FOREWORD

Education is not merely the transmission of knowledge, but the awakening of curiosity, critical thinking, and lifelong learning in every child. In alignment with the transformative vision of the National Education Policy (NEP) 2020, the National Curriculum Framework (NCF) 2023, and the State Curriculum Framework for Andhra Pradesh (SCF –AP), this Teacher Handbook has been thoughtfully designed to support teachers on this inspiring journey.

Teachers are the architects of change in every classroom. Their role has evolved beyond delivering content, toward facilitating meaningful learning experiences that equip students with knowledge, skills, and values to thrive in a rapidly changing world. This handbook is a reflection of that vision — offering not just curriculum interpretation but also practical guidance for lesson planning, assessment, differentiated instruction, and reflective practice.

The handbook provides teachers with structured support, including:

· Clear explanations of curricular goals and learning outcomes.

· Creative, learner-centred pedagogical strategies.

· Access to Teaching-Learning Materials (TLM) and Teacher Resource Materials.

· Guidance on utilizing Science Laboratories and establishing Science Clubs.

· Promotion of joyful and experiential learning approaches.

· Alignment with the Academic Calendar for effective year-round planning.

· Support for creating inclusive, multi-grade, and multilingual classrooms.

This handbook is a companion in your professional journey. It invites you to experiment, reflect, collaborate, and continuously evolve as a practitioner of transformative education.

Let this resource inspire you to create classrooms where every child feels valued, engaged, and empowered to learn — and where teachers lead with purpose, confidence, and joy.

I hope the teachers will find these resources valuable and helpful in transforming classroom transactions. Together I hope we will reshape the educational landscape of Andhra Pradesh in the years ahead. Best wishes for your endeavor

Department Of School Education

Government of Andhra Pradesh, Amaravati
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INDEX

YEAR PLAN

S. No.	Name of the Chapter	Month	No. of Instructional Periods Allocated	No. of Non - Instructional Periods Allocated	Total No. of Periods
1	Nutrition in Plants	June	7	8	15
2	Nutrition in Animals	July	8	9	17
3	Heat	July	9	4	13
4	Acids and Bases	August	10	4	14
5	Physical and Chemical changes	August & September	8	4	12
6	Respiration in Organisms	September	7	7	14
7	Transportation in Animals	October	9	9	18
8	Reproduction in Plants	November	8	10	18
9	Motion and Time	December	9	4	13
10	Electric Current & its Effects	December	8	5	13
11	Light	January	8	5	13
12	Forest: Our life line	February	9	9	18
13	Waste water story	March	9	4	13

June 2025

No bag Day — C2M1S3

Cluster Complex — F1S8Y2

Teacher Resources — E5F4M6

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 Sunday	2	3	4	5	6	7 Bakr Eid
8 Sunday	9	10	11	NI 12 Reopening day	NI	14 Second Saturday
15 Sunday	16 1.1	17 1.2	18 1.2	19 1.3	20 1.4	21 International Yoga Day No Bag Day
22 Sunday	23 A1.2	24 1.5	25 NI	26 NI	27 NI	28 No Bag Day Mega PTM
29 Sunday National Statistics Day	30 NI					

Week1:

Week 2:

Week 3: 1.1 –

Week 4: A1.2 – 1.5

Week 5:

↓ TEACHER'S NOTES ↓

1 NUTRITION IN PLANTS

G3H6I5

Learning Outcomes: Students will be able to:

1. Understands the different modes of nutrition in plants
2. appreciate the role of plants in supplying food for all living organisms.
3. understand how symbiosis helps the plants to fix nitrogen.
4. Give examples for insectivorous plants
5. Identify the fungi in their surroundings.
6. understand how symbiosis helps the plants to fix nitrogen.
7. understand how symbiosis helps the plants to fix nitrogen.

Prior Concept/ Skills:

- Familiarity with the terms "nutrients" and "nutrition."
- Ability to differentiate between living and non-living things.
- All living organisms need food, which provides essential nutrients like carbohydrates, proteins, fats, vitamins, and minerals.

Teacher References:

1. National Science Teaching Association (NSTA) - Provides resources and articles on teaching plant biology and nutrition.

   https://www.nsta.org
2. Khan Academy - Offers explanations and videos on photosynthesis and modes of nutrition in plants and animals.

   https://www.khanacademy.org/science/bridge-course-class-10th-science/x37589313f9a4c197:week-2/x37589313f9a4c197:life-processes/e/d
3. BBC Bitesize - Has student-friendly resources on nutrition in plants and other biology topics.https://www.bbc.co.uk/bitesize/search?q=Photosynthesis&edgeauth=eyJhbGciOiAiSFMyNTYiLCAidHlwIjogIkpXVCJ9.eyJrZXkiOiAiZmFzdGx5LXVyaS10b2tlbi0xIiwiZXhwIjogMTczMTMzMTY4MywibmJmIjogMTczMTMzMTMyMywicmVxdWVzdHVyaSI6ICIlMkZiaXRlc2l6ZSUyRnNlYXJjaCUzRnElM0RQaG90b3N5bnRoZXNpcyJ9.HCAojcYfEarG6j-XMKDB-ccvBOXNZyovjmyLulsqWdQ
4. CK-12 Foundation - An educational platform that provides textbooks and activities related to photosynthesis and nutrition in plants.https://www.ck12.org/biology/photosynthesis/

5. Science Kids - Offers simple explanations and fun facts for kids about nutrition in plants and animals. https://www.sciencekids.co.nz/sciencefacts/biology/photosynthesis.html

Teaching Learning Material (TLM):

- Diagram of a leaf showing stomata and chlorophyll.
- https://drive.google.com/file/d/1-YGGWLn5-WyEqTiI-zmuswzN7wmybWRN/view?usp=drive_link
- Experimental setup for photosynthesis (beaker, green leaves, lamp).
- https://drive.google.com/file/d/1pAH6BkWN8gPI1TFd7C6A1xGYtYu6sNsz/view?usp=drive_link
- https://drive.google.com/file/d/1rseqX1w4D66g6X5ZocsSCW4rxJywWdU2/view?usp=drive_link
- https://drive.google.com/file/d/1zeIwrk9plZQDeTIUN-fmuuoUgWDdL3za/view?usp=drive_link
- https://drive.google.com/file/d/1k7AXaDnyusdB7YcoZpUkPq4PT9zfbxqO/view?usp=drive_link
- https://docs.google.com/document/d/1PwaKj0E3XA2DSAX8MxJSPpXzr-rNNMxBjiq0MQfrrMU/edit?usp=sharing with key terms (e.g., autotrophs, heterotrophs).
- https://docs.google.com/document/d/17aWZBOyh76fAl63dI26sFyGjqG9aDBose816aFoqSdY/edit?usp=sharing - Mode Of Nutrition In Plants
- https://www.youtube.com/watch?v=jJrqmkbiwdE
- Independent Practice Worksheet - Period 2 - https://docs.google.com/document/d/1WEwYSd26F_wlC68P65BJAvJiP-9u8Ux9AL1LXes4jO0/edit?usp=sharing
- Quick Video showing the process of photosynthesis (Script is according to this video) - https://youtu.be/yHVhM-pLRXk?t=64
- Another video for photosynthesis - https://www.youtube.com/watch?v=_xeYNnzwpSE
- Assessment Worksheet - Photosynthesis — Food Making Process In Plants - https://docs.google.com/document/d/1Ipv7TjH4_HRSiO4aiSnNWoZ938IkgfLYif4IfGom9ws/edit?usp=sharing
- Venus Fly Trap Time Lapse Video - https://www.youtube.com/watch?v=9cRmDyhcGaM
- Parasitic Dodder Plant - https://drive.google.com/file/d/1nddgg1lA1pkzZSj2UmY2ZtN1vbNMO-fb/view?usp=drive_link
- Insectivorous Plant 1 - Pitcher Plant - https://drive.google.com/file/d/1waNrztqCtnvsSyRIyb_eEBe6g9p9e_Gg/view?usp=drive_link
- Insectivorous Plant 2 - Venus Fly Trap - https://drive.google.com/file/d/1CT6W2__UXA2j2h13bUArAV42_jCVu8Q5/view?usp=drive_link
- Insectivorous Plant 3 - Cobra Plant - https://drive.google.com/file/d/1RrPjyo2tzl3jVzXR5keJAi7304fqRsJm/view?usp=drive_link
- Dodder on a host plant Time lapse video - https://www.youtube.com/watch?v=JZoks-zOaAA
- Saprotrophs 1 - https://drive.google.com/file/d/19_yo1SorC96wSgrPiIBzcQk3_a3hB-c3/view?usp=drive_link
- Saprotrophs 2 - https://drive.google.com/file/d/1BCbfG9MC6Kr_fvVz99y2rhKtOvxAl56F/view?usp=drive_link
- Saprotrophs 3 - https://drive.google.com/file/d/17W5MesRbEO6nPOQAoMpUAcm0SyYVETPu/view?usp=drive_link

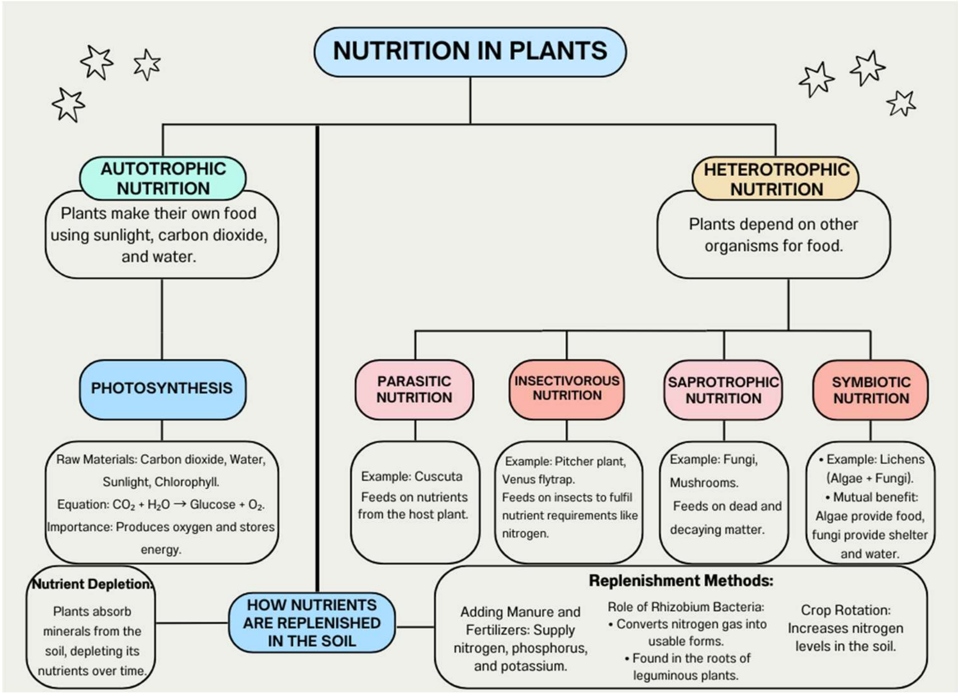
- Time Lapse video of Bread mould - https://www.youtube.com/watch?v=tHC2MPU8hL0
- Same experiment conducted here - https://www.youtube.com/watch?v=QzL6AdQIq2M
- Assessment Worksheet - Other Modes Of Nutrition In Plants - https://docs.google.com/document/d/1ub4IWk4JgeIclcCPziJVTL2naCH04MrEnJY59C4CftE/edit?usp=sharing

- Puzzle pieces for period 6 - https://docs.google.com/document/d/170Tza_10lm7DZGepYKkEXBjZcyPGPRCOXnGHNrmxF9M/edit?usp=sharing
- Assessment Worksheet - How Nutrients Are Replenished in the Soil - https://docs.google.com/document/d/1wuJwhgXObPHS_DVCD49DqdPHq01yTQnJeTND9LW5nsc/edit?usp=sharing
- SIP Worksheet #1 - https://docs.google.com/document/d/1UWSvFo-ubKrwruyg-XquMBQqeORxGzE7NBQ4CEsVj4Y/edit?usp=sharing

- SIP Worksheet #2 - https://docs.google.com/document/d/1UqlgnxqT_pInpjH3KuWimGdRQnJ-IKD540X0_qxc_-8/edit?usp=sharing
- List of activities to be performed - https://drive.google.com/file/d/1SsReXJ7VVQxPT209ywB4t9EtvYJHvuaN/view?usp=sharing
- SIP Worksheet #3 - https://docs.google.com/document/d/1WC8iUT0HEUiMQ3Mxyl7jiKNrhnM-V1-zZ-E-RcyvvfM/edit?usp=sharing

- SIP Worksheet #4 - https://docs.google.com/document/d/1Tmnko58Al8OpJABVBem56HmBXzPbrR1YpIuPlWJgWVM/edit?usp=sharing
- Cards Sheet - https://docs.google.com/document/d/10Hj7DJBYDWdukucSMuEqR_j-O5r9mEvdfXxyfl1RoPI/edit?usp=sharing
- Cards Document - https://docs.google.com/document/d/1pMk3S0v7NWDDaCBXviy4WD7FNOthHXEINPVwk5WJTV4/edit?usp=sharing

CONCEPT MAP



SYNOPSIS

1. Nutrition in Plants

- Definition: Nutrition is the process by which organisms obtain and utilize food for growth, repair, and energy.
- Plants have two main modes of nutrition:
- Autotrophic Nutrition: Plants prepare their own food.
- Heterotrophic Nutrition: Plants depend on other organisms for food.

2. Autotrophic Nutrition

- Process: Photosynthesis.
- Raw Materials Required:
- Carbon dioxide (from the atmosphere, through stomata).
- Water (absorbed by roots).
- Sunlight (captured by chlorophyll in leaves).
- End Products: Glucose (stored as starch) and Oxygen (released into the air).
- Equation: $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$
- Importance of Photosynthesis:
  Provides food for plants.
  Releases oxygen essential for life on Earth.

3. Heterotrophic Nutrition

- Definition: Plants that do not make their food and depend on other organisms.
- Types of Heterotrophic Nutrition:
  - **Parasitic Nutrition:**
    Example: Cuscuta (Amarbel).
    Parasites absorb nutrients from a host plant.

- **Insectivorous Plants:**
  Example: Pitcher Plant.
  Adapted to trap insects for nutrients like nitrogen.
- **Saprotrophic Nutrition:**
  Example: Fungi (e.g., mushrooms, bread mold).
  Absorb nutrients from dead and decaying matter.
- **Symbiosis:**
  Example 1: Lichens (Alga + Fungus).
  Alga prepares food; Fungus provides shelter and water.
  Example 2: Rhizobium in leguminous plants.
  Rhizobium fixes nitrogen; plants provide food and shelter.

4. How Soil Nutrients Are Replenished

- Why Nutrients Deplete: Plants absorb nutrients from the soil, making it less fertile over time.
- Methods to Replenish Soil:
  - Use of Manures and Fertilizers.
  - **Growing Leguminous Plants:**
    Have Rhizobium bacteria in their root nodules.
  - Rhizobium converts nitrogen gas into a usable form, enriching the soil naturally.

5. Significance of Nutrition in Plants

- Plants form the base of the food chain.
- Autotrophic plants provide energy directly or indirectly to all living organisms.
- Symbiotic relationships like those with Rhizobium and legumes enhance soil fertility, reducing the need for synthetic fertilizers.

Period-wise Topics

Chapters and Concepts

Period number	Topic	Remarks
1.1	Introduction, 1.1 Mode of nutrition in plants	
1.2	1.2 Photosynthesis- Food making process in plants	
1.3	1.2- Activity1.1, Synthesis of plant food other than carbohydrates	
1.4	1.3 other modes of nutrition in plants	
1.5	1.4 Saprotrophs	

1.6	1.4, Activity 1.2	
1.7	1.5 How Nutrients are replenished in the soil	

Period 1.1

Concepts Covered : Introduction, 1.1 Mode of nutrition in plants
Learning Objectives : Understand the different modes of nutrition in plants

Prior Concept/ Skills: Familiarity with the terms "nutrients" and "nutrition."

TLM Required : images of autotrophs and heterotrophs.
Teacher Resources : Bilingual textbook

Igniting Activity:

"Have you ever wondered how plants survive and get their energy if they can't eat food like us? Do all plants need the same things to survive? Or do they have different needs?"

Experience and Reflection:

"Think about the plants you've seen in your surroundings—at home, in parks, or during trips.

1. If you had to grow a plant at home, how would you take care of the plant to help it grow?
2. Have you ever noticed plants like money plants climbing walls, grass growing in cracks of the road or mushrooms growing on old trees? How do you think these plants grow and survive in such unusual places?

Explicit Teaching/Teacher Modelling (I Do)

"Nutrition refers to how living organisms obtain their food and energy to survive. There are two main modes of nutrition in plants and animals: autotrophic and heterotrophic nutrition."

Autotrophic Nutrition:

"Plants use autotrophic nutrition, which means they make their own food. The word 'auto' means self, and 'trophic' means nourishment. Organisms that use autotrophic nutrition are called autotrophs."

(Show an image of a green plant and explain how it makes food.)

Autotroph 1 -
https://drive.google.com/file/d/1pAH6BkWN8gPI1TFd7C6A1xGYtYu6sNsz/view?usp=drive_link

Autotroph 2 –

https://drive.google.com/file/d/1rseqX1w4D66g6X5ZocsSCW4rxJywWdU2/view?usp=drive_link

Autotroph 3 –
https://drive.google.com/file/d/1zeIwrk9plZQDeTIUN-fmuuoUgWDdL3za/view?usp=drive_link

"This ability makes green plants independent—they don't need to rely on other organisms for food."

Examples of Autotrophs: Green plants, Algae

Heterotrophic Nutrition:

"Unlike plants, animals, including humans, cannot make their own food. They depend on other organisms for their nutrition. This is called

heterotrophic nutrition. The word ‘hetero’ means different, indicating dependence on other sources.”
(Show an image of a human eating vegetables or an animal eating prey.)Add link to an image
“Heterotrophs can eat plants (like herbivores), other animals (like carnivores), or both (like omnivores). They rely on the food chain for survival.”
Examples of Heterotrophs: Humans, Cows, lions.
Image of Heterotrophs –
https://drive.google.com/file/d/1k7AXaDnyusdB7YcoZpUkPq4PT9zfbxqO/view?usp=drive_link

“These two modes of nutrition, autotrophic and heterotrophic, form the basis of how life thrives on Earth. Green plants produce food, while animals and other organisms depend on them either directly or indirectly.”

CFU (Open ended/ Factual)

Factual Questions

1. What does autotrophic nutrition mean? Give two examples of autotrophs.
   ESR: It means “self-nourishment,” where organisms make their own food. Examples are Green plants and algae.
2. Why are humans called heterotrophs?
   ESR: Because they depend on other organisms for food.

Open- Ended Questions

3. Why do you think autotrophic plants are essential for the survival of heterotrophs?
   ESR: Because autotrophs produce food and oxygen, which are necessary for the survival of heterotrophs.
4. Can you think of any challenges heterotrophs might face if autotrophs stopped making food?
   ESR: Heterotrophs would struggle to find food and oxygen, leading to a collapse in the food chain.

Group Work (We Do)

Sorting Game: Autotrophs vs. Heterotrophs
“Take a look at each organism in the worksheet, discuss with your group, and decide if it’s an autotroph or a heterotroph. Think carefully about whether
the plant or organism can make its own food or relies on others. What clues from the card helped you decide? Remember, autotrophs are typically
green plants that use sunlight to make food,
while heterotrophs depend on others.”
Worksheet –
https://docs.google.com/document/d/1PwaKj0E3XA2DSAX8MxJSPpXzr-rNNMxBjiq0MQfrrMU/edit?usp=sharing

Independent Work (You Do)

1. List at least 5 examples each of autotrophs and heterotrophs that you can find in your surroundings (e.g., at home, in a garden, or a local park).
2. Write a paragraph explaining the difference between autotrophs and heterotrophs in your own words. Include:

How autotrophs obtain food and energy.

How heterotrophs obtain food and energy.

Why do we need both autotrophs and heterotrophs in nature?

3. Think of a heterotroph you see every day (e.g., a pet, a bird, or yourself). Write a few sentences explaining how this heterotroph depends on autotrophs, directly or indirectly, for its survival.

Homework

1. Define autotrophic and heterotrophic nutrition with one example of each.
2. Classify the following as autotrophs or heterotrophs: Lion, Cotton plant, Algae, and Cow, sugarcane crop, cactus.
3. Observe a plant near your home or school. Write about how the plant might depend on its surroundings for survival and how other organisms, like birds or insects, might depend on the plant.

Closing

"Today, we explored two main modes of nutrition: autotrophic, where organisms like plants make their own food, and heterotrophic, where organisms like humans depend on others for food. Understanding these modes helps us see how all living beings are connected in the cycle of life."

1. What did you find most surprising about how plants and animals obtain their food?
   ESR: Any logical answer, for example: I found it surprising that plants can make their own food, but animals can't and must rely on others.
2. How do autotrophs and heterotrophs play different roles in the environment?
   ESR: Autotrophs produce food and oxygen, while heterotrophs consume the food and keep the cycle going.

Assessment

- What is nutrition?
- How many types of nutrition are there? What are they?
- Give examples for autotrophs and heterotrophs.

Period 1.2

Concepts Covered : 1.2 Photosynthesis- Food making process in plants

Learning Objectives :
- Understand the meaning and importance of photosynthesis in plants.
- Identify the raw materials required for photosynthesis: sunlight, water, carbon dioxide, and chlorophyll.
- Explain how plants absorb water through roots and carbon dioxide through stomata.

Prior Concept/ Skills: Autotrophic nutrition, Plants prepare their own food.

TLM Required : material required for iodine test

Teacher Resources : Diagram of a leaf showing stomata and chlorophyll - https://drive.google.com/file/d/1-YGGWLn5-WyEqTiI-zmuswzN7wmybWRN/view?usp=drive_link

Experimental setup for photosynthesis (beaker, green leaves, lamp).

Igniting Activity : Hook:

“Before we begin learning about photosynthesis, let’s watch a short video.”

Time Lapse video that shows plants grow in the direction of the sunlight - https://www.youtube.com/watch?v=jJrqmkbiwdE

Invite students to discuss their observations about plants in different light conditions.

Experience and Reflection (Questions):

“Imagine you’re on a hot summer day without any food or water. How would you feel? Now think about plants—they don’t eat like us, but they still grow tall and strong.

1. What do you think they need to survive and grow?

   ESR: They need water or sunlight.

“Exactly! Plants need certain raw materials to grow and stay healthy. Today, we’re going to learn what these materials are and how plants use them to make their food.”

Explicit Teaching/Teacher Modelling (I Do)	**Group Work (We Do)**	**Independent Work** (You Do)
“Plants, just like humans and animals, need food to grow and survive. But unlike us, they don’t eat. Instead, they use materials from their surroundings to make their food. Today, we’ll learn about the materials plants need and how they get them.” Sunlight: “First, plants need sunlight. Think about the plants you see in sunny areas compared to those in shady areas. Sunlight is their main source of energy. Leaves act like tiny solar panels, capturing sunlight to help make food.” Water: “Second, plants need water. Roots spread wide and deep in the soil to absorb water and minerals. The tiny hair-like structures on roots, called root hairs, help them absorb water efficiently by increasing contact with the soil. The stem then acts as a transport system, carrying the water and minerals absorbed by the roots up to the leaves. This connection between roots and stems ensures that the leaves get all the raw materials they need to make food.” Carbon Dioxide:	Objective: To demonstrate that sunlight and water are required for photosynthesis by observing oxygen bubbles formed during the process. Materials Needed: ● A small transparent bowl or beaker filled with water. ● A freshly plucked leafy plant with thin leaves (e.g., spinach, money plant). ● A small, clear glass plate or petri dish. ● A sunny spot or a bright light source like a desk lamp. ● A dark cupboard or cardboard box.	**WORKSHEET - https://docs.google.com/document/d/1WEwYSd26F_wlC68P65BJAvJiP-9u8Ux9AL1LXes4jO0/edit?usp=sharing** “Now it’s time for an independent activity. Complete the worksheet to apply what you’ve learned about raw materials and their roles in photosynthesis, and how plants absorb them. Take your time and think critically.”

"Third, plants need carbon dioxide. This is a gas found in the air that plants take in through tiny openings in their leaves called stomata. These stomata act like tiny mouths, opening and closing to allow carbon dioxide to enter while releasing oxygen. You can think of this gas as one of the key ingredients plants use to make their food." Chlorophyll: "Finally, plants need chlorophyll. Chlorophyll is what makes leaves green. It helps the plant capture sunlight and is essential for making food." "Together, these materials—sunlight, water, carbon dioxide, and chlorophyll—are used by plants to prepare their food. This amazing process is called photosynthesis, and we'll explore it in detail in the next period." [Note for teacher: The explanation and the video can be done simultaneously.] "We're about to watch a video that explains the process of photosynthesis, step by step. Pay close attention to how the plant uses sunlight, water, and carbon dioxide to make its food." Video for photosynthesis – https://www.youtube.com/watch?v=_xeYNnzwpSE "Now that we've watched the video, let's go over what we've learned together." Step-by-Step Explanation: 1. "Plants need three key ingredients for photosynthesis: sunlight, water, and carbon dioxide." ● "Sunlight provides the energy for the process." ● "Water, absorbed by the roots, travels up through the xylem to the leaves." ● "Carbon dioxide enters through tiny openings in the leaves called stomata." 2. "Inside the leaves, the green pigment chlorophyll captures sunlight and helps combine the water and carbon dioxide to make food in the form of glucose." 3. "The glucose provides energy for the plant to grow and develop, while oxygen is released as a byproduct." 4. "This entire process, called photosynthesis, is why plants are so important—they produce oxygen for us to breathe and food for themselves and other organisms in the ecosystem."	● A timer or stopwatch. Procedure: ● Setup in Sunlight: ● Fill the bowl or beaker with water. ● Place a small leafy plant fully submerged in the water. ● Cover the leaf gently with the clear glass plate or petri dish to hold it down. ● Place the setup in a sunny spot or under a desk lamp. ● Observe Oxygen Formation: ● Leave the setup for 30–60 minutes. ● Look closely at the surface of the leaves. Tiny bubbles of oxygen will start forming and collecting on the leaf surface. Dark Setup (Control): ● Take another identical setup and place it in a dark cupboard or cover it with a cardboard box to block sunlight. ● Leave this setup undisturbed for the same amount of time. Comparison of Results:	1. Write the four raw materials needed for photosynthesis. 2. Write two key steps of photosynthesis in your own words: Step 1: How plants get water and carbon dioxide Step 2: What happens to these raw materials in the presence of sunlight and chlorophyll? 3. Explain what might happen to the oxygen levels in the atmosphere if there were no green plants left on Earth. **Homework** 4. List the four raw materials that plants need to make their food. 5. Write one sentence explaining where plants get each raw material. 6. Imagine there is a drought, and plants cannot get water. Describe how this might affect the plant and the animals that depend on it.

"When you go outside next, observe the plants around you. Look for their leaves, their position in sunlight, and think about how they're constantly at work making food through photosynthesis! Another video of photosynthesis – https://youtu.be/yHVhM-pLRXk?t=64 **CFU (Open ended/ Factual) [2.ii.a]** Factual Questions 1. What are the four things plants need to make their food? ESR: Sunlight, water, carbon dioxide, and chlorophyll. 2. What is the name of the gas that plants take in from the air to make their food? ESR: Carbon dioxide. 1. What are the two main products of photosynthesis? ESR: Glucose and oxygen. 2. Through which part of the plant does water enter for photosynthesis? ESR: Roots. Open-Ended Questions 1. Why do you think most leaves are green? ESR: Because they contain chlorophyll, which helps capture sunlight. 2. How do you think plants in dry areas, like deserts, manage to get water for their survival? ESR: They may have long roots to search for water deep in the soil or store water in their stems or leaves. 1. Why do you think sunlight is necessary for photosynthesis? ESR: It provides the energy needed to convert carbon dioxide and water into food. 2. How does photosynthesis help both plants and animals survive? ESR: It provides food for plants and releases oxygen, which animals need to breathe.	● After 5–10 minutes, compare the two setups. ● The setup in sunlight will have oxygen bubbles on the leaf, whereas the dark setup will show no bubbles. Explanation for Students: ● The plant in sunlight performs photosynthesis, using sunlight, water, and carbon dioxide to produce food. ● Oxygen bubbles are released as a byproduct of this process, which you observe on the leaf surface. ● In the dark, no photosynthesis occurs because sunlight is missing, so no bubbles form.	7. Write the steps of photosynthesis in your own words. 8. Why is chlorophyll important for photosynthesis? 9. Imagine a world where sunlight was blocked for weeks. Write a paragraph describing how this might affect plants, animals, and humans.

Closing

"Today, we learned about the raw materials plants need to make their food: sunlight, water, carbon dioxide, and chlorophyll. Each of these plays a crucial role in helping plants grow and survive."

1. What was one surprising thing you learned in this period?

   ESR: Any logical answer

2. What would happen to plants if any one of these materials was missing?

   ESR: The plant wouldn't be able to make food and would eventually die.

how plants use sunlight, water, carbon dioxide, and chlorophyll to make their food through the process of photosynthesis. This process is essential not just for plants, but for all living beings, as it provides food and oxygen, which are vital for life on Earth."

1. Why do you think photosynthesis is called the most important process on Earth?

   ESR: Because it provides food and oxygen, which are necessary for life.

2. If you could change one step in photosynthesis, what would you change and why?

ESR: I might make it so plants don't need water, so they could survive better in dry places

<u>Assessment</u>

Define photosynthesis.

What are the requirements of photosynthesis?

What are the end products of photosynthesis?

What is the index of photosynthesis?

Period 1.3

**Concepts Covered : ** 1.2- Activity1.1, Synthesis of plant food other than carbohydrates

Learning Objectives:

- Describes the role of water and sunlight in photosynthesis**.**
- Identifies organisms that prepare their own food by photosynthesis.
- Understands all the nutrients including proteins and vitamins are also synthesized by themselves.

Prior Concept/ Skills: Requirements of photosynthesis are sunlight, water and carbon dioxide.

TLM Required: Two potted plants, material required for iodine test.

Teacher Resources: bilingual text book

Igniting Activity: What are the nutrients required for our growth?

Can you guess how a plant prepare its proteins and vitamins?

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
The teacher explains the following concepts 1. Non-green leaves (e.g., red, brown) also contain chlorophyll and undergo photosynthesis. 2. Algae, found in ponds or stagnant water, are green due to chlorophyll and can perform photosynthesis. **<u>Plant Food Synthesis</u>** Plants synthesize carbohydrates through photosynthesis, but they also need nitrogen to produce proteins and other compounds. They obtain nitrogen from: 1. Soil bacteria that convert gaseous nitrogen into a usable form 2. Nitrogen-rich fertilizers added to the soil With nitrogen, plants can synthesize: 1. Proteins 2. Vitamins Nitrogen is an essential nutrient for plant growth and development, impacting crop yields and productivity. **<u>Factual questions:</u>** 1. What pigment is responsible for the green color in algae and non-green leaves? 2. What process do plants use to synthesize carbohydrates? 3. What nutrient do plants need to produce proteins and other compounds? 4. How do plants obtain nitrogen? 5. What compounds can plants synthesize with nitrogen? 6. Why is nitrogen essential for plant growth and development? **<u>Open ended questions:</u>** 1. What would happen if a plant were unable to undergo photosynthesis, and how would this impact its survival and the ecosystem as a whole?	"Now that we know plants need sunlight and water to grow and survive, it's your turn to design an experiment to test how these materials affect a plant's growth. You'll plan your experiment today in groups, present your ideas to the class, and then set it up at home. Over the next few days, observe your plants and record what you see. You'll share your findings once the experiment is completed at home." 1. Decide What to Test: Focus on sunlight and water as the factors you want to explore. 2. As a group, decide: ● What type of plant will you use? (e.g., Money Plant, a small potted plant, or a common garden plant). ● How will you treat the plants differently in each condition? ● How long will you observe the plants? ● What changes will you record, such as leaf color, wilting, or growth? 3. Each group will present their experimental design to the class. Be ready to explain: ● Why they chose this setup. ● What they expect to observe in each condition. 4. After presenting, take your setup home and begin the experiment. Observe and record changes daily for the next 3–5 days. 5. Bring your observations, along with your experiment setup, to share with the class in the next period.	1. Give examples for the plants with non green leaves. 2. What are the substances other than glucose are synthesized by plants? 3. What are the uses of nitrogen in living organisms? **Home work:** Gather information of what are the nitrogen rich fertilizers used by the farmers.

2. How does the nitrogen availability affect the crop yield?		

Closing/ Summary

1. Leaves with non-green colors, such as red or brown, still contain chlorophyll and are capable of photosynthesis.
2. Algae, typically found in aquatic environments, appear green due to the presence of chlorophyll, which enables them to undergo photosynthesis.

Plants produce carbohydrates through photosynthesis, but they also require nitrogen to create essential compounds like proteins and vitamins. Nitrogen is obtained from two primary sources: soil bacteria that convert atmospheric nitrogen into a usable form, and nitrogen-rich fertilizers added to the soil. With adequate nitrogen, plants can synthesize vital nutrients, including proteins and vitamins, which are crucial for growth and development. As a result, nitrogen plays a critical role in determining crop yields and overall plant productivity.

Assessment:

1. What pigment is responsible for the green color in algae and non-green leaves?
2. What process do plants use to synthesize carbohydrates?
3. What nutrient do plants need to produce proteins and other compounds?
4. How do plants obtain nitrogen?

Period 1.4

Concepts Covered : 1.3 other modes of nutrition in plants

Learning Objectives: Students will be able to:

1. Understand the different modes of heterotrophic nutrition: parasitic and saprotrophic.
2. Identify examples of plants using these modes of nutrition, such as Cuscuta (parasitic), insectivorous plants.
3. Explain the adaptations of these plants for their mode of nutrition.

Prior Concept/ Skills: Not all plants are green in colour, students can observe Cuscuta in their surrounds.

TLM Required : Insectivorous plants videos, Cuscuta plant if available if not picture

Teacher Resources : Bilingual text book, insectivorous plant videos.

Igniting Activity

Hook:

"We're going to watch a time-lapse video of a very unique plant. Observe carefully what happens and how the plant interacts with its surroundings. After the video, be ready to share your observations."
https://www.youtube.com/watch?v=9cRmDyhcGaM
Prompt students to challenge or confirm their assumptions.
"Let's explore the unique modes of nutrition in plants."

Experience and Reflection:

"Think about where you've seen plants grow—some in soil, some climbing trees, and even some floating in water. Why do you think plants grow in so many ways? Could it be related to how they meet their nutritional needs?"

1. Why do you think some plants grow on other trees instead of growing on their own in the soil?

ESR: They might need support or depend on the tree for food and nutrients because they cannot make their own.

2. Have you noticed plants that don't have green leaves? How do you think they manage to get their food if they can't use sunlight like green plants?"
ESR: "These plants might rely on other plants or organisms for their nutrition since they lack chlorophyll to make food themselves.

Explicit Teaching/Teacher Modelling (I Do)	**Group Work (We Do)**	**Independent Work** (You Do)
Explicit Teaching/Teacher Modelling (I Do) "In our last lesson, we learned that most plants use autotrophic nutrition to make their own food. But not all plants can do this. Today, we'll explore two fascinating modes of nutrition: parasitic nutrition and insectivorous nutrition." **Parasitic Nutrition:** "Some plants depend on other plants for their food. This is called parasitic nutrition. A parasitic plant attaches itself to a host plant and takes nutrients from it." **Example:** "One example of a parasitic plant is Cuscuta, also called Amarbel. It is a yellow, thread-like plant that wraps around the stem of a host plant. It doesn't have green leaves or chlorophyll, so it can't make its own food. Instead, it absorbs food from the host plant." https://drive.google.com/file/d/1nddgg1lA1pkzZSj2UmY2ZtN1vbNMO-fb/view **Insectivorous Nutrition:** "Some plants, like the pitcher plant, eat insects to obtain nutrients. This is called insectivorous nutrition. These plants usually grow in areas where the soil is poor in nutrients, especially nitrogen." **Example:** "The pitcher plant has a modified leaf shaped like a pitcher or a jug. Inside, it produces a sticky fluid. When an insect lands on it, the insect slips into the pitcher, gets trapped, and is digested by the plant to get nutrients. You might think of this plant as part plant, part predator! It grows in areas where it can't get enough nutrients from the soil, so it catches insects to survive." https://drive.google.com/file/d/1waNrztqCtnvsSyRIyb_eEBe6g9p9e_Gg/view https://drive.google.com/file/d/1CT6W2_UXA2j2h13bUArAV42_jCVu8Q5/view https://drive.google.com/file/d/1RrPjyo2tzl3jVzXR5keJAi7304fqRsJm/view **CFU (Open ended/ Factual)** Factual Questions	Experiment: Observing the Effects of Cuscuta on a Host Plant Objective: To observe the parasitic relationship between Cuscuta (Amarbel) and its host plant, focusing on how Cuscuta attaches to and affects the host. Materials Needed: A potted plant infected with Cuscuta (Amarbel) (can be obtained from local nurseries or natural surroundings). Magnifying glass (optional, for close observation). Notebook and pencil for recording observations. Gloves (for handling the plant). "Today, we're going to study the parasitic plant Cuscuta (Amarbel) and its relationship with a host plant. Your task is to carefully observe how Cuscuta attaches to its host and note down your findings. Focus on the parts of the host plant that are affected and how Cuscuta extracts nutrients." Steps: 1. Examine the Host Plant: ● Look at the areas where Cuscuta is attached to the host plant. ● Note which parts of the host (stem, branches, leaves) the parasite is wrapping around. 2. Observe Cuscuta's Structure:	1.Why do you think insectivorous plants, like the Venus Flytrap, trap insects if they are green and have chlorophyll? ESR: Insectivorous plants grow in soil that lacks nutrients, especially nitrogen, so they trap insects to get those nutrients.

1. What is parasitic nutrition? ESR: It is a mode of nutrition where a plant depends on a host plant for food. 2. Why do insectivorous plants, like the pitcher plant, trap insects? ESR: To get nutrients, especially nitrogen, which is not available in the soil they grow in. **<u>Open-Ended Questions</u>** 1. Why do you think parasitic plants, like Cuscuta, cannot make their own food? ESR: Because they lack chlorophyll and cannot carry out photosynthesis. 2. How do you think the pitcher plant's structure helps it trap insects? ESR: Its modified leaf forms a pitcher-like structure with slippery walls and sticky fluid that traps insects.	● Observe the thin, yellow thread-like structure of Cuscuta and its lack of leaves or green color. ● Look for the haustoria (tiny projections) where Cuscuta connects to the host to draw nutrients. 3. Inspect the Host's Health: ● Compare parts of the host plant affected by Cuscuta (e.g., wilting, discoloration, reduced growth) with unaffected parts. ● Think about how the host plant might be struggling to grow. 4. Record Observations: ● Write down detailed notes on: ● The appearance of Cuscuta. ● Where and how it attaches to the host. ● Changes in the host plant's health (e.g., color, texture, or strength). 1. Which part of the host plant does Cuscuta attach to the most? ESR: The stem or branches, where it can easily draw nutrients. 2. What differences did you notice between affected and unaffected parts of the host plant? ESR: The affected parts looked weaker, discolored, or unhealthy. 3. Why do you think Cuscuta does not have green leaves or perform photosynthesis? ESR: Because it relies entirely on the host plant for its food and energy. https://www.youtube.com/watch?v=JZoks-zOaAA	2. Imagine a world without insectivorous plants. What might happen to the environment where these plants grow? ESR: Nutrient-poor soils would remain barren, and there might be an overpopulation of insects in those areas. **Homework** 1. Define parasitic nutrition and give one example of a parasitic plant. 2. Why do parasitic plants depend on a host for food?

		3. Imagine you are observing a tree with Cuscuta growing on it. Write a short paragraph describing how the tree and Cuscuta interact. **4.** Justify insectivorous plants as partial heterotrophs.

Closing

"Today, we explored two fascinating modes of nutrition in plants: parasitic nutrition, where plants like Cuscuta depend on a host for their food, and insectivorous nutrition, where plants like the pitcher plant trap insects to get nutrients. These adaptations help plants survive in environments where they cannot make their own food like green plants do."

1. Why do you think Cuscuta depends on a host plant instead of making its own food?
   ESR: Because it doesn't have chlorophyll and can't carry out photosynthesis.
2. How do insectivorous plants like the pitcher plant benefit from catching insects?
   ESR: They get nutrients, especially nitrogen, which they can't get from the soil.

"In our next period, we'll learn about more unique ways plants obtain their food, including some surprising partnerships they form with other organisms!"

Assessment:

What is parasitic nutrition?
What is a host?
Give examples for insectivorous plants.

Period 1.5

Concepts Covered : 1.4 Saprotrophs
Learning Objectives : Students will be able to:

1. Understand the different modes of heterotrophic nutrition: saprotrophic.
2. Identify examples of plants using these modes of nutrition.
3. Explain the adaptations of these plants for their mode of nutrition

Prior Concept/ Skills: Students are aware of spoiling of food by fungi, nutritional value of mushrooms.
TLM Required : Pictures of mushroom, fungi on food
Teacher Resources : Bilingual textbook, videos
Igniting Activity
1. Think about mushrooms in the market and fungi on the food.
2. Now ask yourself how these organisms are growing, what is the source of nutrients for them.
3. With this note jump into the lesson for today.

Explicit Teaching/Teacher Modelling (I Do)	**Group Work (We Do)**	**Independent Work** (You Do)
"In the last period, we learned about parasitic and insectivorous plants, both of which rely on others for their food. Today, we'll explore two more fascinating modes of nutrition: saprotrophic nutrition and symbiotic nutrition." <u>Saprotrophic Nutrition:</u>"Saprotrophic nutrition is when organisms feed on dead and decaying matter. They release digestive juices into the matter, break it down, and absorb nutrients." Example:"Mushrooms and fungi are examples of organisms that use this mode of nutrition. You may have seen mushrooms growing on rotting wood or fallen leaves during the rainy season. They can't make their own food because they lack chlorophyll, so they depend on decaying organic matter." "Have you noticed mold growing on bread if left out for too long? That's an example of fungi feeding on decaying matter!" **CFU (Open ended/ Factual) [2.ii.a]** <u>Factual Questions</u> 1. What is saprotrophic nutrition? ESR: It is a mode of nutrition where organisms feed on dead and decaying matter. 2. Name one example of an organism that uses saprotrophic nutrition. ESR: Fungi or mushrooms Open ended questions: 1. What happens to the food if it is uncovered?	**Exploring Saprotrophs** **Objective:** To understand the concept of saprotrophs and how they obtain nutrients. **Activity:** Group Discussion and Research 1. Divide students into small groups of 3-4. 2. Provide each group with pictures or real-life examples of mushrooms growing in different environments (e.g., rotting wood, moist soil). 3. Ask each group to research and discuss: - What type of nutrients do mushrooms need to survive? - How do mushrooms obtain these nutrients? - What role do saprotrophs play in ecosystems? 4. Encourage groups to present their findings to the class. **Hands-on Component: Model Creation**	1. Imagine a forest where fungi suddenly disappear. What might happen to the dead leaves, wood, and organic waste in that forest? ESR: Dead matter would pile up, as fungi are essential for decomposing and recycling nutrients back into the soil. **Homework** 1. Write the definition of saprotrophic nutrition Include one example. 2. Explain why fungi are called saprotrophs. 3. How do saprotrophs like fungi help maintain cleanliness in nature?

	1. Ask each group to create a model or diagram illustrating how mushrooms obtain nutrients from their environment. 2. Encourage students to include labels and explanations for different components (e.g., enzymes, organic matter, nutrient uptake). 3. Collect reflections from the students and ask them to note.	

Closing

"Today, we explored fascinating mode of nutrition: saprotrophic nutrition, where organisms like fungi feed on dead and decaying matter. This mode shows how plants and organisms adapt to their environment to obtain nutrients."

1. Why do you think saprotrophs like fungi are important for the ecosystem?
   ESR: They break down dead matter and recycle nutrients back into the soil.

"In our next lesson, we'll connect all these modes of nutrition to understand how plants maintain balance in the ecosystem. Great job today!"

Assessment

What type of nutrition is seen in mushrooms?
Where do mushrooms obtain their nutrients?
How do they get their nutrients?

Period 1.6

Concepts Covered : 1.4, Activity 1.2
Learning Objectives : Students will be able to:

1. Understand the different modes of heterotrophic nutrition: saprotrophic and symbiotic.
2. Identify examples of plants using these modes of nutrition.
3. Explain the adaptations of these plants for their mode of nutrition

Prior Concept/ Skills: Students are aware of saprotrophic nutrition and also about nitrogen fixation.
TLM Required : bread, water, box etc
Teacher Resources : Bilingual textbook, videos
Igniting Activity:
"Today, we'll explore the fascinating world of symbiotic nutrition, where organisms form mutually beneficial relationships to obtain nutrients. Get ready to discover the intricate web of relationships in nature!"

Explicit Teaching/Teacher Modelling (I Do)	**Group Work (We Do)**	
<u>Symbiotic Nutrition: </u>"Symbiotic nutrition is when two different organisms live together and both benefit from the relationship. Each organism contributes something that helps the other survive." Example: "Lichens, which are made up of an alga and a fungus, are an example of symbiotic nutrition. The fungus provides water and shelter, while the alga makes food through photosynthesis and shares it with the fungus. Another example is fungi living in the roots of plants, where the fungi help the plant absorb water and nutrients, and the plant gives food to the fungi." "Have you seen patches of lichens growing on rocks or tree bark? Those are examples of two organisms—an alga and a fungus—working together to thrive. They can even grow in harsh conditions like deserts!" CFU Factual questions: 1. What is symbiotic nutrition? 2. Which organisms are in symbiosis in lichens? <u>Open-Ended Questions</u> 1. Why do you think lichens can survive in harsh environments like rocks or deserts? ESR: Because the fungus provides water and shelter, while the alga makes food, helping both survive together. 2. How is symbiotic nutrition different from parasitic nutrition? ESR: In symbiotic nutrition, both organisms benefit, while in parasitic nutrition, only the parasite benefits, and the host is harmed.	Objective: Students will observe the growth of bread mold to understand how certain organisms feed on dead and decaying matter. [Brief for the teacher: To ensure the activity is completed within one period, the teacher should: 1. Bring slices of bread with visible mold already growing on them (store slightly moistened bread in ziplock bags in a warm, dark place 2–3 days prior to the lesson). 2. Prepare clean slices of bread for comparison during the observation.] Materials Needed (per group): ● A slice of moldy bread (prepared by the teacher). ● A clean slice of bread (for comparison). ● A magnifying glass (optional). ● Notebook and pencil for recording observations. Procedure: 1. "Today, we'll observe mold growing on bread to understand saprotrophic nutrition—how fungi feed on dead and decaying matter." 2. Divide the students into small groups and provide each group with: ● A slice of moldy bread. ● A clean slice of bread for comparison. ● Ask students to closely observe the moldy bread using a magnifying glass if available. ● What does the mold look like (color, texture)? ● Can they see thread-like structures spreading over the bread? 3. Prompt students to discuss why mold is only present on one slice of bread. 4. Ask each group to record their observations, including: ● The appearance of the mold. ● How it differs from clean bread.	a symbiotic relationship. Write one benefit that the fungus provides to the alga and one benefit the alga provides to the fungus. ESR: The fungus provides shelter and water to the alga. The alga makes food through photosynthesis and provides it to the fungus. **Home work:** Explore the importance of saprotrophic and symbiotic nutrition in our daily life.

	• Any ideas on why mold needs moisture, warm, and dark conditions to grow. Question 1: What differences did you notice between the clean bread and the moldy bread? ESR: The moldy bread had green/white fuzzy patches, while the clean bread was smooth and dry. Question 2: Why do you think mold needs moist and warm conditions to grow? ESR: Moist and warm conditions create the ideal environment for mold to grow and feed. Conclusion: "Saprotrophs like fungi play an essential role in nature by breaking down dead and decaying materials. Without them, organic waste would accumulate in the environment."	

Closing

"Today, we explored one more fascinating mode of nutrition: symbiotic nutrition, where two organisms, like fungi and algae in lichens, work together to survive. This mode shows how plants and organisms adapt to their environment to obtain nutrients."

2. How do fungi and plants benefit each other in a symbiotic relationship?
   ESR: Fungi help plants absorb water and nutrients, while plants provide food to the fungi.

Assessment

What is symbiotic nutrition?
What are the organisms involved in symbiosis in lichens?
How do the organisms benefited by symbiotic nutrition?

Period 1.7

Concepts Covered : 1.5 How Nutrients are replenished in the soil
Learning Objectives : Students will be able to:

1. Understand why nutrients in the soil need to be replenished.
2. Identify natural and artificial methods to restore soil nutrients.
3. Explain the role of leguminous plants and Rhizobium bacteria in nitrogen fixation.

Prior Concept/ Skills: Students are aware of the fact that plants get nitrogen from the soil which is very important for its growth. As nitrogen is necessary to synthesize proteins and vitamins.

TLM Required : soil replenishment puzzle, pictures of soil, leguminous plants roots

Teacher Resources : Bilingual text book, videos

Igniting Activity : Hook:

[Brief for the teacher: Bring a sample of healthy soil and a sample of overused, dry soil to the class for observation.]

"Look at these two soil samples. One is rich and dark, while the other looks dry and lifeless. Why do you think there's such a big difference? How do you think farmers make sure their soil stays fertile?"

Experience & Reflection:

1. Over time, you notice a plant's leaves turning yellow and its growth slowing down, even though it has been given sunlight and water. What could be some of the reasons?

   ESR: The plant might not be getting enough nutrients from its environment, which are necessary for its growth and health.

2. How do you think farmers or gardeners help plants grow better over time?

   ESR: They add fertilizers or compost to replenish nutrients in the soil and make sure the plants get enough water and sunlight.

Explicit Teaching/Teacher Modelling (I Do)	**Group Work (We Do)**	**Independent Work** (You Do)
"Let's begin by understanding why soil needs replenishment. Plants take nutrients from the soil as they grow. These nutrients are used to make their food and to help them grow taller, produce leaves, flowers, and fruits. But over time, if we keep planting crops without adding anything back to the soil, it becomes nutrient-poor. Imagine eating from your kitchen pantry every day but never restocking it—eventually, it would run out of food!" "So, how do nutrients get back into the soil? Nature has its own way of replenishing nutrients, and farmers also play a big role. Let's first talk about what happens naturally." Natural Methods of Replenishment:	**Activity Name: Soil Replenishment Puzzle** Objective: Students will collaboratively piece together the roles and benefits of different soil replenishment methods using a puzzle activity. Steps: 1. Divide students into 4 groups. 2. Provide each group with a set of puzzle pieces related to soil replenishment methods.	Activity Name: Soil Health Reflection Write a short paragraph (4–5 sentences) explaining: Why the soil loses nutrients when crops grow. One method farmers use to replenish these nutrients and why it is effective. Include one suggestion on how to combine natural and human interventions to keep soil fertile. **Homework**

1.Decomposition: "When plants and animals die, their bodies decay, or decompose. This process is carried out by decomposers, like fungi and bacteria, that break down the organic matter into simpler substances. These substances, called humus, are rich in nutrients that go back into the soil, making it fertile. Have you seen a pile of leaves turning into compost over time? That's decomposition in action!" 2.Nitrogen Fixation: "Plants need nitrogen to grow, but they can't use the nitrogen that's already in the air. Certain bacteria, like Rhizobium, live in the roots of leguminous plants such as beans, peas, and lentils. These bacteria take nitrogen from the air and convert it into a form that plants can use. This process is called nitrogen fixation. That's why farmers often grow leguminous plants to improve the nitrogen content of the soil naturally." Human Interventions: "While nature helps replenish nutrients, farmers also play an important role by adding nutrients back to the soil through methods like using manure and fertilizers." 1.Manure: "Manure is made by decomposing plant and animal waste, such as cow dung and crop residues. It is organic and improves the soil structure. Farmers spread manure on fields to enrich the soil with a variety of nutrients slowly over time. This is a natural and environmentally friendly method." 2.Fertilizers: "Fertilizers, on the other hand, are man-made. They contain specific nutrients, such as nitrogen, phosphorus, and potassium, which plants need to grow. Fertilizers work much faster than manure and can give crops a quick boost. However, if fertilizers are overused, they can harm the soil and even pollute water sources. Farmers have to use them carefully." 3.Crop Rotation: "Another method farmers use is crop rotation. Growing the same crop repeatedly can drain the soil of specific nutrients. By rotating crops—such as planting wheat one season and legumes like peas in the next—the soil gets time to recover and different nutrients are used and replenished." 4.Leguminous Plants: "Planting leguminous crops like lentils or beans is a common farming practice to add nitrogen back into the soil. These plants work with nitrogen-fixing bacteria to naturally enrich the soil without needing chemical fertilizers."	3. Each puzzle includes: Method name (e.g., composting, fertilizers, leguminous plants, crop rotation), a description of the method, an image or diagram representing the method, the benefits of the method. Example: For composting, the pieces could include: ● "Composting" ● "Made from decomposed organic matter like plant waste and manure." ● A picture of a compost pile. ● "Improves soil structure and adds nutrients slowly." 4. Students in each group will work together to match and assemble their puzzle. Once completed, each group presents their puzzle to the class, explaining the method and its benefits. 5. https://docs.google.com/document/d/170Tza_10lm7DZGepYKkEXBjZcyPGPRCOXnGHNrmxF9M/edit?tab=t.0	1. List two differences between composting and using fertilizers. 2. Write a paragraph explaining why farmers use crop rotation and how it helps maintain soil fertility. 3. Find one example of a sustainable farming practice used in your region or community and write 3–4 sentences describing its benefits.

"Think about the methods we've discussed: decomposition, manure, fertilizers, crop rotation, and leguminous plants. How do you think farmers decide which method to use for their soil?" **CFU (Open ended/ Factual)** <u>Factual Questions:</u> 1.Why are leguminous plants important for nitrogen fixation? ESR: They have bacteria in their roots that convert nitrogen from the air into a form plants can use. 2.Name two differences between manure and fertilizers. ESR: Manure is organic and slow-acting, while fertilizers are synthetic and provide quick results. <u>Open-Ended Questions:</u> 1.How do you think a farmer decides whether to use manure, fertilizers, or both for their crops? ESR: Depending on the soil's condition, time available, and the type of crop, a farmer may use manure for long-term benefits or fertilizers for quick results, or a combination of both. 2.Why is it important for farmers to combine natural methods like composting and crop rotation with fertilizers? ESR: Combining methods ensures soil health for the long term and reduces harm from overusing synthetic fertilizers.		

Closing "Today, we learned about how soil loses nutrients and the different methods to replenish them. Think about the various natural and human interventions we discussed. Which method do you think is the most sustainable, and why?" 1. "Why do you think it's important to balance natural methods like composting with human-made fertilizers?" ESR: "Balancing methods ensures long-term soil health and avoids harmful effects of overusing synthetic fertilizers." 2. "If you were a farmer, how would you decide which method to use for replenishing the soil?" ESR: "I would look at the soil's condition, the type of crops I'm growing, and how quickly I need results."
Assessment: Why are leguminous plants important for nitrogen fixation? Which bacteria fixes nitrogen for leguminous plants?

TEACHER'S DIARY

Name of the Teacher:				Name of the Month:	
Name of the Lesson:				Class: 7	
Period No	**Name of the Concept to be taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	Remarks
1.1	Introduction, 1.1 Mode of nutrition in plants				
1.2	1.2 Photosynthesis-Food making process in plants				
1. 3	1.2- Activity1.1, Synthesis of plant food other than carbohydrates				
1. 4	1.3 other modes of nutrition in plants				
1. 5	1.4 Saprotrophs				
1. 6	1.4, Activity 1.2				
1. 7	1.5 How Nutrients are replenished in the soil				

1	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?
2	Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
3	What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
4	How well did I adjust my teaching based on student reactions or unforeseen challenges?

Head Teacher's Signature   Teacher's Signature

Head Teacher's Suggestions:

Teacher Notes:

July 2025

No bag Day | Cluster Complex | Teacher Resources

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 2.1	2 2.2	3 A2.2	4 A2.3	5 No Bag Day
6 Sunday Muharram	7 A2.4	8 2.2	9 2.3	10 2.4	11 3NI	12 Second Saturday
13 Sunday	14 NI	15 NI	16 3.1	17 3.2	18 3.3	19 No Bag Day Cluster meeting
20 Sunday	21 3.4	22 3.5	23 3.6	24 3.7	24 3.8	26 No Bag Day SMC Meeting
27 Sunday	28 3.9	29 NI	30 NI	31 NI, NI		

Week1:	**2.1 – A2.3**
Week 2:	**A2.4 – 2.4**
Week 3:	**3.1 - 3.3**
Week 4:	**3.4 – 3.8**
Week 5:	**3.9**

↓ TEACHER'S NOTES ↓

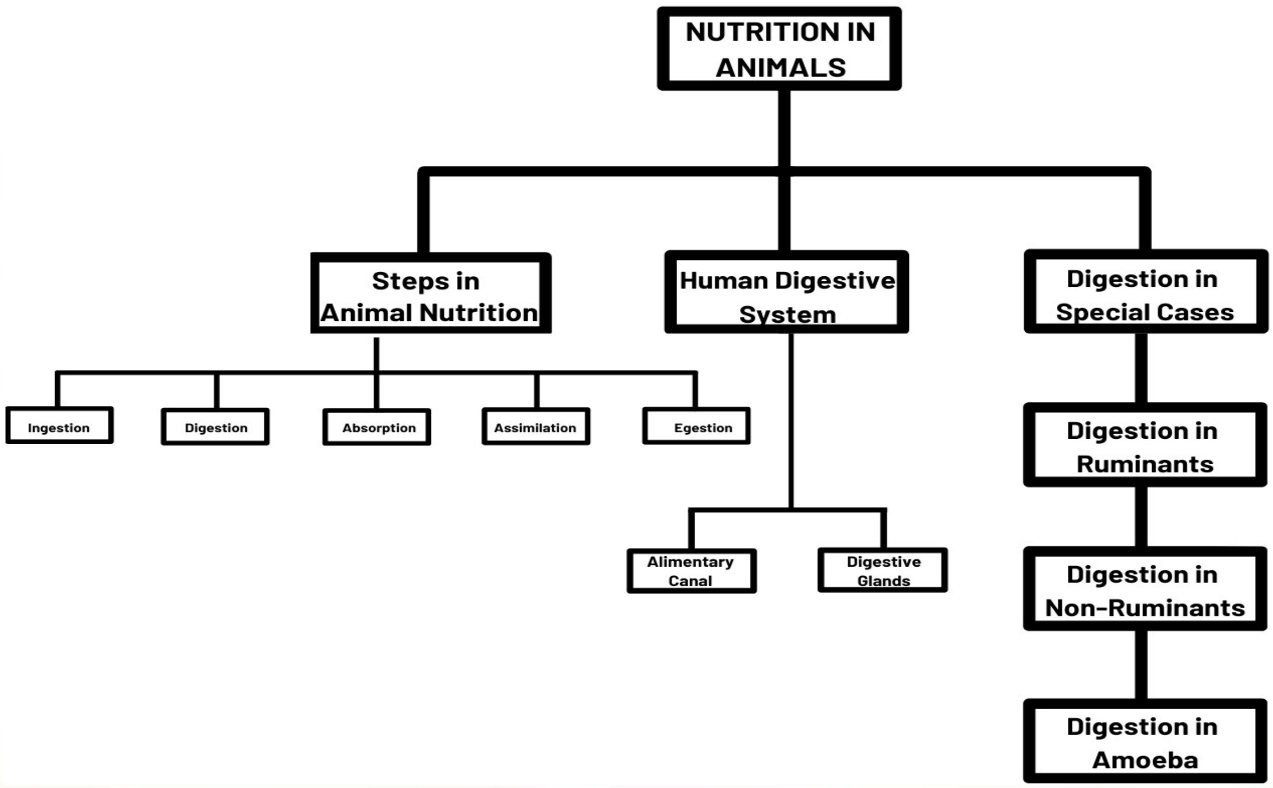
2 NUTRITION IN ANIMALS

Learning Outcomes: Learners

A6R2G3

1. Identifies the different parts of the digestive system in humans and animals based on their functions.
2. Differentiates the process of digestion in humans, ruminants, and unicellular organisms like Amoeba.
3. Classifies animals based on their digestive adaptations, e.g., ruminants vs. non-ruminants.
4. Conducts simple investigations to understand digestion, e.g., testing the action of saliva on starch.
5. Relates digestion to its importance in energy production and overall body functions.
6. Explains the process of digestion step by step, from ingestion to egestion, in humans and animals.
7. Draws and labels diagrams of the human digestive system, ruminant stomach, and Amoeba's feeding process.
8. Applies the knowledge of digestion to understand the importance of a balanced diet and digestive health in daily life.

CONCEPT MAP



Period-wise Topics

Chapters and Concepts

Period number	Topic	Remarks
2.1	Introduction,2.1 different ways of taking food	
2.2	2.2 Digestion in humans	
2.3	ACTIVITY2.2	
2.4	ACTIVITY2.3	
2.5	ACTIVITY2.4	
2.6	The stomach,The small intestine	
2.7	2.3 Digestion in Grass-eating animals	
2.8	2.4 Feeding and digetion in AMOEBA	

SYNOPSIS

- Nutrition in animals is the process by which they obtain and utilize food for growth, energy, and body functions. Unlike plants, animals cannot produce their own food and must consume other organisms for survival.
- The process of nutrition in animals involves five main steps: Ingestion, Digestion, Absorption, Assimilation and Egestion.
- The human digestive system is made up of the alimentary canal and digestive glands.
- Main Parts of the Digestive System are Mouth, Esophagus, Stomach, Small Intestine, Large Intestine and Anus
- Digestive Glands are Salivary Glands, Liver and Pancreas
- There are some special adaptations in digestive system and digestion process in various animals like ruminants as well as amoeba.
- Nutrition in Animals provides energy for survival and body functions, aids in growth and repair of body tissues, supports immunity by providing essential nutrients, ensures proper functioning of organ systems.

Period 2.1: Different methods of taking food

Concepts Covered:

This concept introduces the feeding adaptations in animals, showcasing how their physical structures, such as teeth, beaks, and specialized organs, are uniquely designed to match their feeding habits and diets. It aims to highlight the diversity in nature and the connection between structure and function.

Learning Objectives:

Students will be able to:

1. Students will understand that different organisms have unique methods of taking in food.
2. Students will explore how the structure of an organism (e.g., beaks, teeth, or tentacles) determines its feeding method.
3. Students will classify organisms based on their feeding habits.

Prior Concept/ Skills: (Essential concepts and skills to be checked/bridged before teaching the current concept.)

1. Knowledge that the organisms take food for energy
2. The food habits of various organisms.

TLM Required: Images of Bird's beak, Lion's teeth, Parrot eating seeds, Butterfly proboscis

Teacher Resources:

External links of above images:

- https://drive.google.com/file/d/16KWp4MuB2kMVq7lNt-jmBbJ1nZW2APaf/view?usp=drive_link
- https://drive.google.com/file/d/1sTawh-kXtQUQADl88HpqiO1Rc23GQri5/view?usp=drive_link
- https://drive.google.com/file/d/1nxsanMHWgz-3ttiaBTOtjW8hh8ceIiUg/view?usp=drive_link
- https://drive.google.com/file/d/18iCJ4Y4hebqJQXhV-jGmD1iS0ri6l6Kt/view?usp=drive_link

Igniting Activity: Hook activity:

Good morning class! Today I am going to tell you an interesting story about Jackal and a crane. Once upon a time, a clever Jackal invited his friend, the Crane, for dinner. He served delicious soup, but on a **flat plate**. The poor Crane, with its long, narrow beak, tried to sip the soup but couldn't! Meanwhile, the Jackal licked up the soup easily. The Crane felt disappointed but stayed quiet.

A few days later, the Crane invited the Jackal for dinner. This time, the soup was served in a **tall, narrow-necked jug**. The Crane happily dipped its beak in and drank the soup, but the Jackal couldn't fit his mouth inside! The Jackal finally realized how tricky it was for the Crane to eat from a plate. Why do you think the Jackal and the Crane had trouble eating each other's food? (Pause for responses). Exactly! Different animals have different mouth parts designed for the way they eat. Teacher displays these images. Now, let us explore different modes of taking food in different animals.

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Let us imagine you are in a jungle! You see different animals eating in their own unique ways. Some are chewing leaves, some are sipping nectar, and some are swallowing their prey whole! But how do they do it? Let us find out! (Teacher prepares materials in advance: spoon, straw, sponge, dropper, biscuit, and whole fruit.	**Do:** Teacher divides the class into groups of four and provides the flashcards. Say : Here are with pictures and names of animals (e.g., snail, ant, eagle,	1. Recalls the food components and completes the list given on page 22. 2. Record your observations by filling out the table provided in the textbook given on page 22.

And demonstrates the different mode of feeding in animals) **Demonstration 1: Scraping (e.g., Snail)** Have you ever seen a snail slowly moving on a rock or a tree trunk? How do you think it eats? (Pause for responses.) Ok, let us find out! Imagine the spoon is a snail's mouth. Now, let's gently rub it over this rough surface (coconut shell/sandpaper). Watch closely! (Demonstrate rubbing.) See how tiny bits scrape off? That's exactly how a snail eats! A snail has a special tongue-like structure called a **radula**, covered in tiny, sharp teeth. It scrapes off bits of food, just like this! This mode of feeding is called **scraping** because the snail rubs its radula against surfaces to get food. Can you think of any other animal that might scrape its food like this? (Encourage responses: Possible answers—some fish, certain insects.) Snails use scraping to eat plant material, algae, or soft wood. This is why you often see them on rocks or tree trunks! **Demonstration 2: Siphoning (e.g., Butterfly, Hummingbird)** **Material:** A straw and a glass of juice/water Imagine you are watching a beautiful butterfly in a garden. It flutters from flower to flower, but have you ever wondered how it drinks nectar? (Pause for responses.) Ok! Let us find out! **Step 1:** Place the straw in the juice. **Step 2:** Sip the juice through the straw. Notice how the liquid moves up? **Step 3:** Butterflies and hummingbirds feed in a similar way! They have long, tube-like mouths to suck nectar from flowers. This mode of feeding is called **siphoning**. Butterflies have a long, coiled tube called a **proboscis**, which unrolls to suck up nectar—just like a straw! Hummingbirds have long, narrow beaks and special tongues to sip nectar from deep inside flowers.	hummingbird, lice, mosquito, butterfly, housefly). https://docs.google.com/document/d/1447oV4jJXej60GZGVEMuTCBWtkMG2u_2/edit?usp=drive_link&ouid=107642643193819563729&rtpof=true&sd=true You have to Separate Flashcards with feeding methods and food types (e.g., scraping, chewing, sipping nectar, etc.).	

We know butterflies and hummingbirds sip nectar, but what about mosquitoes? How do they feed? (Wait for responses.) Siphoning allows animals like butterflies and hummingbirds to drink liquid food easily. It is different from sucking, which involves piercing the food source! **Demonstration 3: Sucking (e.g., Mosquito, Lice)** **Material: Dropper** (represents a mosquito's mouthpart) and **Bowl of water** (represents blood or liquid food) Have you ever been bitten by a mosquito? What happens when it bites?(Pause for responses—students may say itching, irritation, or diseases.) Let us find out how they feed: **Step 1:** Place the tip of the dropper into the water. **Step 2:** Squeeze and release the dropper to suck up the water. **Step 3:** Notice how the liquid gets pulled up? This is how mosquitoes and lice suck blood! Mosquitoes and lice have **piercing and sucking mouthparts** that allow them to draw blood from the host. They inject **saliva** into the skin, which can cause **itching** and sometimes spread diseases like **malaria and dengue**. What happens when a mosquito bites you? Why do some mosquito bites itch while others don't? (Encourage discussion on irritation and disease transmission.) Unlike butterflies that sip nectar, mosquitoes and lice use a sharp, tube-like mouth to **pierce the skin and suck blood**—a feeding method called **sucking**! **Demonstration 4: Sponging (e.g., Housefly)** **Material:** A sponge and water Dip the sponge in water and squeeze it. Notice how the sponge absorbs the liquid? Now, squeeze it—see how the liquid comes out? Similarly! Houseflies soak up liquid food like this sponge. What do they do before eating solid food?" (Discuss how they release saliva to dissolve food.) **Demonstration 5: Swallowing (e.g., Snake, Eagle)** **Material:** A whole grape or small fruit Swallow the whole fruit. (without biting).Similarly! Some animals, like snakes, swallow their food without		

chewing! Can you name another animal that does this?" (Possible answers: frogs, owls, pelicans.) Which feeding method do you think a dog uses? (Chewing) Great! Animals like cows, Horses etc., also chew the food. What happens after taking the food in? (Take student responses) Exactly! It gets digested in the digestive system. Can you think of the components of food? (Take student responses) Correct! We have carbohydrates, proteins etc., the breakdown of these complex substances into simple substances is called digestion. **CFU (Open ended/ Factual) [2.ii.a]** Factual Questions: 1. What is meant by digestion? 2. What is the difference between Siphoning and Sucking? Open-Ended Questions: 3. Why do birds have different types of beaks, like long and pointed or short and curved? 4. If a cow had sharp teeth like a lion, how would it affect its ability to eat grass?		

Summary: Today, we explored how different animals take in food. Some chew, some swallow, and some even suck!

Exit Ticket: What was the most interesting feeding method you learned about today?

Homework

1. Observe any three animals or birds in your surroundings. Write down What they eat.
2. How they eat it (e.g., pecking, chewing, tearing).
3. Find and write about one animal with a unique feeding habit (e.g., anteater, hummingbird).

Quick Quiz/ Assignment

I. Multiple Questions (MCQs)

1. Which mode of feeding involves scraping food from surfaces using a specialized tongue-like structure?
   a) Siphoning   b) Scraping   c) Sponging   d) Chewing
2. What structure does a butterfly use to suck nectar?
   a) Radula   b) Proboscis   c) Beak   d) Tentacle

3. Houseflies feed using sponging. How do they eat solid food?
   a) They chew it into small pieces   b) They absorb it directly
   c) They release saliva to dissolve it first   d) They use sharp mouthparts to cut it
4. Mosquitoes feed by:
   a) Scraping   b) Sucking   c) Siphoning   d) Sponging

<u>II. Fill in the Blanks</u>

5. A snail uses its __________ to scrape food from surfaces.
6. Hummingbirds and butterflies feed by __________, which involves using a tube-like mouthpart to suck nectar.
7. A housefly soaks up liquid food using its __________ mouthpart.
8. Mosquitoes have a sharp, tube-like mouthpart that helps them __________ blood from their host.

<u>III. Short Answer Questions</u>

9. How is siphoning different from sucking?
10. Why are houseflies considered unhygienic?
11. Imagine you are in a garden observing different insects. Describe how a butterfly and a mosquito would eat their food.
12. Why do mosquitoes cause irritation after biting, but butterflies do not, even though both use tube-like mouthparts?

Period 2.2: Different parts of digestive system

Concepts Covered : DIGESTIVE SYSTEM IN HUMAN BEINGS
This concept focuses on the human digestive system and its functions. It explores how food is broken down into simpler substances that the body can absorb and use for energy. The lesson introduces the journey of food through various organs and highlights key processes such as ingestion, digestion, absorption, and egestion.

Learning Objectives: Students will be able to:

- Explain the process of digestion and its importance for the body.
- Identify and describe the major organs involved in the human digestive system and their functions.
- Explain the stages of digestion (ingestion, digestion, absorption, assimilation, and egestion) with examples.

Prior Concept/ Skills:
1. Knowledge that we take food through the mouth
2. The food is digested in our stomach

TLM Required: Images of Human digestive system, Posters explaining the journey of food through the alimentary canal

Teacher Resources:

Igniting Activity: Hook activity:
https://www.youtube.com/watch?v=jAP5Biyf7Nc
[Play from timestamp 0:00 to 0:04]
"Let's watch a short video about what happens when we eat food. Think about how the food travels through our body and how it turns into energy we use every day. Once the video ends, we'll discuss your thoughts!"

Experience and Reflection:
https://drive.google.com/file/d/1P9E7dF47GCvgVqJmewx4Q2pU4mZxlpzK/view?usp=drive_link
"Here are two meals—a fast food meal and a balanced meal. Which one do you think is better for your body? Why? Think about how your body digests them and what nutrients each one might provide."

1. What might be the difference in the energy and nutrients provided by these two meals?
   ESR: The fast food meal gives quick energy but fewer nutrients, while the balanced meal provides long-lasting energy and essential nutrients.
2. Why do you think it's important for our body to get a variety of nutrients from food?
   ESR: Because different nutrients help different parts of our body work, like vitamins for immunity and proteins for growth.

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Today, we're going to explore what happens to food after we eat it. Have you ever wondered where your food goes after you swallow it? Does it just disappear? No! It takes an incredible journey inside your body!" Let's watch a short video to see this journey in action. Pay close attention to the different organs food passes through! https://www.youtube.com/shorts/hQS6MV8xEVk?si=1KyYUIThjaASQXL1 (Play the video on digestion.) (After the video) ● Wow! That was an amazing journey, right? Can you recall the path food takes after you swallow it? (Encourage students to respond and list the organs.) Let's see how many organs we can name before I show the diagram! (Teacher shows a Labelled Human Digestive System **diagram** and points to each part.) https://drive.google.com/file/d/1Xa_PGqBhfuOQLLqRdwkmqKKBkOc4zjKq/view?usp=drive_link These are the main organs involved in digestion: the **mouth, esophagus, stomach, small intestine, large intestine, and anus.** Each one plays a special role in breaking down food and absorbing nutrients.	**Do :** Teacher divides the students into pairs **Say :** Observe the image of human digestive system and note down the different parts of it. Each pair play a memory game of the parts of digestive system	List all the digestive organs you remember and write one short sentence about what each organ does.

Along with these parts, various glands associated with the canal such as **salivary glands**, the **liver** and the **pancreas** secrete digestive juices, which help in digestion. Hence, the digestive tract and the associated glands together constitute the **digestive system.** **CFU (Open ended/ Factual)** Factual Questions: 1. Name the major organs of the digestive system. Open Ended Questions: 1. Imagine what may happen if the alimentary canal is completely same tubular model without any diversity in structure?		

Summary: Today, we've explored the different parts of alimentary canal.
Reflection: "What did you find most interesting about how digestion begins?"
Homework
1. Draw the diagram of the human digestive system and label the different parts of it.
2. Prepare model of human digestive system

Period 2.3: Different types of teeth

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Now that we know the main parts of the digestive system, let's begin our journey where digestion starts—the buccal cavity, or simply, the mouth! Close your eyes and imagine taking a bite of a crunchy apple… ● Can you hear the crunch? Feel the pieces on your tongue? What happens next? (Let students respond.) Yes! The food is broken down into smaller pieces. Remember taking food in the body is called **Ingestion.** ● But how does this happen? (Take student responses) Great! Our teeth help break food into smaller pieces. Each tooth is rooted in a separate socket in the gums and they vary in appearance and perform different functions. **CFU (Open ended/ Factual)** Factual Questions: 2. Name the different types of teeth. Open Ended Questions: 1. Why do you think food needs to be broken down into simpler substances?	**Do :** Teacher divides the students into pairs **Say :** Use your index finger to feel the teeth. How many kinds of teeth could you find? Which teeth do you use for biting and cutting, and which ones for piercing and tearing? Find out the ones that are used for chewing and grinding? (Record your observations in the table provided on page 26.	List the different types of teeth and their purpose

Summary: Today, we've explored different types of teeth and their purpose.

Homework

1. Read and write the difference between milk teeth and permanent teeth. (Refer Page no 26 - Blue Box)
2. Why do dentists advise brushing teeth twice a day? Explain how not cleaning your teeth properly can lead to tooth decay. (Refer Page no 28 - Blue Box)
3. Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
4. What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
5. How well did I adjust my teaching based on student reactions or unforeseen challenges?

Period 2.4: Experiment to demonstrate role of saliva in digestion of food.

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
let us know one more interesting thing about buccal cavity. ● What happens when you smell tasty food? Yes! Our mouth waters when we smell or see tasty food. The water is nothing but saliva. ● Why do you think saliva is important? Exactly! Saliva **softens** food. And also It **contains enzymes** that start breaking down **starch into sugar.** **Activity 7.2.3 :** Let us do a quick experiment! Show two test tubes: ● **Test Tube A** – contains boiled rice. ● **Test Tube B** – contains boiled rice that has been chewed for a minute. Add **iodine solution** to both and observe: What do you think will happen when we add iodine to both samples? (Take student responses) Why do you think chewing changes the food? (Take student responses) Ok, let us see what happens: ● Test Tube A turns blue-black **(starch present).** ● Test Tube B does not change color (**starch broken down into sugar by saliva).**	**Do :** Teacher demonstrate the experiment meanwhile discussing about the observations with the students **Say :** Observe the changes in the experiment with saliva on starch and comprehend the conclusion	Write the experiment procedure in the notebook.

This tells us about saliva, that It helps break down food chemically. Now, Imagine eating a lemon versus a chocolate bar. How do you instantly know which one is sour and which one is sweet? (Allow students to respond) "Yes! The tongue is a fleshy muscular organ attached at the back to the floor of the buccal cavity. It is free at the front and can be moved in all directions. ● Do you know the functions of the tongue? (Allow students to respond) Great! The tongue helps us taste food with the help of taste buds! But it does much more than that—it also helps mix the food with saliva and push it down for swallowing. Let us do a quick activity: **Activity 7.2.4** **Preparation (Before Class :** The teacher prepares separate samples of: **Sugar solution** (Sweet), **Common salt solution** (Salty), **Lemon juice** (Sour), and **Juice of crushed neem leaf or bitter gourd** (Bitter) Teacher displays the diagram of the tongue from the textbook and explains that different parts of the tongue detect different tastes. 1. **Teacher** blindfolds the **two students** and asks them to stick out their tongue and keep it **straight and flat**. 2. The teacher **gently drops** a small amount of each solution on **different areas** of the tongue using separate toothpicks. 3. The students describe the taste they perceive and try to guess where the taste was detected. Discussion: ● Did you notice certain tastes are stronger in specific areas? The blindfold is removed, and students compare their experiences with the **tongue taste map**.	Participate in the blindfold activity to comprehend the role of tongue in identifying the taste.	Draw an imaginary diagram representing the different areas of tongue that are more sensitive to specific taste.

Different areas of the tongue are more sensitive to certain tastes but all taste buds work together. **CFU (Open ended/ Factual)** **Factual Questions:** Which gland produces saliva? **Open Ended Questions:** What would happen if we lost our sense of taste? How would it affect the way we eat?		

Summary: Today, we've demonstrated the role of saliva in the digestion process as well in identifying the taste.

Reflection: "What did you find most interesting about sensitivity of the tongue to different tastes?"

Homework

1. Write the experiment to prove that the saliva secreted by salivary glands helps the digestion process.

Period 2.5: Movement of food through Oesophagus and stomach

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Introduction to Digestion: "Let's think about the food you had for breakfast. Where does it go after you eat it? Today, we'll explore what happens to food as it moves from the mouth to the stomach." Role of the Mouth: "Digestion starts in the mouth. When we chew food, our teeth break it into smaller pieces, and saliva mixes with it. Saliva contains an enzyme called amylase that starts breaking down starch into simpler sugars." "Try chewing a piece of bread for a few minutes. Notice how it starts tasting sweeter? That's because amylase is turning the starch into sugar." Esophagus and Peristalsis:	Activity: Labeling the Digestive System https://docs.google.com/document/d/1UCINpbYX6qcZRz_wFqb4loXMGoOIZ0mS/edit?usp=drive_link&ouid=107642643193819563729&rtpof=true&sd=true "As you label each part, discuss what happens to food in that organ. How does it contribute to digestion?" 1. Provide students with a blank diagram of the digestive system. 2. Task: In small groups, label the parts of the digestive system (mouth, esophagus, stomach, etc.) and discuss their functions.	What is the function of the oesophagus in digestion? Why is it important to chew food properly before swallowing it? Design a simple poster that explains what happens to food in the stomach and why stomach acid is essential.

"Once we swallow, the food doesn't just drop into the stomach. The esophagus pushes the food down using a motion called peristalsis—a wave-like movement that ensures the food travels to the stomach." [Show a short video or animation of peristalsis to help students visualize this process.] https://www.youtube.com/watch?v=jAP5Biyf7Nc **Stomach's Role:** "When food enters the stomach, it encounters stomach acid and digestive juices. These help break down food into a liquid-like mixture called chyme. The stomach also churns the food to make digestion easier." Highlight: "The acid in the stomach not only softens food but also kills harmful bacteria that might enter with food." **CFU (Open ended/ Factual)** Factual Questions: 1. What enzyme in saliva helps break down starch? ESR: Amylase. 2. What is the wave-like motion called that moves food through the esophagus? ESR: Peristalsis. **Open-Ended Questions:** 1. Why do you think chewing food properly is important for the digestive process? ESR: Chewing breaks food into smaller pieces, making it easier for enzymes to act on and improving digestion efficiency. 2. If the stomach didn't produce enough acid, how do you think it would affect digestion? ESR: If the stomach didn't produce enough acid, digestion would be	Activity: "What Happens to Food?" https://docs.google.com/document/d/1Cn4HamMiqNNQ7ZP75zm_PuqK4urEeZPz/edit?usp=drive_link&ouid=107642643193819563729&rtpof=true&sd=true Give groups a flowchart of the digestive stages from the mouth to the stomach, but with missing descriptions. Students complete the flowchart based on their learning.	

affected because the food wouldn't break down properly. Proteins wouldn't get digested well, and harmful bacteria in the food might not be killed, which could make us sick.		

Summary: "Today, we explored the process of digestion, focusing on how food moves through the mouth, esophagus, and stomach. Think about how amazing it is that your body works like a well-organized machine, breaking down food into nutrients to give you energy. Let's take a moment to reflect on what we've learned."

Reflection: What did you find most interesting about how the stomach helps in digestion?

ESR: Its ability to churn food and mix it with acid and digestive juices to break it down.

1. Why do you think it's important for all the organs in the digestive system to work together?

ESR: Because each organ has a specific job, and the process won't work correctly if one part fails.

"In the next class, we'll explore what happens after food leaves the stomach—how nutrients are absorbed in the intestines and how the body uses them to stay healthy."

Homework

1. List the three main processes that happen to food in the stomach.
2. Explain how chewing food properly helps the stomach in digestion.
3. What advice would you give someone to ensure food is properly digested in the mouth and stomach?

Period 2.6: SMALL INTESTINE AND COMPLETION OF DIGESTION PROCESS

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
"Today, we'll continue our journey with food as it moves from the stomach to the intestines. Let's explore what happens next!" Use a Flowchart: https://drive.google.com/file/d/1QmCrQA0fVxQ54FT3U4FDcyxcKRRwb8K1/view?usp=drive_link Display a flowchart on the board or screen showing the digestive process from the stomach to the intestines. Point out the flow of food: Stomach → Small Intestine → Large Intestine → Rectum → Anus.	**Activity: Mapping the Journey of Food** Objective: Help students understand the roles of different digestive organs in breaking down food and absorbing nutrients. **Materials Needed:** ● Diagram of the digestive system highlighting the small intestine, large intestine, liver, and pancreas (unlabeled). https://drive.google.com/file/d/1E1othcKqLGJ2jAeixr2oOMh3Flnp-IvG/view?usp=drive_link "Every organ in the digestive system	1. What role does the large intestine play in digestion? 2. What is the role of bile in digestion, and where is it produced? 3. Reflect on the importance of the pancreas in digestion by writing 2–3 sentences.

"After food leaves the stomach, it enters the small intestine. The small intestine is a long, coiled tube where most digestion and nutrient absorption take place." Explain the Roles of Digestive Substances: Bile (Liver): "The liver produces a yellow-green liquid called bile, which is stored in the gallbladder. Bile helps break down fats into smaller droplets, making it easier for the body to digest them." Digestive Juices (Pancreas): "The pancreas produces digestive juices that break down carbohydrates, proteins, and fats into simpler substances that the body can absorb." Show an illustration or model of the digestive system and point out the liver, gallbladder, pancreas, and small intestine. https://drive.google.com/file/d/1Xa_PGqBhfuOQLLqRdwkmqKKBkOc4zjKq/view?usp=drive_link Nutrient Absorption in the Small Intestine: "The walls of the small intestine are lined with tiny, finger-like structures called villi. These villi absorb nutrients like glucose, amino acids, and fatty acids into the blood." Use a diagram or drawing to show the villi image below: https://drive.google.com/file/d/1xSmmLkV1Nhgt1zvbIXww6sB1Ib9st6NB/view?usp=drive_link "Villi increase the surface area by being numerous and lining the inner walls of the small intestine; their microscopic folds provide more contact points for nutrient absorption."	plays a unique role in turning food into energy and nutrients. Today, your job is to explore one organ and learn how it helps in digestion. Work as a team, and we'll put the pieces together to understand the entire journey of food through our bodies!" **Instructions:** 1. Group Assignment: Divide the class into small groups. Assign each group one organ: small intestine, large intestine, liver, or pancreas. 2. Research and Discussion: Provide each group with the diagram and time to discuss: ● What happens to food in their assigned organ? ● What specific role does this organ play in digestion? (e.g., the liver produces bile, the pancreas secretes enzymes, the small intestine absorbs nutrients, the large intestine removes water.) 3. Presentation: Each group presents their findings to the class, explaining how their organ contributes to the overall digestion process. Encourage students to use the diagram to point out their organ's location and function.	

"Once absorbed, these nutrients are transported by the blood to different parts of the body to provide energy and build new cells." Water Absorption in the Large Intestine: "The undigested food then moves into the large intestine. Here, water and some salts are absorbed, and the remaining waste becomes more solid." Show how the large intestine leads to the rectum and anus for egestion (removal of waste). **CFU (Open ended/ Factual) [2.ii.a]** Factual CFUs 1. What role does bile play in digestion? ESR: It breaks down fats into smaller droplets for easier digestion. 2. Name the part of the small intestine responsible for nutrient absorption. ESR: Villi. Open Ended CFUs 1. Why is the small intestine longer than the large intestine? ESR: Because it needs more surface area to absorb nutrients effectively. 2. What would happen if the large intestine did not absorb water from food? ESR: It would lead to diarrhea and dehydration.		

Summary: "Today, we explored how food is broken down and nutrients are absorbed in the small and large intestines. Think about how each organ we discussed plays a role in ensuring our body gets the energy and nutrients it needs to function."

Let's take a moment to reflect on what we've learned."

- Reflection: Why do you think it is important for the small intestine to have such a large surface area?

ESR: To absorb as many nutrients as possible efficiently.

- How does the large intestine support the body even after most nutrients are absorbed?

ESR: By absorbing water and forming solid waste for elimination.

Home Work

1. Label the following on a diagram of the digestive system: small intestine, large intestine, liver, and pancreas.
2. Explain in a short paragraph how the small intestine and large intestine work together in digestion and absorption.
3. Design a simple flowchart to show the journey of food from the stomach to the large intestine, including the roles of the liver and pancreas.

Period 2.7: Digestion in grass eating animals

Concepts Covered: DIGESTION IN GRASS-EATING ANIMALS

Grass-eating animals, or herbivores, have specialized digestive systems to break down cellulose, the main component of plant cell walls. Ruminants like cows and buffaloes possess a four-chambered stomach (rumen, reticulum, omasum, abomasum) to digest fibrous food through microbial fermentation. Non-ruminants like rabbits rely on their caecum for fermenting plant material. This process allows these animals to extract nutrients from foods that humans cannot digest efficiently.

Learning Objectives:

Students will be able to:

- Understand the process of digestion in ruminants (rumination) and how it differs from other animals.
- Learn about the role of specialized structures like the rumen and caecum in digesting cellulose.
- Differentiate between the digestive systems of ruminants, horses, rabbits, and humans.

Prior Concept/ Skills: (Essential concepts and skills to be checked/bridged before teaching the current concept.)

Knowledge about human digestive systema and digestion process, enzymes

TLM Required: Images of digestive system in ruminants, Posters explaining the journey of food through the alimentary canal

Teacher Resources:

External links of above images: DIKSHA links, web pages

Igniting Activity: Hook activity:

“Have you ever seen a cow or goat chewing even when it’s not eating? What do you think they’re doing? Today, we’re going to learn why these animals chew so much and how their digestive systems are different from ours.”

Experience and Reflection:

1. Experience:
   Show the following video:
   https://www.youtube.com/watch?v=dIp_2lG06YY

“Think about your pets or animals you see daily—like cows or rabbits. Do they eat the same way we do? What do you notice about their behavior after eating?”

- Why do you think some animals need extra time to chew food after swallowing?
  ESR: Their food might be harder to digest.
- Why can’t humans eat grass or leaves for energy like cows or rabbits?
  ESR: “Maybe humans don’t have the ability to break down tough plant materials like grass.”

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
"Have you ever noticed cows chewing even when they're not eating? That's because their way of digesting food is very different from ours. Let's learn how they do it!" Video: https://www.youtube.com/watch?v=CJomFwt3eMs 1. The Rumen – A Storage and Fermentation Chamber "Ruminants like cows and goats have a special part of their stomach called the rumen. It stores the food they eat and breaks it down with the help of millions of bacteria. These bacteria produce enzymes that can digest cellulose, a tough carbohydrate found in grass and leaves." Key Point: ● The rumen stores food and uses bacteria to break down cellulose, which humans cannot digest. **Visual Aid:** Show a diagram of the ruminant stomach, highlighting the rumen. https://drive.google.com/file/d/1rJeciCc9XjhrePDTO0j6dy6dSfCie0_B/view?usp=drive_link 2. What is Cud? "Ruminants don't chew their food fully when they eat it. Instead, they swallow it, and the food goes to the rumen. Later, when they rest, the partially digested food, called cud, comes back to their mouth for chewing. This process is called rumination. It helps break down the tough food into smaller pieces so the bacteria can work more effectively." Key Points: ● Cud is partially digested food. ● Rumination helps break food into smaller pieces for easier digestion. 3. Humans vs. Ruminants "Humans can't eat grass or leaves like cows because we don't have a rumen or the	**Activity:** Completing a Ruminant Digestive System Diagram Provide students with a labeled diagram of a ruminant stomach but leave the functions of the rumen, reticulum, omasum, and abomasum blank. Students work in pairs to fill in the blanks based on what they've learned. https://drive.google.com/file/d/1ertRYhhrO4z3mX-bF_4Q4hPYxfiaa20x/view?usp=drive_link	1. Write the names of the four compartments in the stomach of a grass-eating animal like a cow. 2. Write two key steps of digestion in grass-eating animals in your own words. 3. Imagine the microorganisms in the rumen of grass-eating animals suddenly stop functioning. Explain what might happen to the digestion of grass. How could this affect the animal's survival and its role in the food chain?

bacteria needed to digest cellulose. Instead, our digestive system breaks down food with enzymes in different organs like the stomach and intestines. This is why our diets are different." Key Points: ● Humans don't have a rumen or cellulose-digesting bacteria. ● Our diet is different because we cannot digest cellulose. "Why do cows spend so much time chewing, even when they're not eating, but rabbits don't? Today, we're going to find out how these animals digest their food differently!" "Ruminants like cows have a rumen, a special part of the stomach that helps them digest grass with the help of bacteria. They chew cud, which is partially digested food, to help these bacteria work better. ● Example: Cows, deer. ● Have a specialized stomach with a rumen. ● Chew cud to break food into smaller pieces. ● Rely on bacteria in the rumen to digest cellulose. Non-ruminants like rabbits and horses don't have a rumen. Instead, they use a caecum, located between the small and large intestines, to digest cellulose. Both ruminants and non-ruminants need bacteria for this process, but they use different parts of their digestive systems to get energy from grass and leaves." ● Example: Rabbits, horses. ● Have a caecum between the small and large intestines. ● Caecum acts as a fermentation chamber for cellulose digestion. Visual Aid: Display a flowchart showing the journey of food through all four chambers and the intestines Summary Recap "Ruminants like cows have a rumen for storing and fermenting food. They chew cud to help bacteria digest tough plant material. Humans can't do this because we	**Activity:** Compare and Contrast Digestive Systems Objective: Identify similarities and differences between ruminants and non-ruminants. Materials: Fact cards with traits https://docs.google.com/document/d/1AiYLF85_jOK5mezajgy5r4bg2wOEgogK/edit?usp=drive_link&ouid=107642643193819563729&rtpof=true&sd=true	1. Write one difference between the digestive systems of ruminants (like cows) and non-ruminants (like rabbits). 2. Write two key steps in the digestion process for ruminants and non-ruminants 3. Imagine that the population of microorganisms in a cow's rumen decreases significantly due to a sudden illness. ● What challenges would the cow face in digesting grass? How might this affect the amount of energy the cow gets from its food?

don't have a rumen or the bacteria needed to digest cellulose." **CFU (Open ended/ Factual)** Factual CFUs ● What is the rumen, and what is its role in digestion? ESR: It's a part of the ruminant stomach where food is stored and fermented by bacteria. ● What is the role of the rumen? ESR: It stores food and helps break down cellulose with bacteria. ● What is the role of the rumen in ruminants? ESR: The rumen is a storage and fermentation chamber that helps digest cellulose with the help of bacteria. ● Which part of a non-ruminant's digestive system is responsible for digesting cellulose? ESR: The caecum. Open-Ended CFUs ● Why do you think ruminants need to chew cud? ESR: To break food into smaller pieces so that bacteria can digest it more easily. ● Why can't humans eat grass like cows? ESR: We don't have the rumen or bacteria to digest cellulose. ● Why do you think ruminants and non-ruminants have evolved different methods to digest cellulose? ESR: Their digestive systems adapted to their diets and environments to efficiently extract nutrients from plants. ● If humans could digest cellulose, how do you think it would change our diet and energy needs? 2. ESR: Humans might rely more on plant-based diets and would gain energy from foods like grass and leaves.		

Summary: "Today, we explored how grass-eating animals like cows, horses, and rabbits have specialized adaptations to digest cellulose-rich foods. Ruminants like cows chew cud and rely on their rumen, while non-ruminants like rabbits use their caecum to ferment plant material. These adaptations allow them to extract energy from plants that humans cannot digest. Think about how these differences help these animals survive in their unique environments."

Reflection: "Why do ruminants have such a complex digestive system compared to humans?"

ESR: To digest cellulose in grass, which humans can't break down

How do you think the digestive systems of grass-eating animals have adapted over time to make the best use of the food available to them?

ESR: Their digestive systems have developed specialized structures like the rumen or caecum to digest cellulose, ensuring they can survive on plant-based diets in their environments.

Homework

1. What is rumination, and why is it important for ruminants?
2. Compare the digestive systems of a cow and a rabbit in 2–3 sentences. Highlight one similarity and one difference in how they digest food.
3. Design a flowchart showing the stages of rumination in ruminants, starting from when grass is swallowed to when cud is chewed again.

Instructions: Include at least four steps in the flowchart and use simple labels for each stage.

4. Name two ruminants and explain why they can digest grass effectively.

5. Create a chart with two columns:

- Column 1: Ruminants (e.g., cow, buffalo).
- Column 2: Non-ruminants (e.g., rabbit, horse).

Write their food habits and methods of digestion under each.

6. Imagine you are a scientist studying a new herbivorous animal. Based on its diet of leaves and grass, design a digestive system for this animal and describe how it would work.

Instructions: Write 3–4 sentences explaining how this digestive system would help the animal survive.

Period 2.8: Feeding and Digestion in amoeba

Concepts Covered: FEEDING AND DIGESTION IN AMOEBA

Amoeba is a single-celled organism commonly found in water bodies such as ponds and lakes. It has a simple yet fascinating way of capturing and digesting food. Using pseudopodia, or finger-like projections of its cell membrane, it engulfs food particles through a process called phagocytosis. Once engulfed, the food is digested inside a food vacuole with the help of enzymes, and nutrients are absorbed into the cytoplasm. This concept provides an excellent opportunity to help students understand basic cellular processes such as movement, feeding, and digestion in a single-celled organism.

Learning Objectives:

The students will be able to

- Students will be able to: Describe how Amoeba captures and digests food.
- Identify the role of pseudopodia in feeding and movement.
- Explain the process of food vacuole formation and digestion in Amoeba.

Prior Concept/ Skills: (

Knowledge about human digestive systema and digestion process,

TLM Required: videos of digestion process in amoeba , Posters explaining the digestion in amoeba

Teacher Resources:

Igniting Activity: Hook activity:

Video : https://www.youtube.com/watch?v=cfcE81OckPQ

[this can be played at 2x speed]

"How does such a tiny organism eat its food without a mouth?"

Experience and Reflection:

Demonstrate using a simple analogy: "Imagine wrapping your arms around an object and pulling it into your body. That's how Amoeba captures its food!

- How do you think the Amoeba captures its food without a mouth?
  ESR: It uses pseudopodia to surround and engulf the food.
- What happens to the food once it is inside the food vacuole?
  ESR: Enzymes break it down into simpler substances.

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
https://drive.google.com/file/d/14AtPP0zm7byCpda-KzS746bRPa8YIYvA/view?usp=drive_link 1. Introduction to the Concept "Amoeba is a single-celled organism that lives in water. It has no fixed shape, no mouth, and no stomach, yet it can move and eat using its unique structure called pseudopodia (temporary projections of its cell membrane)." 2. Step-by-Step Explanation • Use the earlier video of an Amoeba and explain the process of digestion:	**Activity: Amoeba Role-Play** **1. Setup:** ● Assign different roles to students in each group to act out the digestion process in Amoeba. ● Provide simple props like paper cutouts for food particles and scarves or flexible cloth to represent pseudopodia. **2. Instructions:** - Each group will act out the process of Amoeba capturing and digesting food. - Role Assignments: 1. One student will be Amoeba (holding a flexible	1. Label the pseudopodia, food vacuole, cytoplasm, and egestion site correctly. https://drive.google.com/file/d/19rMwI26S0T44lVcPbFRXdK6aXoqKbvj4/view?usp=drive_link 2. Write down the six steps of digestion in Amoeba in your own words. Guiding Questions: ● How does Amoeba capture food? ● What happens once the food is inside the cell? ● Where does digestion take place?

1. The Amoeba senses food nearby (like bacteria or algae). 2. It extends its pseudopodia around the food particle to engulf it. 3. The food is trapped in a food vacuole, a sac-like structure. 4. Digestive enzymes are secreted into the food vacuole to break down the food. 5. Nutrients are absorbed into the cytoplasm, and the undigested waste is expelled from the cell. **CFU (Open ended/ Factual) [2.ii.a]** **Factual Questions** 1. How does Amoeba obtain its food? ESR: Amoeba extends its pseudopodia around the food, engulfs it, and forms a food vacuole. 2. What is the function of the food vacuole in Amoeba? ESR: The food vacuole stores the engulfed food and releases digestive enzymes to break it down. **Open-Ended Questions** 1. How is Amoeba's way of eating different from that of humans? ESR: Amoeba engulfs food using pseudopodia and digests it in a food vacuole, while humans have specialized organs for digestion. 2. Why do you think Amoeba does not need a mouth or a stomach for digestion? ESR: Because it can directly surround and digest food inside its body using pseudopodia and food vacuoles.	cloth to extend as pseudopodia). 2. One or two students will be food particles (holding small cutouts). - Another student will be digestive enzymes (who will break down the "food"). - One student will act as cytoplasm, showing how nutrients are absorbed. - One student will act as waste, demonstrating egestion. - The Amoeba student will move toward the food, extend the "pseudopodia" (cloth), engulf the food, form a food vacuole, and then process the digestion step by step.	● How are nutrients absorbed? ● What happens to the undigested food? 3. Imagine you are a tiny food particle floating in water. Describe your journey as you are captured, digested, and absorbed by an Amoeba.

Summary:

"Today, we learned how Amoeba captures and digests its food. It does not have a mouth or stomach like humans. Instead, it uses pseudopodia to surround food, forms a food vacuole, digests the food using enzymes, and absorbs nutrients into the cytoplasm. Any undigested waste is removed through egestion."

Reflection: ""If Amoeba had a fixed body shape, do you think it could still capture food the same way? Why or why not?"
ESR: "No, because it needs flexible pseudopodia to engulf food. If it had a fixed shape, it would need a different feeding method."

Homework

1. Write the five steps of digestion in Amoeba in your own words.
2. If Amoeba lost its ability to form a food vacuole, what would happen? Write 3-4 sentences explaining how this would affect its survival.
3. Research how Paramecium digests food. Write 2-3 sentences comparing its digestion with that of Amoeba.

TEACHER'S DIARY

Name of the Teacher:				Name of the Month:	
Name of the Lesson:				**Class: 7**	
Period No	**Name of the Concept to be taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	**Remarks**
2.1	Introduction, 1.1 Mode of nutrition in plants				
2.2	1.2 Photosynthesis- Food making process in plants				
2. 3	1.2- Activity1.1, Synthesis of plant food other than carbohydrates				
2. 4	1.3 other modes of nutrition in plants				
2. 5	1.4 Saprotrophs				
2. 6	1.4, Activity 1.2				
2. 7	1.5 How Nutrients are replenished in the soil				

1	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?
2	Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
3	What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
4	How well did I adjust my teaching based on student reactions or unforeseen challenges?

Head Teacher's Signature Teacher's Signature

Head Teacher's Suggestions:

Teacher Notes:

Lesson Plan :

3. Heat

Grade: 7 **Subjects: Science**

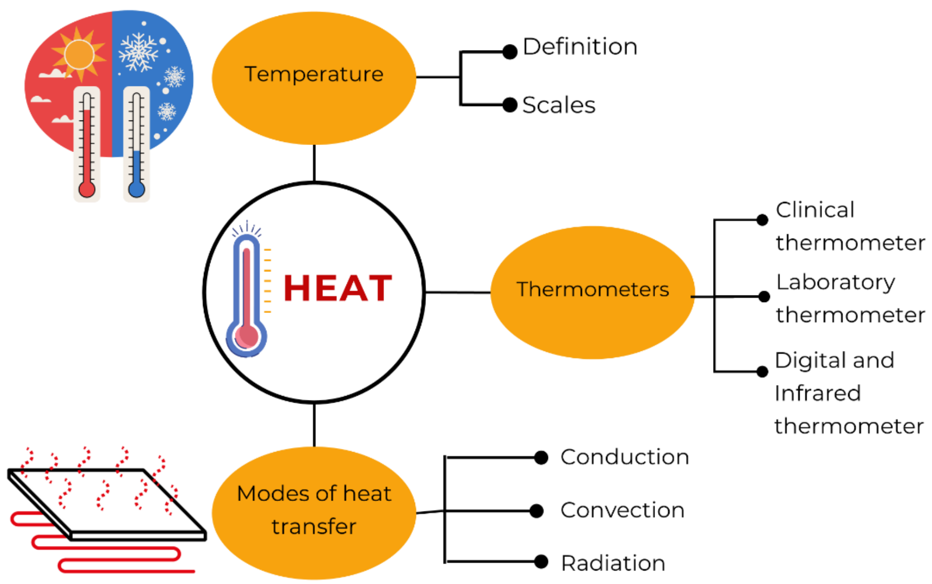
Name of the Chapter: Heat **Chapter Number: 3**

I6A9D8

Learning Outcomes: Students will be able to

1. *Define* temperature
2. *Explain* the principle of working of the thermometer
3. *Measure* temperature using a thermometer
4. *Differentiate* between a clinical thermometer and laboratory thermometer
5. *Conduct* an experiment to observe transfer of heat by conduction
6. *Classify* objects as good and bad conductors of heat
7. *Explain* heat transfer by convection and radiation
8. *Compare* conduction, convection and radiation
9. *Justify* the kinds of clothes we wear in summer and winter

Concept map



Synopsis

Temperature

- We encounter hot and cold objects in our daily life. Our sense of touch is not a reliable guide to the degree of hotness or coldness of an object.
- Temperature is the measure of the degree of hotness or coldness of an object.
- It is commonly measured in Celsius or Fahrenheit scales.
- The normal temperature of human body is 37 ºC.

Thermometers

- A thermometer is a device used for measuring temperatures.
- Liquid-based thermometers use the working principle of expansion of liquid on heating.
- Mercury and alcohol are commonly used liquids in the thermometers.
- A clinical thermometer is used to measure our body temperature. The range of this thermometer is from 35 ^{o}C to 42 ^{o}C.
- A laboratory thermometer is used for all other purposes. The range of this thermometer is generally from -10 ^{o}C to 110 ^{o}C.
- These days digital thermometers are used instead of mercury- based thermometers for measuring our body temperature.
- Infra-red thermometers are used for quick and non-contact measurement of our body temperature.

Modes of heat transfer

- Heat flows from a body at a higher temperature to a body at a lower temperature.
- There are three ways in which heat can flow from one object to another – conduction, convection and radiation.
- In solids, heat is transferred by conduction. In liquids and gases, the heat is transferred by convection. No medium is required for the transfer of heat through radiation.
- Materials which allow heat to pass through them easily are called conductors of heat.
- Materials which do not allow heat to pass through them easily are called insulators.
- Land and sea breezes occur due to convection currents.
- Dark-coloured objects are good absorbers and good radiators of heat than light coloured objects. This is why it is more comfortable to wear light-coloured clothes in summer and dark coloured clothes in winter.
- White, shiny surfaces are bad absorbers and bad radiators of heat but good reflectors of heat.
- Woollen clothes keep us warm during winter because wool is a poor conductor of heat.

Chapters and Concepts

Period number	Topic	Remarks
3.1	Hot And Cold, Activity 3.1	
3.2	Measuring Temperature	
3.3	Activity 3.3,	
3.4	Activity 3.4 Laboratory Thermometer	
3.5	Activity 3.5	
3.6	Transfer Of Heat , Activity 3.6	
3.7	Activity 3.7	
3.8	Activity 3.8, Activity 3.9 Convection	
3.9	Kinds Of Clothese We Wear In Summer And Winter	
3.10	Summarizing The Lesson	
3.11	Student Independent Practice	
3.12	Remedial Teaching Period	
3.13	Remedial Teaching Period	

Prior Concept/ Skills:

(Essential concepts and skills to be checked/bridged before teaching the current concept.)

- Heat is a form of energy.
- Different cloth materials help us feel warm during winters.
- Physical quantities are measured in specific standard units called SI units.
- Intuitive understanding of hot and cold objects, like a cup of coffee is hot, an ice-cream is cold.
- Phase changes can happen due to heat, for example liquid on heating can become gas (as seen in the water cycle studied in grade 5 Science).

Teacher References: *(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)*

- NCERT Class 7 Textbook
- Bal Vaigyanik class 8, Eklavya (chapter 17, Heat and temperature)
- Transfer of heat - IISER Pune video: https://www.youtube.com/watch?v=WHb7qRtdFKY

Teaching Learning Material (TLM):

- Chart for “Question corner”
- Period 1:
  - ❖ Glass of hot tea and glass of cooldrink for Hook activity
  - ❖ 3 cups with hot, cold and room temperature water for Activity 1
- Period 2:
  - ❖ boiling tube, a one-holed cork, glass tube and a candle for Activity 2
  - ❖ clinical thermometer for Activity 3
- Period 3:
  - ❖ History of the thermometer video:https://www.youtube.com/watch?v=rARnTlPax8E
  - ❖ Image comparison of Celsius and Fahrenheit: https://media.gettyimages.com/id/533449924/vector/celsius-and-fahrenheit-thermometer-comparison.jpg?s=1024x1024&w=gi&k=20&c=KNPyXidylOb34tjTyxCNu0BMYQcxly5x0LuAMXK9LWs=
  - ❖ Clinical Thermometer -Activity 3.3
- Period 4:
  - ❖ Cup of hot water, laboratory thermometer
  - ❖ Beaker, Cup of hot water, laboratory thermometer for Activity 4 and 5
  - ❖ Clinical thermometer and laboratory thermometer for Activity 6
- Period 5:
  - ❖ Digital thermometer and Infra-red thermometer
  - ❖ How an infrared thermometer works (1 minute video) : https://www.youtube.com/watch?v=cIbteXkAFxw
  - ❖ A clear straw, a small bottle, ink, water, scale, sketch pens, play-dough/modelling clay, an ink dropper and an (alcohol-based) sanitizer/ rubbing alcohol for Activity 7
  - ❖ Video reference for activity: Make your own thermometer: https://www.youtube.com/watch?v=rtsq-l0AxbY
  - ❖ Measuring temperature of water with laboratory thermometer-Activity 3.5
  - ❖ Worksheet-1: https://docs.google.com/document/d/1mkYh075R6eXG5JuTJTHWOXNYOU_dR8C1/edit
- Period 6:
  - ❖ Transfer of Heat-Activity 3.6 (Hacksaw blade, bricks/anything to make the blade stand, candle, matchbox, nails, scale)
  - ❖ 3 disposal glasses, hot water and cold water (Additional activity)
- Period 7:
  - ❖ Two identical metal spoons, two identical wooden spoons, and ice cubes for Activity 8 (Additional activity)
  - ❖ Beaker of hot water, different materials like metal spoon, pencil, wooden scale, plastic scale etc for Activity 3.7
- Period 8:
  - ❖ Round bottomed flask, matchbox, candle/Bunsen burner, tripod stand, wire gauze, potassium permanganate (or very tiny bits of paper) for Activity 3.8.
  - ❖ Tea bag, matchbox for Activity 3.9
  - ❖ Video reference for the teacher: https://www.youtube.com/watch?v=k7FN-GQLxIQ

- ❖ two sturdy plastic bottles with caps, hot water, cold water, ink/dye, a pair of scissors, glue, tape for Additional Activity

- Period 9:
  - ❖ Black and white papers, colour papers, magnifying glass, stopwatch for Additional Activity
  - ❖ Two identical cans, black and white paint for Activity 3.10 and 3.11.
  - ❖ Worksheet-2: https://docs.google.com/document/d/1L2yqv_TVGKtZP207DIwRO-x_V03slBEc/edit
  - ❖ Worksheet-3: https://docs.google.com/document/d/1N_t4h4fi50U3cL9n00dseR7F2OjVTCS6/edit

Concept 1: Introduction to temperature

Teaching Learning Process

Induction/Introduction
In this concept, students will recall from common knowledge what are hot and cold objects. They will learn to define temperature and measure it using a thermometer. They will learn the principle of working of a thermometer and the properties of liquids used in a thermometer. They will also learn about different types of thermometers.

Vocabulary:
Temperature, thermometer, Celsius, Fahrenheit, clinical thermometer, laboratory thermometer, digital thermometer

Period 3.1 : Hot and cold

LO: Students will be able to
- Differentiate between Hot and Cold
- Explain why touch is not a reliable method for knowing the temperature of an object.
- Define temperature

Hook: 4 minutes
The teacher brings a glass of very hot tea and a glass of cool drink to the class and places them on the table.
"Can you guess what these glasses contain?" (Take student responses)
"How do you know that the tea/coffee is hot and the other drink is cold?"(Take student responses)
"Through steam coming out of the hot drink and drops of water on the cool drink glass."
"Do you think it would be safe for me to touch the glasses? Why or why not?"(Take student responses)
It is not safe to touch hot objects as they might burn the skin.
"What would happen if I kept both these glasses on the table for a few minutes? Will they get hotter or cooler?" (Take student responses)
Students respond. The teacher takes student responses and explains that in this chapter We will be learning about heat and its effects as well as how it transfers.

Experience and reflection:
Have you observed how a hot drink like tea is kept hot in your house? Have you ever thought of where the heat comes from?

Explicit Teaching *(I Do)*	**Group Work** *(We Do*	**Independent Work** (You Do)

"We come across various hot and cold objects around us every day. Let us start by listing some of the hot and cold objects."

The teacher draws the following table (Table 3.1 in the textbook) and fills it in with the responses from the students. She can add more objects in the list by taking examples from students.

Object	Cold/cool	Warm/hot
Ice-cream		
Spoon in a tea cup		
Fruit juice		
Handle of a frying pan		

"Have you observed how an object is heated? For example, how is water heated at your home?"

Students may respond that a gas stove or electric stove is used.

"What is heat?" (Take student responses)

"Heat is a form of energy. As we know, energy can change from one form to another. When we use a gas stove, the chemical energy of the gas is converted to heat energy. In case of the electric stove, the electric energy is converted to heat energy."

"Let's now discuss how do we decide if an object is hot or cold?" (Take student responses)

"If we have 2 hot objects, how do we decide which is hotter than the other?"

The teacher takes students' responses and explains that most often we touch objects to know if they are hot or cold but we will learn through a simple activity whether or not it is a reliable measure.

CFU (Open ended/ Factual)

Factual CFUs

1. Name any 2 hot and cold objects.
2. Heat is a form of energy. True or False.

Open ended CFUs

"Now let's work in our groups for the next activity."

Before starting the activity, the teacher asks students to work in their groups and write in their notebooks:

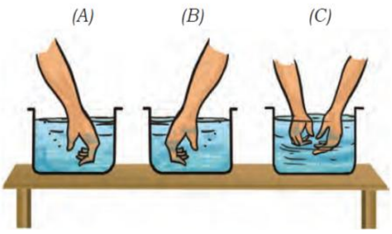
What do I *know* about heat?	What do I *want* to know about heat?

The teacher then gives students instructions for the next activity.

Activity 1 (Activity 3.1 in the textbook)

Each group is given 3 cups, A, B and C. Cup A has cold water, cup B has warm water and cup C has water at room temperature.

- Dip your left-hand index



finger in cup A and right-hand index finger in cup B for about 2 minutes.
- Now put both the index fingers simultaneously in cup C.
- Make a note of how each of the two fingers feel.
- Take turns in your groups to do the activity, so that every person in the group gets a chance to perform it and make their own observations.

The teacher allows time for students to complete the activity and then brings the class together and discusses their findings.

"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own."

Teacher writes down questions on the board and asks students to write their answers in the notebook.

1. Define temperature.
2. Explain why our sense of touch is not always a reliable method for knowing the temperature of an object.

1. If you put a metal spoon and a plastic spoon in the same cup of hot water, which gets hotter first? Why do you think so?	"You must have observed that your left finger which was dipped in cold water told you that the water in cup C is hot, whereas your right finger which was dipped in hot water told you that the water in cup C is cold. This happened because each hand was comparing its experience of dipping in C with the previous experience. Hence, we know that touch is not always a reliable measure of knowing if an object is hot or cold. " For a standard measure, temperature is used.	

Closing- 5 minutes

Teacher recalls the concepts taught:

"What concept did we explore today?"

"What are some ways in which we know if an object is hot or cold?"

"What is temperature?"

"What is the difference between heat and temperature?"

"Are there any other questions that you are curious to know more about?"

Students are given time to write their questions on the "Question corner" chart in the classroom.

Homework:

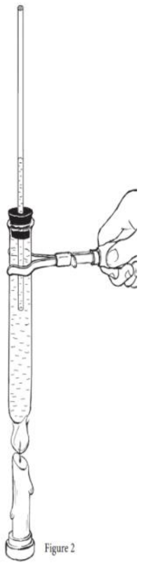
1. Observe the different objects at home. List any 5 hot and cold objects at your home. (Always check with an elder at home before tasting or touching anything.)

Period 3.2: Measuring Temperature

LO: Students will be able to

- Explain the working principle of a thermometer
- Measure temperature using a clinical thermometer

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "We learnt about hot and cold objects and the instrument used to measure temperature. Today we will learn a little more in detail about the thermometer and its working."	The teacher provides each group with a clinical thermometer and asks them to handle it very carefully. The teacher gives  instructions as to how to read the thermometer and how to hold the thermometer while reading.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook.

The teacher performs the following activity to show what happens to liquids when they are heated. **Activity 2:** (Teacher demo) For this activity, a boiling tube, a one-holed cork, glass tube and a candle are required.  Figure 2 ● Fill the boiling tube to the brim with water. ● Colour the water blue by mixing two drops of ink in it (That way you can easily see the water level in the glass tube.) ● Push the glass tube into the one-holed cork and fit the cork tightly into the mouth of the boiling tube as shown in the figure. Some water from the boiling tube will rise into the glass tube. ● Seal the cork with candle wax to prevent water from leaking out of the boiling tube. ● Mark the water level in the glass tube with your pen. ● Now hold the boiling tube upright over a candle flame and heat it continuously. ● Observe the water level in the glass tube carefully for five to ten minutes. The teacher takes students responses about what they observe and why does it happen.	"The clinical thermometer is used to measure our body temperature. A clinical thermometer consists of a long, narrow, uniform glass tube. It has a bulb at one end. This bulb contains mercury. Outside the bulb, a small shining thread of mercury can be seen. You will also find a scale on the thermometer. The scale we use is the Celsius scale, indicated by °C." **Activity 3** (Activity 3.2 in the textbook) Teacher guides the student groups to read the thermometer using the steps given in textbook on Pg. 50 - 51, **"Reading a Thermometer"**: "Have you ever touched the forehead of someone suffering from fever? How does it feel?" Students respond. "When a person has fever, the body temperature increases. You must have seen doctors check the temperature as soon as someone with fever visits them. The temperatures can go up by 6-7 °C and the doctor gives medicines to reduce the temperature as well as treat the cause of the fever."	1. Explain the working principle of a thermometer. 2. Draw a clinical thermometer and state its use. 3. What is the normal temperature of the human body? What happens when we have fever? **Closing- 6 minutes** Teacher recalls the concepts taught: "What did we do today?" "What is the working principle of a thermometer?" "What is a clinical thermometer and what is it used for?" "What is the unit of measurement of temperature?" "Are there any other questions that you are curious to know more about?" Students are given time to write their questions on the "Question corner" chart in the classroom. **Teacher assigns Homework:** 1. Your mother is worried about your sister having a fever. She uses a clinical thermometer to measure her temperature, which reads 38°C. What will you suggest your mother to do based on this temperature reading? 2. Find out from the elders at your home how fever was treated in their homes when they were young? What methods were used even earlier?

"We observed that the water rose up in the glass tube. This happens because liquids expand on heating. Some liquids are more sensitive than water, so that even for a small increase in temperature, the liquid rises. These liquids are used in thermometers to measure temperature. One example of such a liquid is mercury." **CFU (Open ended/ Factual)** Factual CFUs: 1. What happens to liquids when they are heated? 2. What happens to liquids when they are cooled? Open ended CFUs: 1. How do you think this the property of expansion of liquids on heating can be used in thermometers?		

Period 3.3: Measuring Body temperature

LO: Students will be able to

- List the properties of thermometric liquids
- Measures body temperature
- Recall the history of invention of thermometers
- Convert temperature between Celsius and Fahrenheit scales

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. The teacher recalls the concept of temperature and working of the thermometer. She recalls the experiment that was performed in the class and it was observed that water expands on heating. This principle of expansion of liquids is used in thermometers.	Let us now understand how the thermometer was invented. The teacher shows the following video: History of the thermometer: https://www.youtube.com/watch?v=rARnTlPax8E The teacher conducts a class discussion on the following questions:	"Thank you for engaging in the group discussion so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. List the properties of liquids used in thermometers.

"What do you think must be some properties of liquids used in thermometers? Think for a minute and share with your partner (think-pair-share activity)." After giving students time to discuss the teacher takes some responses. Then she elaborates the following properties of thermometric liquids: • It must be very sensitive to heat changes. • It must conduct heat very easily. • It should be opaque so that it can be seen clearly. • It should have a large range, that is, it should have a high boiling point and a low freezing point. • It should have a uniform rate of expansion, that is, if you heat the thermometer, the liquid inside will expand uniformly, making it rise higher and indicate the temperature. The teacher then explains that alcohol and mercury are commonly used as thermometric liquids. "Can you guess why?" The teacher takes a few student responses and explains: • Mercury is the only metal found in liquid state. It conducts heat well. • It is a shiny, white liquid and can be seen easily on the scale. • It does not stick to the wall of the thermometer. • It has a uniform rate of expansion. • It is highly sensitive to heat changes. • It can be easily obtained in pure form. • It also has a freezing point of (-39 $^{\circ}$C) and boiling point of (357 $^{\circ}$C) giving it a very wide range.	• How did the idea of the first thermometer come about? Why was it called a thermoscope and not a thermometer? • How did Galileo improve the design of the thermometer? • Which of the two scales do you think is more sensitive to small changes, Celsius or Fahrenheit? • We know that most countries in the world use the Celsius scale, but the USA uses Fahrenheit scale for temperature. What could be some of the disadvantages when all countries do not follow the same unit systems? After the discussion, the teacher explains the relationship between Celsius and Fahrenheit scales. She explains that the Celsius scale goes from 0°C to 100 $^{\circ}$C, whereas the Fahrenheit scale goes from 32°F to 212°F. She explains that the two temperature scales are related by the following equation: $\frac{\square - 0}{100} = \frac{\square - 32}{180}$ Hence, $^{\circ}$ F = 1.8 ($^{\circ}$C) + 32 $^{\circ}$C = 0.556 ($^{\circ}$F -32) The teacher demonstrates the following conversion of normal human body temperature from Celsius to Fahrenheit. C = 37 $^{\circ}$C,	2. Name any 2 liquids used as thermometric liquids. 3. Why should we exercise caution while using mercury as a thermometric liquid? 4. The weather report on the news says the temperature of your town was 35 $^{\circ}$C. What would the temperature of your town be in $^{\circ}$F?

"But the greatest disadvantage of the mercury thermometer was that mercury itself is poisonous and in case the thermometer breaks, the mercury could be accidently touched or ingested. Hence, it was unsafe to be used at homes. These days, we have digital thermometers that are used in hospitals and you must have seen the temperature sensors used during the Covid period. We will discuss more about types of thermometers in the next class." **CFU (Open ended/ Factual)** Factual CFUs: 1. Which liquids are commonly used as thermometric liquids? 2. What are some properties of thermometric liquids? Open ended CFUs: *3.* Do you think water can be used as a thermometric liquid instead of mercury? Why or why not?	Substituting in the above equation, $\frac{37}{100} = \frac{\square - 32}{180}$ 37*1.8 = F-32 66.8 = F-32 66.8 + 32 = F, F = 98.6 ^oF ● Work in groups to find the temperature in ^oF if the temperature outside is 25 ^oC. The teacher can go around the class and help students to work in their groups and clear any doubts. If time permits, the teacher can do the following problems additionally: 1. During summer, the temperature of a town was recorded to be 42^oC. What would be the temperature in ^oF? 2. Your friend is feeling feverish and when she recorded her temperature, she saw that it was 102 ^oF. What will the temperature be in ^oC?	

Closing-
Teacher recalls the concepts taught:
"What concept did we explore today?"
"Why are alcohol and mercury used as thermometric liquids?"
"Are there any other questions that you are curious to know more about?"
Students are given time to write their questions on the "Question corner" chart in the classroom.

Homework:
Watch the weather report in the news and make a note of the maximum and minimum temperatures reported in your city/district for a week. What do you notice about the change in temperatures?

Period 3.4: Laboratory Thermometer - Activity 3.4

LO: Students will be able to
- Measure temperature using a laboratory thermometer
- Differentiate between laboratory thermometer and clinical thermometer

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class.  "We learnt about temperature and its measurement using thermometers. We learnt how a thermometer works and the different units of measurement used. Today, we will look at the types of thermometers. We already learnt about the clinical thermometer and how to read it." The teacher brings a cup of hot water and places it on the table. "Suppose we have to measure the temperature of this water. Can I use the clinical thermometer? Why or why not? " The teacher gives time for the students to think-pair-share. Then she takes a few student responses. Clinical thermometers can read temperatures only up to 42 ºC. This water might be at a higher temperature and if we use a clinical thermometer for it, it will break. Hence, we cannot use the clinical thermometer in this case.	The teacher divides students into groups and gives them instructions to perform the following activities using a laboratory thermometer. She explains that for taking readings using the thermometer, it must be held upright. The bulb should not touch the bottom of the container, it must be completely immersed in water.  **Activity 4** (Activity 3.4 in the textbook) in an interactive way with follow-up questions like below: ● ● Hold the thermometer vertically. ● Observe the movement of mercury in the thermometer. ● Wait till the mercury thread becomes steady. Note the reading. This is the temperature of water at that time. The groups are encouraged to discuss the following after the activity: Can you guess why the bulb should not touch anything else? (Take student responses) • Avoiding heat transfer from the container, Ensuring accurate reading Why should the thermometer be held upright and not tilted? • In a tilted position, the mercury or alcohol inside the thermometer may not rise properly, leading to incorrect temperature values. ● Compare the temperature of water recorded by each student in the group. Are there any variations in the readings? Discuss the possible reasons. o Possible reasons could be difference in thermometer handling,	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Explain why a clinical thermometer must not be used for measuring human body temperature. 2. Why is it advised not to hold the thermometer by its bulb while reading it? 3. Draw a labelled diagram of a laboratory thermometer. How does it function?

Introduction - thermometer.

The teacher explains that this thermometer can measure temperatures from -10 ºC to 110 ºC. The teacher **demonstrates** the measurement of the temperature of water and shows it to the students. She explains that this thermometer works in a similar way to the clinical thermometer, that is on the principle of expansion of liquids on heating. She then compares the clinical thermometer to the laboratory thermometer. "Do you think I can use the laboratory thermometer to measure the temperature of the human body? Why or why not?" The teacher gives students time to discuss and takes a few student responses. Then she explains that the clinical thermometer has a kink near the bulb. This prevents the temperature from falling when the thermometer is removed from my tongue. But in the case of the laboratory thermometer, the temperature reading falls as soon as the thermometer is removed from the water. "You will learn more about measurements using the laboratory thermometer in the next group activities." **CFU (Open ended/ Factual)** Factual CFUs:	o Environmental factors: If students take readings at different times, the water may have cooled slightly, leading to different results After the students have completed the activity, the teacher brings the class together and gives time for students to share their observations. **Activity 5** (Activity 3.5 in the textbook) ● Take some hot water in a beaker or a mug. ● Dip the thermometer in water. ● Wait till the mercury thread becomes steady and note the temperature. ● Now take out the thermometer from water. Observe carefully what happens now. After the students have completed, the teacher brings the class together and allows time for each group to share their work and observations. The teacher asks students to share what they noticed. "Did you notice that as soon as you took the thermometer out of water, the level of mercury began to fall? • This means that the temperature must be read while the thermometer is in water." If you have observed both the thermometers, what is the use of a kink in a mercury thermometer? • It prevents mercury levels from falling on its own. Please refer to the textbook on Pg.58. Let us also have another activity to observe more differences between a clinical and a laboratory experiment. **Activity 6** For this activity, the teacher gives each group a clinical thermometer and a laboratory thermometer. (If as many clinical thermometers are not available, the teacher can provide images of both for comparison.) "In this activity, you are going to compare the clinical and laboratory thermometer using the following guiding questions:	

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<td>
1. Which thermometer can you use for measuring the temperature of hot liquids?
2. How is the laboratory thermometer different from the clinical thermometer?
Open-ended CFUs
3. We do not measure the temperature of hot water generally. Where do you think it will be useful to measure the temperature of hot liquids? (ESR: In food industry and other chemical industries)
</td>
<td>
<table>
<tr><th></th><th></th><th>Clinical thermometer</th><th>Laboratory thermometer</th></tr>
<tr><td>1.</td><td>How it looks (Draw the thermometer</td><td></td><td></td></tr>
<tr><td>2.</td><td>Highest temperature it can record</td><td></td><td></td></tr>
<tr><td>3</td><td>Lowest temperature it can record</td><td></td><td></td></tr>
<tr><td>4</td><td>Liquid used in the thermometer</td><td></td><td></td></tr>
<tr><td>5</td><td>Method of measurement (position, way of contact)</td><td></td><td></td></tr>
<tr><td>6</td><td>Method of reading (eg. Reading while in contact/reading after removing contact)</td><td></td><td></td></tr>
<tr><td>7</td><td>What can it be used for?</td><td></td><td></td></tr>
<tr><td>8</td><td>Any other differences you noticed</td><td></td><td></td></tr>
</table>
After the students have completed, the teacher brings the class together and discusses their answers and clarifies any questions they have.
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Closing- 5 minutes

Teacher recalls the concepts taught:
"What concept did we explore today?"
"What is a laboratory thermometer? How is it different from a clinical thermometer?"
"Are there any other questions that you are curious to know more about?"
Students are given time to write their questions on the "Question corner" chart in the classroom.

Homework:

1. Go to a veterinary doctor (a doctor who treats animals). Discuss and find out the normal temperature of domestic animals and birds.
2. Write two similarities and two differences between a clinical thermometer and a laboratory thermometer.

Period 3.5: Measuring temperature of water with laboratory thermometer - Acivity 3.5

LO: Students will be able to

- list the different types of thermometers currently being used
- measures the temperature of water with laboratory thermometer
- Makes their own thermometer

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)

The teacher recalls the concepts taught in the previous class. “In the previous class, we learnt about the laboratory thermometer. We also learnt about how it is different from a clinical thermometer. Now, let us look at some other thermometers which you might have seen commonly around you.” The teacher can get a digital thermometer and infrared thermometer and show them to the students. Disadvantages of Mercury based thermometers: “We saw the mercury-based clinical thermometer that we used to measure our body temperature. But we saw that it has mercury which is toxic, hence making it unsafe to use and also it is difficult to dispose off the mercury if the thermometer breaks. To avoid these and for better accuracy, doctors use digital thermometers these days. **Digital Thermometers:** These thermometers can be placed on the tongue or armpits.  “Do you think these thermometers have any thermometric liquid in them?” (Take student responses) The bulb has a substance that is sensitive to heat. You will learn about resistors in higher classes. These sensors will lead to changes in the voltage, current, or resistance (ability to conduct electricity) when there is a change of temperature. This is then read and displayed on a digital screen. **Infra-red thermometer:** The teacher shows the infra-red thermometer and asks students when and where they have seen it? (Take student responses)	The teacher divides students into groups and gives instructions for the following activity. “We learnt about different kinds of thermometers. Though we cannot make a digital or infra-red thermometer model in class, we can make a model of a liquid-based thermometer.” **Activity 7:** “Now in your groups, you are going to make your own thermometers. For this you will be given, a clear straw, a small bottle, ink, water, scale, sketch pens, play-dough/modelling clay, an ink dropper and an (alcohol-based) sanitizer/ rubbing alcohol. (Video reference for activity: https://www.youtube.com/watch?v=rtsq-l0AxbY) Initial s**et-up:** ● Use the sketch pen to mark the straw, from the bottom up, at half-centimetre intervals. These will serve as level marks on your thermometer. ● Take a round, flat piece of clay, bigger than the neck of your bottle. Use your straw to punch a hole in the middle of this round piece of clay, just big enough to allow the straw to go through. Remove any clay clogging the straw. ● Add rubbing alcohol to the bottle, filling it about a third to halfway up. Add a few drops of ink to make it easier to see. ● Open the bottle and fill the dropper with the coloured rubbing alcohol. Carefully set the dropper aside.	“Thank you for engaging in the group activity so well. I saw some interesting responses. Now it’s time for you to work on your own.” Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What are the advantages of using digital and infrared thermometers? 2. Why do you think doctors do not use infrared thermometers instead of digital thermometers? 3. Among the 4 thermometer types that you have learnt about, which can be used for the following: (i) measuring your temperature at the doctor’s office (ii) measuring the temperature of a person suffering from a communicable disease (a disease which can spread upon contact). (iii) measuring the temperature of hot water before using it in the kitchen

“Another kind of thermometer which you would have seen is the Infra-red thermometer. These thermometers were very common during the Covid time. These can sense the temperature without any contact. You must have seen that they can be read against one’s forehead or hand.  These work by detecting the heat emitted by our bodies.” The teacher can show this short video on how it works (the teacher need not explain the terms used in the video) How an infrared thermometer works (1 minute video): https://www.youtube.com/watch?v=cIbteXkAFxw The teacher can then take responses from students and ask them if they have seen any different kind of thermometers used and where they have seen them being used. **CFU (Open ended/ Factual)** Factual CFUs: 1. Name the different types of thermometers used nowadays. 2. Why is a digital thermometer better than a mercury-based thermometer? Open ended CFUs: 1. Why do you think infra-red thermometers were used during the Covid period?	• Poke the straw through the hole in your modeling clay and place the clay on the bottle's neck so the straw hangs into the bottle. Adjust the straw so the end is immersed in the liquid, but does not touch the bottom of the bottle. The majority of the straw will be sticking out from the bottle. • Use the clay to seal the bottle opening in an airtight manner and hold the straw in place. • Drip the content of your dropper —drop by drop— into the straw. What happens when the water is dripped into the straw? Make a note of your obs**ervations.**  • **Behaviour in colder environments:** • If your seal is airtight, no air can flow out of the bottle to make room for additional liquid, so the liquid drops down the straw and forms a column. If this is not the case, ensure that the seal is airtight and repeat the steps. • The fluid level in the column should reach about midway up the visible part of the straw. • Observe the fluid level in the straw. This level indicates room temperature. • Add cold water to a bowl. Place ice cubes in the water so the water cools. Place your thermometer reservoir in the ice-cold water and let the thermometer adjust to its new situation.	

	● Mark the level of the liquid in the narrow tube. What is the change that you see in the level of water when placed in cold water? Make a note of your observations..  **Behaviour in hotter environments:** ● To test what happens if the reservoir is warmed up, hold your hands around the bottle and observe the results. Be patient, as it might take time for the fluid in the reservoir to adjust to its new situation. ● Alternately, you can place your set-up in a bowl of warm water. ● Observe what happens when the set-up is kept in warm water. Make a note of your  observations.	

Closing- 5 minutes

Teacher recalls the concepts taught:
"What concept did we explore today?"
"What are some different types of thermometers?"

Homework:

1. Go to a doctor or your nearest health centre. Observe the doctor taking temperature of patients. Enquire:
   (a) Why she dips the thermometer in a liquid before use.
   (b) why the thermometer is kept under the tongue.
   (c) whether the body temperature can be measured by keeping the thermometer at some place other than the mouth.
   (d) whether the temperature of different parts of the body is the same or different.
   You can add more questions which come to your mind.
2. Make a simple thermometer at home. Draw your model in your notebook.

Assessment of Concept 1: Temperature and its measurement

I. Choose the correct answer: (LO 1, 2)

1. Paheli and Boojho measured their body temperature. Paheli found her's to be 98.6 °F and Boojho recorded 37°C. Which of the following statement is true?
   (a) Paheli has a higher body temperature than Boojho.
   (b) Paheli has a lower body temperature than Boojho.
   (c) Both have normal body temperature.
   (d) Both are suffering from fever.
2. A New liquid is tested to decide whether it is suitable for use in a liquid-in-glass thermometer. It is found that the liquid does not expand uniformly with temperature. What will be the effect of this on the scale of the thermometer?
   (a) It has a short range.
   (b) It is not linear.
   (c) The markings are too close together.
   (d) The markings are too far apart.

II. Answer the following:

1. Explain why our sense of touch is not a reliable of measuring temperature. (LO 3)
2. Define temperature. (LO 1)
3. State the similarities and differences between the laboratory thermometer and the clinical thermometer. (LO 4)
4. Give reasons: (LO 3,4)
   (i) A clinical thermometer cannot be used to measure the temperature of boiling water.
   (ii) A laboratory thermometer cannot be used to measure body temperature.
5. List the properties of thermometric liquids. (LO 2)
6. Draw and explain how you make a simple model of a thermometer (LO 2).

Students will practice Worksheet-1:
https://docs.google.com/document/d/1mkYh075R6eXG5JuTJTHWOXNYOU_dR8C1/edit?pli=1

Concept 2: Transfer of heat

Teaching Learning Process

LO: Students will be able to

- *Conduct* an experiment to observe transfer of heat by conduction
- *Classify* objects as good and bad conductors of heat
- *Explain* heat transfer by convection and radiation
- *Compare* conduction, convection and radiation
- *Justify* the kinds of clothes we wear in summer and winter

Induction/Introduction

In this concept, students will learn about heat transfer. They will learn about heat transfer through conduction, convection and radiation. They will learn about good and bad conductors of heat. They will also learn to justify why we wear certain kinds of clothes in summer and winter.

Vocabulary:

Heat transfer, conduction, convection, radiation

Period 3.6: Transfer of heat by conduction, convection and radiation.

LO: Students will be able to

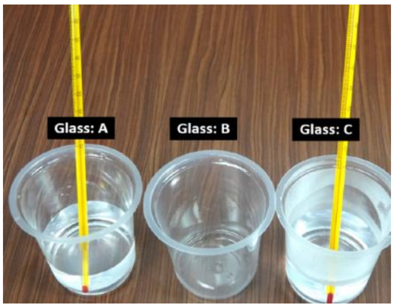
- Conduct an experiment to observe transfer of heat by conduction
- Differentiate between conduction, convection and radiation.

Hook: 4 minutes

Activity 8: Ice Cube Race

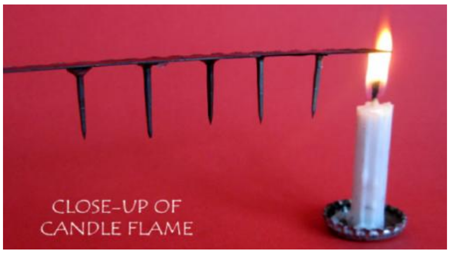
Experience and reflection:

Have you observed the different kinds of utensils used in the kitchen at your home? Why do you think it is easier to stir a bowl of hot soup with a wooden ladle rather than a metal ladle?

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. “Now we will investigate how heat moves between different objects.” “Have you observed that a frying pan becomes hot when kept on a flame? It is because the heat passes from the flame to the utensil. When the pan is removed from the fire, it slowly cools down. Why does it cool down? The heat is transferred from the pan to the surroundings.” “Today, we will investigate how heat moves between different objects.” “From the given examples, can you guess what is the direction of heat transfer?” “We will observe heat transfer more closely with an experiment.” **Activity 9:** (Activity 3.6 in the textbook) (Teacher demonstration) 1. Nail one end of a hack-saw blade into a wooden stand or place it between two bricks. 2. Fix shoe-tack nails on the underside of the hack-saw blade using molten wax.	The teacher divides students into groups. The teacher gives instructions for the following activity. **Activity 10:** ● Take 3 glasses A, B and C. In glass A pour cold water. In glass C, pour the same amount of hot water. ● Measure and record the temperature of water in each of the two glasses with the help of a  thermometer.	“Thank you for engaging in the group activity so well. I saw some interesting responses. Now it’s time for you to work on your own.” Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Define conduction. 2. What are the necessary conditions for conduction of heat to occur? 3. One litre of water at 30°C is mixed with one litre of water at 50°C. The temperature of the mixture will be (a) 80°C (b) more than 50°C but less than 80°C (c) 20°C (d) between 30°C and 50°C 4. An iron ball at 40°C is dropped in a mug

3. Place a lit candle under the free end of the blade.

4. As heat is conducted along the length of the blade, the wax melts, and the nails fall off one after another. Ask students to observe the time taken for each nail to fall and



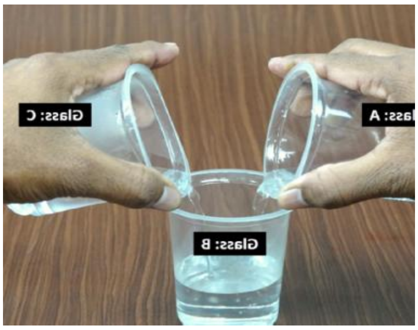
make a note.

5. It takes a slightly longer time for the nails further away from the candle to fall off. This is because heat is also dissipated into the atmosphere.

The teacher asks the student following questions while demonstrating the activity:

- o Which nail falls first?
- o What can we conclude from this?

- Pour the water from both glass A and C into glass B. Before measuring the temperature, write down your guess of what the temperature of water in glass B will be.



- Measure the temperature of water in glass B and see how it compares with what you guessed.

The teacher asks students to discuss the following questions in their groups.

1. What are the temperatures of water in all the three beakers?
2. Why is the temperature of the hot and cold water mixture not hotter or colder than the original beakers?

After students complete the activity, the teacher brings the class together and discusses their findings.

The teacher explains that when hot water and cold water are mixed with each other, heat exchange takes place. Hot water gives heat energy to cold water and decreases its temperature whereas cold water receives that energy and increases its temperature. Therefore, the temperature of the mixture lies in the temperature range of hot and cold water.

“From this and the previous activity, can you tell me what are the two conditions necessary for heat transfer to happen?”

containing water at 40°C. The heat will

(a) flow from iron ball to water.
(b) not flow from iron ball to water or from water to iron ball.
(c) flow from water to iron ball.
(d) increase the temperature of both.

○ Instead of the hacksaw blade, if we use a glass rod, what do you think will happen? The teacher takes student responses and discusses and elaborates on the process. The teacher defines **conduction** as the process by which heat is transferred from a hotter object to a colder object. **CFU (Open ended/ Factual)** Factual CFUs: 1. Define conduction. 2. In which direction does heat get transferred? Open ended CFUs: **2.** What do you think will happen when two objects at the same temperature are in contact? Will there be any heat transfer between them? What will happen to the heat in them? ○ There will be no heat transfer between the objects as heat flows from warmer to cooler objects. The heat could flow into the surrounding air.	The teacher gives students time to discuss in their groups and then takes some student responses. The teacher then elaborates the 2 conditions necessary for conduction of heat: 1. The two objects must be in contact with each other. 2. The temperature of the two objects should be different.	

Closing- 5 minutes

Teacher recalls the concepts taught:

Summary:

"What concept did we explore today?"

"What is conduction?"

"Recall where you have observed heat transfer by conduction in your daily life."

Homework:

- Try this at home. If you leave a metal spoon in a hot cup of coffee or soup, what happens to the handle of the spoon? Why does this happen?
- When you open the door of the fridge, the outside of the fridge gets warm. Why does this happen?

Period 3.7: Conduction of heat by different materials

LO: Students will be able to

- Define conductors and insulators of heat
- Classify substances as conductors or insulators of heat

Explicit Teaching/Teacher Modelling *(I Do)*

Teacher recalls the concepts taught in the previous class.

"We learned about conduction and heat transfer through it. In this class, we will learn more about conduction."

"I had asked the homework question: When you open the door of the fridge, the outside of the fridge gets warm. Why does this happen? " (Take student responses.

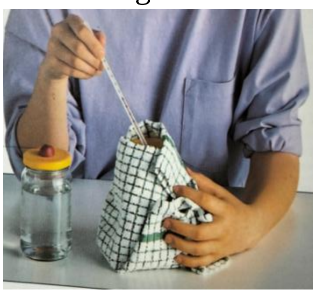
The refrigerator works to maintain a cooling environment through a heat exchange process. Refrigerators work by transferring heat from the inside (the fridge compartment) to the outside (usually the back or bottom of the fridge). They do this using a refrigeration cycle that involves a compressor, condenser coils, and refrigerant.

When you open the fridge door, warm air from the room rushes in, and the fridge's cooling system works harder to remove that heat and bring the temperature back down. To accomplish this, the compressor and condenser are active, and they expel heat outside the fridge, which is why the outside feels warm."

"Let us recall what kind of clothes we wear in winter. We wear warm clothes like woollen sweaters and scarfs. How do you think these help us?
Let us try a simple activity and check for ourselves.

Activity 11 (Teacher demo)

- Take 2 glass bottles with a hole in the lids small enough to insert a



  laboratory thermometer. Seal the gaps with modelling clay.

Group Work *(We Do)*

The teacher divides students into groups. The teacher gives instructions for the following activity and asks students to do the experiment carefully since they will be working with warm water.

Activity 12 (Activity 3.7 in the textbook)

- Take hot water in a beaker.
- Collect some articles like a steel spoon, plastic scale, pencil, compass etc.
- Dip one end of each of these in the hot water.
- Wait for a few minutes.
- Touch the other end.
- Enter your observations in the table below:

Object	Material it is made of	Does the other end get hot? Yes/No
Scale	Plastic	
Spoon	Metal	

After giving students time to complete the activity and enter their observations in the table, the teacher brings the class together and discusses the findings.

- Which objects got hot? What are they made of?
- Which objects did not get hot at all?What are they made of?

Independent Work (You Do)

"Thank you for engaging in the group activity so well. Now it's time for you to work on your own."

Teacher writes down questions on the board and asks students to write their answers in the notebook.

1. What are conductors? Give examples.
2. What are insulators?Give examples.
3. Shopkeepers selling ice blocks usually cover them with jute sacks. Explain why.
4. To keep her soup warm Paheli wrapped the container in which it was kept with a woollen cloth. Can she apply the same method to keep a glass of cold drink cool? Give reason for your answer.

• Fill half the bottles with warm water at the same temperature. • Close the lids with the thermometer in them. • Cover the second bottle with a woollen scarf. • Measure the temperature of the water in the bottles at the start of the activity. • Measure the temperature of the water in the bottles after every 2 minutes. "What do you notice is happening?" "You can see that the temperature reduces very slowly in the second bottle compared to the first bottle. This is because the woollen scarf prevents the heat from escaping. It does not allow heat to pass through it. This is an example of an **insulator.** An insulator does not allow heat to pass through it easily. The materials which allow heat to pass through them easily are called **conductors.**" "Can you give me examples of conductors? I will give you a hint, you must have observed these being used in the kitchen." The teacher takes students responses. "Stainless steel and copper utensils, metal spoons etc. are good conductors of heat. Now, you will be performing an activity in your groups to classify objects into conductors and insulators" **CFU (Open ended/ Factual)** Factual CFUs: 1. What are conductors? Give examples. 2. What are insulators? Give examples. Open ended CFUs: 1. How does wearing a sweater help you on a winter day?		

Closing- 5 minutes

Teacher recalls the concepts taught:

"What concepts did we explore today?"

"What are conductors?"

"What are insulators?"

"Are there any other questions that you are curious to know more about?"

Students are given time to write their questions on the "Question corner" chart in the classroom.

Homework:

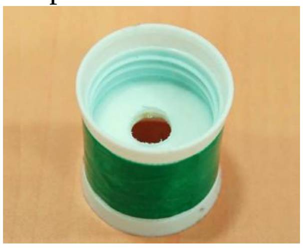
1. Try this at home. Place an ice cube on top of different materials(or wrap the ice cube in each material) like a cotton cloth, an aluminium foil, plastic bag, woollen cloth etc and leave them in a warm area for 30 minutes. Which material kept the ice cubes coldest? What can we conclude from this about the heat transferring capacity of different materials?
2. Pour some hot water in a metal cup and a ceramic cup. Observe which one stays hot for a longer time. Write down your observations. What can you conclude about these two materials in terms of the way they conduct heat?
3. Please bring two sturdy same plastic bottles from home for the activity for the next class. (one person per bench)

Period: 3.8 – Convection

LO: Students will be able to

- Describe how land and sea breezes occur
- Understands the applications of radiation in daily life

Explicit Teaching/ Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "In the last class, we learnt about conductors and insulators. We learnt how heat is transferred between solids. But what about air and water? Today, we will explore how heat transfer happens through air and water." The teacher performs the following activities. **Activity 13** (Activity 3.8 in the textbook) ● Take a round bottom or beaker. ● Fill it two-thirds with water. ● Place it on a tripod, or make some arrangement to place the flask in such a way that you can heat it by placing a candle below it. ● Wait till the water in the flask is still.	Teacher divides students into groups and gives them instructions for the below activity. (For this experiment, each group will need two sturdy  plastic bottles with caps, hot water, cold water, ink/dye, a pair of scissors, glue, tape) **Activity 15**	"Thank you for engaging in the group activity so well. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is convection? 2. Describe a simple experiment to observe convection. 3. How are sea and land breezes formed in coastal areas?

• Place a crystal of potassium permanganate at the bottom of the flask gently using a straw. • Now, heat the water by placing the candle just below the crystal.  (If potassium permanganate is not available in the school, the teacher can also perform this experiment with tiny bits of colour paper/sawdust/ chalk powder. When the water is heated, the bits of paper can be seen rising to the surface.) "What do you observe?" The teacher takes some student responses. "When water is heated, the water near the flame gets hot. Hot water is lighter when compared to cold water and rises up. The cold water from the sides is heavier and hence moves downwards. As the cold water now comes in touch with the source of heat, this water also gets hot and rises and water from the sides moves down. This process continues till the whole water gets heated. This mode of heat transfer is known as **convection.**" "Now let us see if convection happens in air as well and if it is similar or different to this." **Activity 14** (Video reference for the teacher: https://www.youtube.com/watch?v=k7FN-GQLxIQ) (This experiment must be performed where there is minimal air current. It should not be performed in a windy area or in a room where there is an Air conditioner On) • Empty the contents of a tea bag into a container. We only require the outer paper bag. • Open or cut the closed end of the tea bag. • Place the cylindrical paper bag vertically upright in a dish.	• Using the tip of a pair of scissors, make a hole in the caps of the two plastic bottles.  • The diameter of both holes should be ~ 1 cm. • Align the two holes and glue the caps together. • Secure the two caps further with tape. • Fill one bottle completely with cold water. Fill the other bottle with coloured hot water. (Because the hot water is coloured, its path through the colourless cold water would be clearly visible.) • Close the bottle with hot water in it. Cover the bottle with cold water with a hand and flip it over and place it inside the upturned lid. Seal it closed carefully.	

- Using a matchstick, light the upper edge of the tea bag cylinder on fire.

- The bag will burn quickly. (Ensure that safety precautions are followed throughout the activity.)
- The flames heat up the air directly above it, creating a convection current.
- As the bag continues to burn and becomes smaller and lighter, it gets lifted up.

"Why do you think the paper got lifted up? Think about it and discuss with the person sitting next to you."

The teacher gives time for the students to think and discuss. Then she takes a few student responses.

"The tea bag is very light. When it is heated, the air above it gets heated and rises up. The cool air from the surrounding comes in to take its place. This causes the paper to get lifted."

"These convection currents are responsible for a very interesting phenomenon experienced by people living in coastal areas like Vishakapatnam. During the day, the land gets heated faster than the water. The air over the land becomes hotter and rises up. The cooler air from the sea rushes in towards the land to take its place. The warm air from the land moves towards the sea to complete the cycle. The air from the sea is called the **sea breeze**.

- Note down your observations.

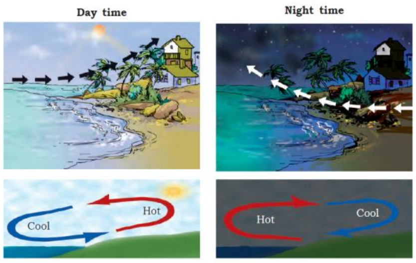
After giving students time to discuss, the teacher brings the class together and discusses their observations.

Discussion questions:

- What happened to the hot water in the lower bottle?
- Why did the water in the upper bottle get coloured? Why do you think this happened?

"You must have observed that the hot water rises up slowly in the top bottle. The warm coloured water can be seen moving up. This is because the hot water is less dense than cold water and is able to

rise through the hole. Cold water being denser comes down. "

 At night it is exactly the reverse. Water over the sea is warmer as the water  cools down more slowly than the land. So, the warm air over the sea moves towards land and the cool air from the land moves towards the sea. This is called the **land breeze**. (Figure 3.11 in the textbook) **CFU (Open ended/ Factual)** Factual CFUs: 1. What is convection? 2. What causes sea breeze during the day? Open ended CFUs: 3. Imagine you are heating a pot of water on the stove. How would you explain the movement of the water as it heats up?		

Closing- 5 minutes

Teacher recalls the concepts taught:

"What concept did we explore today?"

"What is convection?"

"Give some examples of convection in daily life."

"Are there any other questions that you are curious to know more about?"

Students are given time to write their questions on the "Question corner" chart in the classroom.

Homework:

Observe what happens when water is boiled at home.

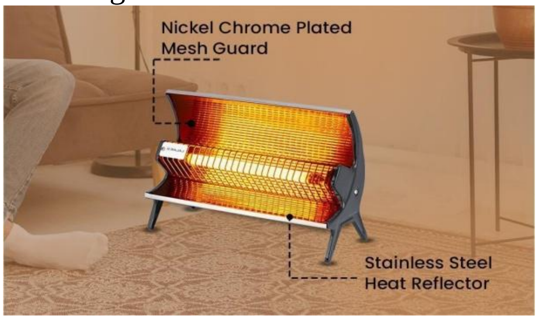
Describe how the water moves? Why does this happen?

Period: 3.9: Kinds of cloths we where in summer and winter

LO: Students will be able to

- Explain the process of radiation
- list the applications of radiation in daily life

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. The heat from the sun reaches us by a process called **radiation**. Heat transfer through radiation does not require any medium. Hence radiation can be defined as the process of transfer of heat from a hotter body to a colder body without heating up of the medium. Have your elders ever told you not to wear black or very dark clothes during summer? Why do you think they say so?" The teacher takes a few student responses. "Let us do a few activities to understand what could be the reason behind this." The teacher performs the following activity: . **Activity 16**  • Place black and white papers of the same thickness out in the sun. • Using a magnifying glass, focus sunlight on a point on white paper. Using a stopwatch, measure the time it takes for the paper to start burning. • Repeat this process using black paper and compare the time required for both papers. • Perform this activity for different coloured papers. "What did you observe? Why do you think the papers took different times to burn?" The teacher allows time for students to think and discuss and then takes a few student responses.	Teacher divides students into groups and gives them instructions for the following activities **Activity 17** (Activity 3.10 in the textbook) • Take two identical cans. • Paint the outer surface of one black and the other white. • Pour equal amounts of water in each and leave them in the sun for a few minutes. • Measure the temperature of water in both the cans. • Note down your observations. Alternatively, the teacher can keep the cans in the sun for a few minutes before the class and keep them ready for the discussion. • Is there a difference in the temperature of water in the cans? Which can feels warmer? After giving students time to perform the activity and discuss, the teacher brings the class together and discusses their observations. "Let us perform another activity with the same cans." **Activity 18** (Activity 3.11 in the textbook) • Empty the cans used in the previous activity and fill them will hot water at the same temperature. • Leave the cans in a corner of your classroom for a few minutes. • Now, measure the temperature of water in both the cans. • Note down your observations.	"Thank you for engaging in the group activity so well. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Explain what is meant by radiation. 2. List a few applications of radiation in our daily life. 3. Why should we wear light coloured clothes in summer and darker clothes in winter? 4. At a camp site there are tents of two shades – one made with black fabric and the other with white fabric. Which one will you prefer for resting on a hot summer afternoon?Give reason for your choice. Would you like to prefer the same tent

"You must have observed that the black paper burnt faster. That is because it absorbs more heat by radiation. Other dark colours, closer to black also tend to absorb more radiation than lighter colours. This is why dark-coloured clothes must be worn in winter as they are able to trap and retain more heat and light-coloured clothes must be worn in summer as they absorb less heat." "This principle is also applied in room heaters. They have polished reflectors at the back of the heating element, so that they reflect most of the heat, without absorbing it themselves.  Similarly, the base of a cooking utensil is painted black, so that it absorbs heat and cooks faster. Radiators of cars and air conditioners are painted black so as to radiate maximum amount of heat and produce cooling effect." **CFU (Open ended/ Factual)** Factual CFUs: 1. What is radiation? 2. What are some applications of the principle of radiation in our lives? Open ended CFUs: 1. When you stand outside on a sunny day, you feel warm even if the air temperature is cool. How does radiation explain this?	Alternatively, the teacher can keep the cans near the window for a few minutes before the class and keep them ready for the discussion. ● Is there a difference in the temperature of water in the cans? Which can feels warmer? After giving students time to perform the activity and discuss, the teacher brings the class together and discusses their observations. "In both the experiments above, you would have observed that a can painted black gets hotter and the water in that can is hotter than the other can. This is because when sunlight strikes a black surface, a large portion of that energy is absorbed and converted into heat, raising the temperature of the surface. When sunlight hits a white surface, a significant portion is reflected back, and only a small amount is absorbed. As a result, the surface stays cooler compared to a black surface." The teacher can also take this time to clear any questions children have.	during winter?

Closing- 5 minutes

Teacher recalls the concepts taught:
"What concept did we explore today?"
"What is radiation?"
"What kind of clothes should we wear in summer? Why?"
"Are there any other questions that you are curious to know more about?"
Students are given time to write their questions on the "Question corner" chart in the classroom.

Homework:

1. Observe if there are any solar panels near your home. If not, you can look at pictures of solar panel on the internet. How is the principle of radiation used in solar panels?
2. Perform the following experiment at home and answer the questions that follow:
   Experiment: Sun & Color Heat Test
   Materials: 2 empty plastic bottles (or paper cups),Black and white paper or cloth

Period 3.10: Summarizing the Lesson

Period 3.11:

Worksheet -2: https://docs.google.com/document/d/1L2yqv_TVGKtZP207DIwRO-x_V03slBEc/edit?pli=1
Worksheet -3:
https://docs.google.com/document/d/1N_t4h4fi50U3cL9n00dseR7F2OjVTCS6/edit?pli=1

Period 3.12: Remedial Teaching

Period 3.13: Remedial teaching:

Teacher's Diary

<table>
<tr><td colspan="4">Name of the Teacher:</td><td colspan="2">Name of the
Month:</td></tr>
<tr><td colspan="4">Name of the Lesson:</td><td colspan="2">Class:</td></tr>
<tr><td>Peri od No</td><td>Name of the Concept to be taught</td><td>Date</td><td>Activities Conducted during the teaching</td><td>TL M Used</td><td>Remarks</td></tr>
<tr><td>3.1</td><td>Hot And Cold, Activity 3.1</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.2</td><td>Meassuring Temperature</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.3</td><td>Activity 3.3,</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.4</td><td>Activity 3.4 Laboratory Thermometer</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.5</td><td>Activity 3.5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.6</td><td>Transfer Of Heat , Activity 3.6</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.7</td><td>Activity 3.7</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.8</td><td>Activity 3.8, Activity 3.9 Convection</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.9</td><td>Kinds Of Clothese We Wear In Summer And Winter</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.10</td><td>Summarizing The Lesson</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.11</td><td>Student Independent Practice</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.12</td><td>Remedial Teaching Period</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.13</td><td>Remedial Teaching Period</td><td></td><td></td><td></td><td></td></tr>
</table>

1.	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?
2.	Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
3.	What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
4.	How well did I adjust my teaching based on student reactions or unforeseen challenges?

Head Teacher's Signature Teacher's Signature

Head Teacher's Suggestions:

Teacher's reflections:

August 2025

No bag Day | Cluster Complex | Teacher Resources

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 4.1	2 No Bag Day
3 Sunday	4 FA - 1	5 FA - 1	6 FA - 1	7 4.2	8 Vara Lakshmi Vratham	9 Second Saturday
10 Sunday	11 4.3, 4.4	12 4.5	13 4.6	14 4.7	15 4.8, 4.9	16 Sri Krishna Ashtami
17 Sunday	18 4.10	19 NI	20 NI, NI	21 NI	22 5.1	23 No Bag Day Cluster meeting
24 Sunday	25 5.2, 5.3	26 5.4	27 Sri Vinayaka Chavithi	28 5.5	29 National Sports day 5.6	30 No Bag Day
31 Sunday						

Week1:	4.1
Week 2:	FA - 1, 4.2
Week 3:	4.3 – 4.9
Week 4:	4.10, 5.1
Week 4:	5.2 - 5.6

TEACHER'S NOTES

Lesson Plan:

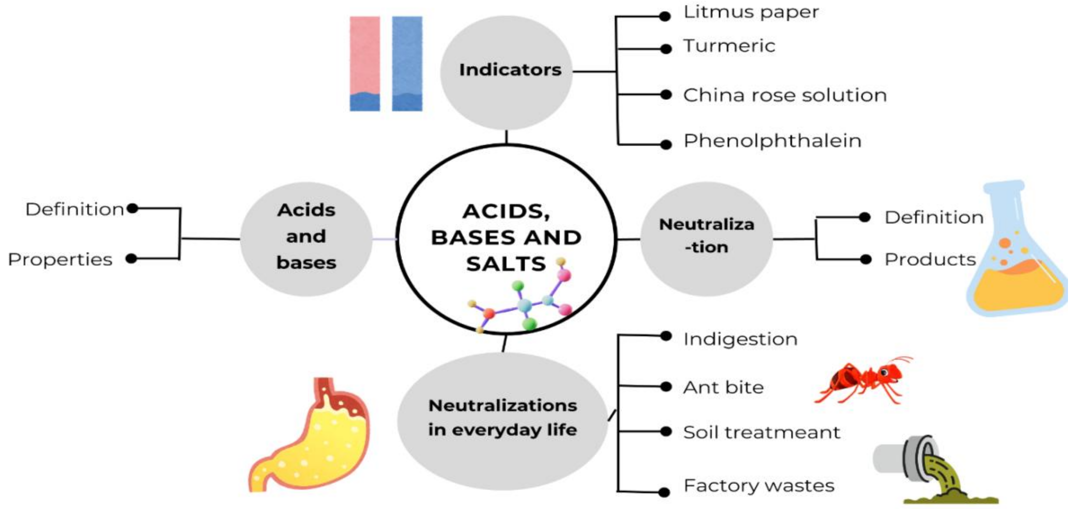
4. Acids, Bases and Salts

T9N3C2

Learning Outcomes: Students will be able to to -

1. *define* acids and *list* sources of acids in daily life
2. *define* bases and *list* sources of bases in daily life
3. *outline* the general properties and uses of acids and bases
4. *explain* the occurrence of acid rains
5. *define* indicators and *investigate* which substances can be used as indicators
6. *differentiate* between acids and bases using indicators
7. *describe* neutralization reactions
8. *explain* the importance of neutralisation in everyday life

Mind- map



Synopsis:

Acids and bases:

- **Acids** are sour in taste. Examples are lemon juice, vinegar etc.
- **Bases** are bitter in taste and soapy to touch. Examples are soaps and detergents.
- Substances that are neither acidic nor basic are **neutral.**

Indicators:

- **Indicators** are chemicals that are used to test if a given substance is acidic, basic or neutral.
- The most common indicator is Litmus paper obtained from Lichens.
- Acids turn blue litmus paper red and bases turn red litmus paper blue.
- Turmeric can also be used as an indicator. It turns red on coming in contact with a basic solution.
- China rose solution is also used as an indicator. It turns dark pink/red with acids and green with bases.
- Phenolphthalein is a synthetic indicator. It turns pink with a basic solution and remains colourless with an acid.

Neutralization:

- The reaction between an acid and a base is called neutralization.
- Salt and water are produced in this reaction along with the evolution of heat.

Neutralization in everyday life:

- Indigestion is caused due to excessive acid in the stomach. It is cured by using antacids that have basic components. These neutralize the acid in the stomach, thus providing relief.
- When an ant bites, it injects formic acid that causes irritation. This is neutralized by the application of baking soda.
- Excessively acidic or basic soil is not conducive for plant growth. Hence fertilizers or organic matter is used to neutralize the soil.
- Factory wastes are acidic in nature and if untreated can harm the living organisms in the water bodies where they are discharged. Hence, they must be neutralized by treating with basic substances.

Chapters and Concepts

Period. No	Topic	Remarks
4.1	Introduction, Acid And Basis	
4.2	Natural Indicators Around Us - Litmus (Activity 4.1)	
4.3	Activity 4.2 Turmeric Is Another Natural Indicator	
4.4	China Rose As Indicato Ractivity 4.3	
4.5	Identification Of Acids And Bases With Indicators	
4.6	Acid Rains	
4.7	Neutralisation - Activity 4.5	
4.8	Neutralisation In Everyday Life, Antacids	
4.9	Neutralisation In Everyday Life - Soil Treatment	
4.10	Neutralisation In Everyday Life - Ant Bite	
4.11	Summarizing The Lesson	
4.12	Student Independent Practice	
4.13	Remedial Teaching Period	
4.14	Remedial Teaching Period	

Prior Concept/ Skills: *(Essential concepts and skills to be check before teaching the concept.)*

- We use many chemicals in daily life.
- Different materials/substances have different properties.

Teacher References: *(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)*

- NCERT Class 7 Textbook
- Bal Vaigyanik class 6, Eklavya (chapter 13, Gases)
- Bal Vaigyanik Class 7 Eklavya (chapter 13, Gases): https://www.eklavya.in/pdfs/Books/HSTP/Bal_Vaigyanik_Current_Edition/Bal_vaigyanik_Class_7_English/Bal_Vaigyanik_Class_7.pdf
- Bal Vaigyanik Class 8, Eklavya (Chapter 7, The mutual relationship of acids and bases)
- Chemistry for Every kid book: https://www.arvindguptatoys.com/arvindgupta/chemistry-janice.pdf

Teaching Learning Material (TLM):

- Period 1:
  - ❖ collection of items used in daily life like toothpaste, soap, cold drink, salt, apple, plastic bag, tomato etc.
  - ❖ Acids and Bases video: https://www.youtube.com/watch?v=ivRczDkilAI
- Period 2:
  - ❖ Red Litmus paper, blue Litmus paper, Baking soda, lemon juice, slaked lime, sugar solution, tamarind juice, lemon pickle, washing soda, salt solution, milk for Activity 4
  - ❖ Lichens and litmus video: https://www.youtube.com/watch?v=StWoewqBjxI
- Period 3:
  - ❖ Stained handkerchief with curry stain, soap for Activity 1
  - ❖ Turmeric, paper, water for Activity 2
  - ❖ Baking soda, lemon juice, slaked lime, sugar solution, tamarind juice, lemon pickle, washing soda, salt solution, milk for Activity 2
- Period 4:
  - ❖ Hibiscus flowers, water, lemon juice, soap solution, test tubes for Activity 5
  - ❖ Hibiscus flowers, water, shampoo, lemon juice, soda water, sodium hydrogen carbonate solution, vinegar, sugar solution, salt solution, milk for Activity 6
  - ❖ Lemon juice, vinegar, cold drink, apple juice, coffee for Activity 7
- Period 5:
  - ❖ Litmus paper, turmeric paper, China rose solution, dilute hydrochloric acid, sulphuric acid, nitric acid, acetic acid, sodium hydroxide, ammonium hydroxide, calcium hydroxide for Activity 8
- Period 6:
  - ❖ Acid rain video: https://www.youtube.com/watch?v=1PDjVDIrFec
  - ❖ Image link acid rain: https://www.epa.gov/sites/default/files/2020-05/acidrainpathway.png
  - ❖ 3 cups, distilled water, vinegar, baking soda, small plants, for Activity 9
  - ❖ Whatever happened to acid rain - TED-Ed video: https://www.youtube.com/watch?v=WIdWjqZsGgg
  - ❖ SIP – Worksheet -1: https://docs.google.com/document/d/1hsNpS-L6V1zI5Zy3vSXfBErkEqA8NOys/edit

- Period 7:
  - ❖ Paper, baking soda solution, cotton bud, grape/lemon juice for Activity 10
  - ❖ Test-tube, dilute hydrochloric acid, phenolphthalein solution, sodium hydroxide solution for Activity 11
  - ❖ Baking soda solution, phenolphthalein solution, vinegar, dropper, test tubes for Activity 12
- Period 8:
  - ❖ How antacids work video: https://www.youtube.com/watch?v=5BhUmaSURx4
  - ❖ Different brands of antacid tablets or gels for Activity 13
  - ❖ Antacid tablets, vinegar solution, blue litmus paper, red litmus paper for Activity 14
  - ❖ Why soil pH is important video: https://www.youtube.com/watch?v=zQowljL8e5E
  - ❖ DIY soil pH test video: https://www.youtube.com/watch?v=zQowljL8e5E
  - ❖ Cups for collecting soil samples, vinegar, baking soda, water for Activity 15
- Period 9:
  - ❖ Neutralization -Khan academy video: https://www.youtube.com/watch?v=sra__tR7QZE
  - ❖ different household products like cleaning products or toothpastes, charts for Activity 16
- Period 10:
  - ❖ SIP Worksheet -2: https://docs.google.com/document/d/1mEi_6Vx_cSCfmd8-qTyfwr1M0SkXy8bd/edit
  - ❖ SIP Worksheet -3: https://docs.google.com/document/d/1sCK8FhW4wzVhKD6Hg9yl-QtBuE05AocA/edit
- Period 11:
  - ❖ flashcards for citric acid, formic acid, acetic acid, lactic acid, oxalic acid, tartaric acid, calcium hydroxide, aluminium hydroxide, sodium hydroxide, magnesium hydroxide for Learning Station -1
  - ❖ Blue litmus paper, vinegar, lemon juice, soap water, soda water, sugar solution, common salt solution for Learning Station -2
  - ❖ red litmus paper, vinegar, lemon juice, soap water, soda water, sugar solution, common salt solution for Learning Station -3
  - ❖ Turmeric paper, vinegar, lemon juice, soap water, soda water, sugar solution, common salt solution for Learning Station -4
  - ❖ China rose indicator, vinegar, lemon juice, soap water, soda water, sugar solution, common salt solution for Learning Station -5
- Period 12:
  - ❖ Phenolphthalein, vinegar, lemon juice, soap water, soda water, sugar solution, common salt solution, test-tubes for Learning Station -1
  - ❖ 3 soil samples, vinegar, baking soda, water for Learning Station -2
  - ❖ 2 samples of antacid tablets or gels for Learning Station -3
  - ❖ charts for Learning Station -4

Concept 1: Acids, bases and indicators

Teaching Learning Process

Learning Objective/s:Students will be able to

- *define* acids and *list* sources of acids in daily life
- *define* bases and *list* sources of bases in daily life
- *outline* the general properties and uses of acids and bases

- *explain* the occurrence of acid rains
- *define* indicators and *investigate* which substances can be used as indicators
- *differentiate* between acids and bases using indicators

Induction/Introduction

In this concept, students will learn what are acids and bases and list some common sources of both acids and bases. They will learn to outline the general properties of acids and bases. They will learn about indicators and how they can be used to identify acids and bases. They will learn about acid rains and how they are caused.

Vocabulary:

Acids, bases, indicators, acid rain

Period: 4.1: Introduction to acids and basis

Learning Objectives: Students will be able to

- define acids and list sources of acids in daily life
- define bases and list sources of bases in daily life

Hook: 4 minutes

The teacher brings a collection of items used in daily life like toothpaste, soap, cold drink, salt, apple, plastic bag, tomato etc and arranges them on the table.

Teacher asks the students to guess which of these objects are made from chemicals and how many chemicals they think each one contains.
As students make guesses, the teacher quickly writes them down on the board. Then, the teacher reveals the surprising answer: "Every object contains chemicals!"

- Have you heard about "chemicals" before? What do you think "chemicals" are? (Take student responses)
    - A **chemical** is a substance that makes up everything around us. It can be a liquid, solid, or gas. Some chemicals are natural, like water or the air we breathe, while others are made by people, like plastic or soap.

The teacher can then give specific examples like soap contains chemicals that help clean and remove dirt, toothpaste contains chemicals, cooldrinks contain carbonated water (carbon dioxide), , and sugar, plastic bag is made of chemicals etc.
"Hence, chemicals aren't just found in the lab — they're in everything around us! Today, we're going to explore how these chemicals work in our everyday life and how they interact with each other."

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
"We learned about the different components of air last year. We also learnt that different substances have different properties and we need to know them for separating them into individual components.	"Now let's work in our groups for the next activity." Before starting the activity, the teacher asks students to work in their groups and write in their notebooks:	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own."

In the next few classes, we will learn about another very interesting and important property of chemicals." The teacher recalls the taste of some everyday items. She writes the below table on the board (Table 4.2 in the textbook) and fills it in with responses from students. <table><tr><th>Substance</th><th>Taste (sour/bitter/ any other)</th></tr><tr><td>Lemon juice</td><td></td></tr><tr><td>Orange juice</td><td></td></tr><tr><td>Vinegar</td><td></td></tr><tr><td>Curd</td><td></td></tr><tr><td>Tamarind (imli)</td><td></td></tr><tr><td>Sugar</td><td></td></tr><tr><td>Common salt</td><td></td></tr><tr><td>Amla</td><td></td></tr><tr><td>Baking soda</td><td></td></tr><tr><td>Grapes</td><td></td></tr><tr><td>Unripe mango</td><td></td></tr><tr><td>Cucumber</td><td></td></tr></table> The teacher then introduces the terms acids and bases. Curd, lemon juice, vinegar etc taste sour. These substances taste sour because they contain chemicals called **acids.** The chemical nature of these substances is **acidic,** one of its properties being sourness. **Did you know?** The word acid comes from the Latin word **acere** which means **sour**. Substances like baking soda feel soapy to touch and are bitter in nature. These contain **bases.** The chemical nature of these substances is known as **basic.** • "Why do you think substances should be classified as acids or bases?"	<table><tr><th>What do I know about chemicals?</th><th>What do I want to know about chemicals?</th></tr><tr><td></td><td></td></tr></table> The teacher shows the following video Acids and Bases https://www.youtube.com/watch?v=ivRczDkilAI (Note to the teacher: The teacher can mention that students will be learning about Hydrogen and Hydroxyl ions in higher classes.) The teacher asks students to work in their groups and fill the following table: <table><tr><th>Acids</th><th>Bases</th></tr><tr><td>Taste __________</td><td>Taste __________</td></tr><tr><td>Examples: __________ , ________, __________, __________</td><td>Examples: __________ , ________, __________, __________</td></tr><tr><td>Foods that contain acids: ________, ________</td><td>Everyday items that contain bases : __________, __________</td></tr><tr><td>Any interesting fact: __________</td><td>Any interesting fact: __________</td></tr></table> After the students have completed, she brings the class together and allows time for each group to share their work.	Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Define acids and bases. 2. Give examples of acids and bases. 3. How does sorting substances with similar properties into groups help us? 4. Do you think we can taste and touch all chemicals to classify them? Why or why not?

The teacher takes student responses and explains that when we classify similar substances together it helps us to study their properties. It is just like sorting vegetables of the same kind or nails of the same kind. It helps us to predict how a substance will behave, how it would react with another substance, how it will taste etc. We will also be learning about the acids in our body and their role as well. **CFU (Open ended/ Factual)** Factual CFUs 1. What are acids and bases? 2. How do acids taste? Open ended CFUs 1. Do you think the best way to classify acids and bases is by tasting them? Why or why not?		

Closing- 3 minutes

Teacher recalls the concepts taught:

"What are acids and bases?"

Homework:

1. Observe the chemicals used in your kitchen at home. Can you name some acids and bases? (Always check with an elder at home before tasting or touching anything.)

Period: 4.2: Natural indicators around us - Litmus (Activity 4.1)

Learning Objectives: Students will be able to

Explain briefly how Litmus paper is obtained

Define neutral substances

Classify substances into acids, bases and neutral substances using Litmus paper as an indicator

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. The teacher then explains that there are many other substances that can be used as indicators. One of them is Litmus paper which is used as a standard test for acids and bases. The teacher shows the following video about how litmus paper is obtained. Lichens and litmus video: https://www.youtube.com/watch?v=StWoewqBjxI	The teacher divides students into groups and gives them instructions to perform the following activity. **Activity 4** (Activity 4.1 in the textbook) The teacher gives instructions for the activity: • Take a drop of a solution (say baking soda solution) and put it on the blue litmus paper. Note down the effect.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is litmus paper?

<table>
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<td>
The teacher explains that litmus paper is available in strips as red litmus paper or blue litmus paper and shows them to the students. The teacher explains that students will be repeating the turmeric activity with litmus paper. They have to add a small drop of each solution on the red or blue litmus paper and observe if there is any change in colour.

CFU (Open ended/ Factual)
Factual CFUs:
1. What is litmus paper?
2. Where is litmus paper obtained from?
Open ended CFUs:
3. We used turmeric as a natural indicator to test different substances. What did you learn about how turmeric works as an indicator, and why do you think scientists use other indicators like litmus paper too?
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<td>
● Take a drop of the same solution and put it on the red litmus paper. Note down the effect.
● Repeat the above two steps with each of the solutions and write each of your observations in the table:

<table>
<tr><th>No.</th><th>Substance</th><th colspan="2">Test with blue litmus</th><th colspan="2">Test with red litmus</th></tr>
<tr><th></th><th></th><th>Turned red</th><th>Remained blue</th><th>Turned blue</th><th>Remained red</th></tr>
<tr><td>1.</td><td>Solution of baking soda</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Lemon juice</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.</td><td>Slaked lime</td><td></td><td></td><td></td><td></td></tr>
<tr><td>4.</td><td>Sugar solution</td><td></td><td></td><td></td><td></td></tr>
<tr><td>5.</td><td>Tamarind juice</td><td></td><td></td><td></td><td></td></tr>
<tr><td>6.</td><td>Lemon pickle</td><td></td><td></td><td></td><td></td></tr>
<tr><td>7.</td><td>Solution of washing soda</td><td></td><td></td><td></td><td></td></tr>
<tr><td>8.</td><td>Salt solution</td><td></td><td></td><td></td><td></td></tr>
<tr><td>9.</td><td>Milk</td><td></td><td></td><td></td><td></td></tr>
<tr><td>10.</td><td>...</td><td></td><td></td><td></td><td></td></tr>
<tr><td>11.</td><td>...</td><td></td><td></td><td></td><td></td></tr>
</table>
After the students have completed, the class is brought together and allowed time for each group to share their work and observations.

*Classify solutions into acids and bases based on your observations. (Take student responses)
Observe that all the acids have turned blue litmus paper into red, and all the bases have turned red litmus paper into blue.
*Were there any solutions that did not have any effect on blue or red litmus paper? (Take student responses)
“Yes! Such solutions are neither acidic nor basic. They are called neutral solutions.”
</td>
<td>
2. How does litmus paper act as an indicator?
3. You are given 3 solutions. One is acidic, another basic and the third neutral. You are also given blue litmus paper. Can you use it to identify which solution is which?
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</table>

Closing- 5 minutes

Teacher recalls the concepts taught:

“What change happens on a litmus paper when an acid or base is dropped on it?”

Homework:

Think of examples of solutions used at home that are neutral. Bring a small sample of them to the class and test them with litmus paper.

Period: 4.3: Turmeric - The natural Indicator (Activity 4.2)

Learning Objectives: Students will be able to

- define indicators
- classify substances into acids and bases using turmeric as an indicator

Explicit Teaching *(I Do)*

Teacher recalls the concepts taught in the previous class. "We learnt about acids and bases and some of their characteristics. In this class we will be learning how to identify acids and bases without touching or tasting them."

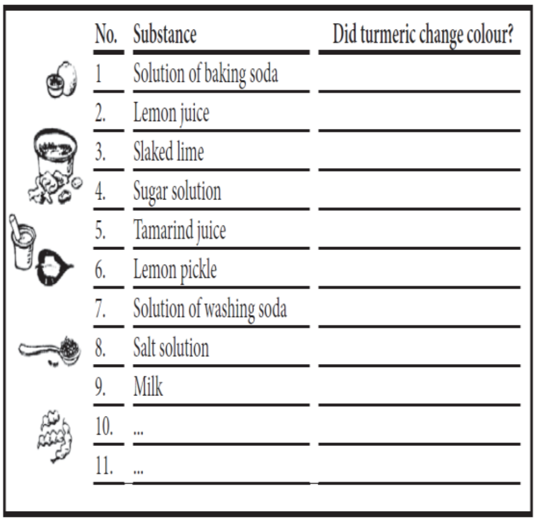
The teacher defines **indicators** as substances that are used to identify if a solution is acidic or basic. The indicators change colour when added to a basic or acidic solution. This property of indicator is very helpful as we can avoid touching or tasting the chemicals to identify them.

Activity 1:
The teacher demonstrates the following example with a stained handkerchief and soap.

Group Work *(We Do)*

Activity 2: (Activity 4.2 in the textbook)
The teacher gives instructions for preparing turmeric paper.

- Take a tablespoonful of turmeric powder. Add a little water and make a paste.
- Make turmeric paper by applying turmeric paste evenly on blotting paper/filter paper and dry it for a few minutes. Cut thin strips of the yellow paper obtained so that each member of the group gets one strip of the turmeric paper.
- Now test with the following solutions and see what happens.



No.	Substance	Did turmeric change colour?
1	Solution of baking soda	
2.	Lemon juice	
3.	Slaked lime	
4.	Sugar solution	
5.	Tamarind juice	
6.	Lemon pickle	
7.	Solution of washing soda	
8.	Salt solution	
9.	Milk	
10.	...	
11.	...	

After the students have completed, she brings the class together and allows time for each group to share their work and observations.

Activity 3:
"Have you wondered what would happen if we use baking soda powder instead of solution in the previous activity?"

Independent Work (You Do)

"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own."
Teacher writes down questions on the board and asks students to write their answers in the notebook.

1. Define indicators.
2. How do you know if a substance is an indicator?
   (ESR: An acid-base indicator will change color when it is exposed to acidic or basic solutions. The substance will have one color in acidic conditions and a different color in basic or alkaline conditions)
3. Give an example of an indicator.
4. Which substances changed the colour of the turmeric paper? What does it say about the substance?

"Raju was eating lunch with his friends when he spilled some curry on his handkerchief. He wanted to wash it immediately, so he applied soap on the stain. He was surprised to see that the stain became red when he applied soap. When he asked his mother why it happened, she explained that the turmeric in the curry caused the yellow stain on the handkerchief and the turmeric reacted with the soap to turn the stain red. Now Raju wants to know if turmeric will change colour with other substances as well. The teacher asks students what they think and collects responses. Then she tells students that they are going to work in groups to answer Raju's question of whether turmeric changes colour with other substances. **CFU (Open ended/ Factual)** Factual CFUs: 1. What are indicators? Open ended CFUs: 1. Do you think turmeric will be an indicator?	The teacher asks students to add dry baking soda to the turmeric paper and observe if there is any change. Then the teacher asks students to discuss among themselves what happened. The teacher explains that the baking soda must be dissolved in water for it to turn turmeric paper red, because only when it is dissolved in paper, the chemicals in it are free to react with the turmeric paper. (Since children are not introduced to the concept of Hydrogen and OH ions at this stage, the teacher need not go into those details now.)	

Closing- 4 minutes

Teacher recalls the concepts taught:

Summary:

"What did we do today?"

"What are indicators? Give an example."

Homework:

1. Make a turmeric greeting card. Apply turmeric paste on a sheet of plane white paper and dry it. Draw a beautiful flower with soap solution with the help of a cotton bud. You will get a beautiful greeting card.

Period: 4.4 - Natural Indicator -Chaina Rose (Activity 4.3)

Learning Objectives : Students will be able to

Classify substances as acids or bases making use of China Rose as an indicator

Explicit Teaching / Teacher Modelling *(I Do)*

Teacher recalls the concepts taught in the previous class.

We learnt how we can use turmeric and litmus paper as indicators. Today we are going to learn to use yet another indicator. We are going to make this indicator.

Activity 5

The teacher takes a few hibiscus flowers and says that the indicator will be made using this flower.

She takes the petals of these flowers and puts them in warm water. Wait till the mixture becomes coloured. The coloured water will act as an indicator.

The teacher asks students to guess what will be the effect of adding acids or bases to the solution.

After taking a few responses from the students, the teacher adds a few drops of lemon juice to the solution and the solution becomes dark pink. She then takes another test tube and adds a few drops of soap solution and the solution becomes green.

Group Work *(We Do)*

The teacher divides students into groups and gives them instructions to perform the following activities.

Activity 6 (Activity 4.3 in the textbook)

The teacher gives instructions for performing the activity.

S. No.	Test solution	Initial colour	Final colour
1.	Shampoo (dilute solution)		
2.	Lemon juice		
3.	Soda water		
4.	Sodium hydrogencarbonate solution		
5.	Vinegar		
6.	Sugar solution		
7.	Common salt solution		

- Take a few drops of a solution (say baking soda solution) and check its effect on the China rose indicator.
- Note the initial colour before adding the solution and the colour change after adding the test solution.
- Every student to take turns to repeat the above two steps with 1-2 test solutions. Write each of your observations in the table:

After the students have completed, the teacher brings the class together and allows time for each group to share their work and observations.

The teacher asks students to classify the solutions into acids/bases based on their observations.

Activity 7

"We have used different indicators for testing solutions. Now we will be testing solutions to see how strongly acidic they are."

Independent Work (You Do

Teacher writes down questions on the board and asks students to write their answers in the notebook.

1. Explain how you can use China rose indicator to test for acids and bases.
2. How can you test the strength of acids using indicators?
3. Is the soap solution acidic, basic or neutral? How would you verify it?
4. You are provided with four test tubes containing sugar solution, baking soda solution, tamarind solution, salt solution. Write down an activity to find the nature (acidic/basic/neutral) of each solution.

<table>
<tr>
<td>CFU (Open ended/ Factual)
Factual CFUs:
1. How does the China rose indicator change in the presence of an acid or a base?
2. How can you prepare the China rose indicator?
Open-ended CFUs
3. What do you think will be the effect on this indicator if we test tap water?</td>
<td>
<table>
<tr><td>Test solution</td><td>Initial colour</td><td>Final colour</td></tr>
<tr><td>Lemon juice</td><td></td><td></td></tr>
<tr><td>Vinegar</td><td></td><td></td></tr>
<tr><td>Cold drink</td><td></td><td></td></tr>
<tr><td>Apple juice</td><td></td><td></td></tr>
<tr><td>Coffee</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
The teacher asks students to check the change in colour for each of these acids and rank the acids based on their strength. The stronger acids will show a greater change in colour.</td>
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Closing- 5 minutes

Teacher recalls the concepts taught:

"What concept did we explore today?"

"What is China Rose indicator?" How is it used?"

"Are there any other questions that you are curious to know more about?"

Students are given time to write their questions on the "Question corner" chart in the classroom.

Homework:

Make the China rose indicator at home and test various solutions at home. Which solutions are strongly acidic or basic? (Note: Perform the experiment with the help of an elder. Use gloves while working with strong solutions.)

Period: 4.5 : Identification of acids and bases with indicators

Learning Objectives: Students will be able to

List the general properties of acids and bases

Classify laboratory chemicals making use of indicators

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class.	The teacher divides students into groups. For this activity, the teacher gives clear instructions for students to handle the acids and bases very carefully, since these are laboratory chemicals and much stronger and corrosive than household chemicals. **Activity 8:** (Activity 5.4 in the textbook) The teacher demonstrates the activity with student volunteers and asks students to observe the changes and write down.	Teacher writes questions on the board and asks students to write their answers in the notebook.

"In the previous classes, we learnt about indicators for acids and bases. Now, we can summarise the properties of acids and bases. The teacher explains the general properties of acids and bases (these are common properties but there can be some exceptions, like coffee is not sour but bitter and it is acidic.) and asks students to write them down.

Properties of acids:

- Acids have a sour taste.
- They are soluble in water.
- They turn blue litmus solution red.
- They have no effect on turmeric solution. They turn China rose solution red/dark pink.
- They are corrosive in nature
- Examples of acids are: lemon juice, apple juice, milk, hydrochloric acid, sulphuric acid etc.

Properties of Bases:

- Bases have a bitter taste.
- They are soapy to touch.
- They may or may not be soluble in water.
- They turn red litmus solution blue.
- They have turmeric solution red. They turn China rose solution green.
- They are corrosive in nature

- Take a few drops of a solution (say dilute hydrochloric acid) and check its effect on litmus paper,turmeric paper, Compare the effect on each of the indicators and write your observations in the table:

S.No	Name of the chemical	Effect on litmus paper	Effect on turmeric paper	Acidic/ Basic
1	Dilute hydrochloric acid			
2	Sulphuric acid			
3	Nitric acid(found in soil when fertilizer breaks down)			
4	Acetic acid			
5	Sodium hydroxide			
6	Ammonium hydroxide			
7	Calcium hydroxide			

After the students have completed, the teacher brings the class together and allows time for each group to share their work and observations. The teacher asks students to classify the solutions into groups based on their observations.

Boojho, Paheli and their friend Golu were provided with a test tube each containing China rose solution which was pink in colour. Boojho added two drops of solution 'A' in his test tube and got dark pink colour. Paheli added 2 drops of solution 'B' to her test tube and got green colour. Golu added 2 drops of solution 'C' but could not get any change in colour. Suggest the possible cause for the variation in their results.

1) It is not known whether a certain substance is acidic, basic or neutral. When 2-3 drops of this substance were put on red litmus paper, there was no change. On observing this, Ajay said the substance is certainly neutral. But Rehana said perhaps it is acidic. How can we find out whether the substance is acidic or neutral?

3. Name the following:

(i) A substance used to test the acidic or basic nature of another substance.

____

(ii) The most common indicator used in the laboratory. __________

(iii) An example of a natural indicator.

____

• Examples of bases are: soap solution, detergent solution, baking soda solution, ammonium hydroxide etc. **CFU (Open ended/ Factual)** Factual CFUs: 1. Name any 2 properties of acids. 2. Name any 2 properties of bases. Open ended CFUs: 1. What do you think will happen when an acid comes in contact with a base?		

Closing- 5 minutes

Teacher recalls the concepts taught:

"What concept did we explore today?"

"What are some general properties of acids and bases?"

"Are there any other questions that you are curious to know more about?"

Students are given time to write their questions on the "Question corner" chart in the classroom.

Homework:

Can we say that all sour things are acidic in nature? Test the following sour substances at home and verify your answer. – curd, buttermilk, unripe mango, tomato

Period: 4.6: Acid rains

Learning objectives: Students will be able to

- *explain* the occurrence of acid rains
- *describe the effects of* acid rains and propose solutions to prevent them.

Explicit Teaching / Teacher Modelling ***(I Do)***	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "In the previous classes, we learnt about acids-base indicators, general properties of acids and base. Today we are going to learn about another topic relating to acids in everyday life." "How many of you think rain water is safe to drink?" The teacher takes student responses. "How many of you think rain water is safe to use other than drinking?" The teacher takes student responses.	The teacher divides students into groups. The teacher gives instructions for the following activity. **Activity 9:** Simulating Acid Rain • Label two cups: "Control, and "Acid Rain," • In the Control cup, pour distilled water (this represents normal rain).	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook.

"Do you think there is a change in the rain water between cities and villages? Or cities and forests?" The teacher takes student responses. The teacher explains about acid rains. Rain containing excess of acids is called acid rain. The rain becomes acidic because carbon dioxide, sulphur dioxide and nitrogen dioxide (which are released into the air as pollutants) dissolve in rain drops to form carbonic acid, sulphuric acid and nitric acid respectively. Acid rain can cause damage to buildings, historical monuments, plants and animals. The teacher shows the following video about acid rains: https://www.youtube.com/watch?v=1PDjVDIrFec Discussion questions: ● What is acid rain? ● What are some human activities that can lead to acid rain? ● How does acid rain affect aquatic organisms? The gases sulfur dioxide (SO2) and various nitrogen oxides (NOx) are mainly responsible for the increase in acidity. These gases are primarily created by industrial factories, coal-fired power plants, and car emissions. The teacher then explains the acid rain pathway with this picture https://www.epa.gov/sites/default/files/2020-05/acidrainpathway.png :	● In the Acid Rain cup, mix distilled water with a small amount of vinegar to create an acidic solution (pH 4-5). ● Add plants: Place a small potted plant or a seedling in each cup. Use plants of the same type and size for consistency. ● Observe and record: Have students observe the changes in the plants over time. They (Note: This is to be done over the course of 2-3 days) o How the plants look immediately after being placed in the cups. o Any differences between the control, acid rain, and neutralized plants. ● In your groups, draw the acid rain cycle. ● Discuss steps on how acid rain can be prevented. After students complete the activity, the teacher gives time for groups to discuss their ideas with the rest of the class.	1. Draw and explain how acid rain is formed. 2. What are the effects of acid rain? 3. How can acid rain be prevented?

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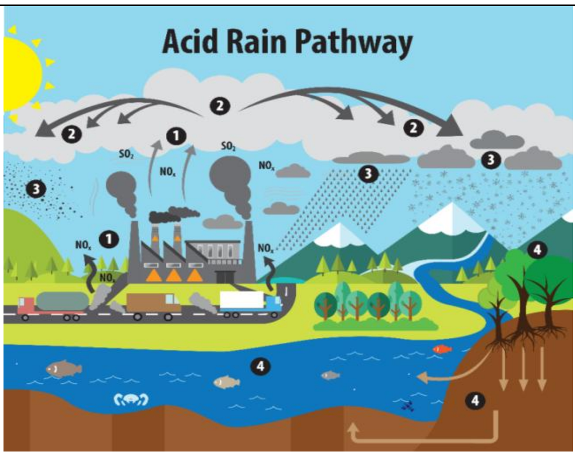

(1) Emissions of SO2 and NOx are released into the air, where (2) the pollutants are transformed into acid particles that may be transported long distances. (3) These acid particles then fall to the earth as wet and dry deposition (dust, rain, snow, etc.) and (4) may cause harmful effects on soil, forests, streams, and lakes.
CFU (Open ended/ Factual)
Factual CFUs:

What is acid rain?
What causes acid rain?

Open ended CFUs:

How do you think acid rain can be prevented?

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Closing- 4 minutes

Teacher recalls the concepts taught:
“What concept did we explore today?”
“What is acid rain?”
What causes acid rains and what are its effects?”
“How can acid rain be prevented?”

Homework:

Imagine you are a farmer with crops near an area affected by acid rain. How might acid rain affect your crops, and what steps could you take to protect them?

Assessment of Concept 1

I. Choose the correct answer:

1. ‘Litmus’, a natural dye is an extract of which of the following?
   (a) China rose (*Gudhal*) (b) Beetroot
   (c) Lichen (d) Blue berries (*Jamun*)
2. A solution changes the colour of turmeric indicator from yellow to red. The solution is
   (a) basic (b) acidic (c) neutral (d) either neutral or acidic
3. Acid rain can cause damage to buildings, soil and plants. Where do you think the acids come from?
   (a) Calcium oxide and carbon dioxide dissolve in rain water to produce acids.
   (b) Carbon dioxide and sulphur dioxide dissolve in rain water to produce acids.
   (c) Sulphuric acid and carbon monoxide dissolve in rain water to produce acids.

(d) Chlorine and fluorine gases dissolve in rain water to produce acids.

4. Preeti has collected some items from her kitchen:
   (i) Amla (ii) Baking soda (iii) Tamarind (iv) Soap
   (v) Lime water(vi) Common salt (vii) Sugar.
   She classified them as acidic, basic and neutral substances. Which of the following classification is correct?
   (a) Acidic – (i), (ii), Basic – (iv), (vii), Neutral – (iii), (v), (vi)
   (b) Acidic – (iv), (vi), Basic – (i), (ii), (iii), Neutral – (v), (vii)
   (c) Acidic – (i), (iii), Basic – (ii), (v), (vi), Neutral – (iv), (vii)
   (d) Acidic – (i), (iii), Basic – (ii), (iv), (v), Neutral – (vi), (vii)

II. State whether the statement is "True" or "False"
(i) Nitric acid turns red litmus blue. (T/F)
(ii) Sodium hydroxide turns blue litmus red. (T/F)
(iii)Indicator is a substance which shows different colours in acidic and basic solutions. (T/F)

III. Answer the following:

5. State two differences between acids and bases.
6. What are neutral substances? Give examples.
7. Which substance is used to classify substances as acids and bases? Define it.
8. Ammonia is found in many household products, such as window cleaners. It turns red litmus blue. What is its nature?
9. Blue litmus paper is dipped in a solution. It remains blue. What is the nature of the solution? Explain
10. Consider the following statements:
    (a) Both acids and bases change colour of all indicators.
    (b) If an indicator gives a colour change with an acid, it does not give a change with a base.
    (c) If an indicator changes colour with a base, it does not change colour with an acid.
    (d) Change of colour in an acid and a base depends on the type of the indicator.
    Which of these statements are correct?
    (i) All four (ii) a and d (iii) b, c and d (iv) only d

SIP Worksheet -1: https://docs.google.com/document/d/1hsNpS-L6V1zI5Zy3vSXfBErkEqA8NOys/edit?pli=1

Concept 2: Neutralization reactions

Learning Objective/s: Students will be able to
- describe neutralization reactions
- explain the importance of neutralisation in everyday life

Induction/Introduction

In this concept, students will learn that when acids and bases react, they neutralize each other. They will learn about some common neutralization reactions.

Vocabulary:

Neutralization, salts

Period: 4.7 : Nuetralization (Activity 4.5)

Learning Objective/s: Students will be able to Describe neutralization reactions

Hook: 4 minutes

Activity 10:

The teacher brings a paper which looks empty. (The teacher must have already used a solution of baking soda in water and used a cotton bud to write a message on the paper.)The teacher shows the paper and asks if there is anything written on it. Students will respond that there is nothing written.

“Now I am going to show you some magic!” The teacher takes a little grape juice (which is mildly acidic) and rubs it over the paper, the chemical reaction between the alkaline sodium bicarbonate and acidic grape juice causes the words to be revealed.

“We are going to learn more about how this happens in the next few classes.”

Experience and reflection:

Did you ever feel a burning sensation in your stomach when you haven’t eaten for a long time? Have you seen advertisements on TV that talk about ‘acidity’? How do you think the medicines help?

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. What do you think will happen when an acid and base come together? Will the resulting solution be an acid or base or neutral? **Activity 11** (Activity 4.5 in the textbook) ● Fill one fourth of a test tube with dilute hydrochloric acid. Note down its colour. ● Note down the colour of phenolphthalein(chemical indicator used to test whether a solution is acidic or basic) solution also. ● The teacher explains that when the solution is basic, phenolphthalein gives a pink colour. On the other hand, when the solution is acidic or neutral, it remains colourless.	The teacher divides students into groups. The teacher gives instructions for the following activity. **Activity 12** The teacher gives instructions for the following activity: ● Take baking soda in a test tube and add water to prepare its solution. ● Take this solution in a conical flask and add a few drops of phenolphthalein. Note the colour of the solution. ● Now add a few drops of vinegar to the solution with the help of a dropper and notice the colour of the solution. ● Keep adding drops of vinegar and shake the flask every time you add a drop. ● Keep adding vinegar till the solution turns colourless.	“Thank you for engaging in the group activity so well. I saw some interesting responses. Now it’s time for you to work on your own.” Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is a neutralization reaction? Give an example. 2. Suggest an experiment to observe the neutralization of an acid by a base. 3. Do you think we can use China rose indicator or turmeric for observing a neutralization reaction? Why or why not?

 ● Add 2–3 drops of the indicator to the acid. Now shake the test tube gently. Ask the students if they observe any change in colour of the acid and discuss the same. ● Add to the acidic solution a drop of sodium hydroxide(base) solution by a dropper. ● Stir the tube gently. Is there any change in the colour of the solution? Continue adding the sodium hydroxide solution drop by drop while stirring till the pink colour just appears. ● Now add one more drop of dilute hydrochloric acid. What do you observe? ● The solution again becomes colourless. ○ What could be the reason? (Take student responses) Yes! The solution has either become neutral or acidic. ● Again add one drop of sodium hydroxide solution. ○ Is there any change in colour? What could be the reason? (Take student responses) Yes! The solution again becomes pink in colour. This indicates that the solution has become basic again. The teacher further explains what happens when an acid and a base react. When an acid solution and a base solution are mixed in suitable amounts, both the acidic nature of the acid and the basic nature of the base are destroyed, resulting in a neutral solution.	● Touch the flask and see if it is hot or cold. Make a note. After students complete the activity, the teacher discusses the findings and explains that the reaction that took place here was: Acetic acid (vinegar) + Sodium bicarbonate -> Sodium acetate +Carbon dioxide + water	

Teacher goes around the classroom asking students to hold the test-tube and share their observations on what they feel. (Take student responses) In a neutralisation reaction heat is always produced. The new substance formed during this reaction is a **salt.** The teacher writes the following definition on the board and asks students to write it down: **The reaction between an acid and a base is known as neutralisation. Salt and water are produced in this process with the evolution of heat.** Acid + Base ----> Salt + Water (Heat is evolved) The following reaction is an example: Hydrochloric acid (HCl) + Sodium hydroxide (NaOH) -----> Sodium chloride (NaCl) + Water (H_2O) **CFU (Open ended/ Factual)** Factual CFUs: 1. Define neutralization reaction and write its equation. Open ended CFUs: 1. You are conducting an experiment to neutralize an acid with a base. After adding the base, you notice the temperature of the solution increases. How would you explain this observation? 2. Imagine you accidentally spill some lemon juice (acid) on your clothes. Instead of just washing it with water, your friend suggests using baking soda. How do you think baking soda might help?		

Closing- 2 minutes

Teacher recalls the concepts taught:

"What concepts did we explore today?"

"What is a neutralization reaction?"

"What are the products obtained after a neutralization reaction?"

Homework:

1. If you spill a small amount of an acidic cleaning solution (like lemon juice or vinegar) on a counter, how might you neutralize it safely using common household items?
2. Try this at home: Take vinegar in two glasses. To the first glass, add water. What happens? Make a note. To the second glass, add baking soda. Observe what happens and make a note. What does this tell you about neutralization reactions?

Period: 4.8: Neutralization in Everyday life - antacids, soil treatment

Learning Objectives: Students able to explain the neutralization happening with antacids

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "In the last class, we learnt what neutralization is. In this class, we will learn about a neutralization reaction that happens in our body." "Has anyone ever had a stomach ache after eating something too spicy or too much food? What do you think causes that feeling?" The teacher takes student responses. Then she explains what indigestion is. She recalls the concept of digestion learnt in Chapter 2 and that the stomach contains hydrochloric acid which helps to digest food. Sometimes, this acid can irritate the stomach lining, leading to indigestion. Common causes of indigestion, such as overeating, spicy foods, stress, or drinking too much caffeine. Sometimes indigestion is painful. To relieve indigestion, we take an antacid such as milk of magnesia, which contains magnesium hydroxide. It neutralises the effect of excessive acid. The teacher can show this video to show some examples of neutralization reactions: https://www.youtube.com/watch?v=5BhUmaSURx4 She can then take an example of an antacid tablet, like Gelusil and show that it contains Aluminium hydroxide that reacts with HCl and forms Aluminium chloride salt. **CFU (Open ended/ Factual)** Factual CFUs: 1. What causes stomach acidity? 2. How do antacids help reduce acidity? Open ended CFUs: 3. What do you think could happen if we take too many antacids?	Teacher divides students into groups and gives them instructions for the below activity. **Activity** ● Take 2-3 tablets of any antacid tablet, grind it and make a thick solution, like a gel (or 10 ml of antacid tonic gel). ● Take a solution of vinegar in a cup. ● Add a drop of vinegar on a blue litmus paper. You will observe that the paper turns red as expected. ● Now add a few drops of the antacid gel to the vinegar, mix it well and put a drop on the blue litmus paper. Does it turn red? ● Keep adding the gel to the vinegar, few drops at a time and testing the acidity. ● At one point, you will see that the resulting solution does not turn blue litmus red. This means that neutralization has occurred. After the students complete the activity, the teacher brings the class together and discusses their observations. The teacher explains that this is similar to the neutralization reaction happening in our body. The teacher can also take this time to clear any questions children have.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is the neutralization reaction that happens in our stomach when we take antacids? 2. Give some examples of common antacids. 3. What causes acid build up in the stomach? 4. If stomach acid were consistently too low (not enough acid), how might this affect digestion and overall health?

Closing- 5 minutes

Teacher recalls the concepts taught:

"What concept did we explore today?"

"What is meant by acidity in the stomach? How is it caused?"
"How do antacids help treat stomach acidity?"

Homework:

- Imagine you are having dinner with your cousins at home, and one of them starts complaining of indigestion and heartburn. What steps would you suggest they take to feel better?
- Ask elders at home what are some natural remedies for acidity and describe how it may work.

Period: 4.9 : Neutralization in Everyday life - soil treatment

Learning Objectives:

Students will be able to Justify the importance of neutralization of the soil for farming.

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. We will learn about how knowing about neutralization is important for farmers or anyone growing plants." "Have you ever noticed how some plants grow better in certain soils than others? What do you think makes some soil better for plants than others?" The teacher takes student responses. Then she explains that just like with solutions, soil can also be acidic or basic. The teacher shows the following video - Why soil pH is important: https://www.youtube.com/watch?v=zQowljL8e5E Discussion questions: ● What happened to the tree when the soil was very acidic? ● What happened to the tree when the soil was very basic? ● Is normal rainwater acidic or basic? Does it affect plants? Then the teacher discusses that soil pH is important, when the soil is too acidic or too basic plants do not grow well. When the soil is too acidic, it is treated with bases like quick lime (calcium oxide) or slaked lime (calcium hydroxide). If the soil is basic, organic matter (compost) is added to it. Organic matter releases acids which neutralises the basic nature of the soil. **CFU (Open ended/ Factual)** Factual CFUs: 1. Why is it important to know if soil is acidic or basic? 2. What can be done to treat acidic soil? Open ended CFUs:	Teacher divides students into groups and gives them instructions for the below activity. **Activity 15** (Activity reference: https://www.youtube.com/watch?v=OvWB86ngIds) ● Collect 3 soil samples from different parts of the school ground. While collecting soil, do not collect the top layer, but take soil from 3-4 inches below the top layer. ● Collect each sample in 2 cups so that it can be tested with an acid and a base. ● Add a little water to the cups. ● To one of the cups add a little vinegar. If the soil is basic, you can observe bubbles due to the neutralization reaction. ● To the other one of the cups add a little baking soda mixed in water. If the soil is acidic, you can observe bubbles due to the neutralization reaction. ● If you did not observe bubbles in either case, it means the soil is close to neutral. ● Repeat this with the other 2 soil samples you collected and find if the soil is acidic or basic.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Explain what is meant by soil acidity. 2. How can you test if a given soil sample is acidic or basic. 3. Justify the importance of neutralization of the soil for farming.

3. How do you think the acidity or basic nature of soil can be tested?	 After the students complete the activity, the teacher brings the class together and discusses their observations. The teacher can also take this time to clear any questions children have.	

Closing- 5 minutes

Teacher recalls the concepts taught:

"What concept did we explore today?"

"What is meant by soil acidity? Why is it important?"

"How do farmers treat the soil to make it less acidic or basic?"

Homework:

1. Test the soil sample of your area, find out if it is acidic, basic or neutral. Discuss your results with your friends.
2. Imagine you are a **farming expert** helping a farmer whose crops aren't growing well. The farmer has tested the soil and found that it is **too acidic** or **too basic**. Your job is to **explain why this is a problem and how neutralization can help.**
   - Write a short letter (about 1–2 paragraphs) to the farmer:
     Explain what neutralization means.
     Describe how acidic or basic soil can affect crops.
     Suggest how the farmer can neutralize the soil and why it's important.

Period: 4.10: Neutralization in Everyday life - ant bite, Factory waste treatment

Learning Objectives:

Students will be able to Summarize the importance of neutralization reactions in daily life

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. Today we will learn about some other places where neutralization happens in daily life." "Have you ever been bitten by an ant or wasp? Did the elders at home suggest to apply baking soda on the area? This is an example of a neutralization reaction. The ant inject formic acid into the skin when it bites and the baking soda neutralizes its effect."	Teacher divides students into groups and gives them instructions for the below activity. Each group has a different presentation to work on. **Activity 16**	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own."

“Did you know that one of the first things we do in the morning, brushing our teeth also involves a neutralization reaction? When we eat sugary food or drinks, the bacteria in our mouth multiply very quickly and produce an acid. This acid reacts with the calcium compounds in our teeth and can cause tooth decay. The toothpastes we use contain basic substances like calcium carbonate and aluminium hydroxide which can act with the acid and neutralize it.” The teacher shows the following video to summarize neutralization - https://www.youtube.com/watch?v=sra__tR7QZE Discussion questions: ● What happens when an acid reacts with a base? ● How does neutralisation reaction help in case of indigestion? ● What is the chemistry behind the remedy for ant bites? “Neutralization is also important in industries. The wastes of many factories contain acids. If they are allowed to flow into the water bodies, the acids will kill fish and other organisms. The factory wastes are, therefore, neutralised by adding basic substances.” **CFU (Open ended/ Factual)** Factual CFUs: 1. Why is it important to treat factory wastes before discharging them? 2. How does baking soda help for ant bites? Open ended CFUs: 3. How does neutralization play a role in making cleaning products safe to use? Can you think of a specific example where neutralization is important in cleaning?	Group 1 and 2: Prepare a role play /skit where someone is suffering from indigestion and the doctor gives him antacids. It should cover the role of stomach acid in digestion, how antacids work, the effect of overuse of antacids. Group 3 and 4 : You are a farmer who wants to grow a crop in neutral soil. How will you find out if your soil is acidic or basic? What remedies can you use? Prepare a presentation. Group 5 and 6: An industry is discharging acidic waste into the lake near your house. Prepare a poster to create awareness and urge the factory to treat the water with the right chemicals before discharging the water. After giving students time to prepare , the teacher brings the class together and every group gets time to make their presentation.	Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Give 4 examples of neutralization from daily life. 2. How do toothpastes help in preventing tooth decay? 3. Why is it important for factories to do proper waste water treatment?

Closing- 3 minutes

Teacher recalls the concepts taught:

“What concept did we explore today?”

“What are some examples of neutralization in daily life?”

Homework:

1. Acid rain can cause damage to plants, buildings, and water bodies. What process could be followed to counteract the effects of acid rain on soil and water? Which ingredients could be used for the process?

2. Find out the ingredients of your toothpaste. Which components do you think help in neutralization?

Assessment of concept 2

I. Choose the correct answer:

1. Products of a neutralisation reaction are always
   (a) an acid and a base. (b) an acid and a salt.
   (c) a salt and water. (d) a salt and a base.
2. When the soil is too basic, plants do not grow well in it. To improve its quality what must be added to the soil?
   (a) Organic matter (b) Quick lime
   (c) Slaked lime (d) Calamine solution
3. Fill in the blanks by choosing the option with the appropriate words.
   When hydrochloric acid reacts with sodium hydroxide, _____ and _______ are formed. The process _______ heat. The resulting solution is ____ in nature.
   (a) Salt, water, gives out, neutral (b) Salt, water, gives out, acidic
   (c) Salt, water, takes in, neutral (d) Salt, water, takes in, basic

II. Answer the following:

4. Describe the process of neutralisation with the help of an example.
5. Explain why:
   (a) An antacid tablet is taken when you suffer from acidity.
   (b) Calamine solution is applied on the skin when an ant bites.
   (c) Factory waste is neutralised before disposing it into the water bodies.

Period 4.11 - Summarizing the Lesson

Period 4.12 – Student Independent Practice

Worksheet -2 https://docs.google.com/document/d/1mEi_6Vx_cSCfmd8-qTyfwr1M0SkXy8bd/edit?pli=1

Worksheet -3:

https://docs.google.com/document/d/1sCK8FhW4wzVhKD6Hg9yl-QtBuE05AocA/edit?pli=1

Period 4.13 - Remedial Teaching Period -1

Period 4.14 - Remedial teaching: Period 2

Teacher's Diary

Name of the Teacher:				Name of the Month:	
Name of the Lesson:				Class:	
Period No	**Name of the Concept to be taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	**Remarks**
4.1	Introduction, Acid And Basis				
4.2	Natural Indicators Around Us - Litmus (Activity 4.1)				
4.3	Activity 4.2 Turmeric Is Another Natural Indicator				
4.4	China Rose As Indicato Ractivity 4.3				
4.5	Identification Of Acids And Bases With Indicators				
4.6	Acid Rains				
4.7	Neutralization - Activity 4.5				
4.8	Neutralization In Everyday Life, Antacids				
4.9	Neutralization In Everyday Life - Soil Treatment				
4.10	Neutralization In Everyday Life - Ant Bite				
4.11	Summarizing The Lesson				
4.12	Student Independent Practice				
4.13	Remedial Teaching Period				
4.14	Remedial Teaching Period				

1.	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?
2.	Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
3.	What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
4.	How well did I adjust my teaching based on student reactions or unforeseen challenges?

Head Teacher's Signature　　　　　　　　　　Teacher's Signature

Head Teacher's Suggestions:

Teacher Notes:

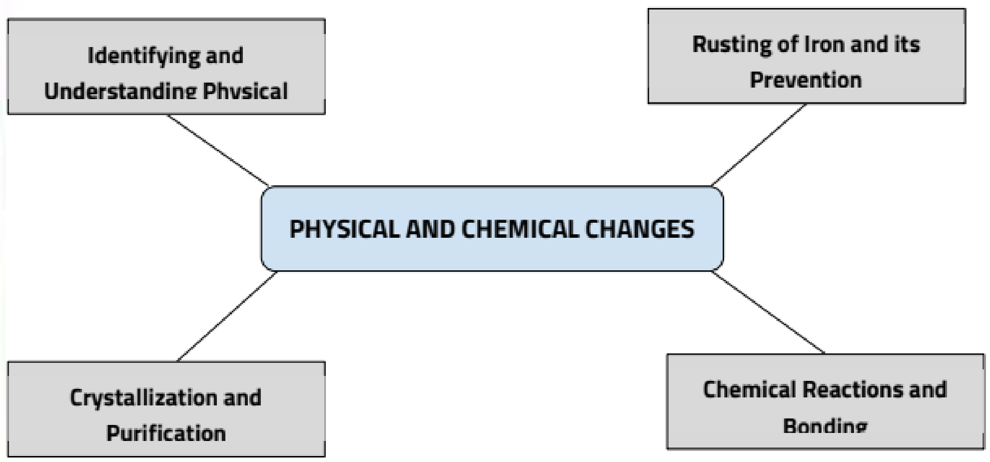
5. Physical and Chemical Changes

Learning Outcomes:

Students will be able to

1. Identify materials and organisms, such as, animal fibres; types of teeth; mirrors and lenses, on the basis of observable features, i.e., appearance, texture, functions, etc.
2. Classify materials and organisms based on properties/characteristics, e.g., plant and animal fibres; physical and chemical changes
3. Conduct simple investigations on his/her own in order to seek answers to queries
4. Writes word equation in order to express chemical reactions

CONCEPT MAP



Synopsis

Physical Changes

A physical change is a change in which the form or appearance of a substance alters, but its chemical composition remains the same. Key characteristics include:

- Changes in shape, size, state, or color.
- No new substance is formed.
- Generally reversible (e.g., melting of ice, dissolving salt in water, cutting paper).

Chemical Changes

A chemical change results in the formation of one or more new substances with different properties. It is often irreversible. Key indicators of a chemical change include:

- Formation of gas (bubbling or fizzing).
- Change in color.
- Production or absorption of heat, light, or sound.

- Formation of a precipitate (solid substance).
- Change in smell (e.g., souring of milk, burning of wood, rusting of iron).

Rusting of Iron

Rusting is a slow chemical change that occurs when iron reacts with oxygen and water, forming iron oxide (rust). This process is destructive and weakens iron structures. Rusting can be prevented by:

- Painting or greasing to block air and moisture.
- Galvanization, where a layer of zinc is coated on iron to prevent direct contact with air and water.

Crystallization

Crystallization is a process used to obtain pure substances from solutions. It is an example of a physical change. Large, well-formed crystals can be obtained through slow cooling of saturated solutions (e.g., purification of salts like copper sulfate).

Chemical Reactions and Bonding

A chemical reaction is a process where one or more substances (reactants) undergo a transformation to form new substances (products). Chemical bonding plays a crucial role in these reactions. Some examples of chemical reactions include:

- Burning of magnesium ribbon (formation of magnesium oxide).
- Reaction of copper sulfate solution with iron (formation of iron sulfate and copper).
- Vinegar and baking soda reaction (carbon dioxide gas formation).

Chapters and Concepts

Period number	Topic	Remarks
5.1	Introduction,5.1 Physical Changes (Activity 5.1,Activity 5.2, Activity 5.3, Activity 5.4)	
5.2	Chemical Change	
5.3	Physical & Chemical Change	
5.4	Chemical Reaction - Activity 5.6 And Activity 5.7	
5.5	Activity 5.8	
5.6	Rusting Of Iron (Activity 5.9)	
5.7	Rusting Of Iron - Prevention	
5.8	Crystalisation	
5.9	Summarizing The Lesson	
5.10	Student Independent Practice	
5.11	Remedial Teaching Period	
5.12	Remedial Teaching Period	

Prior Skills: *(Essential concepts and skills to be checked before teaching the current concept.)*

- Matter is anything that has mass and occupies space.
- Matter exists in different states and can be classified as solids, liquids, and gases based on their shape, volume, and ability to flow.
- Materials can change when subjected to certain conditions like heat, pressure, or mixing with other substances.
- Some substances dissolve in water to form solutions, while others do not.
- Mixing certain substances may produce bubbles, color changes, or new smells, which could indicate a reaction.

Teacher References: *(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)*

- NCERT Class 7 Textbook
- Physical changes activity: https://educators.brainpop.com/lesson-plan/physical-and-chemical-changes-activities-for-kids/#:~:text=Give%20each%20student%20one%20or,even%20wet%20the%20paper%20too.
- Worksheets and Activities: https://educators.brainpop.com/lesson-plan/physical-and-chemical-changes-activities-for-kids/#:~:text=Give%20each%20student%20one%20or,even%20wet%20the%20paper%20too.
- Invisible Ink Experiment: https://www.nationalarchives.gov.uk/education/families/celebrating-british-science-week/how-to-make-invisible-ink/invisible-ink-recipe/
- Assessment questions: https://ncert.nic.in/pdf/publication/exemplarproblem/classVII/Science/geep106.pdf

Teaching Learning Material (TLM):

Situation cards (Period 2)
PPT (Period 3)
Lemon (Period 4)
Iron and ironing board (Period 5)
Magnesium ribbon (Period 5)
Candle (Period 5)
Copper sulfate solution (Period 5)
Baking soda (Period 6)
Vinegar (Period 6)
Balloon (Period 6)
Funnel/Paper cone (Period 6)
Iron nail (Period 5)
Salt/Sugar (Period 12)

Concept 1: Identifying and Understanding Physical and Chemical Changes

Teaching Learning Process

Learning Objective/s: Students will be able to

1. Infer the effects which indicate physical change
2. Summarize various features accompanying a chemical change
3. Compare physical and chemical changes based on their characteristics and examples.
4. Describe the significance of physical and chemical changes in daily life.

Induction/Introduction

In this lesson, students will explore how substances undergo changes and how these changes can be classified as physical or chemical. They will learn to identify the key features of each type of change and understand their significance in daily life.

Period 5.1: Introduction - Physical changes (Activity 5.1 to 5.5)

(LO 1): Students will be able to infer the effects which indicate physical change

Hook:

Hold up a piece of paper in front of the class and dramatically tear it into small pieces. Ask:

➡ *"Did I just create something new, or is this still paper?"*

Then, take another piece of paper, light it on fire (or show a video/picture of burning paper if fire isn't allowed). Ask:

➡ *"Now, is this still paper? Can I bring it back to its original form?"*

Discussion Questions:

1. What was different between tearing and burning the paper?
2. Can we reverse both changes? Why or why not?
3. What clues tell us that something new has been formed?

Experience and reflection:

Can you think of any other changes like this in daily life?

Explicit Teaching/ Teacher modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
"Look around you. Every day, things change. Ice melts, clothes dry in the sun, paper gets cut, and sugar dissolves in water." But do these changes create something completely new? Or are they just different forms of the same thing? *Teacher demonstrates the following activity:* Hold a used hack-saw blade with a pair of tongs. Keep the tip of the free end of the blade on the gas stove. Wait for a few minutes. Does the colour of the tip of the blade change? *(Students respond)* Remove the blade from the flame. Observe the tip once again after some time. Does it get back its original colour? *(Students respond)*	The teacher demonstrates two activities. The students will observe each of the activities and discuss the prompt questions in their groups. 1. Form small groups (4–5 students per group). 2. Activity 1: Take some ice in a glass or plastic tumbler. Melt a small portion of ice by placing the tumbler in the sun. You have now a mixture of ice and water. Now place the tumbler in a freezing mixture (ice plus common salt). - What type of change occurs when ice melts into water? Does it change its chemical composition?	Students will answer the following questions in their notebooks. Look at the following scenarios. Identify whether the change is physical or not and explain their reasoning in one sentence. 1. A glass falls and shatters into pieces. Is this a physical change? Why? 2. A candle melts when heated. Is this a physical change? Explain. 3. A wet towel dries in the sun. Is this a physical change for the water in the towel? Why?

The teacher summarizes, “Properties such as shape, size, colour, and state of a substance are called its physical properties. A change in which a substance undergoes a change in its physical properties is called a physical change.” **CFU (open-ended/ Factual)** Factual CFUs 1. Does a physical change create a new substance? 2. Which of these is NOT a physical change? (a) Cutting paper (b) Boiling water (c) Burning wood (d) Dissolving salt in water Open-ended CFUs 1. You accidentally drop a glass, and it breaks into pieces. Is this a physical change? Why or why not? 2. Imagine you are making lemonade. You mix sugar, lemon juice, and water. Would this be a physical change or something else? Why?	- When the tumbler is placed in the freezing mixture, the water turns back into ice. Why is this considered a physical change? - Can you reverse the changes observed in this activity? Why or why not? 3. Activity 2: Boil some water in a container. Do you see the steam rising from the surface of water? Hold an inverted pan by its handle over the steam at some distance from the boiling water. Observe the inner surface of the pan. - What happens to the water when it is heated, and how does this demonstrate a physical change? - What do you observe on the inner surface of the pan? How did the steam turn into water droplets?	4. You sharpen a pencil, and shavings fall off. Is this a physical change for the shavings? Why?

Closing-

"Look around you—physical changes happen all the time. This morning, maybe you stretched a rubber band, folded your clothes, or watched steam rise from a hot cup of tea. None of these created anything new, but they all changed how something looked or felt. Physical changes don’t create new substances. They can involve a change in shape, size, or state, and most of them can be reversed Think: If you knead dough to make chapati, is that a physical change? What about after you cook it? Why do you think so?

Homework:

Observe and identify three physical changes that happen at home. Write down the change you observed. Describe what happened and explain why it is a physical change. Answer this question: Was the change reversible or irreversible? Why?

Period 5.2: Chemical changes

(LO 2): Students will be able to summarize various features accompanying a chemical change and analyze if the change is chemical in nature.

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Let us start with a quick test! If I tear this paper, what happens? Does it continue to remain a paper?"	1. Divide the class into small groups.	Students will answer the following questions in their notebooks.

<table>
<tr>
<td>
(Students: "It changes shape, but it's still paper!")
Now, what if I take this piece of paper and burn it? What do you think will happen?"
(Students: "It will turn into ash!")
But here’s the real question—can I take that ash and turn it back into paper?"

(Students: "No!")
"Why not?"
(Take responses)
Teacher explains “No!", because rust is a new substance!"
“Let us try something fun. Have you ever seen an apple turn brown after being cut?”
(Students: "Yes!")
"Why do you think that happens?"
(Take responses)
“When an apple is exposed to air, a chemical reaction takes place, and a new substance forms on the surface. This is another clue—a change in color can mean a chemical change is happening”
“Chemical changes are different from physical changes because they always create a new substance. They’re also mostly irreversible, and we can identify them by things like color change, gas formation, or heat production."
CFU (open-ended/ Factual)
Factual CFUs
1. Does a chemical change always produce a new substance?
</td>
<td>
2. Each group will rotate through five investigation stations, spending 3 minutes at each station.
3. Have a situation at each station. (Link: https://docs.google.com/document/d/1D3F7Vk7KvyroEETprScuBCuDsDou-Plf1gHxwkhYVms/edit?tab=t.0)
4. At each station, they will:
- Read the situation.
- Discuss what they see and identify signs of a chemical change.
- Record their observations.
5. Each group picks one station to present their findings to the class.
- What were the signs of a chemical change in your station?
- Was there any change that confused you? Why?
- Why do you think chemical changes happen in daily life?
</td>
<td>
Look at the following scenarios. Identify whether the change is chemical or not and explain their reasoning in one sentence.
1. A glass of milk is left outside on a hot day and turns sour. Is this a chemical change? Why?
2. A piece of silver jewelry becomes dark and tarnished over time. What feature of a chemical change does this show?
3. You mix two clear liquids, and suddenly the solution turns bright orange. What does this indicate?
4. A metal rod is heated until it glows red and then cools back to its original state. Is this a chemical or physical change? Why?
</td>
</tr>
</table>

2. Which of the following is NOT a chemical change? (a) Burning wood (b) Melting wax (c) Baking a cake (d) Rusting of iron Open-ended CFUs 1. You accidentally leave a slice of bread out for several days, and it develops mold. Is this a chemical change? Why or why not? 2. Why do you think most chemical changes are irreversible?		

Closing

"Today, we learned that chemical changes often show signs—color changes, gas formation, heat, or even new substances appearing. The rust on an old bicycle, the fizz in a soda, the way fruit ripens—all of these are clues that a chemical reaction has taken place."

"Now, think for a moment—what chemical change might be happening around you right now?

Homework:

1. Observe and identify two chemical changes that happen at home.
2. Describe the change you observed.
3. Explain what new substance(s) were formed.
4. Identify at least one feature of a chemical change in your example (color change, gas production, new substance, heat/light, etc.).

Period 5.3: Comparing physical and chemical changes

Learning Objective (LO 3): Students will be able to compare physical and chemical changes .

Explicit Teaching /Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
The teacher takes a recap of the concept of physical and chemical change by going through this PPT in the class: https://docs.google.com/presentation/d/1x0blwDi9j0B7rKDQFdAzEEUn4dIj_UdjdwAE3ZfZAL4/edit **CFU (open-ended/ Factual)** Factual CFUs 1. Which of these is a physical change? (a) Rusting (b) Melting ice (c) Burning wood (d) Cooking food 2. What are two pieces of evidence to differentiate a physical change from a chemical change? Open-ended CFUs	1. Divide students into groups. 2. Students will create informational posters or infographics about physical and chemical changes. 3. Students could use the Physical and Chemical Changes Poster Rubric to guide the creation of the poster: https://docs.google.com/document/d/1RaLAQA0meAW6mSK9Kk0F79U26s4hP9P7/edit	Students will complete this worksheet in their notebooks: https://docs.google.com/document/d/1drBN2f91FaQvNsJLmHhmpytAvK5fqWYH/edit#heading=h.cqqwmtfgnvv4

1. Give an example of a physical change and a chemical change. 2. Why is cooking considered a chemical change?		

Closing

"Today, we explored how physical and chemical changes are different. Some changes, like melting ice or tearing paper, only affect the way something looks—but the substance stays the same. Others, like burning wood or rusting iron, create something completely new that cannot be reversed."

If you crumble a cookie and then bake a new one from dough, which part is a physical change and which is a chemical change? Why?

Homework:

Perform this or any other experiment at home and come up with an explanation on the changes that occur during the experiment.

Make sure you take help from an adult.

Assessment of Concept 1:

1. Which of the following is a physical change? (LO 1)

   a) Burning paper b) Rusting of iron

   c) Boiling water d) Cooking an egg

2. Which of the following observations suggests that a chemical change has occurred? (LO 2)

   a) A substance changes from solid to liquid b) A gas is produced with bubbling

   c) A piece of metal is cut into two smaller pieces d) Water evaporates into the air

I. Fill in the blanks in the following statements: (LO 3)

(a) When carbon dioxide is passed through lime water, it turns milky due to the formation of __________.

(b) The chemical name of baking soda is __________.

(c) Changes in which only __________ properties of a substance change are called physical changes.

(e) Changes in which new substances are formed are called __________ changes.

1. How would you show that setting of curd is a chemical change?(LO 2)
2. Explain why dissolving sugar in water is a physical change. How can you prove that the sugar is still present? (LO 1)
3. When a candle burns, both physical and chemical changes take place. Identify these changes. Give another example of a familiar process in which both the chemical and physical changes take place. (LO 3)
4. When baking soda is mixed with lemon juice, bubbles are formed with the evolution of a gas. What type of change is it? Explain.(LO 2)
5. Chemical changes are essential in cooking. Explain how cooking food is a chemical change and why it is important in our daily lives. (LO 4)

(Here is the **Assessment** (link: https://docs.google.com/document/d/1hb-3CdEhmdH5Snpn_zQI5Pxar_g0O3q4Nq9GP3RKM9M/edit?tab=t.0) to take print and the **Key sheet** is provided for teacher reference)

Concept 2: Chemical Reactions

Learning Objective/s: Students will be able to

1. Describe what happens during a chemical reaction and how it forms new substances, with relevant examples.
2. Investigate how gases are formed in chemical reactions and analyze their effects.
3. Analyze real-life examples of chemical reactions, identifying their effects and significance.
4. Observe and analyze how temperature affects the speed of a chemical reaction. (Experiment)

Induction/Introduction

In this lesson, students will learn how chemical reactions create new substances with different properties. They will also explore real-life examples of chemical reactions and their significance in everyday activities like cooking, rusting, and fuel burning.

Period 5.4: Chemical reactions (Activity 5.6 & 5.7)

Learning Objective (LO 5): Students will be able to describe what happens during a chemical reaction and how it forms new substances, with relevant examples.

Hook:

Teacher demonstrates:

Take a clear glass of water and add a spoonful of baking soda. Stir:

Ask: "What do you notice? Has anything new formed?" (Students: "No, it just dissolved!")

Now, slowly pour in vinegar and ask students to observe. The mixture bubbles and fizzes, releasing gas.

Ask: "What just happened? Where did the bubbles come from?"

"Is this the same as dissolving sugar in water, or is something new being formed?"

Experience and Reflection:

"How do you know that a new substance was formed in this reaction? What clues helped you decide?"

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Imagine you are baking cookies. You mix flour, sugar, eggs, and butter. But when you put the dough in the oven, something magical happens—it turns into soft, delicious cookies! Can you take it out of the oven and get the raw dough back?" *(Students: "No!")* "Right! That's because heat causes the ingredients to react and form something new. This is what happens in a chemical reaction!" **Teacher demonstrates:** Take a thin strip or ribbon of magnesium. Bring the tip near a candle flame. It burns , producing a white flame and forms a white powder. **Ask:** What do you think that powder is? Can it converted back into the ribbon? *(Students: "The powder is a new substance which cannot be converted into its original form")*	1. Teacher demonstrates: - The teacher takes a blue copper sulfate ($CuSO_4$) solution in a beaker. (Teacher must also have a pre-dipped solution to save time) - A clean iron nail is placed in the solution and left undisturbed for a few minutes. - Students observe the changes happening to the nail and the solution. 2. Groups discuss and note their observations about the nail and the solution. 3. Prompt Questions:	Based on the iron nail and copper sulfate reaction demonstrated in class, answer the following questions in your notebook: 1. Describe two changes you observed during the reaction. How do these changes indicate that a chemical reaction has occurred?

Ask: How would you symbolically represent 2 mangoes put together with another mango? *(Students: 2 + 1 = 3, or 2M + 1 M = 3 M etc)* Like the way we make use of symbols and numerals in math to represent quantity of things, we can also represent chemicals using symbols. **Reaction:** Magnesium + Oxygen → Magnesium Oxide ($Mg + O_2 \rightarrow MgO$) **Signs of Chemical Change:** - Bright white flame (heat & light produced) - New substance (white powder - Magnesium Oxide) *Now, let ustake this white powder (magnesium oxide) and mix it with water.* What are the visible changes that you can observe in this reaction? Take 3 minutes to observe. ?" (*Students respond* Formation of a white, cloudy suspension that settles over time.) **Explanation:** A new substance, **magnesium hydroxide**, is formed. **Reaction:** Magnesium Oxide + Water → Magnesium Hydroxide ($MgO + H_2O \rightarrow Mg(OH)_2$) Teacher asks: "Why do you think this is also a chemical reaction?" (Students respond: "Because a new substance is formed!") "That's right! First, magnesium burned to form magnesium oxide, and then it reacted with water to form magnesium hydroxide—each step creating a new substance!" **CFU (open-ended/ Factual)** Factual CFUs: 1. What happens to magnesium when it burns? What new substance does it form? 2. How do we know that a chemical reaction occurred in both cases? Open-ended CFUs: 1. You mixed magnesium oxide with water and observed a change. What differences did you notice before and after mixing? How do these differences indicate a chemical reaction?	- Has the color of the solution changed? - What do you notice on the surface of the iron nail? - Do you think a new substance has formed? Why? 4. Groups infer what happened and answer: - Did the iron nail react with copper sulfate? - What was the original color of the solution, and what is it now? - Why do you think a reddish-brown deposit formed on the nail? - How do you know this is a chemical reaction? 5. The teacher explains the chemical reaction: The solution becomes lighter in color, and the nail develops a reddish-brown coating (copper metal). Chemical Reaction: Iron + Copper Sulfate → Iron Sulfate + Copper	2. What would happen if we left the iron nail in the copper sulfate solution longer? Predict the changes you might see.

2. Imagine you are a scientist trying to explain what a chemical reaction is to someone who has never heard of it before. How would you describe it using your own words and examples?		

Closing

"Today, we observed two chemical reactions—burning magnesium and the reaction between iron and copper sulfate. Both experiments showed clear signs of chemical change, such as color change, heat production, and the formation of new substances.

Why do you think some chemical reactions happen quickly, like burning magnesium, while others, like rusting, take a long time?

Homework

Perform a simple activity at home to observe a chemical reaction. Choose one of the following:

Iron and lemon juice:

- Rub the lemon on iron.
- Observe what happens.
- Write down two signs that show a chemical reaction has occurred.

(Observation and Analysis: The citric acid in lemon juice will react with the iron, and begin to dissolve some of the iron. This will cause rust to be removed.)

Period 5.5: Changes that occure during chemical reactions

Learning Objective (LO 6): Students will be able to identify the changes that occur during the chemical reactions.

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
"Have you ever opened a bottle of soda and seen bubbles rush to the top? What do you think causes those bubbles?" *(Students respond)* "Gases can be released when certain substances react with each other. Just like how opening a soda lets carbon dioxide escape, many chemical reactions also produce gases. Today, we're going to investigate how gases are formed in chemical reactions and why they are important." **How Do We Know a Gas is Produced in a Chemical Reaction?** Key Signs That a Gas is Formed: - Bubbling or fizzing. - Expansion (inflating balloons or rising dough). - A change in smell (some gases have strong odors). - Fog or smoke (visible gas production).	1. Divide students into groups. 2. Materials (For Each Group): - Small plastic bottle - Baking soda (1 spoon) - Vinegar (¼ cup) - Balloon - Funnel or paper cone (to pour baking soda) 3. Each group will: - Pour vinegar into the plastic bottle. - Use a funnel to put baking soda inside the balloon. - Carefully stretch the balloon over the bottle's opening, ensuring the baking soda stays inside. - Lift the balloon so the baking soda falls into the vinegar and observe the reaction.	Students will answer the following questions: 1. How did you know that a gas was formed in the experiment? 2. Which gas was produced when baking soda reacted with vinegar? 3. Give two other examples where gas formation happens in daily life. Explain how the gas is produced. 4. Why is it important to control gas formation in industries and the environment?

Teacher Asks: "Can you think of a situation where you see bubbles forming when mixing substances?" *(Students respond)* **What Happens When Gases Are Trapped?** Real-Life Applications: - Fire Extinguishers: Release CO_2 to put out fires. - Chemical Factories: Trap and store gases for industrial use. Teacher Asks: "Why is it important to understand gas formation in chemical reactions? How can this knowledge be useful?" **CFU (open-ended/ Factual)** Factual CFUs: 1. What are some signs that a gas is produced during a chemical reaction? 2. Name one chemical reaction in daily life that produces a gas and explain how it happens. Open-ended CFUs: 1. Some gases are useful, while others can be harmful. Can you think of a situation where a gas release is dangerous? 2. If you had to design an experiment to test if a reaction produces a gas, how would you set it up?	(Video reference: https://www.youtube.com/shorts/zy4prJI6iOY) 4. Each group discusses the following: - What happened when the baking soda mixed with vinegar? - How do we know a gas was formed? - What do you think would happen if we used a bigger bottle and a larger balloon but kept the same amount of baking soda and vinegar? Teacher closes the activity by summarizing: We observed that when baking soda mixed with vinegar, bubbles formed, and the balloon inflated. This tells us that a gas was produced. The fizzing and bubbling were signs of a chemical reaction. The gas released was **carbon dioxide**, which filled up the balloon. We also discussed how changing the bottle or balloon size wouldn't affect the amount of gas produced unless we changed the amounts of baking soda and vinegar. This activity shows us that chemical reactions create new substances, and one way to identify them is by looking for signs like gas formation!	

Closing

"Today, we observed how a gas was produced when baking soda reacted with vinegar, causing the balloon to inflate. This reaction is just one example of how gases form in chemical reactions. From rising bread to burning fuels, gas production plays an important role in our daily lives."

"Can you think of a situation where gas formation might be dangerous? How could we control or prevent it?"

Homework

Observe and think about how gases are formed around you. Answer the following questions in your notebook.

1. Identify one situation in daily life where a gas is produced naturally or through a reaction (e.g., cooking, digestion, pollution). Describe what happens.
2. Why do you think some chemical reactions produce gases while others do not?
3. Imagine you need to design a product that uses gas formation in a useful way (like a fire extinguisher or baking powder). What would it be, and how would it work?
4.

Assessment of Concept 2:

1. Which of the following is a chemical reaction? (LO 5)
   a) Ice melting   b) Paper tearing
   c) Burning wood   d) Dissolving salt in water
2. What is always true about a chemical reaction? (LO 5)
   a) It is easily reversible   b) A new substance is formed
   c) It always gives off heat   d) The reactants stay the same
3. Why does food spoil faster in warm weather? (LO 8)
   a) More bacteria are present
   b) Higher temperature speeds up the reactions that cause food to spoil
   c) Cold temperatures destroy bacteria
   d) Heat removes oxygen from the food
4. Match the following real-life examples with the correct evidence of a chemical reaction: (LO 7)

Example	Sign of Chemical Reaction
Rusting of iron	a) Heat and light produced
Baking a cake	b) Color change
Fireworks exploding	c) New substance formation

5. Some chemical reactions are useful, while others can be harmful. Choose one useful and one harmful chemical reaction from daily life and explain their effects. (LO 7)
6. Describe what happens in a chemical reaction. How is it different from a physical change? Give one example of each. (LO 7)
7. A scientist is studying how temperature affects the rate of medicine dissolving in the stomach. Why do you think doctors might recommend taking medicine with warm water instead of cold water? (LO 8)

Here is the **Assessment** to take print (link : https://docs.google.com/document/d/1sGO8e2cC7Z4Nw2SXM-3rej3PalJNDIEN5zosty3DyXQ/edit?tab=t.0
and the **Key sheet** is provided for teacher reference.

Concept 3: Rusting of Iron and its Prevention

Teaching Learning Process

Learning Objective/s: Students will be able to

Defend why rusting of iron is a chemical change

. Design an experiment to prevent rusting by eliminating/controlling a particular condition for rusting

Induction/Introduction

In this lesson, students will explore rusting as a chemical change by understanding how iron reacts with oxygen and water to form a new substance, iron oxide. They will analyze why rusting is irreversible and identify the key signs of a chemical reaction. Additionally, students will design an experiment to test different ways to prevent rusting by controlling one or more factors that contribute to the process.

Period 5.6: Rusting of Iron

Learning Objective (LO 9): Students will be able to explain why rusting of iron is a chemical change and identify conditions that accelerate rusting**.**

Hook:

Look at the pictures given below and note the difference:

"Look at these two monuments, the Qutub Minar and the Howrah Bridge. One is an iron pillar that has remained rust-free for over 1,600 years, while the other requires regular maintenance to prevent rusting. Can you guess why?"

(Students respond)

Experience and Reflection:

Can you give real-life situations where you have seen rust being formed over time?

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
"Imagine you leave a brand-new iron nail outside in the rain. A few days later, you see reddish-brown patches forming on it. Is this just dirt, or has something new been created?" *(Students respond: "It's rust!", "Something new has formed!", "It's reacting with water and air!")* "That's right! But is this the same iron nail, just with a different appearance, or has a chemical reaction occurred?" Teacher explains: - "Rusting is a slow chemical reaction that happens when iron reacts with oxygen and water. - Rust (iron oxide) is a completely new substance—it is flaky, brittle, and weakens the iron object.	1. Divide students into groups. 2. Set up three stations with three iron nails in different conditions: - Nail 1: Placed in a dry container (no water or moisture). - Nail 2: Placed in water (exposed to oxygen and water).	Students answer the following questions in their notebooks: 1. Why is rusting considered a chemical reaction and not a physical change? 2. Write the chemical equation for rusting and identify the reactants and products.

- The Reaction: Iron (Fe) + Oxygen (O_2) + Water (H_2O) → Iron Oxide ($Fe_2O_3 \cdot xH_2O$) (Rust)" Teacher asks: "Can we scrape off the rust and get the same strong iron back?" *(Students: "No, because the iron has changed into a new substance!")* "This proves rusting is a chemical change because: - A new substance (iron oxide) is formed. - The process cannot be reversed easily. - Rust has different properties from iron—it is weak and brittle." Teacher asks: "What can the real -life impacts of rusting be?" *(Students respond)* **CFU (open-ended/ Factual)** Factual CFUs: 1. What are the two essential conditions for rusting to occur? 2. How is rusting different from a physical change like bending iron? Open-ended CFUs: 1. If a ship is constantly in contact with water, what problems might rusting cause over time? 2. Why do you think some old iron structures lie The Qutub Minar rust faster than others like The Statue of Liberty?	- Nail 3: Placed in saltwater (accelerates rusting). 3. Each group observes the rusted and non-rusted nails and discusses: - Which nail rusted the most? Why? - Did all nails rust? If not, what prevented rusting? - What new substance was formed on the rusted nail? - Why do you think saltwater speeds up rusting?	3. Sita lives in Vijaywada and Geeta lives in Visakhapatnam. Both of them got iron gates fixed to their compound wall at the same time. Whose gate will rust faster? Explain your reasoning.

Closing

". Today, we saw how water and oxygen cause rusting and why it's a problem for structures like bridges and ships. Understanding rusting helps us find ways to prevent damage and extend the life of iron objects."

"Why is it important to prevent rusting in everyday life?"

Homework

Observe and analyze rusting in your surroundings. Answer the following questions in your notebook:

1. Find an iron object (e.g., a gate, railing, bicycle, or tool) that has rusted. Describe its appearance.
2. Where did you find the rusted object? Was it exposed to water or moisture?
3. Why do you think the object rusted? What conditions caused it?

September 2025

No bag Day C2M1S3 | Cluster Complex F1S8Y2 | Teacher Resources E5F4M6

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 5.7	2 5.8	3 NI	4 NI	5 Milad -Un -Nabi National Teacher's Day	6 No Bag Day
7 Sunday	8 International Literacy NI	9 NI	10 6.1,6.2	11 6.2	12 6.3	13 Second Saturday
14 Sunday Hindi Diwas	15 International Day of Democracy A6.4,A6	16 A6.6	17 6.5	18 6.6	19 NI	20 No Bag Day
21 Sunday	22 NI	23 NI	24 Dussera Holiday	25 Dussera Holiday	26 Dussera Holiday	27 Cluster and SMC meeting
28 Sunday	29 Dussera Holiday	30 Durgaa shtami Dussera Holiday				

Dasara Holidays 24.09.25 to 02.10.25 **Dasara Holidays for Minority Institutions** 27.09.25 to 02.10.25

Week 2:	**5.7 – 5.8**
Week 3:	**6.1 -6.3**
Week 4	**A6.4 -6.6**
Week 5:	**NI**

TEACHER'S NOTES

Period 5.7: Preventive measures for Rusting

Learning Objective (LO 10): Students will be able to

- Analyze the factors contributing to rust formation, and
- propose effective methods to prevent rusting.

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
"We know that rusting is a chemical reaction that weakens iron, but what if we could stop it? Imagine you are an engineer designing a bridge over the sea. Why would it be important to use methods to prevent it from rusting?" *(Students respond)* Today, we will learn how to prevent rusting by controlling or eliminating the conditions that cause it. And by the end of the lesson, you'll be able to design your own experiment to test a rust prevention method!" "We know that rusting needs three things: iron, water, and oxygen. If we remove or block any of these, can rust still form?" *(Students: "No!", "It should stop!")* "Now let's look at different ways to prevent rusting and how they work." **Method 1: Painting or Coating with Plastic** **How it works:** "A layer of paint or plastic covers the iron, blocking water and oxygen from reaching it. Have you observed objects made of iron being painted to prevent rust? (Take student responses) Yes! This is why bridges, gates, and fences are often painted. Example: A painted iron gate doesn't rust, but if the paint chips off, rust starts forming in that area." **Method 2: Applying Oil or Grease** **How it works:** "Oil or grease forms a slippery layer on iron, repelling water and stopping rust. Have you observed instances where oil is applied to prevent rust? (Take student responses) Oil is used for bicycle chains, tools, and machines. Example: A bicycle chain rusts quickly if left in the rain, but applying oil prevents rust." **Method 3: Galvanization (Coating with Zinc)** How it works: "A thin layer of zinc is coated over iron. Zinc reacts with oxygen first, protecting the iron underneath. This is used for water pipes, iron poles, and railway tracks. Example: Galvanized iron buckets don't rust because the zinc coating protects them."	1. Divide students into groups. 2. Take students to the playground or nearby areas where metal objects are exposed to air and moisture 3. Each group searches for rusted objects and notes down their location and condition. 4. Students sketch or take notes describing the rusted object (size, color, level of rusting). 5. Groups brainstorm and list methods to prevent further rusting (painting, oiling, galvanization, etc.).	Students will answer the following questions in their notebooks: . Why does rusting happen more quickly in coastal areas than in dry regions? . Why do people paint iron gates and railings? How does this help prevent rusting? . Which rust prevention method do you think is the most effective? Explain your reasoning

Method 4: Keeping Iron Dry (Removing Water or Moisture) How it works: "Rust cannot form without water. Storing iron in a dry place or using silica gel (like in shoe boxes) prevents rust. Example: Iron tools stored in a dry box don't rust, but if left outside in the rain, they will." **CFU (open-ended/ Factual)** Factual CFUs: 1. What are the necessary conditions for rusting to occur? 2. What is galvanization, and why does it help prevent rust? Open-ended CFUs: 1. If you were designing an iron bridge near the ocean, what method would you use to protect it from rust? Why?		

Closing

"Today, we explored different ways to prevent rusting by blocking air and water or using protective coatings. We also learned that rusting is not just about appearance—it weakens iron, causing real damage to objects like bridges, gates, and ships."

"If you had to design a rust-proof iron structure, which prevention method would you use and why?"

Teacher sets up an activity for the next period with the help of student volunteers:

The teacher, with the help of student volunteers, places iron nails in three different test tubes:

- Test Tube 1: Nail submerged in water.
- Test Tube 2: Nail exposed to air but kept dry.
- Test Tube 3: Nail submerged in saltwater.

The test tubes are left undisturbed until the next period for rusting to occur.

Homework

Observe and analyze how rust prevention methods are used around you. Answer the following questions in your notebook.

1. Find an iron object in your home or surroundings that has rusted. What caused it to rust?
2. Find an iron object that has not rusted. What method has been used to prevent rusting?
3. Which rust prevention method do you think is the most commonly used? Why?

Learning Objective (LO 11): SIP

Recap: "In our last lesson on rusting, we learned that rust is a new substance formed when iron reacts with water and oxygen. We also discussed how rusting weakens iron over time."

Teacher Asks Review Questions:

1. What are the two essential things needed for rusting to happen? (Students: "Water and oxygen!")
2. Why is rusting a chemical change? (Students: "Because a new substance (iron oxide) is formed!")
3. Can rusting be reversed? (Students: "No, because the iron has changed permanently!")

"Now that we know what causes rusting, let's see if we can control or prevent it! What do you think will happen if we remove either water or oxygen? Will rust still form? Let's find out!"

Key Idea:

✔Rusting happens when iron, oxygen, and water react together.

✔Removing oxygen or water can slow down or stop rusting.

Students observe and answer the following questions:
The teacher presents the three samples to the students:
Students examine the nails and note which one rusted the most and which remained rust-free.

Q1. Why did some nails rust more than others?
Q2. What conditions are needed for rusting to occur?
Q3. How can we prevent rusting? (e.g., painting, oiling, galvanization)
Q4. A farmer has two metal water tanks—one is painted, and the other is unpainted. After a few months, he notices that the unpainted tank has started rusting, while the painted one remains unaffected. However, he also realizes that some areas of the painted tank where the paint has chipped off are starting to rust.

Assessment of Concept 3:

1. Which of the following conditions is necessary for rusting to occur? (LO 9)
   a) Only oxygen b) Only water
   c) Both oxygen and water d) Only iron
2. Which of the following methods helps prevent rusting? (LO 10)
   a) Exposing iron to more air b) Painting or oiling the surface
   c) Keeping iron wet at all times d) Scraping off the outer layer of iron
3. Explain how rusting weakens iron objects. What problems can it cause in real life? (LO 9)
4. You have an iron nail. Describe two different ways you could prevent it from rusting. Which method do you think would work best and why? (LO 10 & 11)
5. In the experiment, why was a layer of oil added to one of the bottles? How did it help in preventing rust? (LO 11)
6. If you compare a bicycle left in a garage to a bicycle left outside in the rain, which one will rust faster? Explain why using your knowledge of rusting conditions. (LO 9 & 10)

Here is the **Assessment** to take print (link :
https://docs.google.com/document/d/1_Tqm69CJAy0EGTADzvKl9CzLJZwx4OP8WBXhle8g7Y8/edit?tab=t.0
and the **Key sheet** for teacher reference.

Concept 4: Crystallization and Purification

Teaching Learning Process

Learning Objective/s:
Students will be able to Illustrate the usage of crystallization in the purification of various salts

Induction/Introduction
In this lesson, students will learn how crystallization helps purify salts and why lower temperatures lead to better crystal formation.

Period 5.8: Crystalization

Learning Objective (LO 12): Students will be able to illustrate the usage of crystallization in the purification of various salts

Hook:

"Have you ever seen salt collected from seawater? Do you think the salt in your kitchen comes straight from the sea?"

(Students respond)

What do you see in the image given below?

"If salt is mixed with impurities, how do you think we get pure salt from it?"

Experience and Reflection:

"Can you think of any other substances that need to be purified before we use them?"

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
"Imagine you are making lemonade. You mix sugar into water, and it disappears. But what if you wanted to get that sugar back? Could you just scoop it out?" *(Students respond: "No, it dissolved!", "We would need to remove the water!")* "Exactly! When a solid dissolves in a liquid, we can't see it anymore. But if we remove the liquid carefully, we can get back the solid. That's what happens in a process called crystallization—it helps us get pure substances like salt and sugar from solutions." Teacher writes "Crystallization" on the board and asks: "Have you ever seen big, shiny salt or sugar crystals? How do you think they are made?" *(Students respond)* Crystallization is a process used to separate and purify a solid from a solution by forming well-defined crystals. How It Works: Step 1: The impure solid (e.g., salt) is dissolved in water. Step 2: The solution is heated to remove excess water. Step 3: As it cools, pure crystals form, while the impurities remain behind. **Teacher guides students through a thought experiment:**	1. Divide students into groups. 2. Teacher Led Demonstration with student volunteers. (Each group could be invited to do some portion of the task): - Take a beaker with a cup of water and add a few drops of dilute sulfuric acid. - Heat the water until it starts boiling. - Add copper sulfate powder slowly while stirring continuously. - Keep adding until no more powder dissolves, forming a saturated solution. - Filter the solution to remove undissolved particles.	Students will answer the following questions: 1. What is crystallization, and how does it help purify substances? 2. In the salt experiment, why was the solution filtered before cooling? 3. Besides salt and copper sulfate, name one other substance that can be purified using crystallization.

"Imagine we collected some salt from seawater. But it's not clean—it has sand and other impurities. Let's go step by step to get pure salt." Step 1: Dissolving the Salt: "First, we mix the salt in warm water. What do you think happens?" *(Students: "Salt dissolves!", "But the dirt stays back!")* Step 2: Filtering the Solution: "Now, we pour the saltwater through a filter. What will the filter remove?" *(Students: "The dirt and sand!")* Step 3: Heating the Solution: "Next, we gently heat the filtered saltwater. What do you think will happen as we heat?" *(Students: "The water will evaporate!", "Salt will be left behind!")* Step 4: Cooling and Forming Crystals: "But instead of letting all the water evaporate, we stop heating and let it cool. What do you think happens now?" *(Students: "Salt crystals will start forming!", "They'll grow bigger as it cool)* *This happens because when a substance like salt or sugar dissolves in water, it spreads out evenly. If we* ***evaporate the water slowly*** *or* ***cool the solution****, the dissolved substance starts coming together in an* ***organized pattern****, forming crystals. This happens because the remaining water can no longer hold all the dissolved material.*	- Allow the solution to cool undisturbed. - Teacher shows a pre-prepared solution with crystal formation. 3. Students discuss: - What did you see at each step of the process? - How does crystallization help purify copper sulfate? - What would happen if we didn't let the solution cool slowly? - How is this method used in industries like salt and sugar production? Further instructions for upcoming period number 16: - Observe the beaker after some time or on a daily basis. (Solution to be kept in an undisturbed place for a few days.) - As the solution cools, shiny blue copper sulfate crystals will begin to form. - Follow-up questions: ● How have the crystals changed since the last time you saw them?	

Note: If water evaporates too quickly, the dissolved substance may not have enough time to form well-structured crystals, leading to smaller or irregular deposits. Slower evaporation allows for larger, more defined crystal formation. **CFU (open-ended/ Factual)** Factual CFUs: 1. Why is crystallization useful for purifying salt? 2. What would happen if we evaporated all the water too quickly? Open-ended CFUs: 1. If salt was dried directly from seawater without dissolving and filtering, what problems might occur? 2. How does crystallization help us get substances that are safe for use?	● What do you notice about their size and shape? Why do you think this happens? ● If we had disturbed the solution while it was cooling, how might the crystals have looked different? ● What role does temperature play in crystal formation?	

Closing

"Today, we saw how crystallization helps purify substances like copper sulfate by forming well-structured, pure crystals. This method is not just used in science experiments—it plays a big role in producing everyday substances like salt, sugar, and even medicines. By allowing a solution to cool slowly, we can get larger and purer crystals, making this an important process in purification."

"Imagine you have a mixture containing salt and another containing sand. If you needed to purify each substance, which one would you choose to purify using crystallization and why?"

Homework

Try this simple activity to observe crystallization at home.

Instructions:

1. Take half a cup of warm water in a glass or bowl.
2. Add salt or sugar one spoon at a time, stirring continuously until no more dissolves (this makes a saturated solution).
3. Place the glass in a safe spot where it won’t be disturbed.
4. Let it sit overnight and observe any changes the next day.

Observation:

Look closely at the bottom or sides of the glass. Do you see any crystals forming?

If not, leave it for another day and check again.

Assessment for concept 4:

Section A: Objective Questions

1. What is crystallization?

   a) Melting a substance b) Purifying a substance by forming crystals

c) Mixing substances together d) Boiling a liquid

2. Why is crystallization useful for purifying salts?
   a) It changes the color of the salt
   b) It removes impurities by forming pure crystals
   c) It turns salt into a gas
   d) It makes salt dissolve in water
3. Which factor helps in forming larger crystals?
   a) Rapid cooling b) Slow cooling
   c) Stirring continuously d) Adding more impurities

Section B: Short Answer Questions

1. Explain why crystallization is a better method for purifying salt than simply drying seawater.
2. What would happen if a crystallization solution was disturbed while cooling?

Section C: Application-Based Questions

A student tries to purify sugar using crystallization but heats the solution too much and then cools it rapidly. What do you think will happen? What should they have done differently?

Here is the **Assessment** to take print

(Link :
https://docs.google.com/document/d/1WV4eBFLZWVm6rwyZYoHxemY9sEURdT_Hj5f_FNwTO9Q/edit?tab=t.0)

and the **Key sheet** is provided for teacher reference.

Period 5.9: Summarizing the Lesson

Period 5.10: Student Independent Practice

Students will complete these worksheets in their notebooks:

Worksheet 1: https://docs.google.com/document/d/1uLH56cpG2oFjobQLfjdnvyXJCz4g-cGhwD4SAP-tNT8/edit?tab=t.0

Worksheet 2:
https://docs.google.com/document/d/1S8xw8Q5bfizrHT2LMxwS66x87qvX6_jq7ZaPWttRjNQ/edit?tab=t.0

Worksheet 3:
https://docs.google.com/document/d/1vVVClO_yV0ZWK3_ujRIpSUpKr0T6Wnu66D2XsNCPHps/edit?tab=t.0

Period 11 - Remedial Teaching

Period 12 - Remedial Teaching

Teacher's Diary

Name of the Teacher:				**Name of the Month:**	
Name of the Lesson:				**Class:**	
Period No	**Name of the Concept to be taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	**Remarks**
5.1	Introduction,5.1 Physical Changes (Activity 5.1,Activity 5.2, Activity 5.3, Activity 5.4)				
5.2	Chemical Change				
5.3	Physical & Chemical Change				
5.4	Chemical Reaction - Activity 5.6 And Activity 5.7				
5.5	Activity 5.8				
5.6	Rusting Of Iron (Activity 5.9)				
5.7	Rusting Of Iron - Prevention				
5.8	Crystalisation				
5.9	Summarizing The Lesson				
5.10	Student Independent Practice				
5.11	Remedial Teaching Period				
5.12	Remedial Teaching Period				

1.	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?
2.	Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
3.	What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
4.	How well did I adjust my teaching based on student reactions or unforeseen challenges?

Head Teacher's Signature   Teacher's Signature

Head Teacher's Suggestions:

Teacher's Notes:

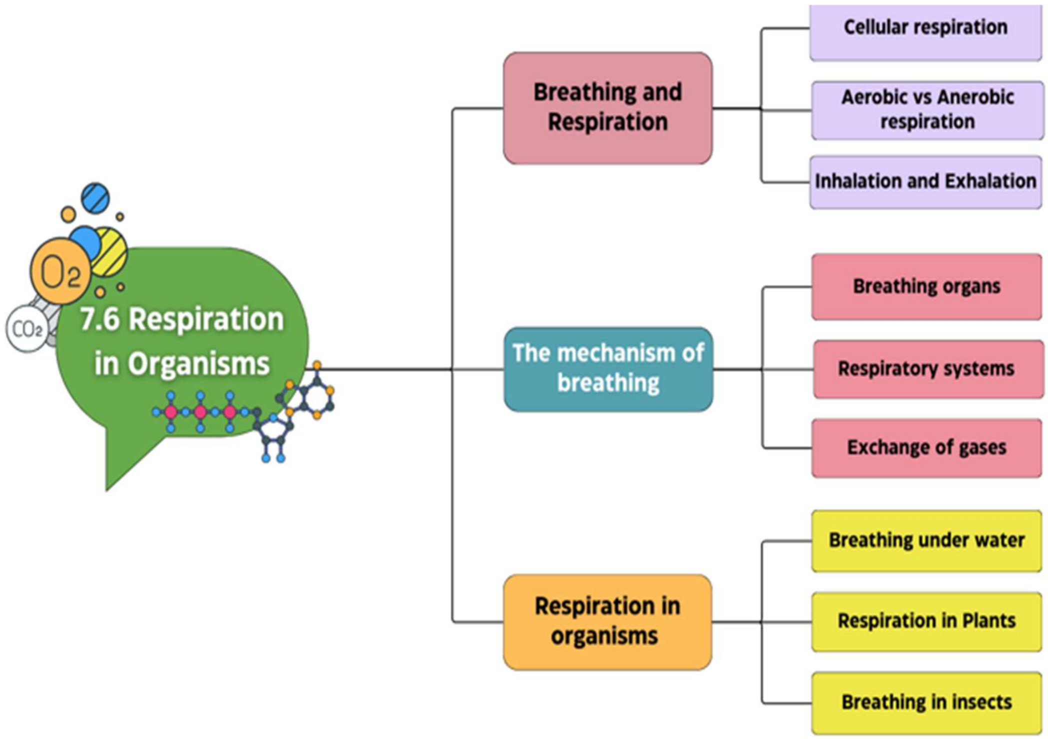
6 RESPIRATION IN ORGANISMS

Learning Outcomes:

X5P6X7

1. Define respiration and differentiate it from breathing
2. Recall The different types of respiration (aerobic and anaerobic) and their significance
3. Explain the process of cellular respiration and how energy is released in organisms
4. Compare the respiratory organs of different animals (lungs gills trachea and skin respiration)
5. Analyse how physical activity affects breathing rate and oxygen demand
6. Conduct simple experiments to measure breathing rates before and after exercise
7. Interpret the role of anaerobic respiration in muscle fatigue and oxygen debit
8. Demonstrate the mechanism of breathing using models of the lungs and the diaphragm

CONCEPT MAP



SYNOPSIS

- Respiration is essential for survival of living organisms. It releases energy from the food.
- The oxygen we inhale is used to breakdown glucose into carbon dioxide and water. Energy is released in the process.
- The breakdown of glucose occurs in the cells of an organism (cellular respiration).
- If the food is broken down with the use of oxygen, it is called aerobic respiration. If the breakdown occurs without the use of oxygen, the respiration is called anaerobic respiration.
- During heavy exercise when the supply of oxygen to our muscle cells is insufficient, food breakdown is by anaerobic respiration.
- Breathing is a part of the process of respiration during which an organism takes in the oxygen-rich air and gives out air rich in carbon dioxide. The respiratory organs for the exchange of gases vary in different organisms.
- During inhalation, our lungs expand and then come back to the original state as the air moves out during exhalation.
- Increased physical activity enhances the rate of breathing. In animals like cow, buffalo, dog and cat the respiratory organs and the process of breathing are similar to those in humans.
- In earthworm, the exchange of gases occurs through the moist skin. In fishes it takes place through gills and in insects through the tracheae.
- In a plant the roots take in air present in the soil. Leaves have tiny pores called stomata through which they exchange gases. The breakdown of glucose in the plant cells is similar to that in other living beings.

Period-wise Topics

Chapters and Concepts

Period. No	Topic	Remarks
6.1	Introduction, Activity 1	
6.2	11.1 Is air present every where around us	
6.3	11.2 What is air made up of ? Activity 3	
6.4	Activity 4	
6.5	11.3 How does oxygen become available Activity 5,6	
6.6	11.4 How is the oxygen in the atmosphere replaced ?	

Period 6.1

Concepts Covered:

1. Why do we Breathe.
2. Breathing

Learning Objectives:

- Students will be able to identify key terms related to respiration, such as aerobic respiration, anaerobic respiration, and cellular respiration
- Analyse and compare aerobic and anaerobic respiration by explaining their processes, identifying their products, and evaluating their significance in different organisms.
- Explain the role of respiration in energy production by describing how ATP is generated and utilized in cellular activities

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

Breathe in ***Breathe out***

- **TLM Required:** Flash Cards, Text Book images, Activity Cards

Teacher Resources:

- NCERT Class 7 Textbook : https://ncert.nic.in/textbook.php?iesc1=7-15
- Bal Vaigyanik, Pages 125-130 : https://www.eklavya.in/pdfs/Books/HSTP/Bal_Vaigyanik_Current_Edition/Bal_vaigyanik_Class_7_English/Bal_Vaigyanik_Class_7.pdf
- How to draw the Human Respiratory System: https://www.youtube.com/watch?v=A5x5CTmrQus
- How do lungs work? : https://www.youtube.com/watch?v=8NUxvJS-_0k
- How breathing works : https://www.youtube.com/watch?v=Kl4cU9sG_08

Igniting Activity The teacher first instructs students to sit still and take slow, normal breaths for 30 seconds. Then, the teacher asks the students to stand up, jog in place for 30 seconds, and notice their breathing.

Learning Point: What changed in your breathing when you moved?

Why do we breathe faster when we exercise?

Concept	Ignitng Activity	Activity (I Do)	Activity We do	Activity You do
What is breathing	The teacher brings a candle and a glass jar to the classroom. The teacher lights the candle and puts a jar over the candle after a few seconds.	Why did the candle go out? What do you think this tells us about breathing? The teacher explains the role of oxygen and carbon dioxide in breathing.	Students form groups of four. Each group will measure their breathing rate (number of breaths per minute) in three different conditions: ● At rest ● After light walking ● After running in place for 30 seconds	**Task:** Read the following scenarios and answer the questions: 1. A person is calmly reading a book. 2. A child is running to catch a school bus. 3. A swimmer is holding their breath underwater. **For each scenario, answer:** ● What do you think is happening to their breathing rate? ● Why is it changing (or not changing)? ● How does the body adjust to the situation?
Why do we Breathe	We all know that all living things need energy to perform essential life functions such as walking, talking, eating, and even thinking. But where do we get this energy from?	By taking student responses explain the process of cellular Respiration, Aerobic Respiration, Anaerobic Respiration	The teacher divides the students into small groups (4-5). The groups will see the pictures of different organisms on the board and categorize them into one of the three categories: Aerobic respiration, Anaerobic respiration, and Cellular respiration	Choose two environments (e.g., deep ocean, desert, high mountains, or underground). Research one organism from each environment and write 3 to 4 sentences explaining how it respires in that habitat. Does it use aerobic or anaerobic respiration? Why? Think about your daily activities. Write down three activities you do every day that require energy (e.g., walking to school, playing outside, studying).
What is ATP?	The teacher holds a mobile phone with a low battery indicator. Imagine you are using your phone, and suddenly, this battery symbol appears. What do you do? Your body also needs energy to function like a phone needs a charged battery. But instead of electricity, our	Our body needs steady energy to move, think, and grow. This energy comes from a molecule called **ATP (Adenosine Triphosphate)**, which acts like a rechargeable battery.	**Materials Needed:** ● **ATP Coins** (small tokens or paper slips labeled "ATP") ● **Glucose Cards** (representing food energy) ● **Oxygen Cards** (representing respiration) ● **Activity Task Cards** (listing actions that require ATP, such as writing, jumping, and talking) ● **Mitochondria Zones** (designated	Complete the sentences below to explain what you learned about ATP. 1. ATP gives energy to our body to do work like ______ and ______. 2. Our body makes ATP using ______ and ______. 3. If we do not have enough ATP, we feel ______ and cannot ______. 4. Oxygen helps in making ATP because it allows ______ to happen. 5. I learned that ATP is necessary because ______. *Answer Key: 1. walking, writing | 2. glucose, oxygen | 3. tired, do work*

	body runs on a special type of energy called ATP. How do we produce it? Think of a time when you felt exhausted after running or playing a game. What happened to your body?		spots in the classroom where ATP is generated) ● **Energy Restoration Station** (a rest area where students can simulate replenishing ATP) **Teacher action:** The teacher divides the students into small groups. Each group represents a **cell** and starts with **a shared pool of 20 ATP coins**. Group members must decide how to spend ATP on tasks such as writing, walking, or jumping, each with a specific cost. To replenish ATP, groups must collect **Glucose Cards** (pretending to eat) and **Oxygen Cards** (taking deep breaths). ● They then visit the **Mitochondria Zone** to trade **1 Glucose + 1 Oxygen** for **3 ATP coins**, which the group can distribute among members. If a group runs out of ATP, they must send a member to the **Energy Restoration Station** to "rest" or generate ATP through **anaerobic respiration**, where **1 Glucose Card** gives only **1 ATP**. ● After the activity, each group discusses how they managed their ATP, the challenges faced, and the importance of oxygen in efficient energy production.	*properly* | *4. aerobic respiration* | *5. it provides energy for all activities*

Summary:

➔ The process of breakdown of food in the cell with the release of energy is called **cellular respiration**.
➔ When breakdown of glucose occurs with the use of oxygen it is called **aerobic respiration**. Food can also be broken down, without using oxygen. This is called **anaerobic respiration**. Breakdown of food releases energy
➔ The number of times a person breathes in a minute is termed as the **breathing rate**.

Factual Questions:

- Are breathing and respiration the same thing? Why/Why not?
- Where does cellular respiration take place?
- Open Ended Questions: 1. Why do athletes breathe faster after running?
- What do you think would happen if your cells could not perform respiration?

Quick Quiz/ Assignment:

- Why does lactic acid build up in muscles?
- Which organisms use anaerobic respiration to produce alcohol?
- Why do athletes need to breathe heavily after running?
- why do some organisms still use anaerobic respiration if oxygen is available Summary?

Period 6.2: Topics to be covered

- Activity 6.1
- Activity 6.2
- Learning Objectives
- Students understand the process of inhalation and exhalation

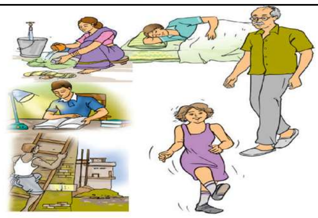
<table>
<tr><th>Topic</th><th>Ignite activity</th><th>I do</th><th>We do</th><th>You do</th></tr>
<tr>
<td>Activity 6.1

Activity 6.3</td>
<td>Find out how many times you breathe in and breathe out in a minute?</td>
<td>Teacher will ask the following questions
Did you inhale the same number of times as you exhaled?
Now count your breathing rate

Calculate the breathing rate by observing the picture given below</td>
<td>Students form groups of four. Each group will measure their breathing rate (number of breaths per minute) in three different conditions:
• At Normal
• After a brisk walk for 10 minutes
• After running fast 100m
• At rest

In groups students calculate the Breathing rates and</td>
<td>Complete the following Table
<table>
<tr><th>Name of the classmate</th><th colspan="4">Breathing rate</th></tr>
<tr><th></th><th>Normal</th><th>After a brisk walk for 10 minutes</th><th>After running fast 100 m</th><th>At rest</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Self</td><td></td><td></td><td></td><td></td></tr>
</table>

Read the following scenarios and answer the questions:
1. A person is calmly reading a book.
2. A child is running to catch a school bus.</td>
</tr>
</table>

	Observing variations in breathing rate at different activities		arrange them in an order	3. A swimmer is holding their breath underwater. For each scenario, answer: ● What do you think is happening to their breathing rate? ● Why is it changing (or not changing)? ● How does the body adjust to the situation?

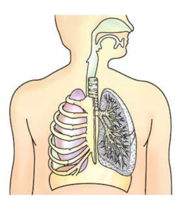
On an average, an adult human being at rest breathes in and out 15–18 times in a minute. During heavy exercise, the breathing rate can increase upto25 times per minute. While we exercise, not only do we breathe fast, we also take deep breaths and thus inhale more oxygen.
Assignment

1. Are breathing and respiration the same thing? Why/Why not?
2. What are the two main steps of breathing?
3. How doyou think emotions like stress or fear affect breathing?

PERIOD 6.3 : Topics to be covered- Mechanism of Breathing

Learning Objectives

Explain the process of inhalation and exhalation, including the role of the diaphragm and rib muscles.
Trace air movement through the respiratory system, from the nasal cavity to the alveoli, identifying key structures involved in gas exchange

TOPIC	Ignite Activity	I do	We do	You do
Mechanism of Breathing	The teacher places a blown-up balloon on the table and slowly releases the air. - Look at this balloon. What happens when I let go of it? *(Students observe air coming out.)* - Our lungs work in a similar way!	Breathing is something we do all the time without thinking. But have you ever wondered how air travels inside your body? Let us  explore step by step By showing videos and Photos Teacher will explain the Structure and mechanism of Breathing	The teacher divides the students into small groups based on their roles as parts of the respiratory system. The class works together to create a **human model of the respiratory system** by acting as different parts. Each student receives a small **colored token** (representing oxygen or carbon dioxide).	Now that you are familiar with different parts of the respiratory system, draw a well-labeled diagram of the respiratory system and color each part with caution. Write a few sentences on the role of the respiratory system

	But how do we take in air and push it out?	1. **Nasal Cavity & Pharynx** ○ The air enters the nasal cavity when we breathe in through our nose. What do you feel when you breathe through your nose? *[Students respond: cool air, tickling, etc.]* ○ The nasal cavity has tiny hairs and mucus that trap dust and germs before air moves down the throat. 2. **Trachea & Bronchi** ○ The air then passes through the pharynx and enters the trachea. This is a long tube that carries air down toward the lungs. ○ The trachea then splits into two branches, called bronchi—one leading to each lung. 3. **Bronchioles & Alveoli** ○ Inside the lungs, the bronchi divide into smaller tubes called bronchioles. Imagine a tree with branches getting smaller and smaller. ○ At the end of these tiny bronchioles are air sacs called alveoli. This is where the magic happens—gas exchange! 4. **Gas Exchange** ○ The alveoli are surrounded by tiny blood vessels called capillaries. When air reaches the alveoli, oxygen moves into the blood, and carbon	**Instructions:** 1. The first few students form a line between the **nasal cavity and the trachea**. They pass the oxygen token down the line. 2. The next group represents the **bronchi and bronchioles**. They split the oxygen tokens and send them in different directions. 3. The final group represents the **alveoli and blood**. - The alveoli students exchange the oxygen token for a carbon dioxide token. - The blood students carry the carbon dioxide tokens back through the system, simulating exhalation.	

		dioxide moves out to be exhaled. ○ So, oxygen enters your blood every time you breathe, and waste gases leave. This keeps you alive		

Summary Breathing is a part of the process of respiration during which an organism takes in the oxygen-rich air and gives out air rich in carbon dioxide. The respiratory organs for the exchange of gases vary in different organisms.

<table>
<tr><th>Topic</th><th>Ignite Activity</th><th>I DO</th><th>WE DO</th><th>YOU DO</th></tr>
<tr>
<td>Activity 6.4 Measuring chest expansion

Activity 6.6</td>
<td>Have you ever noticed how your chest moves when you breathe deeply? Let us all take a deep breath and observe what happens</td>
<td>The teacher pairs students and distributes measuring tapes with everyone.
● The teacher instructs one student to wrap the measuring tape around their partner’s chest and record the measurement while breathing normally.
● The partner then takes a deep breath, and the measurement is recorded again.
● The teacher asks students to compare their results and identify whose chest expands the most.
● The teacher discusses: Why does our chest expand when we inhale? (Guide students toward understanding that it is due to the movement of</td>
<td>Students record their observations with the help of a teacher
<table>
<tr><th rowspan="2">Name of the classmate</th><th colspan="3">Size of the chest (cm)</th></tr>
<tr><th>During inhalation</th><th>During exhalation</th><th>Difference in size</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
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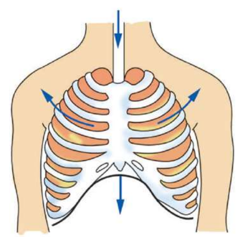
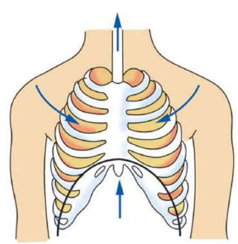


</td>
<td>How can we keep our lungs healthy? (Encourage answers related to exercise, clean air, etc.)

What would happen if your diaphragm stopped working properly? How do you think it would affect your breathing and daily activities?</td>
</tr>
</table>

Creating a Breathing model		*the diaphragm and ribcage.)* Tacher will show the Model of Breathing - Pull the plastic sheet downward and ask: - What happens to the balloons? *(They inflate, showing inhalation.)* - Push the plastic sheet upward and ask: - What happens now? *(The balloons deflate, showing exhalation.)* - The teacher reminds students that this is how our diaphragm moves while breathing.	1. Show the materials and explain the process step by step: ○ Insert the Y-tube into the bottle through the hole in the cap. ○ Attach two deflated balloons to the forked ends of the tube. ○ Secure the cap on the bottle to make it airtight. ○ Stretch a thin rubber or plastic sheet over the bottom opening and secure it with a rubber band. 2. Let students construct the model in groups. Demonstration & Discussion ● Pull the plastic sheet downward and ask: ○ What happens to the balloons? (They inflate, showing inhalation.) ● Push the plastic sheet upward and ask: ○ What happens now? (The balloons deflate, showing exhalation.) ● The teacher reminds students that this is how our diaphragm moves while breathing.	● Students write a short paragraph explaining how the breathing model represents the human respiratory system. Students must include a labelled diagram of their model.

During inhalation, our lungs expand and then come back to the original state as the air moves out during exhalation

Assignment

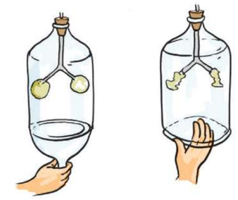
1. Which structure carries air from the throat to the lungs?
2. What are the two branches of the trachea called?
3. What would happen if the trachea were blocked?
4. How does exercise affect our breathing?

PERIOD 6.4

TOPICS TO BE COVERED
Activity 6.5
Activity 6.6
Learning Objectives
Demonstrate the movement of the diaphragm and ribcage in breathing using a model.

SUMMARY

Breathing always happens, but now you know how your diaphragm and rib muscles make it possible. Every breath you take is a coordinated movement of muscles to bring oxygen into your body and remove carbon dioxide



ASSIGNMENT
1. What happens to the diaphragm when we inhale?
2. What do the rib muscles do during exhalation?
3. Why do we need to expand our chest while inhaling?
4. How does exercise affect the movement of the diaphragm?

PERIOD 6.5

TOPICS TO BE COVERED
Activity 6.6
What do we Breathe out
Learning Objectives
Students understand the composition of Air we exhale

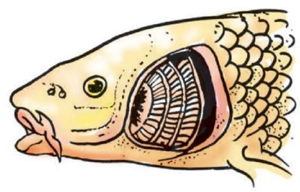
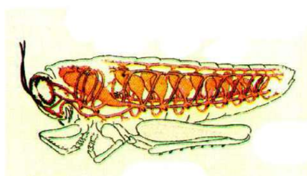
Topic	Ignite the Activity	I DO	WE DO	YOU DO
Activity 6.6 What do we Breathe out	Have you ever observed the air inhale is cool and the air we exhale is hot and contain more carbon dioxide	Teacher will perform the activity by using waste materials 	Take a slender, clean test tube or a glass/plastic bottle. Make a hole in its lid and fix it on the bottle. Pour some freshly prepared lime water in the test-tube. Insert a plastic straw through the hole in the lid in such a way that it dips in lime water. Now blow gently through the straw a few times.	Prepare a chart showing oxygen and carbon dioxide concentration in the inhaled and exhaled air.

SUMMARY

PERIOD 6.6

TOPICS TO BE COVERED
Breathing in other Animals

Learning Objectives
Students will identify the different respiratory organs used by various organisms (lungs, gills, spiracles, skin, tracheal tubes) and explain their basic function in gas exchange.

Topic	Ignite an Activity	I DO	WE DO	YOU DO
Breathing in other animals 6.6 Respiration underwater	Imagine you are holding your breath underwater. Can you stay there as long as a fish? Why not?	The teacher shows different respiratory organs present in different organisms on the screen. Different organisms have different ways of breathing. Let us look at the main types of respiratory organs.   1. **Lungs** – Humans, mammals, and birds have lungs. Lungs help take in oxygen from the air and remove carbon dioxide when we exhale. 2. **Gills** – Fish and some amphibians have gills. Gills absorb oxygen from water and release carbon dioxide back into it. 3. **Spiracles and Tracheal Tubes** – Insects like grasshoppers have small openings called spiracles on their body. These connect to tubes that carry air directly inside. 4. **Skin (Cutaneous Respiration)** – Frogs and earthworms breathe through their moist skin.	Teacher actions: **Divide the class into four groups.** Each group will focus on one type of respiratory organ: ● Group 1: **Lungs** (Humans, mammals, birds) ● Group 2: **Gills** (Fish, amphibians) ● Group 3: **Spiracles & Tracheal Tubes** (Insects) ● Group 4: **Skin (Cutaneous Respiration)** (Frogs, earthworms) **Task:** Each group fills a simple chart with three columns: ● **Organ Name** (e.g., lungs) ● **Example Organisms** (e.g., humans, lions) ● **How It Works** (e.g., takes in oxygen from the air)	Research and write about one unique respiratory adaptation in an unusual animal (e.g., dolphins, earthworms, or sea cucumbers).

		Oxygen passes directly into their blood. All these organs help in gas exchange, taking in oxygen and removing carbon dioxide. Their structure depends on where the organism lives.		

The air we exhale contains more carbon dioxide than the air we inhaled. The air we inhale contains more oxygen than the air we exhale.

ASSIGNMENT

How does air pollution affect breathing?

PERIOD 6.6

TOPICS TO BE COVERED

Breathing in other Animals

Learning Objectives

Students will identify the different respiratory organs used by various organisms (lungs, gills, spiracles, skin, tracheal tubes) and explain their basic function in gas exchange.

SUMMARY

In animals like cow, buffalo, dog and cat the respiratory organs and the process of breathing are similar to those in humans.

In earthworm, the exchange of gases occurs through the moist skin. In fishes it takes place through gills and in insects through the tracheae.

Assignment

1. Name one organism that breathes through spiracles.
2. What is the function of gills?
3. Why do some fish need to keep moving to survive?
4. What happens if a land animal's lungs dry out?

Open-Ended

1. How does the environment influence the type of respiratory organ an organism has?
2. Why do humans need lungs while insects do not?
3. What do you think would happen if an animal had both gills and lungs but lived only on land?

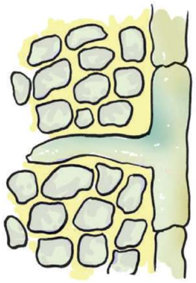
PERIOD 6.7

TOPICS TO BE COVERED

6.7 Do plants also Respire

Learning Objectives

Students will identify the respiratory organs in plants.

Topic	Ignite an Activity	I DO	WE DO	YOU DO
Respiration in plants	Can you guess what would happen if a potted plant is over watered?	Teacher shows stomata and root hair of a plant image and explain how the plants respire  Do all the organisms need O2 for the oxidation of glucose? In the cells oxygen is used to break down glucose into carbon dioxide and water as in other organisms. In plants each part can independently take in oxygen from the air and give out carbon dioxide		

SUMMARY

In a plant the roots take in air present in the soil. Leaves have tiny pores called stomata through which they exchange gases. The breakdown of glucose in the plant cells is similar to that in other living beings

ASSIGNMENT

1. Explain the importance of plant respiration in the context of plant growth and development?
2. How does plant respiration affect the environment?
3. How does oxygen availability affect plant respiratio

TEACHER'S DIARY

Name of the Teacher:				Name of the Month:	
Name of the Lesson:				**Class: 7**	
Period. No	**Name of the Concept to be taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	Remarks
6.1	6.1 why do we breath, 6.2 Breathing				
6.2	Activity 6.2, 6.3				
6. 3	6.3 mechanism of breathing				
6. 4	Activity 6.4, &6,5				
6. 5	Activity 6.6, what do we breath out				
6. 6	6.5 Breathing in other animals				
6. 7	6.6 Breathing under wayers				

1	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?

<table>
<tr><td>2</td><td>Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?</td></tr>
<tr><td>3</td><td>What additional resources or modifications could improve the effectiveness of this lesson in future implementations?</td></tr>
<tr><td>4</td><td>How well did I adjust my teaching based on student reactions or unforeseen challenges?</td></tr>
<tr><td colspan="2">Head Teacher's Signature Teacher's Signature</td></tr>
<tr><td colspan="2">Head Teacher's Suggestions:</td></tr>
<tr><td colspan="2">Teacher Notes:</td></tr>
</table>

October 2025

No bag Day — C2M1S3

Cluster Complex — F1S8Y2

Teacher Resources — E5F4M6

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2 Mahatma Gandhi Jayanti Vijayadashami	3 NI	4 No Bag Day Sakunthala Devi Jayanti
5 Sunday International Teacher's Day	6 7.1	7 A7.1	8 7.1	9 NI	10 NI	11 Second Saturday
12 Sunday	13 FA - 2	14 FA - 2	15 FA - 2	16 NI	17 A7.2	18 No Bag Day Cluster meeting
19 Sunday	20 Deepavali	21 7.2	22 7.2	23 7.2	24 7.3	25 No Bag Day SMC Meeting
26 Sunday	27 A7.3	28 NI	29 8.1	30 A8.2	31 National Unity Day 8.1	

Week 1: NI

Week 2: 7.1

Week 3: FA2, 7.2

Week 4: 7.2, 7.3

Week 5: 7.3, 8.1, 8.2

↓ TEACHER'S NOTES ↓

7 TRANSPORTATION

Learning Outcomes: Students will be able to:

A2B1M3

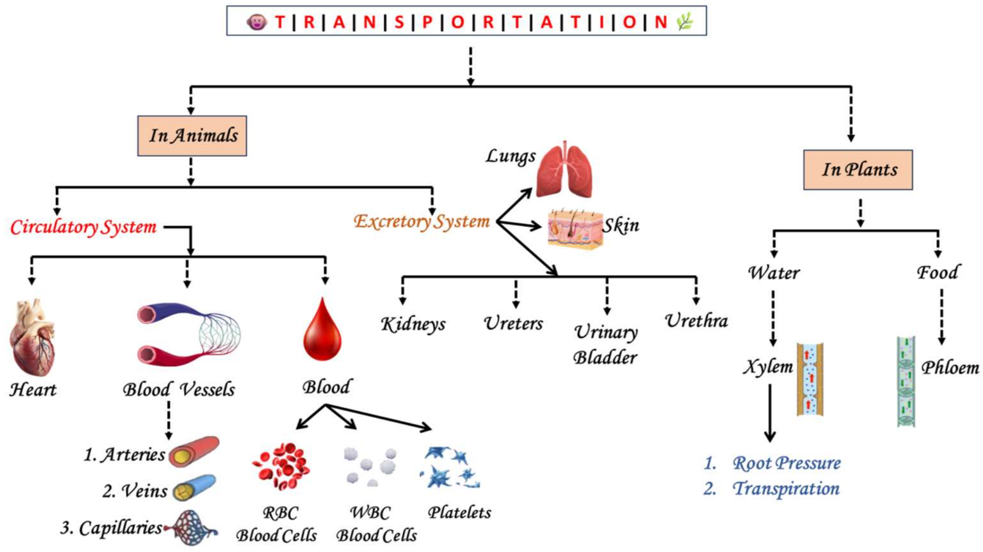
1. LO 1: Explain the need for a transport system in animals and plants.
2. LO 2: Explain the composition of blood, identify its components, and describe their functions.
3. LO 3: Identify the three types of blood vessels (arteries, veins, and capillaries), understand their functions and differences, and investigate how physical activity affects pulse rate.
4. LO 4: Identify and label the main parts of the heart.
5. LO 5: Describe how the heart pumps blood and circulates it through the body.
6. LO 6: Construct a simple model of a stethoscope and explain the relation between heartbeat and pulse rate.
7. LO 7: Identify the excretory organs and explain their functions.
8. LO 8: Identify and describe the roles of xylem and phloem in transporting water, minerals, and food in plants. s
9. LO 9: Describe transpiration process and its importance.

Prior Concept/Skills:

- Difference between **plants and animals**
- **Basic structure of a plant** (Roots, Stem, Leaves)
- **Basic structure of the human body** (Organs and Organ Systems)
- Role of **cells** as the basic unit of life
- Basic idea of **diffusion and osmosis** (movement of substances)
- How plants take in water and nutrients from soil
- Basic understanding of **breathing and oxygen use** in animals
- How living organisms **remove waste** (e.g., urination, sweating)

Drawing and labeling diagrams (such as plant and human organs)

CONCEPT MAP



SYNOPSIS

Circulatory system in Animals:

- The circulatory system transports oxygen, nutrients, and waste products within the body.
- Blood consists of plasma, red blood cells (RBCs), white blood cells (WBCs), and platelets.
- RBCs contain haemoglobin, which helps transport oxygen.
- WBCs play a role in fighting infections and protecting the body.
- Platelets help in blood clotting to prevent excessive bleeding.
- Blood vessels include:
  - **Arteries** – Carry oxygen-rich blood from the heart to the body.
  - **Veins** – Carry carbon dioxide-rich blood back to the heart.
  - **Capillaries** – Facilitate the exchange of oxygen, nutrients, and waste.
- The heart is a four-chambered organ that pumps blood continuously.
- Heartbeats are the rhythmic contractions and relaxations of the heart muscles.
- A stethoscope is used to measure heartbeats.
- Pulse rate indicates heart activity and varies with physical exertion.

Excretion in Animals:

- The process of removing waste products from the body.
- The human excretory system includes **kidneys, ureters, bladder, and urethra**.
- **Kidneys** filter waste from the blood, forming urine.
- Other excretory processes include **sweating** (removes salts and water) and **exhalation** (removes carbon dioxide).
- Different animals excrete waste in different forms (e.g., fish release ammonia, birds excrete uric acid).

Transportation in Plants:

- **Root hairs** absorb water and minerals from the soil.
- **Xylem** transports water and minerals from roots to leaves.
- **Phloem** transports food (glucose) from leaves to other parts of the plant.
- **Transpiration** (loss of water through leaves) helps pull water upward and cools the plant.
- **Stomata** are tiny openings on leaves that control water loss and gas exchange.

Period-wise Topics

Chapters and Concepts

Period number	Topic	Remarks
7.1	7.1 circulatory system	
7.2	7.1 activity	
7.3	Structure of heart	
7.4	Activity 7.2	
7.5	7.2 Excretion in animals	
7.6	Excretion in humans	
7.7	Human excretory system	
7.8	7.3 transport of substances in plants	
7.9	Activity 7.3	
7.10	Student Independent Practice	
7.11	Student Independent Practice	
7.12	Remedial Period	
7.13	Remedial Period	

Period- 7.1

Learning Objectives: To know the importance and appreciates the role of circulatory system
TLM Required:
A dry sponge, a bowl of colored water, a clear straw for Activity 1

Teacher Resources:

I Do	We do	You do
Today, let us explore why transportation is so important! Activity 1:"The Traveling Water" *Materials:* ● A **dry sponge** ● A **bowl of colored water** ● A **clear straw** (optional, for further demonstration) **Teacher (holding a dry sponge):** This sponge is completely dry. ● What do you think will happen if I place it in the water? **(Dip the sponge in colored water and let students observe absorption.)** ● Now, does the water stay only where it first touched the sponge? **(Gently squeeze the sponge.)** ● What happens now? *(Water flows out—students see movement!)* Right! *Just like the water moved inside the sponge, the food and oxygen we take in, needs to move inside our body too.* They travel to where they are needed. As we have learnt in the earlier classes, Living things cannot survive without essential materials like food, water, and gases. The food that we eat travels within the body. So, if food doesn't stay in one place in our body, what do you think helps in transporting it? Great! Through blood. Just Imagine blood as a delivery service like Swiggy or Zomato. It carries oxygen and nutrients to all cells! In the same way, Food made in leaves is also sent to other parts of the plant about which we will be learning in the upcoming sessions. So, no living thing can survive without transportation! ● Imagine if this system stopped for even a few minutes—what would happen? Exactly! That is why transportation is one of the most important processes keeping all living things alive.	Teacher divides the class into groups of four. **Say :** Discuss the following questions in your groups and analyze the role of transport systems in living organisms and cities. Be prepared to share your thoughts with the class. Discussion Questions for Groups 1. What would happen to humans, plants, or cities if their transport system stopped working? 2. How is the **transportation of nutrients in plants** similar to **delivery services in a city**? 3. Why do you think **waste removal** is just as important as transporting food and oxygen? 4. If you could improve the transport system of the human body, plants, or cities, what would you change?	**Think and answer the following questions:** 1. Why do animals and plants need a transport system? (Give two reasons) 2. Name two substances other than water and food that are transported in plants and two in animals.

- NCERT Class 7 Textbook
- Bal Vaigyanik Class 7 Eklavya: https://www.eklavya.in/pdfs/Books/HSTP/Bal_Vaigyanik_Current_Edition/Bal_vaigyanik_Class_7_English/Bal_Vaigyanik_Class_7.pdf
- Transportation in Animals and Plants - NCERT : https://drive.google.com/file/d/12UAmNDHdFwIlrYtAJOnR2qCD1Ug26Ds2/view?usp=drive_link
- Heart Pumping Model : https://www.youtube.com/watch?v=uWcNGSORSqM
- Excretory system in Animals: https://www.pw.live/chapter-transportation-in-animals-and-plants-class-seven/excretory-system-in-humans
- Transportation in Plants - Working Model : https://www.youtube.com/watch?v=d8i2P0KKjOk

Igniting Activity:
Imagine your school has no water pipes, and no garbage collection. What would happen? (Take student responses)
Exactly! We may not have drinking water and Garbage will pile up, and it will be smelly!

Now, imagine if our body or a plant faced the same problem—no way to move food, water, or waste. How would we survive? (Take student responses)
Just like a school needs a transport system to bring essentials and remove waste, our body and plants also have transport systems.

Summary:

1. What are the transport systems in animals?
2. How does transportation help living things survive?
In the next lesson, we will dive deeper into how the circulatory system works in animals. Get ready to explore your own body's transport network!

Quick Quiz / Assignment

1. Which system is associated with the transport system?
2. Which part of the plant absorbs water and minerals from the soil?
3. If you could design a more efficient transport system for plants, how would you improve it?
4. How do you think the transport system in unicellular organisms is different from that in humans.
1. How do sponges and hydra receive oxygen and nutrients if they don't have blood?
2. List three examples of transportation in your own body (e.g., breathing, digestion).
3. Observe a potted plant at home or in your surroundings. Predict what would happen if you forget to water it for a week. Explain why.
4. What is the need of transport system in animals?

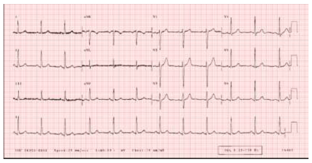
Period- 7.2

Concepts Covered: Activity-7.1

Learning Objectives: Identify the components of blood, and describe their functions.
Observes the pulse and understands the pulse rate.

Igniting Activity:

Good morning class! Look at these images**:**
https://docs.google.com/document/d/1XJMxLtBPiNWydqAuNIo8wVH6hFOzOQ7ExBrjGRSe6Y8/edit?tab=t.0

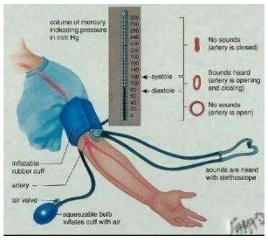


1. *Look at this graph. It shows the rhythm of an organ that keeps you alive every second. Which organ is it? (Take student responses)*

   Yes!

The heart works like a pump, pushing blood through our body, just like a motor in a water system!

Challenge Task: What are such graphs called as? Research and get your answers for the next class.



2. *This device measures how fast blood moves through thin tubes inside your body. What are these tubes called?*

Correct! Blood vessels act like highways for blood. When a doctor checks blood pressure, they measure how forcefully blood moves through these vessels!

Challenge Task: What is the type of device used to measure blood pressure? Research and get your answers for the next class.

3. When you get a cut, what comes out? (Take student responses)

That's right! Blood! It carries oxygen, essential materials and also helps heal wounds by clotting!

So, the circulatory system has three main components: the Heart, Blood Vessels, and Blood! Today, let's explore the importance of blood and its components!

SUMMARY:

Today, we learned that blood is made of plasma, red blood cells, white blood cells, and platelets. RBCs carry oxygen, WBCs fight infections, Plasma transports nutrients, and Platelets help in clotting. Blood also travels through arteries and veins, keeping our body functioning. Next time you get a clot due to a small cut, remember—it's your blood, specifically the platelets doing their job! And also we learnt about the importance of blood donation in saving others' lives.

ASSIGNMENT:

1. Answer the questions 5, 8, 9 and 10 given on page 162.
2. Why is blood donation important, and who can donate blood?
3. Find out about blood groups and their importance.

   1. What is the relation between hearts beat and pulse rate?
   2. Which instrument is useful for measuring heart beat?
   3. What is the rate of heart beat of a normal man?

Period- 7.3

I Do	We do	You Do
The teacher shows this video on components and functions of blood: https://docs.google.com/document/d/1XJMxLtBPiNWydqAuNIo8wVH6hFOzOQ7ExBrjGRSe6Y8/edit?tab=t.0 ● What did you notice about the different components of blood? (Take student responses) Yes! Blood is made up of four key components: plasma, red blood cells, white blood cells, and platelets. Each has a specific function in our body. ● Which component of blood is mostly liquid and helps transport nutrients? (Take student responses) Exactly! It is plasma which is light yellow in colour and helps transport nutrients. ● Which component carries oxygen? (Take student responses) Correct! Red blood cells contain a pigment called hemoglobin, which binds with oxygen and transports it to all parts of the body. This is what gives blood its red color. It is similar to the chlorophyll pigment which gives green colour to the leaves. ● What helps fight infections in our body? (Take student responses) Right! White blood cells act as our body's defense system. They fight germs and keep us healthy. ● How does blood clot when we get a cut? (Take student responses)	Now that we have learned about the components of blood, let's create our own blood model to see how these components exist in different amounts! Do : Teacher divides the class into groups of four and provides materials to do the activity.. **Materials Required:** Red beads (for red blood cells), White beads (for white blood cells) Small uncooked rice (for platelets), Water with one drop of yellow food coloring (for plasma), Clear beaker, spoon, measuring cups and Image of blood separation in a test tube for reference: https://docs.google.com/document/d/1Zv6JD6P8z8xXsPVSBSClIHi18CBS-vsJb-wSQ3pROEI/edit?tab=t.0 (Teacher gives instructions step by step and students follow the instructions carefully) Activity 2 : **Step 1:** Pour 2 1/3 cups (55%) of yellow-tinted water (Plasma) into the mixing bowl.	**Reflect on these questions and answer them:** *1. Why do you think we need more red blood cells than white blood cells?* *2. What would happen if we didn't have enough platelets?* *3. How is plasma important in transporting nutrients and waste?*

Exactly! Platelets rush to the site of injury and form a clot to stop the bleeding, preventing excessive blood loss. So, blood is made of plasma, red blood cells, white blood cells, and platelets. Each plays a crucial role in keeping us alive and healthy. **But did you know that donated blood can also help save lives?** Many people need blood due to accidents, surgeries, or illnesses, but shortages are common. Voluntary blood donation is a **safe and painless process** that helps save lives. Hospitals and authorized centers store donated blood in blood banks for emergencies. There is **no substitute for blood**—when people lose it due to injury or medical conditions, transfusion is the only solution. Donating blood does not weaken the donor, and a **small act of donation can make a big difference in saving lives.** There is no substitute for blood. If people lose blood from surgery or injury or if their bodies cannot produce enough blood, there is only one way to get it — through transfusion of blood donated by volunteers. Blood is usually in short supply. Donating blood does not decrease the strength of the donors.	**Step 2:** Add 1 1/3 cups (44%) of red beads (RBCs) – since red blood cells are the most abundant. **Step 3:** Add 1 teaspoon (0.7%) of white beads (WBCs) – they are fewer but essential for immunity. (NOTE: The proportion of red blood cells is large compared to that of white blood cells.) **Step 4:** Add 1 teaspoon (0.3%) of tiny paper scraps (Platelets) – small but critical for clotting. **Step 5:** Mix everything together and observe! ● Each group explains the function of each component using their model.	

Concept covered: Structure of heart.

Learning Objectives:

Identify and understand the structure of Heart

SUMMARY:

Today, we explored the structure of the heart, identifying its chambers, major blood vessels, and the role of the septum in keeping oxygen-rich and carbon-dioxide rich blood separate. We also labeled the heart diagram to reinforce our learning.

Assignment:

1. What is the role of the septum in the heart?
2. What is the function of the aorta?

3. Why do you think the heart needs four chambers instead of just one or two?
4. How would our body be affected if the septum didn't separate the left and right sides of the heart?
5. What are the names of upper and lower chambers of heart?
6. Name the valve present between right auricle and right ventricle?
7. What is the name of largest blood vessel in our body?
8. Which blood vessel carries deoxygenated blood to the heart?
9. Draw a heart diagram and color-code oxygen rich (oxygenated) and carbon-dioxide rich (deoxygenated) blood.

Period- 7.4

Concept covered: Activity-7.2

Learning Objectives: Construct a simple model of a stethoscope and explain the relation between heartbeat and pulse rate.

I Do	We do	You Do
Today, we are going to explore an amazing organ—our heart! The study of the heart and its functions is called **cardiology**. Doctors who specialize in this field are known as **cardiologists**. *First, let us figure out where our heart is located. Place your hand on the left side of your chest.* ● *Do you feel* something beating? *That is your heart! It sits slightly to the left of the center of your chest, between your lungs.* Do you think such an important organ needs protection? *(Encourage responses.)* ***Exactly!*** *The heart is protected by:* *1. A strong bony structure—**the ribcage**—which acts like a shield.* *2. A **double-layered membrane** called the **pericardium**, which keeps it moist and prevents friction.* *Imagine the heart as a house with four rooms.* ● Can you guess what these rooms are called? *(Encourage responses.)* *Yes! They are called chambers. The heart has **four chambers**:* *1. **Two upper chambers:** Atria (singular: Atrium) → **Receive blood*** *2. **Two lower chambers:** Ventricles → **Pump blood out of the heart*** ● Can you guess which chambers have thicker walls—the atria or the ventricles? *(Encourage responses.)* *Correct! **The ventricles!** They need **thicker walls** because they pump blood out with **force**.*	The teacher pairs up the students. Work together with your partner to solve this puzzle. **Think and answer:** In the human body 'A' is a pumping organ. From the lungs blood vessel 'B' with oxygenated blood enters upper 'C' part of the left chamber of the organ. When the 'C' chamber contracts blood flows into 'D' lower left chamber. 'D' chamber contracts blood is pumped to all parts of the body except lungs through blood vessel 'E'. Carbon-dioxide rich (deoxygenated) blood from body parts is collected by the blood vessel 'F' and opens the upper 'G' right chamber. This	The teacher can provide these questions as a worksheet for students to complete. https://docs.google.com/document/d/1ILPEM-m1aaznwE2aIeztiexKa3DOEXg0MatelmrpjRY/edit?tab=t.0#heading=h.2clssrcg59t0 Alternatively, the teacher can read the questions aloud while students write the answers in their notebooks, followed by a peer review session.

● ***Imagine we split the heart into a left and right side. What do you think separates them?*** *(Pause for answers.)* *Yes! It is a **thick muscular wall** called the **septum** separates them.* ● Why do you think the septum is important? *(Encourage responses.)* *Exactly! The **septum prevents oxygen-rich and oxygen-poor blood from mixing.** This helps the body get **properly oxygenated blood** for efficient circulation.* *Let us talk about how blood moves in and out of the heart. Just like cities have roads for transportation, the heart has **blood vessels** to carry blood.* *Teacher points to the main blood vessels in the diagram:* https://docs.google.com/document/d/1UDDYF5iLwjsSue1apTUwF6ZyxQZjDvTzCmZlKPww6U8/edit?tab=t.0 ***The Vena Cava** (points to it in the diagram)* *1. This blood vessel brings __________ (pause for student response) from the body into the right atrium.* ● *Is it oxygen-rich or oxygen-poor? (Encourage responses)* *Correct! It carries **deoxygenated** blood.* ***The Pulmonary Artery** (points to it)* *2. This vessel carries blood from the __________ (pause) to the lungs to pick up oxygen.* ● *Since it is taking blood to the lungs, do you think it carries oxygen-rich or oxygen-poor blood?* *(Pause for responses)* *Yes! It carries **oxygen-poor** blood, making it unique because most arteries carry oxygen-rich blood.* ***The Pulmonary Vein** (points to it)* *3. Now, once the blood picks up oxygen in the lungs, it returns to the heart through the __________.* ● *This time, is the blood oxygen-rich or oxygen-poor? (Encourage students to answer.)* *Right! The **Pulmonary Vein** brings **oxygen-rich** blood back to the left atrium.* ***The Aorta** (points to it)* *4. The largest artery in our body is called the __________.* ● *It carries oxygen-rich blood from the __________ (pause) to the rest of the body.* *Great job! The **Aorta** carries blood from the **left ventricle** to supply oxygen to all organs and tissues.* *Now, let us see if we can recall! I will point to a blood vessel, and you tell me its name and function.*	chamber contracts blood flow 'H' lower chamber. Lastly 'H' contracts carbon-dioxide rich (deoxygenated) blood sent to lungs by blood vessel 'I'. a) 'A' represents which organ? b) (i) B (ii) E (iii) F and (iv) I are what blood vessels? Write their names. c) (i) C (ii) D are what chambers? d) (i) G (ii) H are what chambers? Write their names. Next, write a short explanation (1-2 sentences) for the function of any three parts they labeled. .	

SUMMARY:

Today, we learned about heartbeat, how it is produced by the rhythmic contraction and relaxation of the heart muscles, and how doctors use a stethoscope to listen to it. We built a model stethoscope and observed the relationship between heartbeat and pulse rate before and after exercise. We also discovered that simple organisms like sponges and hydra do not have a circulatory system.

ASSIGNMENT:

1. How do sponges and hydra receive oxygen and nutrients if they don't have blood?
2. What is a heartbeat?
3. Think of any other ways to measure heart activity besides using a stethoscope?
4. If you were a doctor, why would it be important to listen to a patient's heartbeat using a stethoscope?
5. Who invented stethoscope?
6. What is the heart beat of a normal person per a minute?
7. What is BP?

Period- 7.5

Concept covered: Excretion in animals

Learning Objectives: Knowing about the excretory organs and different types of excretory substances in animals.

I Do	We do	You Do
Today, we will learn about heartbeat. First, let us think— ● What do you think a **heartbeat** is? (Allow students to guess.) Exactly! A heartbeat is the rhythmic contraction and relaxation of heart muscles that pump blood throughout the body. ● Have you ever heard the '**lub-dub**' sound of a heartbeat? What do you think causes this sound? (Encourage responses.) Great! The 'lub-dub' sound is caused by the closing of heart valves, which control blood flow inside the heart! ● How do doctors listen to the heartbeat clearly? (Pause for responses.) Yes! They use a special instrument called a **stethoscope**!	. Teacher divides the students into pairs. **Say :** Are you all ready with the materials required for this activity? Let us try to make our own stethoscope. (Teacher demonstrates and students work in groups) Activity 6 :	1. a) What happens to your heartbeat when you exercise? b) How can we measure heartbeat without a stethoscope? How?

(Show a real stethoscope if available, or use a picture.) *Let us look at its parts:* 1. **Diaphragm** – Captures the sound. 2. **Rubber Tube** – Carries sound to the ears of the listener. 3. **Earpieces** – Help doctors hear clearly. • Do you think there is a connection between **heartbeat rate and pulse rate ?** That's a great thought! The heartbeat rate and pulse rate are closely connected. Every time the heart beats, it pumps blood into the arteries, creating a pulse that we can feel in certain parts of our body, like the wrist or neck. • Now, do you think your heartbeat rate and pulse rate are the same? (Pause for responses.) Yes! The **pulse rate is equal to the heartbeat rate** because every heartbeat pumps blood into the arteries, creating a pulse. This means if your heart beats **72 times per minute**, your pulse rate will also be **72 beats per minute (bpm)**. • Before we build our own stethoscope, let us think —do all living things have a heart like humans? (Pause for responses.) Exactly! No! Some simple organisms, like *sponges and hydra*,, don't have a heart or blood! Images of sponges and hydra: https://docs.google.com/document/d/1PvQk3_evGre_yuj_UQw6R92yQeK4LtDQlgcFPAYHzN4/edit?tab=t.0 Instead of blood circulation, **water** flows through their bodies, bringing nutrients and oxygen directly to *their cells.*	**Step 1:** *Take a small funnel (6-7 cm in diameter).* *Why do you think we need a funnel?* (Let students guess.) Yes! It acts like the diaphragm of a stethoscope, capturing sound. **Step 2:** *Stretch a rubber sheet or balloon tightly over the funnel's mouth. What will happen if the rubber isn't stretched properly?* (Encourage predictions.) Exactly! The sound won't travel well. **Step 3:** *Secure the rubber sheet with a rubber band. Why do we need to tie it tightly?* (Let students think.) Right! This helps in picking up sound vibrations. **Step 4:** *Attach a 50 cm rubber tube to the funnel's stem. What could the tube represent in a real stethoscope?* (Encourage guesses.) Yes! It acts as a sound carrier, just like the tubes in a real stethoscope.	2. Independently check your friend's heartbeat and pulse rate while they are resting and after running. Count the number of beats per minute and record the values in the table.

	Step 5: *Put the open end of the tube in your ear and place the funnel on your chest.* Now, listen carefully. What do you hear? (Encourage responses.) *Guide students to listen to the 'lub-dub' sound of their heartbeat.* You just built a simple stethoscope! Imagine how real doctors use an advanced version to check if the heart is healthy.	
So today, we are going to explore how animals remove different wastes from their bodies through the **excretory system**! Can you say the name of any machine that can produce a product without waste generation? ---NO Correct, all machines are producing wastes as a byproduct. Among them some are useful and some are harmful. In the same manner our body is also working as a machine and produces so many types of wastes. Which waste producing by our body is most poisonous? Sweat or urine. Which among these is dangerous and what are present in them? The teacher explains…….. In the entire organism the poisonous excretory substances are Nitrogenous wastes. Different organisms produce different nitrogenous waste products. They are Ammonia, Urea, and Uric acid. Depending on availability of water the waste they produce is changing.	The teacher divides the students into groups and asks them to categorize the organisms into different groups depending on the waste they produce.	1. Give examples for Ammonotelic organisms? 2. What are Uricotelic organisms? 3. What is the waste producing by man in urine? 4. The waste producing by bird is--- ------------------

Period- 7.6, 7.7

Concept covered: Excretion in Human, Human Excretory system

Learning Objectives: identify the human excretory (urinary) organs and **explain** their functions.

Igniting Activity:

Good morning class! *What happens if we keep drinking water all day? Where does it go?*

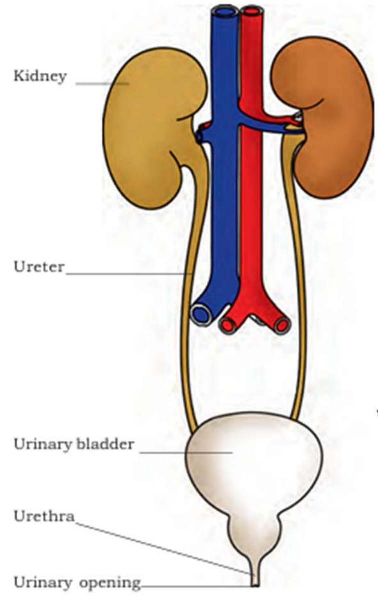
(Allow students to give quick answers)

Yes! It goes into the stomach, gets absorbed, and later comes out as urine.

Have you ever observed the white marks on your clothes during summer?

Great! Those marks are from the salts excreted through our skin.

I Do	We do	You Do
So today, we are going to explore how animals, including humans, remove waste from their bodies through the **excretory system**! We already know how **carbon dioxide** leaves our body. ● Can you recall how that happens? (Encourage responses.) **Correct!** It is removed through the **lungs** when we exhale. The **process of removing waste** produced in the cells of living organisms is called **excretion**. The **organs involved** in this process form the **excretory system**. ● Why do you think excretion is important? (Take student responses) Yes! It helps remove **toxic waste** from the body and keeps us **healthy**.	**Do :** Teacher divides the students into groups of four. **Say :** List the main excretory organs in the human body. For each organ, write down two important points about its function.	1. Imagine you are a doctor, and a patient has kidney problems. Write a short paragraph explaining what advice you would give them to keep their kidneys healthy. 2. Answer the questions ● What are the main organs of the excretory system and their functions? ● How do the kidneys filter waste from the blood? ● Why is excretion important for the body?

Teacher uses a **tactile diagram** or show this **video** to introduce the human excretory system: https://www.youtube.com/watch?v=dZREDWD_5bA ● What do you think is the main organ responsible for filtering waste from our blood? Yes! The **kidneys**. Let us see the main organs of excretory system: **Kidneys:** Filter blood and remove waste. **Ureters:** Carry urine from kidneys to the bladder. **Bladder:** Stores urine until it is expelled. **Urethra:** Helps expel urine from the body. ● Can you guess how much urine an adult passes in a day? Correct! An adult human passes about **1-1.8L of urine** every 24 hours. *Just like a sieve separates tea leaves from chai or coffee grounds from brewed coffee, a filter paper removes solid particles from a liquid. Similarly, our kidneys use tiny filtering units called **nephrons** to filter waste from the blood while keeping useful substances. Our urine consists of 95% water, 2.5% urea, and 2.5% other waste materials.* ● What happens if a person's kidneys stop working due to infection or injury?		3. Draw the figure of  ***Fig. 7.6** Human excretory system* Excretory system

Right! Waste products start accumulating in the blood, which can be **life-threatening**. Such persons **cannot survive** unless their **blood is filtered** periodically through an **artificial kidney**. This process is called **dialysis**. ● Why do you think we sweat more in summer?Right! To help cool down the body. Just like how water evaporates from an earthen pot and cools it down, sweat evaporates from our skin, helping to **regulate body temperature**.		

SUMMARY:

Recap of the period: The excretory system removes waste from the body, keeping it healthy. The **kidneys** filter blood and produce urine, which is stored in the **bladder** and expelled through the **urethra**. Other organs like the **skin, lungs, and liver** also help in waste removal. **Sweating** removes excess salts and cools the body, while the **lungs** expel carbon dioxide. Different animals excrete waste in different forms, like **ammonia in fish** and **uric acid in birds**. Proper excretion is essential to prevent waste buildup and maintain health.

ASSIGNMENT:

1. Why is sweating important?
2. How does the liver help in excretion?
3. Draw a diagram of the human excretory system and label the various parts.

1. **Which organ filters waste materials from the blood in humans?**
   a) Lungs b) Liver c) Kidneys d) Stomach
2. **What is the main excretory product in humans?**
   a) Uric acid b) Ammonia c) Urea d) Carbon dioxide
3. **Which of the following is NOT a function of the excretory system?**
   a) Removal of urea from the blood b) Filtering useful substances from the urine
   c) Transporting oxygen to different organs d) Storing urine before excretion
4. **Which component is found in the highest percentage in urine?**
   a) Urea b) Salts c) Water d) Glucose
5. **Aquatic animals like fish excrete waste in the form of:**
   a) Urea b) Uric acid c) Ammonia d) Water vapor

Section B: Fill in the Blanks

1. The organs involved in the removal of wastes from the body form the ___________ system.

2. The muscular tube through which urine is passed out of the body is called the __________.
3. The major excretory product in birds, lizards, and snakes is __________.
4. The urine is temporarily stored in the __________ before excretion.
5. Sweat contains water and __________, which sometimes leave white patches on clothes.

Section C: Answer the following questions

1. Describe the excretory system with a neat labelled diagram.
2. Why do we sweat, and how does it help in excretion and cooling of the body?
3. How does the mode of excretion in animals depend on the availability of water? Explain with examples of aquatic and land animals.

Period- 7.8

Concept covered: Transportation of substances in plants

Learning Objectives: Identify and describe the roles of **xylem** and **phloem** in transporting water, minerals, and food in plants.

Igniting Activity:

Good morning, class! Have you ever wondered how trees grow so tall? They don't eat like we do, and they don't drink water from a bottle. So how do they survive?

(Pause for student responses—some might mention water, sunlight, or soil.)

Exactly! Water and nutrients come from the soil, but how do they travel all the way to the top of the tree? Does the tree have a lift inside? Or tiny pipes? Today, we'll uncover the secret of how plants transport water, minerals, and food!

I Do	We do	You Do
Show an image of a plant root or use a real potted plant. https://docs.google.com/document/d/1a36FF-Zo-kAt29UVii2R0NOvfJnL1PYxtdMkE_RmJIQ/edit?tab=t.0 Look closely at these roots. • Do you see tiny hair-like structures? (Encourage students to observe and describe what they see.) These are called **root hairs**. Their job is to **absorb water and minerals** from the soil.	**Say :** Are you all ready with the materials needed for the activity? Now, let us make a simple model of how plants transport materials! This hands-on activity will help us understand how water and food move inside plants **Activity 7:**	1. What is the function of phloem and xylem in a plant?? 2. If the xylem in a plant stopped functioning but the phloem remained active, how would this affect the plant's growth and survival?

Think of them as little straws that help the plant drink! Draw or display an image of xylem. https://docs.google.com/document/d/1XD3Suy6XjA9EqzOExzamUI34zj_M7FmyJIyUakxlQ3E/edit?tab=t.0 ● Once the roots absorb water, how does it reach the leaves? Exactly! Plants have special tube-like structures called **xylem** that carry water **up** from the roots to the leaves. **Demonstrate:** Hold up a straw and demonstrate by sipping water. Just like this straw helps water move up, xylem works the same way in plants! In the same way, xylem carries water from the roots all the way to the leaves. But water alone is not enough for plants to survive. They also need food! ● Where do plants make their food? Right! In the leaves! ● Do you remember, what is photosynthesis? Great! Leaves are like tiny kitchens for plants. They use sunlight, carbon dioxide, and water to make food through **photosynthesis**. But the food is made in the leaves— ● So how does it reach the roots, stem, and other parts? You are right! Plants have another set of tubes called **phloem** (https://docs.google.com/document/d/1XD3Suy6XjA9EqzOExzamUI34zj_M7FmyJIyUakxlQ3E/edit?tab=t.0) that transport food **down** to all parts of the plant. So **xylem** moves water **up**, and **phloem** moves food **down**—like an elevator system! Now, look at this working model of vascular tissues - Xylem and Phloem. Teacher **demonstrates** the working model here which was prepared by themselves before the class by referring to the video link given in Teacher References.	**Do :** Teacher divides the class into groups of four and provides a few questions. **Say :** Yesterday, we set up an experiment to observe how water moves in plants. We placed a herb in red-colored water and left it overnight. Today, let us see what happened! (Teacher keeps the set-up of experiment on the table) Observe the herb carefully and discuss in your groups: 1. What changes do you notice in the flower petals or leaves? *(Has the color changed? Where do you see the red ink?)* 2. Where do you think the red ink traveled inside the plant? *(Did it move only to some parts or all over?)* 3. Which plant structure helped the water move upwards? *(Hint: Xylem!)* 4. How do you think the water moved all the way up from the glass to the leaves? *(What process helped this happen?)*	3. Sketch a simple section of a plant root showing root hair and label the xylem inside it.

https://docs.google.com/document/d/1t-EbDiqgxITan_SRGZOPkSSbqjqYry7OEwGqRkb0Yk/edit?tab=t.0 1. What did you observe? How did the blue and red water move? 2. What would happen if **xylem or phloem stopped working?** (Write on the board: 'Xylem – Water Transport (Up), Phloem – Food Transport (Down). This model helps us understand how **xylem moves water up**, and **phloem moves food down** —keeping the plant healthy and growing!		

SUMMARY:

Just like our body has a circulatory system(blood vessels) to transport nutrients and oxygen, plants have xylem and phloem to transport water and food. Without this, they wouldn't survive!

Assignment:

1. What would happen if plants didn't have a transport system?
2. Why do plants need a **transport system**?
3. What is a vascular tissue and writes its functions?
4. In the activity, If we cut the xylem pipe in the middle, what do you think will happen to the movement of water?
5. What are the two types of vascular tissues in plants?
6. What is the function of root hairs in a plant?
7. If xylem didn't work properly in a plant, what do you think would happen?
8. Why do desert plants have fewer leaves or smaller leaves? How does this relate to water transport?

Period- 7.9

Concept covered: Activity-7.3

Learning Objectives: describe transpiration process and its importance.

Igniting Activity:

Good morning class! Imagine it's a hot summer day. You take rest in the shade of a tree—

- How do you feel? (Wait for responses)

Right! We feel "cool," "comfortable," or "relaxed"

- Why do you think we feel cool under a tree?

Good! because of "shade," "leaves blocking the sun," or "trees give oxygen".

Great thinking! But there is more to it than just shade. Trees have a special way of cooling the air around them.

Today, we will uncover the secret behind how trees stay cool and help us feel cooler too—let us

explore the amazing process of transpiration!

I Do	We do	You Do
Let us think about how plants get water. • Do they drink it like we do? Exactly! Plants absorb water and minerals from the soil through their roots. • But how does the water reach the leaves, which are so far away from the roots? Plants have special tube-like structures called **xylem**, which act like straws to pull water upward from the roots to the leaves. This water is then used for **photosynthesis**—the process by which plants make their own food • Do you think plants use **all** the water they take in? Right! Not all of it is needed. Some of the extra water needs to **exit** the plant—but how does this happen? (Point to a diagram of a leaf with stomata labeled.) Look at these **tiny openings** on the surface of the leaf. They are called **stomata**. Water evaporates through them into the air, by the process of transpiration. • Now, how do you think this process actually works? (Pause for responses.)	**Do :** Teacher divides the class into groups of four and provides a few questions. **Say :** Yesterday, we set up an experiment to observe how water evaporates from leaves. We tied a clear plastic bag around a bunch of leaves on a potted plant and left it overnight. Today, let us see what happened! (Teacher keeps the set-up of experiment (3 potted plants) on the table) **Observe and Discuss in Your Groups:** 1. What do you notice inside the plastic bag after some time? (Are there water droplets?) 2. Where do you think this water came from? (Did it come from the soil or the leaves?) 3. What does this tell us about how plants lose water? (How does this relate to transpiration?) 4. How might different conditions (sunlight, shade, wind) affect the amount of water collected?	Write a short paragraph (4-5 sentences) explaining why transpiration is essential for plants. Use these guiding points: • How does transpiration move water in plants? • How does it help cool the plant? • What would happen if there was no transpiration?

As water escapes from the leaves, it creates a pull—just like when you sip juice through a straw! This suction force helps draw more water up from the roots, allowing plants to transport water even to great heights, like in tall trees. Transpiration is not just about losing water—it plays a major role in keeping plants alive! Let us think about why it is so important. It **moves water** to all parts of the plant, ensuring nutrients reach every cell. It **cools the plant**, just like sweating helps us cool down on a hot day. It **maintains the water cycle** by returning water to the air as vapor. So, transpiration is not just a side effect—it is a vital process that helps plants grow and survive!	5. If transpiration helps release water, how does it help the plant take up more water from the roots? 6. If we had not covered the leaves with plastic, do you think the water would still move up? Why or why not?	

SUMMARY: Today we have learnt about the transpiration process and its importance.

ASSIGNMENT:

1. What are stomata? Give two functions of stomata.
2. Does transpiration serve any useful function in the plants? Explain.
3. Conduct the transpiration experiment at home and note your observations.

Multiple Choice Questions (MCQs)

1. **Which part of the plant absorbs water and minerals from the soil?**
   a) Stem b) Leaves c) Roots d) Flowers
2. **Which vascular tissue transports water and minerals from the roots to other parts of the plant?**
   a) Phloem b) Xylem c) Epidermis d) Cortex

3. **Which of the following best explains how water moves up the plant?**
   a) Gravity pulls water upward.
   b) The plant actively pumps water to the top.
   c) Suction pull created by transpiration helps move water up the xylem.
   d) Water is pushed up by air pressure.

4. **Which part of the plant is responsible for transporting food from the leaves to other parts?**
   a) Xylem b) Phloem c) Stomata d) Root hairs
5. **Transpiration helps in which of the following functions?**
   a) Cooling the plant b) Transporting water upward
   c) Creating a suction pull d) All of the above

Section B: Fill in the Blanks

6. The vascular tissue responsible for transporting water and minerals in plants is called __________.
7. The loss of water through the stomata in leaves is known as __________.
8. Phloem transports __________ from the leaves to different parts of the plant.
9. Root __________ increase the surface area for absorbing water and minerals.
10. The process of transpiration creates a __________ pull, helping water move up the plant.

Section C: Answer the Following Questions

11. What is the role of xylem and phloem in plants? How are they different in function?
12. Describe the process of transpiration. Why is it important for plants?
13. Activity-Based Question: Imagine you performed Activity 7.3 by placing a balsam plant in red-colored water.
    (a) What do you observe after a few hours?
    (b) Explain how the red color moves to different parts of the plant.
14. **Write a detailed explanation on how water and food are transported in plants.**

- Mention the role of **xylem** and **phloem**.
- Explain **transpiration** and how it helps in water movement.
- Draw a **neat and labeled diagram** to support your explanation.

(Here is the Assessment 3 to take print and the key sheet is provided for teacher reference:

https://docs.google.com/document/d/1hb6ece8Tb1yk-KDyTzsFV-f2AQTl4hqdwF4v92ACxZA/edit?tab=t.0

Period- 7.10 - Student Independent Practice:

The students will practice the given Worksheet 1 independently. (key sheet for worksheet 1 is provided for teacher reference)

https://docs.google.com/document/d/1P3Rb40bAFXNYGAhkXZIwjHy6knyY09hddQ_ddy2Rc6k/edit?tab=t.0

Period- 7.11 - Student Independent Practice:

The students will practice the given Worksheet 2 independently. (Key sheet for worksheet 2 is provided for teacher reference)

https://docs.google.com/document/d/1YyAIVlDx8tAimmJbfvSCcI8WROOJvykozJOTzqloHN8/edit?tab=t.0

Period- 7.12 - Remedial 1

Circulatory System

- Ask simple questions to assess prior knowledge:
  - What happens when you get a cut?
  - Why do we need blood circulation?
  - What organ pumps the blood in our body?

- ***Recap of Key Concepts***

A. Components of the Circulatory System

- Explain that the circulatory system consists of:
  - **Heart** – Acts as a pump
  - **Blood** – Carries oxygen, nutrients, and waste
  - **Blood vessels** – Transport blood throughout the body

B. Blood and Its Components

- Explain the four components of blood:
  - **Red Blood Cells (RBCs)** – Contain haemoglobin to transport oxygen
  - **White Blood Cells (WBCs)** – Help fight infections
  - **Platelets** – Help in blood clotting
  - **Plasma** – The liquid part that carries substances

C. Types of Blood Vessels

- Explain the functions of:
  - **Arteries** – Carry oxygen-rich blood from the heart (thick walls)
  - **Veins** – Carry carbon dioxide-rich blood to the heart (thin walls with valves)
  - **Capillaries** – Connect arteries and veins, allowing exchange of gases and nutrients

(If time permits this video can be played for reinforcement of the topic **Song on Circulation :** https://www.youtube.com/watch?v=WyK9XplI-6g **)**

Think-Pair-Share Activity: To ensure effective peer learning, pair up students strategically by matching those who have a strong grasp of the topic with those who may need additional support.

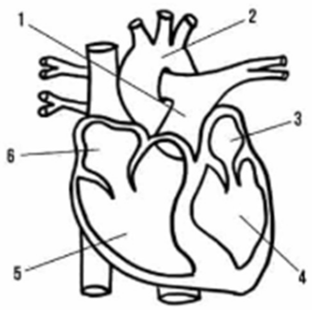
Activity 1: Pulse Rate Measurement

- Ask students to place their fingers on their wrist and count their pulse for one minute.
- Let them record their observations before and after light exercise.
- Discuss how physical activity affects heart rate.

1. Ask students to think individually and write down differences between arteries and veins.
2. What are the different components of the blood? Mention their functions.

Hands-on Labeling Exercise:

- Give students a blank diagram of the structure of the heart to label.
- Encourage them to explain the function of each part they label.



Summary & Assessment : (Quiz - 1 is for recap or assessment for remedial period)
https://mcqmojo.com/cbse-mcq-questions-for-class-7-science-transportation-in-animals-and-plants-quiz-1/#question-1

(Or)

- Ask quick oral questions to check understanding:
  - What is the function of RBCs?
  - How does the heart prevent oxygenated and deoxygenated blood from mixing?
  - Why do veins have valves?

(Summarize key points and clarify doubts if any)

Assign a short take-home activity:

- Draw and label the human heart.
- Write a short paragraph on why exercise is good for the circulatory system.

Period- 7.13 - Remedial 2

Transportation in Plants & Excretory System

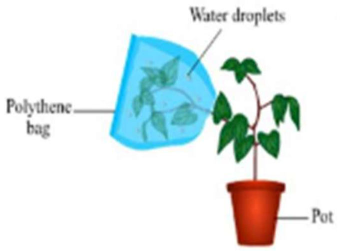
TEACHING LEARNING PROCESS

- First, ask simple questions to gauge prior understanding:
  - How do plants get water from the soil?
  - Do plants have a circulatory system like humans?
  - How does the human body remove waste?

- ***Recap of Key Concepts***

Transportation in Plants:

1. Explain the roles of **xylem and phloem** with diagrams on the board.



- Xylem: Transports **water and minerals** from roots to leaves.
- Phloem: Transports **food (glucose)** from leaves to other parts.

2. Discuss **root hairs** and their importance:

- Root hairs **increase the surface area** for absorbing water and minerals from the soil.
- They help in **efficient water intake**, which is transported through xylem.

3. Discuss **transpiration** and its role in pulling water up through the plant.

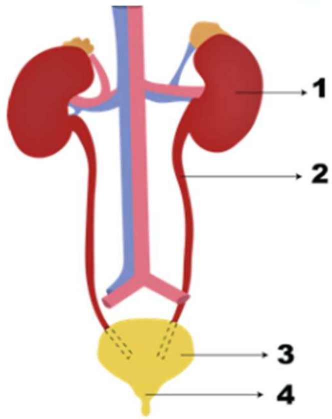
Excretory System in Animals:

1. Explain the function of the **kidneys, ureters, bladder, and urethra**.
2. Discuss how **waste is filtered from the blood and removed as urine**.

3. Mention other excretory processes like sweating and exhalation of carbon dioxide.

4. Show a diagram of the human excretory system. And ask students to trace the path of waste removal in the body.

- **Think-Pair-Share Activity:** To ensure effective peer learning, pair up students strategically by matching those who have a strong grasp of the topic with those who may need additional support.



  - Ask students to think individually and write down what phenomenon we observe in the figure and write its importance.
  - If a plant's root hairs are damaged, what will happen to water absorption?
  - What do you think will happen if transpiration stops in plants?
  - What problems might arise if the kidneys stop filtering waste?
- **Hands-on Labeling Exercise:**

  - Give students a blank diagram of the human excretory system to label.
  - Encourage them to explain the function of each part they label.

Summary & Assessment

- Ask quick oral questions to check understanding:
  - Which part of the plant transports food?
  - What is the role of root hairs?
  - Why do plants need transpiration?
  - Which organ filters blood in the human body?
  - What are the main waste products removed by the human body?

- Assign a short take-home activity:

  Refer to the text book and draw a neat labelled diagram of a section of root showing the vascular tissues.

TEACHER'S DIARY

Name of the Teacher:				Name of the Month:	
Name of the Lesson: 1. Motion				**Class: 7**	
Period No	**Name of the Concept to be taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	Remarks
7.1	Circulatory system				
7.2	7.1activity				
7. 3	Structure of heart				
7. 4	Activity 7.2				
7. 5	Excretion in animals				
7. 6	Excretion in humans				
7. 7	Human excretory system				
7.8	Transport of substances in plants				
7.9	Activity 7.3				
7.10	Student Independent Practice				
7.11	Student Independent Practice				
7.12	Remedial Period				
7.13	Remedial Period				

1	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?
2	Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
3	What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
4	How well did I adjust my teaching based on student reactions or unforeseen challenges?

Head Teacher's Signature Teacher's Signature

Head Teacher's Suggestions:

Teacher Notes:

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November 2025

C2M1S3 No bag Day | F1S8Y2 Cluster Complex | E5F4M6 Teacher Resources

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 No Bag Day Andhra Pradesh Avatarana
2 Sunday	3 8.2	4 8.2	5 8.2	6 NI	7 NI	8 Second Saturday
9 Sunday	10 NI	11 Nati... Educ... Day	12	13	14 ... Day	15 No Bag Day
16 Sunday	17 8.3	18 8.4	19 NI	20 NI	21 NI	22 No Bag Day Cluster meeting **Fibonacci Day**
23 Sunday	24 NI	25 NI	26 National Constituti... ... India NI	27 Sanjeevaraya ... NI	28 NI	29 No Bag Day SMC Meeting
30 Sunday						

SA - 1 (11–14)

14 - 20 National Library Week

Week1:	**8.2**
Week 2:	**SA1**
Week 3:	**8.3-8.4**
Week 4:	**NI**

TEACHER'S NOTES

8 REPRODUCTION IN PLANTS

Learning Outcomes:

D1G8T2

1. comprehends the modes of reproduction in plants
2. Understands pollination and differentiates self and cross pollination, draws diagrams on pollination
3. understands budding and fragmentation
4. Comprehends the process of fertilization, draws labelled diagrams on fertilization
5. understands spore formation process occurs in vegetative propagation
6. Comprehends formation of fruits and seeds,
7. understands sexual reproduction in plants, draws labelled diagram of parts of flower
8. understands modes of seed dispersal

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

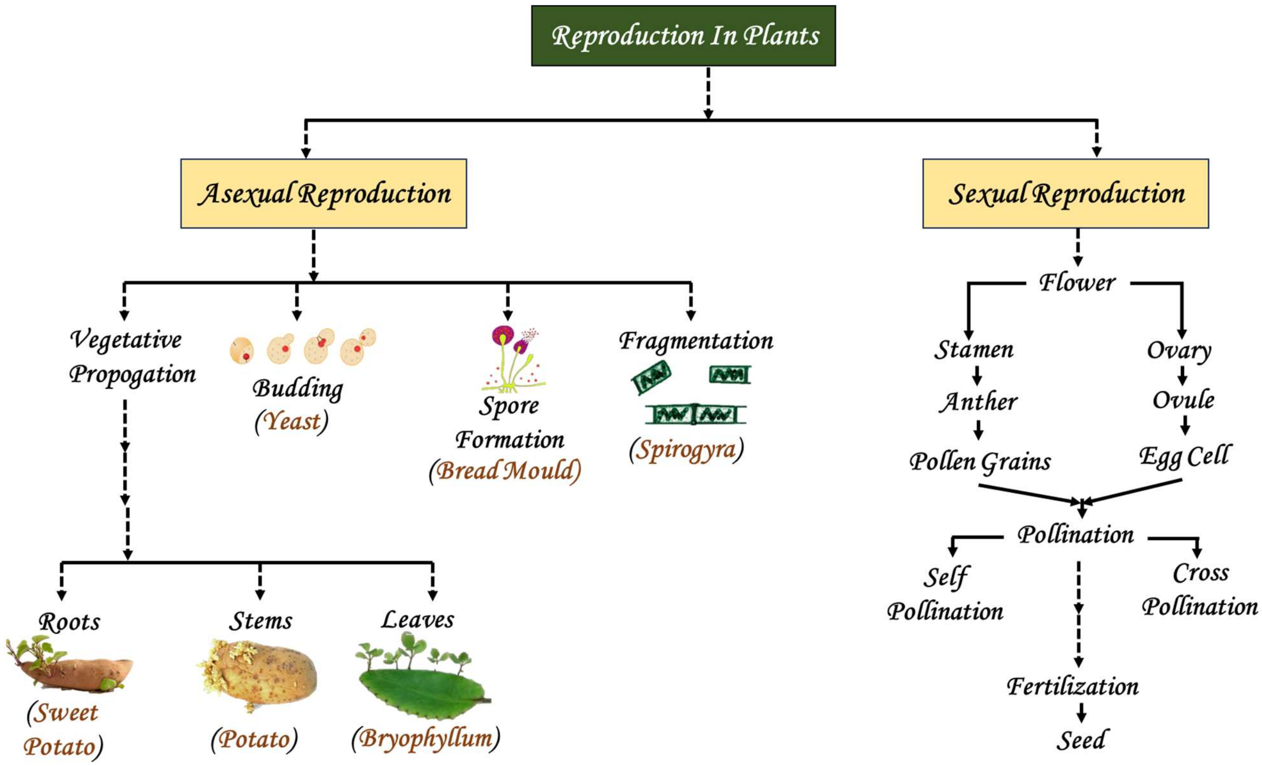
- *Understanding of **living and non-living things**.*
- *Differences between **plants and animals** (basic characteristics).*
- *The **importance of plants** in the environment.*
- *Familiarity with **basic plant structures** and Functions of **different plant parts** (roots, stems, leaves, flowers, fruits, and seeds).*

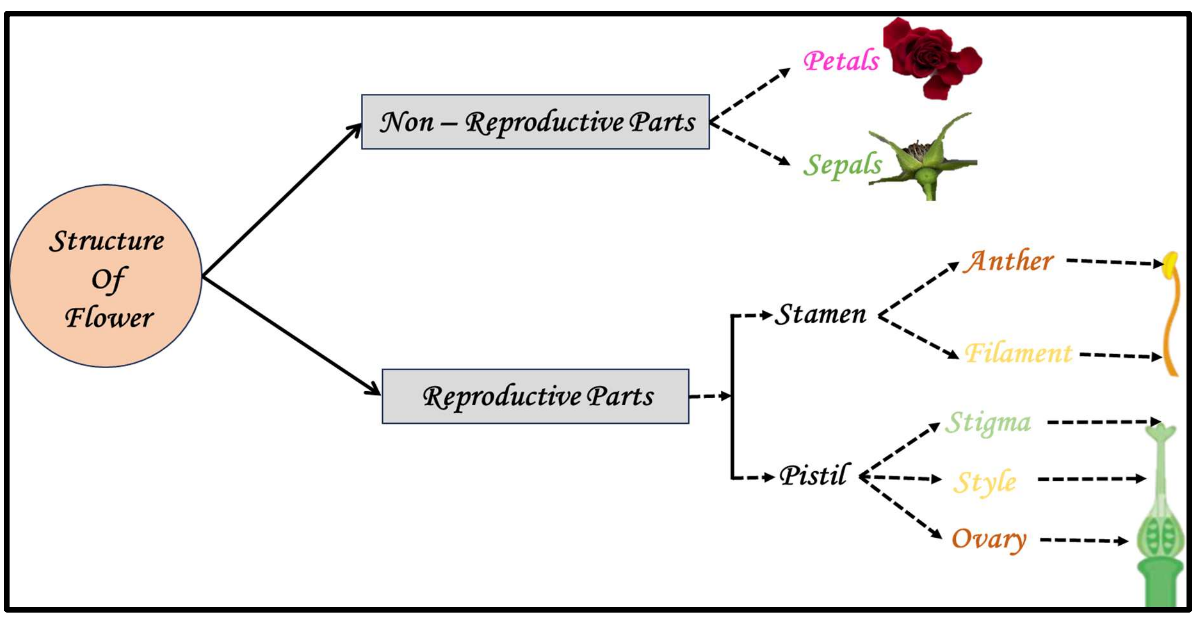
Teacher Resources:

(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)

- NCERT Class 7 Textbook
- A sample journal - To record plant growth: https://www.theprimaryresourcerack.com/product-page/plant-growth-observation-worksheet

CONCEPT MAP


Reproduction In Plants
Asexual Reproduction
Sexual Reproduction
Vegetative Propogation
Budding
(Yeast)
Spore Formation
(Bread Mould)
Fragmentation
(Spirogyra)
Roots
(Sweet Potato)
Stems
(Potato)
Leaves
(Bryophyllum)
Flower
Stamen
Anther
Pollen Grains
Ovary
Ovule
Egg Cell
Pollination
Self Pollination
Cross Pollination
Fertilization
Seed


Structure Of Flower
Non – Reproductive Parts
Petals
Sepals
Reproductive Parts
Stamen
Anther
Filament
Pistil
Stigma
Style
Ovary

Period-wise Topics

Chapters and Concepts

Period number	Topic	Remarks
8.1	Modes of reproduction, 8.1 vegetative Propagation	
8.2	Activity 8.2, Budding and fragmentation	
8.3	Spore formation	
8.4	8.2 Sexual Reproduction	
8.5	pollination , types of pollination	
8.6	Fertilization	
8.7	8.3 fruits and seed formation,	
8.8	8.4 Seed dispersal	

Period- 8.1

Concepts Covered:

1. **Modes of reproduction**
2. **Asexual reproduction**
3. **Vegetative propagation – Root, stem, leaves**

Learning Objectives: Students will be able to

1. Understand the types of reproduction
2. Understand the types vegetative propagation

TLM Required:

1. Any seeded fruit or vegetable, Any non seeded vegetable like Potato or their Images.
2. Flashcards for group activity: https://docs.google.com/document/d/1RJMU7Kar8cwYZ8XieiQa0Tk5jq3X65yrG5Se2U9wFAc/edit?tab=t.0

3. A small **stem cutting** (from a rose, money plant, or hibiscus), a **small container or pot** filled with soil (you can use a plastic cup with holes at the bottom) and a **bottle of water** for watering the cutting for Activity 1.

4. Potato, Ginger (& sprouted ginger), and a Bryophyllum leaf or images

5. Potato with buds, a **small container or pot** filled with soil, water, knife for Activity 2
6. Flashcards for group activity: https://docs.google.com/document/d/1s-5pBaWi3jAZ8HgOSUDJMSJrnAdVGT-2gXZgE5V3OEE/edit?tab=t.0

Igniting Activity:

Good morning class! (Teacher holds up both chikoo or any other seeded fruit & Potato and asks)
Here, I have two fruits. What are they?
Right! They are Chikoo and Potato
What do you notice about this chikoo fruit compared to this potato?
Exactly! Chikoo has a seed inside it, whereas potato doesn't have a seed.

- If we want to grow a new chikoo plant, what should we do?

Good! We have to "Plant the seed!"

Now, what if I want to grow a new potato plant? Should I look for potato seeds? Exactly! No, we plant a part of the potato itself!

That is interesting! The chikoo grows from a seed, but the potato grows from a part of the potato itself.

- Do you think both are reproducing in the same way?

Correct! No. Some plants grow from seeds, while others can grow from different parts like roots, stems, or leaves.

This shows us that plants reproduce in different ways! Today, we are going to explore these different methods and understand why some plants need seeds while others don't.

Experience and Reflection: The teacher asks the following questions:

1. Have you ever noticed how gardeners or farmers grow flowering plants?

Learning Point:

1. comprehends the modes of reproduction in plants

I do (Direct Instructions)	We do (Guided Practice)	You do (Independent Practice)
Now that we have seen two different ways plants grow, let us explore how plants reproduce in	**Do :** Teacher divides the class into four groups and provides a deck of cards with plant names. **Say :**Each team picks one plant card	1. What is the difference between asexual and sexual reproduction in plants? 2. What are vegetative parts and reproductive parts?

detail. First, let us know what reproduction is and its main purpose. You have learnt about reproduction in your earlier classes, can any of you answer this? (Encourage students to answer) Yes! Reproduction is the process of producing young ones. In the word itself we have Re (again) production (producing) the same species or race. But do all plants reproduce in the same way? (Take student responses) Exactly! No. Scientists categorize these into two types of reproduction. (Writes **"Asexual"** and **"Sexual"** on board) ● Some plants grow without seeds – that is called **Asexual Reproduction**. (Point the potato) Potato does not have seeds but grows from its part —this means it follows **asexual reproduction** ● Others grow from seeds – this is **Sexual Reproduction**. (Point the chikoo) Chikoo grows from a seed, which means it follows **sexual reproduction** If you take a stem cutting of a money plant and plant it in water, will it grow? Yes! That means it's growing without a seed! So, this is a ______________________ . (Asexual reproduction) ● Name few plants that need a seed to grow? What kind of	at a time from a shuffled deck of flashcards, and decides whether the plant reproduces sexually or asexually and should place the card under the correct category ("Sexual" or "Asexual") on the chart paper/board. After placing the card, teams write a short reason for placing it under that category on a sticky note or whiteboard and attach it below the card. (Here is the deck of flashcards provided to print and cut for activity: https://docs.google.com/document/d/1RJMU7Kar8cwYZ8XieiQa0Tk5jq3X65yrG5Se2U9wFAc/edit?tab=t.0#heading=h.8hk71wfbwa7l) **Do :** Teacher divides the class into groups and instructs them to get ready with the materials they bought for the activity and follow her instructions. **Say :** Now, let us get our hands dirty and grow a new plant from a stem cutting! Follow along as we go through each step together. **Activity 1 : Materials Needed (per group):** ● A stem cutting (rose or money plant) ● Small pots with soil ● Watering can **Step-by-Step Instructions:** **Observe the Cutting** ● Look at the cutting in your hand. Do you see the small bumps along the stem? **These are nodes**—they will help the plant grow new roots! **Observe the Buds**	3. How is vegetative propagation useful in agriculture? Give two examples. 4. Which vegetative part (stem, root, leaf) do you think is best for propagation? Why? 5. What might happen if you cut a plant's stem but do not place it in soil or water? 6. Draw a potato and label the "eyes" (buds). 7. Sketch and label a Bryophyllum leaf with tiny buds. 8. Write a short note on, "How do buds help in vegetative propagation? 9.

reproduction is this? (Take student responses) Yes! So, this is a __________________________ (sexual reproduction) ● Can you recall and tell what are the parts of a plant? (Take student responses) Great! roots, stems and leaves are called the vegetative parts of a plant, and flowers are the reproductive parts of a plant. Remember, Vegetative parts are helpful in Asexual reproduction and Reproductive parts are helpful in Sexual reproduction. **Now,** Think about humans. We inherit traits from both our parents. Do you think a plant growing from a seed will be identical to its parent plant? Exactly! No, it may have variations, because it gets the traits of two parent plants. ● Then do you think a plant growing from the same plant part will be identical to its parent plant? Great! Yes, it will be identical as it gets the traits from only one parent plant. So, the main difference between these two types of reproduction is that, Asexual = one parent, identical plant; Sexual = two parents, variations in plant. **CFU (Open ended/ Factual) [2.ii.a]** **Factual CFUs:** 1. What is the purpose of reproduction?	● You must have seen **flower buds** developing into flowers. ● Apart from these, some buds grow at the **axil** (where the leaf attaches to the stem). These are called **vegetative buds**, and they can grow into **new shoots and branches**. (*Encourage students to find and point out the vegetative buds on their cuttings.*) **Plant the Cutting** ● Gently cut the stem **just above** a node. ● Bury the lower part of the cutting in the soil, making sure a **node is inside the soil**—this is where the roots will grow from! **Water the Cutting** ● Pour a little water around the plant. But **don't overwater**! ● Why do you think too much water can be harmful? (*Let students guess—then explain that excess water can cause root rot.*) **Make Observations & Predictions** ● Over the next few days, observe your plant. ● How long do you think it will take for roots to appear? (*Have them write their predictions in their notebooks.*) **Alternative Method – Water Propagation** ● *Did you know we can also grow a money plant in just water?* ● Place a **money plant cutting**	

2. Name the two different types of reproduction seen in plants. **Open ended CFUs:** 1. What might happen if plants could only reproduce in one way? 2. Think and tell examples of plants in your environment that reproduce asexually? You all know that many plants grow from seeds. But did you know that some plants don't need seeds at all? Yes! We discussed it in **Asexual Reproduction**. Let us explore how that happens through a process called **vegetative propagation**! (Write "Vegetative Propagation" on the board.) Vegetative propagation is when a new plant grows from a part of an existing plant—like its **stem, root, leaf, or bud**—instead of from a seed! ● Can you think of a time when you saw a plant grow from something other than a seed? Exactly! Some plants can grow from their stems, some from roots, and even from leaves. (Use real plant samples or pictures to keep students engaged.) Today let us know about vegetative propagation by stems and roots. 1. **By Stems** (Hold up a money plant cutting in a jar of water.) ● Have you ever put a money plant stem in water and seen roots appear after a few	in a **jar of water** and observe the root growth over time. **Do :** Teacher divides the class into groups of three and provides the flashcards. **Say :** Each group gets **3 flashcards** with names of plants that reproduce through roots, leaves, or buds (e.g., sweet potato, Bryophyllum, ginger). You have to - 1. Identify whether their plant reproduces by roots, leaves, or buds. 2. Discuss how the plant grows into a new plant. 3. Draw and label their plant's vegetative structure (e.g., a sweet potato with roots, a Bryophyllum leaf with buds). ✓ Each group presents their findings to the class. (Here are the Flashcards and categorized list of plants provided for teacher reference: https://docs.google.com/document/d/1s-5pBaWi3jAZ8HgOSUDJMSJrnAdVGT-2gXZgE5V3OEE/edit?tab=t.0)	

days? That's because the stem has special areas called **nodes** that help it grow new roots! (Ask students to observe the roots near nodes on the stem they bought) 2. **By Roots** (Hold up the Sweet Potato) Who has eaten a sweet potato before? Did you notice how it sometimes grows little root-like structures? That's because it can grow into a whole new plant just from its roots! Now, let us know why farmers and gardeners love vegetative propagation. Can you guess the advantages of vegetative propagation? (Take student responses) **Great guessing!** **✓ It's faster than growing from seeds** (Plants grow and bear flowers or fruits sooner.) **✓ The new plant is exactly like the parent plant** (If you love a rose's color and smell, the new plant will have the same!) **CFU (Open ended/ Factual) [2.ii.a]** **Factual CFUs:** 1. Which parts of a plant can be used in vegetative propagation? 2. What are the advantages of vegetative propagation over growing plants from seeds? **Open ended CFUs:** 1. What would happen if you tried to grow a mango tree		

using a stem cutting instead of a seed? Why might it work or not work? 2. If you were to experiment with growing a new plant at home, which method would you choose and why? **Activity 1:** (Show real samples or images of potato, ginger, and Bryophyllum/Brahmakamal leaves.) Look at these—potato, ginger, and a Bryophyllum/Brahmakamal leaf. What do they have in common? (Pause for responses.) Yes! They are all parts of the plant, they all can grow into new plants—without seeds! But how? That is what we will explore today! Look at this potato. Do you see these little spots? These are called **'eyes'**, and they are actually buds! If we plant a potato with these 'eyes,' it will grow into a new plant. *Now, let us look at this ginger.* ● *Do you see these swollen parts?* (Shows ginger and sprouted ginger.) ● *What do you think these are? (Take student responses)* *Great thinking! These swollen parts have buds that sprout into new shoots. If you bury this ginger in soil, it will grow into a whole new plant!* Now, look at this Bryophyllum leaf. ● Can you see tiny buds along the edges? (Hold up a Bryophyllum leaf or picture.) ● What do you think will		

happen if this leaf falls on the soil? *(Take student responses)* Exactly! Each bud on the edge of the leaf can grow into a whole new plant! Activity 2 : Now, let us see how this works in real life! (Teacher demonstrates the activity 8.2) **Step 1:** Observe the "eyes" on a potato using a magnifying glass. **Step 2:** Identify buds on a ginger piece and Bryophyllum leaf (if available). **Step 3:** Cut a potato into small pieces, each with at least one "eye." **Step 4:** Cut a piece of ginger with buds. **Step 5:** Plant them in moist soil and lightly water them. **(Optional: Plant a piece of potato without 'eyes' to compare later.)** ● How long do you think it will take for new shoots to appear? Good predictions! Maybe in a few days or weeks, We will observe and find out! ● What do you think would happen if we planted a potato without any 'eyes'? Exactly! Without the buds, the potato won't grow into a new plant. This shows that buds are necessary for vegetative propagation! **CFU (Open ended/ Factual)** **Factual CFUs:** 1. Name the leaf which reproduces with the help of buds?		

2. What do you call the scars present on potatoes? **Open ended CFUs:** 1. Think and tell about other plants that might grow without seeds. 2. What do you think would happen if a Bryophyllum leaf fell into dry, rocky soil instead of moist soil?		

Summary:

Reproduction

- The process of producing new individuals from parents.

Modes of Reproduction

- **Asexual Reproduction**: New plants are produced without seeds.
- **Sexual Reproduction**: New plants are obtained from seeds.
- **Vegetative Propagation**: New plants grow from roots, stems, leaves, and buds.
  Example: Rose (stem cutting), Potato (eyes on tuber), Bryophyllum (buds on leaves).

Factual Questions:

- What are the types of reproduction?
- What are the different types of vegetative propagation?

Open Ended Questions: 1. What will happen if potato eys would not produce new plant?

Evaluation/Quiz/ Assignment:

1. Define the asexual reproduction.
2. Write the different types of vegetative propagation.

Home work:

Identify and Classify:

- List five plants you see around your home or neighborhood.
- Identify whether they reproduce sexually or asexually and write a short reason
- Write a short **"Did You Know?" fact sheet** with at least **5 facts** about real-world use of vegetative propagation.
- Write about the potato propagation activity you learned in class. (Refer to **Pg. No. 04** in your textbook.)

Period- 8.2

Concepts Covered:

1. Budding
2. **Fragmentation**

Learning Objectives:

1. SWBAT understand budding process in yeast
2. SWBAT understand the Fragmentation in spirogyra

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- *Definition of asexual reproduction*

TLM Required:

- Yeast, sugar, warm water, beaker, slide, microscope for activity 3.

Teacher Resources:

(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)

- NCERT Class 7 Textbook
- A sample journal - To record plant growth: https://www.theprimaryresourcerack.com/product-page/plant-growth-observation-worksheet

Igniting Activity:

- By showing short video of the rapid growth of east.
- And ask some open-ended questions
- What will happen if any big animal reproduces like this?
- Why don't they grow like this in number rapidly?

Learning Point:

- **understands budding and fragmentation**

I do (Direct Instructions)	We do (Guided Practice)	You do (Independent Practice)
(Note : Since yeast growth might take time, the teacher should be ready with a pre-prepared yeast solution (left for an hour) for immediate microscopic observation during the class demonstration.) Who here loves fluffy bread or soft idlis? ● Have you ever wondered how they become so soft and airy?	**Do :** Teacher divides students in pairs. Say : Now, let us see budding in action! I will mix **yeast with sugar and warm water** and leave it for a few minutes. What do you think will happen? **Activity 3 : Observing Yeast Growth** *(Teacher*	1. Define budding. 2. Write 3-4 sentences explaining how yeast reproduces through budding. 3. Think & Answer: Why do bakers use yeast in bread-making?

(Pauses for student responses.) Yes! That is because of a tiny **living organism** called **yeast**! But yeast is so small we **can't see it with our eyes**—we need a microscope! Yeast is a **single-celled fungus**(fungus as a special type of living thing that is not a plant and not an animal. Fungi absorb nutrients from other things, like dead plants, animals, or even food!) . It grows super fast and reproduces in a special way called **budding**! Let us understand how yeast reproduce: *(Shows a diagram or draws budding yeast on the board.)* Look at this yeast cell. A tiny bump appears on it—this is called a **bud**. The bud **grows bigger** and bigger while still attached to the parent cell. Eventually, it **separates** and becomes a **new yeast cell**! Sometimes, multiple buds form, creating a **chain of yeast cells**. The new yeast cell is **exactly the same** as the parent yeast cell. There's **no mixing of traits from two parents**—it's an **exact copy**!" *(Writes "Exact Copy = Clone" on the board.)* This group of identical yeast cells is called a **clone**. A clone means a group of **genetically identical** organisms, all coming from a single parent. That's why all the yeast cells look and behave exactly the same! • *If one yeast cell doubles every hour, how many yeast cells will we have after 10 hours?* *(Encourage students to think about doubling: 1 → 2 → 4 → 8 → 16 → ... until 1024.)* See how fast clones can multiply? This is why yeast grows quickly! Now, imagine this rapid growth happening in something you use every day... Think about dough rising when you make roti, dosa, or cake. • Why do you think that happens? *(Encourages different answers.)*	*Demonstration & Student Observation)* **Steps:** 1. Teacher mixes **yeast, sugar, and warm water** in a beaker. 2. Students observe bubbles forming (indicating yeast growth). (**Microscopic Examination:** Since yeast growth might take time, the teacher provides a pre-prepared yeast solution (left for an hour) for immediate microscopic observation.) 3. Teacher places a drop of the prepared yeast solution on a **microscope slide.** 4. Students take turns looking through the microscope to observe budding yeast. • What do you notice about the yeast cells? • Can you see small buds forming? • Why do you think sugar helps yeast grow? • What do you think would happen if we tried the yeast experiment with cold water instead of warm water? • If yeast cells can keep	

Exactly! That's because yeast produces gas while growing, which makes the dough **puff up**! ● What do you think will happen if I mix yeast with sugar and warm water? *(Encourages guesses like "it will bubble," "it will grow," etc.)* "Great thinking! Now, let us test it with an experiment! *(Moves into the group activity.)* **CFU (Open ended/ Factual)** **Factual CFUs:** 1. What type of organism is yeast? 2. How does yeast help in making bread or idlis soft and fluffy? **Open ended CFUs:** 1. Is yeast important? Why or why not?? 2. If yeast keeps reproducing by budding, what do you think will happen to the population over time?	producing new buds, do you think they can ever stop growing? Why or why not?	

Summary:

- **Budding**: Small buds grow on the parent organism and develop into new individuals.
  - Example: Yeast.
- **Fragmentation**: Algae break into fragments, each growing into a new individual.
  - Example: Algae in ponds.

Factual Questions:

- What is budding?
- What is Fragmentation?

Open Ended Questions: 1. What will happen if p spirogyra can not produce new with broken Fragment?

Evaluation/Quiz/ Assignment:

1. Write the procedure to observe the growth of east.
2. Draw the diagram of yeast showing budding.

Home work:

1. **Draw and label** the stages of budding in yeast.
2. Research & Write: Find out one more example of an organism that reproduces through budding and explain it in 3-4 sentences

Period- 8.2

Concepts Covered:

1. Budding 2. Fragmentation

Learning Objectives:
1. SWBAT understand budding process in yeast
2. SWBAT understand the Fragmentation in spirogyra

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- *Definition of asexual reproduction*

TLM Required:

1. Yeast, sugar, warm water, beaker, slide, microscope for activity 3.

Teacher Resources:

(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)
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Igniting Activity:

By showing short video of the rapid growth of east.
And ask some open-ended questions

- What will happen if any big animal reproduces like this?
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Learning Point:

- **understands budding and fragmentation**

I do (Direct Instructions)	We do (Guided Practice)	You do (Independent Practice)
(Note : Since yeast growth might take time, the teacher should be ready with a pre-prepared yeast solution (left for an hour) for immediate microscopic observation during the class demonstration.) Who here loves fluffy bread or soft idlis? ● Have you ever wondered how they become so soft and airy? (*Pauses for student responses.*)	**Do :** Teacher divides students in pairs. Say : Now, let us see budding in action! I will mix **yeast with sugar and warm water** and leave it for a few minutes. What do you think will happen? **Activity 3 : Observing Yeast Growth** *(Teacher Demonstration & Student*	1. Define budding. 2. Write 3-4 sentences explaining how yeast reproduces through budding. 3. Think & Answer: Why do bakers use yeast in bread-making?

Yes! That is because of a tiny **living organism** called **yeast**! But yeast is so small we **can't see it with our eyes**—we need a microscope! Yeast is a **single-celled fungus**(fungus as a special type of living thing that is not a plant and not an animal. Fungi absorb nutrients from other things, like dead plants, animals, or even food!) . It grows super fast and reproduces in a special way called **budding**! Let us understand how yeast reproduce: *(Shows a diagram or draws budding yeast on the board.)* Look at this yeast cell. A tiny bump appears on it—this is called a **bud**. The bud **grows bigger** and bigger while still attached to the parent cell. Eventually, it **separates** and becomes a **new yeast cell**! Sometimes, multiple buds form, creating a **chain of yeast cells**. The new yeast cell is **exactly the same** as the parent yeast cell. There's **no mixing of traits from two parents**—it's an **exact copy**!" *(Writes "Exact Copy = Clone" on the board.)* This group of identical yeast cells is called a **clone**. A clone means a group of **genetically identical** organisms, all coming from a single parent. That's why all the yeast cells look and behave exactly the same! • *If one yeast cell doubles every hour, how many yeast cells will we have after 10 hours?* *(Encourage students to think about doubling: 1 → 2 → 4 → 8 → 16 → ... until 1024.)* See how fast clones can multiply? This is why yeast grows quickly!	*Observation)* **Steps:** 1. Teacher mixes **yeast, sugar, and warm water** in a beaker. 2. Students observe bubbles forming (indicating yeast growth). (**Microscopic Examination:** Since yeast growth might take time, the teacher provides a pre-prepared yeast solution (left for an hour) for immediate microscopic observation.) 3. Teacher places a drop of the prepared yeast solution on a **microscope slide.** 4. Students take turns looking through the microscope to observe budding yeast. • What do you notice about the yeast cells? • Can you see small buds forming? • Why do you think sugar helps yeast grow? • What do you think would happen if we tried the yeast experiment with cold water instead of warm water? • If yeast cells can keep producing new buds,	

Now, imagine this rapid growth happening in something you use every day... Think about dough rising when you make roti, dosa, or cake. • Why do you think that happens? *(Encourages different answers.)* Exactly! That's because yeast produces gas while growing, which makes the dough **puff up**! • What do you think will happen if I mix yeast with sugar and warm water? *(Encourages guesses like "it will bubble," "it will grow," etc.)* "Great thinking! Now, let us test it with an experiment! *(Moves into the group activity.)* **CFU (Open ended/ Factual) [2.ii.a]** **Factual CFUs:** 1. What type of organism is yeast? 2. How does yeast help in making bread or idlis soft and fluffy? **Open ended CFUs:** 1. Is yeast important? Why or why not?? 2. If yeast keeps reproducing by budding, what do you think will happen to the population over time?	do you think they can ever stop growing? Why or why not?	

Summary:

- **Budding**: Small buds grow on the parent organism and develop into new individuals.
  - Example: Yeast.
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  - Example: Algae in ponds.

Factual Questions:

- What is budding?
- What is Fragmentation?

Open Ended Questions: 1. What will happen if p spirogyra can not produce new with broken fragment ?

Evaluation/Quiz/ Assignment:

1.Write the procedure to observe the growth of east.
2.Draw the diagram of yeast showing budding.

Home work:

1.**Draw and label** the stages of budding in yeast.
2.Research & Write: Find out one more example of an organism that reproduces through budding and explain it in 3-4 sentences

Period- 8.3

Concepts Covered:

Spore formation

Learning Objectives:

1. SWBAT understand term spore
2. SWBAT understand the process of **Spore formation**

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- *Definition of asexual reproduction and mushroom, bread mold, rotten bread*

TLM Required:

- *container with green algae or image of Spirogyra* (https://docs.google.com/document/d/11W7zo2IhNTaZQJNGso5v-wGZ3RlfkbjmBnl5WMuCSio/edit?tab=t.0)
- *Moldy bread or Image of moldy bread* (https://docs.google.com/document/d/11W7zo2IhNTaZQJNGso5v-wGZ3RlfkbjmBnl5WMuCSio/edit?tab=t.0)
- Moss and ferns - Image (https://docs.google.com/document/d/1Xwx23dDdfkPHdAAnx1BCJLVkaEAn33Ypb4TXg0DawyA/edit?tab=t.0)

Teacher Resources:

(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)

- NCERT Class 7 Textbook
- A sample journal - To record plant growth: https://www.theprimaryresourcerack.com/product-page/plant-growth-observation-worksheet

Igniting Activity:

- By showing rotten bread, ask them to observe with magnifier and why its rotten?

Learning Point:

- **understands spore formation process occurs in vegetative propagation**

Teacher Notes:	Teacher Notes:	Teacher Notes:
(Have you ever seen green slimy patches in ponds or mold growing on old bread? What do you think these are? (Take student responses) To some of us it might appear like small slippery green grass. These are tiny **living organisms** that are plant-like. They can also make their own food using sunlight. *Teacher shows a container with green algae or an image of Spirogyra.* https://docs.google.com/document/d/11W7zo2IhNTaZQJNGso5v-wGZ3RlfkbjmBnl5WMuCSio/edit?tab=t.0 Let us see how they grow. Look at this algae. Refer Fig 8.6 on Pg.8. It looks like a long strand, right? But what happens if it breaks into smaller pieces? *(Waits for student guesses.)* Great thinking! When algae breaks into pieces, each piece can grow into a new algae strand. This process is called **fragmentation**—where one organism **splits into parts**, and each part grows into a new individual. *If a pond dries up, and only a few tiny pieces of algae remain, what do you think will happen when it rains again? (Take responses)* *Excellent prediction! algae will start growing again.* ***Teacher holds up moldy bread or shows a diagram of fungi*** https://docs.google.com/document/d/11W7zo2IhNTaZQJNGso5v-wGZ3RlfkbjmBnl5WMuCSio/edit?tab=t.0 Now, let's talk about **fungi**—like the mold on this bread! Did anyone put mold on it? No! Then where	**Do :** Teacher divides the students into groups of four and provides a packed moldy bread or an image of moldy bread. **Say :** Do as instructed : **Step 1: Observation & Inquiry** Examine the moldy bread—color, texture, and spread. What do you notice about the mold's growth? Where do you think the mold came from? **Step 2: Discussion & Prediction** Discuss how mold grows and spreads. Predict what happens in different conditions (moist, dry, cold). If mold is in the air, why doesn't it grow on fresh bread immediately? Why does mold grow faster in some places? How does mold spread to other food? **Step 3: Connecting to Spore Formation** Relate mold growth to spores in fungi, moss, and ferns. Why do fungi use spores instead of seeds? How do spores help fungi survive? **Step 4: Presentation & Sharing**	*Sketch the diagram of spore formation and explain how spore formation helps fungi survive in harsh conditions?* (Students write your answers in 3-4 sentences, explaining how spores can stay dormant and grow when conditions improve, you can refer pg .no 08)

did it come from? *(Waits for student responses.)* Correct! It came from the air! The mold grew from **tiny spores** floating around us. Spores are like tiny seeds but much lighter. They travel through air, water, or even on animals until they land on something damp—like this bread! Do you know, Moss and ferns also reproduce using spores! Look at this fern leaf. See these tiny spots underneath? *(Points to spore clusters in an image.* https://docs.google.com/document/d/1Xwx23dDdfkPHdAAnx1BCJLVkaEAn33Ypb4TXg0DawyA/edit?tab=t.0 *)* These are **spore-producing bodies**, and they release thousands of spores into the air! *If spores are so tiny and light, how do they spread to different places?* *Great! They spread by wind, water, animals, etc.* *So, we learned that **fragmentation** helps algae multiply quickly, while **spore formation** allows fungi, moss, and ferns to spread over long distances—even in tough conditions!* **CFU (Open ended/ Factual) [2.ii.a]** **Factual CFUs:** What is fragmentation in algae? How does spore formation help fungi reproduce? **Open ended CFUs:** Imagine a dry desert and a damp forest. Where do you think spores will grow faster, and why? How does fragmentation help algae spread quickly in ponds?	Groups share key observations and conclusions.	

Summary:

- **Spore Formation**: Spores are released into the air and grow into new plants under favorable conditions.
  Example: Fungi, Moss, Ferns.

Factual Questions:

- What is called spore?
- Give example for sporophyll?

Open Ended Questions: 1. What will happen if fungi never produce sores?

Evaluation/Quiz/ Assignment:

1. Write the procedure to observe the growth of fungi.
2. Draw the diagram of fungi.

Home work:

- Discuss with your family members and write about two other examples where fungi or algae grow due to fragmentation or spore formation.
- Ask parents/grandparents about traditional ways to prevent mold on food (like storing rice with neem leaves!).

Period- 8.4

Concepts Covered:

- **Sexual reproduction**
- **Types of flowers**

Learning Objectives:

3. Understand term sexual reproduction
4. Understand the types of flowers

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- *Flower parts*

TLM Required:

- *Unisexual and bisexual flowers for Each student, lense*

Teacher Resources:

(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)

- NCERT Class 7 Textbook
- A sample journal - To record plant growth : https://www.theprimaryresourcerack.com/product-page/plant-growth-observation-worksheet
- Pollination - Khan Academy : https://www.youtube.com/watch?v=hCloCHwrJdQ

Igniting Activity:

- By asking a question
- Do all papaya trees give fruits? Why and why not?

Good morning class! *I have a special mystery box* **(Hold up a closed box with a flower inside.)** *Who wants to guess what's inside?*

1. It is colorful and attracts bees and butterflies.

2 . Without it, we wouldn't have fruits or seeds!

What do you think it is? *(Let students guess—some might say 'flower,' 'fruit,' etc.)*

Yes! It's a **flower!** (Take out a real flower and show it to the class.) But did you know that a flower is not just for decoration? It is the reproductive part of a plant!

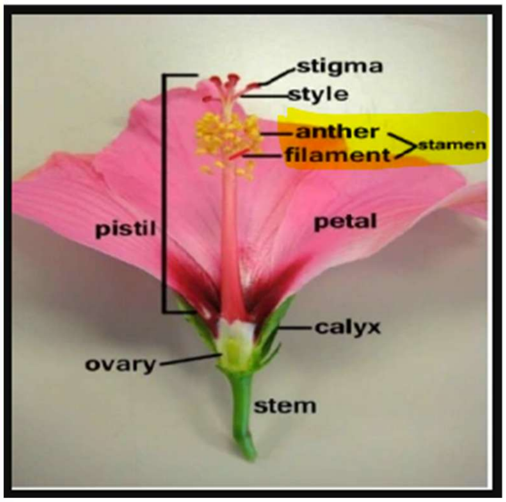
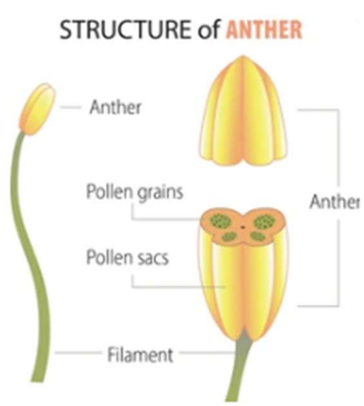
- Today, we are going to explore its hidden parts and discover how plants reproduce through sexual reproduction!

Experience and Reflection: Why do you think flowers are important for a plant's survival?

Learning Point:

- **understands sexual reproduction in plants, draws labelled diagram onf parts of flower**

I do (Direct Instructions)	We do (Guided Practice)	You do (Independent Practice)
Teacher gives a Hibiscus flower to each group of students so that they can observe the parts of the flower. If not available, the teacher can refer to the image as well.) *(Teacher holds up a Hibiscus flower or refers to the Image.)* **The Male Part – Stamen Teacher points to the stamen of a Hibiscus flower or refers to the Image:** https://docs.google.com/presentation/d/1YHEwUKOm-jSuomM67ikJ60iU0YpAaa_V4tcOh3cfNzs/edit This is the **stamen**, the male reproductive part. It has two parts: Anther and Filament.	**Do :** Teacher divides students into small groups of 3-4 students. Each group will use the flowers they brought from home. **Say :** Before dissection, **observe the flower:** • What color and shape are its petals? • Does it have a strong scent? **Carefully Dissect the Flower** – • Gently remove the petals to expose inner structures. • Identify and observe the **stamen** (anther & filament) and **pistil** (stigma, style, ovary, and ovules) Now, use the following **Graphic Organizer** to note your observation: https://docs.google.com/docum	Label a diagram of a flower with male reproductive parts: **stamen, anther, filament,** and female reproductive parts: **pistil, stigma, style, ovary, and ovule.** Write **one sentence per part** describing its function.

 Let us look at the zoomed in image of the anther. ○ **Anther** (produces pollen grains – the male gametes) ○ **Filament** (a stalk that holds the anther) ● What do you think pollen grains do? *(Wait for answers)*  *Correct! They help in reproduction by transferring male gametes.* **The Female Part – Pistil Teacher points to the pistil.** Now, This is the **pistil**, the female reproductive part. It has three main parts:  (b) Pistil ○ **Stigma**	ent/d/1B6HVLswskjL7Yrg_9WrLo6zxEM2xiBwSQKY0MTTJ9vg/edit?tab=t.0 **Classify the Flower** – ● **Is it unisexual or bisexual?** (Does it have both stamens & pistil, or only one?) ● **Compare different flowers** – Do all flowers in your group have the same structure? **Group Discussion Prompts:** ● *Where do you think the pollen is produced?* ● *Can you find the ovules in the ovary?* ● *Do all flowers look the same inside? What differences do you notice?* ● *Do any of your flowers look like they will turn into fruit?*	

(sticky part that catches pollen) ○ **Style** (tube that connects stigma to ovary) ○ **Ovary** (contains **ovules** which turn into seeds after fertilization!) ● Which part do you think turns into a fruit after fertilization? Yes! The **ovary** turns into a fruit after fertilization! **Unisexual vs. Bisexual Flowers** Next, look at this flower (Teacher shows the hibiscus or any bisexual flower) Some flowers have both male and female parts – we call these **bisexual flowers** (like mustard, hibiscus & rose). **(Teacher points to a unisexual flower.)** Others have only one reproductive part, either male or female – these are called **unisexual flowers** (like papaya & corn). ● Name a fruit or flower you have seen that might be unisexual? *(Let students guess—guide them towards papaya, cucumber, corn, etc.)* Great! Now, let us do a hands-on activity and explore real flowers!		

Summary:

- **Spore Formation**: Spores are released into the air and grow into new plants under favorable conditions.
  - Example: Fungi, Moss, Ferns.

CFU (Open ended/ Factual)
Factual CFUs:

1. What are the **male** and **female** reproductive parts of a flower called?
2. What is the difference between a **unisexual** and a **bisexual** flower?

Open ended CFUs:

1. Can you think of any everyday foods that come from flowers?
2. If the anther was removed from a flower, how would it affect the plant?

Evaluation/Quiz/ Assignment:

1. Write the parts of flower and their functions?
2. Draw the diagram of flower and label the parts.

Home work:

- Discuss with your family members and write about two other examples where fungi or algae grow due to fragmentation or spore formation.
- Ask parents/grandparents about traditional ways to prevent mold on food (like storing rice with neem leaves!).

Period- 8.5

Concepts Covered:

- **Pollination,**
- **types of pollination**

Learning Objectives:

- SWBAT understand term pollination
- SWBAT understand the types of pollination

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- *Flower parts and tier functions, butterflies, honey bees*

TLM Required:

Video - On pollination: https://www.youtube.com/watch?v=Dfvyoir_SCY

Teacher Resources:

(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)

- NCERT Class 7 Textbook
- A sample journal - To record plant growth : https://www.theprimaryresourcerack.com/product-page/plant-growth-observation-worksheet
- Pollination - Khan Academy: https://www.youtube.com/watch?v=hCloCHwrJdQ

Igniting Activity:

Good morning class! *Have you ever seen a bee buzzing around a flower? Why do you think bees visit flowers?*

Yes! Bees visit flowers mainly to collect nectar, their food. But while doing so, something else happens — pollen sticks to their bodies! When they fly to the next flower, they unknowingly transfer this pollen. This process helps flowers reproduce!

Let's recall! 1. What are the male and female reproductive parts of a flower? (Let students respond)

*Yes! They are – **Stamen & Pistil**)*

2. *Which part of the stamen produces pollen?*

*Great! **Anther** part of stamen! It produces the **pollen** which produces the **male gametes.***

3. *Where is the ovule found in a flower?*

***Yes! Ovule is found Inside the ovary - part of the pistil,** which produces female gametes.*

4. *Do all flowers have both male and female parts?*

Exactly! No! Some are unisexual, meaning they have only one reproductive part!

Experience and reflection : Have you ever observed bees, butterflies in the garden? Why do you think we found them in the garden only?

Learning Point:

- **Understands pollination and differentiates self and cross pollination, draws diagrams on pollination**

I do (Direct Instructions)	We do (Guided Practice)	You do (Independent Practice)
For reproduction to occur, pollen from a male flower must reach the stigma of a female flower. But how does this transfer happen? This process is called **pollination**—the transfer of pollen from the anther to the stigma of a flower. *This is important because it leads to fertilization, which allows plants to produce seeds and fruits!* • *Why do you think pollination is necessary for plants? (Let students think and respond.)* *Let's explore how pollen moves to make reproduction possible. **(Show this video or draw on the board:** https://www.youtube.com/watch?v=Dfvyoir_SCY **)*** • *What are the types of pollination you observed?* *Pollination can happen in two ways: **Self-Pollination** and **Cross-Pollination**.* ***Self - Pollination:*** *Here, the pollen from the **anther** of a flower lands on the **stigma** of the **same flower** or another flower on the **same***	**Do :** Teacher divides the class into pairs. (Think - pair - share) **Say : Let us do a quick hands-on activity!** (Teacher demonstrates, and students carefully follow the instructions.) 1. Each group takes a flower they brought or received. 2. **Using a small brush or cotton swab, gently transfer pollen** from the anther to the stigma of: ○ The same flower (**self-pollination**). ○ A different flower of the same species (**cross-pollination**). **Observe & Analyze:** • Observe and note where the **stamen and pistil are positioned**—are they close together or far apart? • Analyze whether the flower is adapted for self-pollination or cross-pollination. **Discuss and Reflect:**	• Define pollination. And what are the two types of pollination? • Draw Fig 8.10 on page 10 showing self-pollinating and one cross-pollinating flower!

plant. ***Examples:*** *Pea, Tomato, Mustard* ● *Why might this be an advantage?* *Yes! It is faster and doesn't need insects.* ***Cross pollination:*** *Here, pollen moves from the* ***anther*** *of one flower to the* ***stigma*** *of* ***another flower*** *on a* ***different plant*** *of the same species.* ***Examples of Cross Pollinating Plants:*** *Apple, Papaya, Sunflower* ● *Can cross-pollination happen between two different species of plants? Why or why not?* *Great! No, cross-pollination usually happens between the same kind of plants because their flower parts are compatible.* ● *Can you think of some natural helpers that move pollen between flowers?* *Exactly! Wind, water, insects, and even birds help transfer pollen!* ● *Which among self and cross pollination is better? Why?* *Self pollination is faster whereas Cross pollination leads to more variety and stronger plants.*	● How might the pollen transfer? ● If using wind or insects, what features help the flower in pollination? ● Share your analysis with the class.	

Summary:

Pollination

- Transfer of pollen from the anther to the stigma.
- **Self-pollination:** Pollen lands on the stigma of the same flower or plant.
- **Cross-pollination:** Pollen is transferred from one flower to another of the same species (via wind, water, or insects).

CFU (Open ended/ Factual) [2.ii.a]
Factual CFUs:

1. *What is pollination?*
2. *Name two examples of self-pollinating and cross-pollinating plants.*

Open ended CFUs:

1. *Why do you think some plants rely on cross-pollination instead of self-pollination?*
2. *Can you think of an example where human activities might affect pollination?*

Evaluation/Quiz/ Assignment:
1. Write the types of pollination.
2. Draw the fig cross pollination.

Home work:
- Explain the difference between self-pollination and cross-pollination.
- Observe flowers from a few plants around your home. Observe their structure and mention whether the flowers would undergo self or cross pollination.

Period- 8.6

Concepts Covered:
- **Fertilization**

Learning Objectives:
1. SWBAT understand term fertilization
2. SWBAT understand the process of fertilization

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*
- *Flower parts and tier functions, butterflies, honey bees, seed and fruit*

TLM Required:
1. **Video** - On Fertilization: https://drive.google.com/file/d/1lvHUkx3WpQCvWpELhHpGXd3i_BpvI8PH/view

Teacher Resources:
(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)
- NCERT Class 7 Textbook
- A sample journal - To record plant growth

https://www.theprimaryresourcerack.com/product-page/plant-growth-observation-worksheet
- Pollination - Khan Academy: https://www.youtube.com/watch?v=hCloCHwrJdQ

Igniting Activity:
1. What is pollination?
2. Pollen travels from which part of the flower and reaches stigma?

Learning Point:
- **Comprehends the process of fertilization, draws labelled diagrams on fertilization**

I do (Direct Instructions)	We do (Guided Practice)	You do (Independent Practice)
We learned about pollination—how pollen reaches the stigma. But what happens next? How does this tiny pollen grain actually help form a seed?	**Do :** Teacher divides the students into pairs. **Say :** Imagine you are a pollen grain and describe your journey for fertilization. Answer the following hints then write a paragraph as first person narration.	Students draw the fertilization process in flowers and label: (Refer Fig. 8.11 given on page 12) • Pollen grain • Pollen tube • Ovule

Let's brainstorm! ● *What do you think happens to pollen once it lands on the stigma? (Take student responses)* *Correct! The pollen must reach the **ovule** for fertilization to happen.* *First, When a pollen grain lands on the stigma, it forms a **pollen tube** that grows down through the **style** toward the ovary.* ● *This tube helps the **male gamete (pollen)** reach the **female gamete (egg inside the ovule).*** *How do you think the pollen tube knows where to go? (Guide students toward the idea that it follows chemical signals from the ovule.)* *Next is **the Fusion of Gametes (Fertilization):*** ● *Once the pollen tube reaches the ovule, the **male gamete fuses with the egg cell** inside, forming a **zygote**.* ● *This **zygote develops into an embryo**, which will later grow into a **new plant!*** To reinforce our understanding of fertilization in plants, let us watch a **video** of it. Observe how the pollen reaches the ovule! https://drive.google.com/file/d/1lvHUkx3WpQCvWpELhHpGXd3i_BpvI8PH/view	**Introduce Yourself:** ● What's your name? (e.g., "I'm Poppy the Pollen Grain!") ● Where do you live? (On a **bright yellow anther** of a flower) **The Takeoff:** ● How do you leave your anther? (Does a **bee carry you**? Does the **wind blow you away**?) ● What do you see as you travel? **Landing on the Stigma:** ● Where do you land? (A **sticky stigma**) ● How does it feel? (Warm? Sticky? Like a soft cushion?) **Growing the Pollen Tube:** ● What happens next? (A **pollen tube starts growing!**) ● Describe your **journey down the style** (Is it a **long tunnel**? A **slide**?) ● Are there any obstacles? (Narrow spaces? Twisting paths?) **Meeting the Ovule & Fertilization:** ● Who is waiting at the bottom? (The **egg cell inside the ovule**) ● How do you **fuse** together? (Describe the moment when fertilization happens.) ● What do you become? (**A zygote!**) **The Future – A New Life Begins:** ● What will happen next? (The **zygote will grow into a seed** and later a **new plant!**) ● How do you feel knowing you will become a plant one day? (Here is the sample story of journey of a pollen grain for teacher reference: https://docs.google.com/document/d/17-8ShKoz3pXB0vY3nQQN9sNDiHbTb0b8mShkmXx8aSQ/edit?tab=t.0)	● Fertilization (fusion of gametes)

Summary:

Fertilization & Zygote Formation

- After pollination, pollen develops a **pollen tube** to transport the male gamete to the ovule.
- Male and female gametes fuse, forming a **zygote**, which develops into an embryo.

CFU (Open ended/ Factual) [2.ii.a]

Factual CFUs:

1. What is the purpose of the pollen tube? (*To help the male gamete reach the ovule*)
2. What happens when the male gamete reaches the ovule? (*It fuses with the egg cell to form a zygote*)
3. What does the zygote develop into? (*An embryo, which later becomes a new plant*)

Open ended CFUs:

1. If the pollen tube does not reach the ovule, what do you think will happen?
2. How might human activities like deforestation, pollution, or the use of pesticides affect fertilization in plants?

Evaluation/Quiz/ Assignment:

3. Write the process of fertilization.
4. Draw the fig fertilization

Home work:

Explain the process of fertilisation from pollination to formation of zygote. You can also draw images of the different stages.

Period- 8.7

Concepts Covered:

- **fruits and**
- **seed formation,**

Learning Objectives:

3. SWBAT understand the relation between flower and fruit
4. SWBAT understand the importance of seed dispersal

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- *Flower parts and tier functions, butterflies, honey bees, seed and fruit*

TLM Required:

Different fruits and seeds

Teacher Resources:

(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)

- NCERT Class 7 Textbook
- A sample journal - To record plant growth

https://www.theprimaryresourcerack.com/product-page/plant-growth-observation-worksheet

- Pollination - Khan Academy: https://www.youtube.com/watch?v=hCloCHwrJdQ

Igniting Activity:

1. What is fertilization?
2. What happens to the zygote?

Learning Point:

- **Comprehends formation of fruits and seeds,**

I do (Direct Instructions)	We do (Guided Practice)	You do (Independent Practice)
Great! As we learned in the previous period, the **zygote develops into an embryo**, which grows into a new plant. Now, let us think about this—where do seeds come from inside fruits like mangoes and walnuts? **Exactly!** After fertilization: Let us watch a time-lapse video on the **transformation from flower to fruit:** https://www.youtube.com/watch?v=cLj71H3kiZI **(**After the video) What did you observe in the video? What changes take place in the flower as it turns into a fruit? (Take student responses and write their responses on board) ● The **ovary develops into a fruit**, and ● The **ovules turn into seeds**, which contain the embryo. Ok, now, let us break this down step by step: 1. The **ovary of the flower enlarges** and starts transforming into a fruit. 2. The **ovules inside the ovary develop into seeds** that carry the future plant. 3. Other flower parts like **petals, sepals, and stamens fall off** as the fruit grows.	**Do :** Teacher divides the students into groups of four. **Say :** Let us look at this video on **formation of seed and fruit** https://drive.google.com/file/d/1lvHUkx3WpQCvWpELhHpGXd3i_BpvI8PH/view (After the video) Now, discuss the below questions and answer them. 1. What happens to the petals, sepals, and stamens after fertilization? Why do they fall off? 2. How does the ovary change as it develops into a fruit? 3. What role does the seed coat play in protecting the embryo inside the seed? 4. Why do different fruits have different numbers of seeds? 5. How do fruits help in seed dispersal? Can you think of some examples from your surroundings?	**Answer the following questions:** 1. Write **2-3 sentences** explaining the process of fruit and seed formation. 2. Imagine if all seeds of a mango fell under the same tree and started growing there. What problems would this cause? Suggest how nature prevents this from happening.

Now, let's pause and think: **What exactly is a fruit?** A **fruit** is a **ripened ovary** that protects the seed. But are all fruits soft and juicy? (Encourage student responses.) **Right!** Some fruits are **fleshy and juicy** (like **mango, oranges, and tomatoes**), while others are **dry and hard** (like **walnuts and almonds**). **Why Are Fruits Important for Plants?** Why do you think plants produce fruits? (Take responses.) Yes! **Fruits** play a vital role because: 1. They **protect seeds** inside them. 2. They **help in seed dispersal**, ensuring new plants grow in different places.		

Summary:

Fruit & Seed Formation

- After fertilization, the **ovary develops into a fruit**, and **ovules turn into seeds**.
- Some fruits are **fleshy** (mango, orange), while others are **dry** (almond, walnut).

CFU (Open ended/ Factual) [2.ii.a]
Factual CFUs:
1. What do ovules develop into after fertilization?
2. Which part of the flower falls off as the fruit develops?

Open ended CFUs:
1. Why do you think seeds are enclosed inside fruits?
2. Can you think of a way in which humans benefit from the process of fruit and seed formation in plants?

Evaluation/Quiz/ Assignment:
Home work:
1. Think: **Why do some fruits have one seed while others have many?**
2. Complete the project given in Question No.2 given on page 20.

Period- 8.8

Concepts Covered:

- **Seed dispersal**

Learning Objectives:

1. SWBAT understand the importance of seed dispersal

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- *Different types of seeds and fruits*

TLM Required:

Different fruits and seeds

Teacher Resources:

(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)

- NCERT Class 7 Textbook
- A sample journal - To record plant growth

https://www.theprimaryresourcerack.com/product-page/plant-growth-observation-worksheet

- Pollination - Khan Academy: https://www.youtube.com/watch?v=hCloCHwrJdQ

Igniting Activity:

Good morning class! See this **short video on Maple seeds:**
https://www.youtube.com/shorts/6U7yNYHMtao

What do you notice about how these seeds move? (Take student responses)
Exactly! The seed floats slowly instead of falling straight down and gets carried away by the wind to far places.

Why do some seeds have wings or hairs? (Take student responses)
Right! So that the wind can carry them away from the parent plant.

Alternate Hook (Option 2 - Outdoor Observation):

Good morning class! Let's step outside and observe the trees around our campus.

Activity:

- *Walk around and look for seeds that have fallen near trees.*
- *Observe where the seeds are placed—are they directly under the tree or spread out?*
- *Discuss: Why do you think the seeds are not all in one place?*

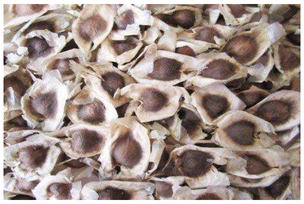
Guiding the Discussion:

- *Notice how some seeds have moved away from the tree. What could have caused this?*
- *Could wind, animals, or other factors be responsible for their movement*

Experience and Reflection: Have you ever seen a white hairy structure flying in the wind?

Learning Point:

- **understands modes of seed dispersal**

I do (Direct Instructions)	We do (Guided Practice)	You do (Independent Practice)
Imagine you are a tree, and you have hundreds of seeds. What will happen if all your seeds fall right below you? (Take student responses) *Yes!* • The seeds will not have space to grow! • They will fight for sunlight and water! Hence it is necessary to spread the seeds to different places. *Plants have special ways to spread their seeds to different places. This is called **seed dispersal.** Today, we'll explore how seeds travel by **wind and water.*** ***Note:** Teacher is encouraged to use the regional names of the plants.* *As we saw in the video earlier, maple and drumstick seeds are winged to help them fly away from their mother plants. Here, dispersal is happening through wind.* *Show images:*   • ***Now take a light, hairy seed (e.g., dandelion, aak).*** • ***Activity:** Blow on it gently and let students watch it float.* *Why do these seeds have wings or hairs? (Take student responses)* *Exactly! To help them fly, to be carried far by the wind.* *Can you think of other plants with similar seeds? (Take student responses)* *Right! Cotton, milkweed.* *So, wind helps seeds that are light, have wings, or are hairy to travel far. Now, let's look at another way seeds travel—**through water!*** ***Water Dispersal (Hands-on Demonstration) Teacher holds up a coconut and asks:*** *Why do you think this coconut is so big and has a thick*	**Do :** Teacher divides the class into pairs and provides images of a few seeds. **Say** : These are the Images of a few seeds: https://docs.google.com/document/d/1C9HvdHRW-SMl1p_ehY6eA-O3RY6pLXj9kOoDLacwPPQ/edit?tab=t.0 observe and classify based on dispersal type and write down your observations and justify your answers.	1. Sketch and label one wind- and one water-dispersed seed. 2. If you were a seed, would you prefer to travel by wind or water? Why?

outer shell? (Take student responses) ● ***Activity:*** *Place a coconut in a water container and let students observe it floating.* ● ***Discussion:*** *Explain that the fibrous coat helps it stay afloat and travel long distances in water.* *Have you ever seen a coconut floating in water before? Where? (Take student responses)* *Right! You might have observed coconut plants near water bodies.* *Why do some seeds need to float? (Take student responses)* *Right to travel across rivers, lakes, and oceans.* *Can you think of other plants that use water dispersal? (Take student responses)*		

Summary:
Seed Dispersal

- Seeds are dispersed to prevent overcrowding and competition.
- Dispersal methods:
  - **Wind:** Light seeds (maple, sunflower) are carried by the wind.
  - **Water:** Seeds like coconut float and travel through water.
  - **Animals:** Sticky/spiny seeds (Xanthium) attach to animals.
  - **Explosion:** Some fruits burst and scatter seeds (balsam, castor)

CFU (Open ended/ Factual)
Factual CFUs:
1. What is seed dispersal?
2. Why do seeds need to be dispersed?

Open ended CFUs:
1. Which method of seed dispersal do you think is the most effective? Why?

Why do you think some seeds are lightweight while others are heavy?Evaluation/Quiz/ Assignment:

Home work:
1. Look for at least **two seeds** in your surroundings that could be dispersed by wind or water. Draw the seed (If possible take a picture) and write down its features (e.g., light, winged, hairy, floating) then Predict whether it is dispersed by wind or water and explain why.
2. Observe **two fruits** and describe their **type, seed count, and dispersal method**.
3. **Research & Reflect:**
   - Find one **new** example of a wind- or water-dispersed seed (not covered in class).
   - Write 2-3 sentences about how its structure helps in dispersal.

TEACHER'S DIARY

Name of the Teacher:				Name of the Month:	
Name of the Lesson: 1. Motion				**Class: 7**	
Period No	**Name of the Concept to be taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	**Remarks**
8.1	Modes of reproduction, 8.1 vegetative Propagation				
8.2	Activity 8.2, Budding and fragmentation				
8. 3	Spore formation				
8. 4	8.2 Sexual Reproduction				
8. 5	pollination , types of pollination				
8. 6	Fertilization				
8. 7	8.3 fruits and seed formation,				
8.8	8.4 Seed dispersal				

1	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?
2	Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
3	What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
4	How well did I adjust my teaching based on student reactions or unforeseen challenges?

Head Teacher's Signature   Teacher's Signature

Head Teacher's Suggestions:

Teacher Notes:

December 2025

C2M1S3 No bag Day | F1S8Y2 Cluster Complex | E5F4M6 Teacher Resources

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 World AIDS 9.1	2 9.2	3 9.3	4 9.4	5 9.5, 9.6	6 No Bag Day Mega PTM/SMC
7 Sunday	8 9.7, 9.8	9 9.9	10 Human NI	11 NI	12 NI, NI	13 Second Saturday
14 Sunday	15 10.1, 10.2	16 10.3	17 10.4	18 10. 5	19 10.6, 10.7	20 No Bag Day Cluster Meeting
21 Sunday	22 Mathematics Day Christmas Holiday	23 Christmas Holiday	24 National Christmas Holiday	25 Christmas Christmas Holiday	26 Christmas Holiday	27 No Bag Christmas Holiday
28 Sunday	29 10.8, NI	30 NI	31 NI, NI			

Christmas Holidays for Christian Minority Institutions 21.12.25 to 28.12.25

Week1:	**9.1 – 9.6**
Week 2:	**9.7 – 9.9**
Week 3:	**10.1– 10.7**
Week 4:	**NA**
Week 5:	**10.8**

TEACHER'S NOTES

Lesson Plan :

9. Motion and Time

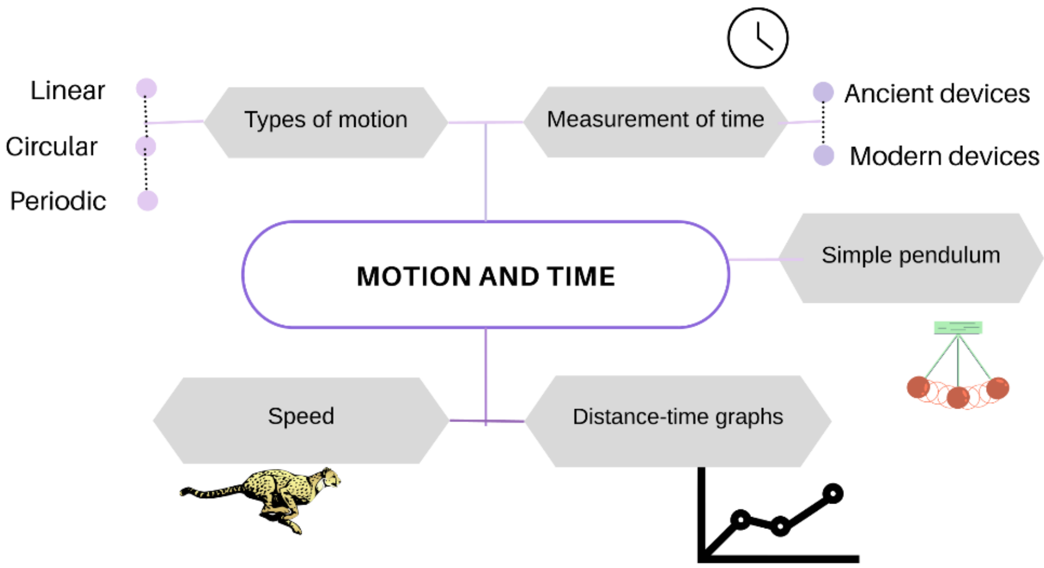
Name of the Teacher:
Name of the School

Grade: 7
Subjects: Science

Learning Outcomes: Students will be able to

- *Recall* the different types of motion
- *Define* and *calculate* the speed of an object
- *Differentiate* between uniform and non-uniform motion
- *Calculate* the time period of a simple pendulum
- *Construct* their own models of time-measurement devices
- *Plot and interpret* distance-time graphs
- *Solve* word problems involving distance-time graphs

Concept Map



Synopsis

Types of motion

- There are different types of motion including linear motion, circular motion and periodic motion.

Speed

- The distance moved by an object in a unit time is called its speed.
- Speed of objects helps us decide which object is moving faster than the other.
- The SI unit of speed is metres/second.

Measurement of time

- Periodic events occurring in nature were used as a measure of time.
- Some of the devices used in ancient times include sundials, water clocks and sand clocks.

- These days we use clocks, watches and digital devices to measure time.

Simple pendulum

- A simple pendulum consists of a small metallic ball suspended from a rigid stand by a thread.
- The time period of a pendulum is the time taken to complete one oscillation.
- The time period of a pendulum depends on the length of the string and is independent of the mass of the bob.
- Periodic motion of a pendulum has been used to make clocks and watches.

Distance-time graphs

- Motion of objects can be presented in a pictorial form using a distance-time graph.
- The distance-time graph of an object moving at a constant speed is a straight line.
- Speed of an object can be calculated using the distance-time graph.

Chapters and Concepts

Period number	Topic	Remarks
9.1	Concept Of Motion, Slow Or Fast, Typesof Motions	
9.2	Speed - Uniform, Non Uniform Motion	
9.3	Speed - Problems	
9.4	Measurement Of Time	
9.5	Activity 9.2, Time Period Of Simple Pendulum	
9.6	Measuring Speed	
9.7	Distance - Time Graph	
9.8	Distance - Time Graph	
9.9	Distance - Time Graph	
9.10	Summarizing The Lesson	
9.11	Student Independent Practice	
9.12	Remedial Teaching Period	
9.13	Remedial Teaching Period	

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- Objects can be at rest or in motion.
- Objects in motion can exhibit different types of motion.
- We use standard units called SI units to express units of measurement, like metre for length and seconds for time.
- Graphs are used to understand the relationship between two variables.

- A graph is used to present information in a simple manner.

Teacher References: *(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)*

- NCERT Class 7 Textbook
- Bal Vaigyanik Class 7,_Eklavya : https://www.eklavya.in/pdfs/Books/HSTP/Bal_Vaigyanik_Current_Edition/Bal_vaigyanik_Class_7_English/Bal_Vaigyanik_Class_7.pdf
- How and why wonderbook of time : https://www.arvindguptatoys.com/arvindgupta/14.how-why-time.pdf
- Pendulums- Activity
- IISER Pune Science Activity Centre

Teaching Learning Material (TLM):

- Chart for "Question corner"
- Usain Bolt Rio Olympics (video)
- Stone, thread, toy car for Activity 1
- Stop clock/watch for Hook activity, concept-2
- Slow to fast animals (video)
- IISER Pune Science Activity Centre (video)
- Toy cars/battery operated cars, a smooth pieces of cardboard, straws/sticks and a stop watch for Activity 2 and 3
- Stop clock/watch for Hook activity, concept-3
- Straight long stick for Activity 4
- Candles, wooden board, nails, matchstick, matchbox and markers for Activity 5
- Pendulum clock video
- Physical model of simple pendulum and stop clock for Activity 6
- Stopwatches, strings, tapes and washer nuts (instead of bobs because bobs are not easily available).
- Image link for Activity 7
- Image link-2 for Activity 7
- How speedometers work video
- Chalk, stopwatches, ruler/measuring tapes for Activity-9
- Picture reference: Bal Vaigyanik Class 7, Page 105
- Charts, sketch pens for Activity 10
- Graph sheets
- Parker Solar Probe video
- Pendulums in different mediums video
- Simple pendulum in continuous motion video
- Flashcards – definition and formula of speed for Remedial Teaching period -1
- Different time measurement devices – sundial model, sand clock model, clocks, stopwatches for Remedial teaching period -1
- Model of simple pendulum for Remedial Teaching period -1
- Strings, washers nuts to make simple pendulum - for Remedial Teaching period -1
- Graph sheets or plain white papers for Remedial Teaching period -1
- Worksheet-1
- Worksheet-2

- Worksheet-3
- Worksheet-4
- Worksheet-5
- Worksheet-6

Concept 1: Types of motion

Teaching Learning Process

Induction/Introduction

In this concept, children will recall what is meant by rest and motion. Then they will recall the types of motion learned in class -6 and identify the types of motion exhibited by objects in some common scenarios.

Vocabulary:

Rest, Motion, Linear motion, circular motion, periodic motion

Hook: 4 minutes

"Let's start the class with a short video. I want you to observe the video very carefully. Then we will be discussing some questions based on that."
Teacher plays the following video from 3:04 to 3:29.
Usain Bolt Rio Olympics
"What did you observe in the video?"
Students respond.
"What were some things (or people) that were in motion?"
Students respond.
"What were some things (or people) that were at rest?"
Students respond.
"What is this sport you saw?"
Students respond.
"Yes, we saw people competing and the person who can the fastest wins the race."
In this chapter, we will be learning about objects in motion, how we measure time and speed.

Experience and reflection:

Do you recall when you visited a fair or exhibition? What were some things at rest and what were some things in motion there?

Period: 9.1: Concept of Motion, Slow or fast, Types of motion

Learning Objectives:

Students will be able to

- *Recall* the concepts of rest and motion
- *Recall* the different types of motion

<table>
<tr>
<th>Explicit Teaching/Teacher Modelling (I Do)</th>
<th>Group Work (We Do)</th>
<th>Independent Work (You Do)</th>
</tr>
<tr>
<td>
"We learned about objects at rest and in motion in class -6. Do you recall what is rest and what is motion?"
Students respond.
"What are some things that are in motion in the classroom?"
Students respond.
"What are some things that are at rest in the classroom?"
Students respond.
"Look out the window and tell me what are some things that are at rest and in motion in the playground?"
Students respond.
"We have recalled what is rest and motion."
"Now let us recall the types of motion we studied last year."
"We learned that motion can be along a straight line, circular or periodic. Now I am going to perform some actions, you have to tell me what kind of motion the object exhibits."

Activity -1: Types of motion
(Teacher demo)
1. Teacher takes a stone, ties it to a thread and whirl it with her hand.
"What kind of motion does the stone exhibit?"
Students respond.
"Yes, it exhibits circular motion."
"What are some examples of circular motion that you have observed?"
Students respond.
2. The teacher takes a toy car and moves it from one end of the table to the other in a straight line.
"What kind of motion does the car exhibit?"
</td>
<td>
"Now let's work in our groups for the next activity."
The teacher divides the students into groups and asks them to discuss in their groups and fill in the following table: (Page 22 in the textbook)
<table>
<tr><th>Example of motion</th><th>Type of motion
Along a straight line/circular/ periodic</th></tr>
<tr><td>Soldiers in a march past</td><td></td></tr>
<tr><td>Bullock cart moving on a straight road</td><td></td></tr>
<tr><td>Hands of an athlete in a race</td><td></td></tr>
<tr><td>Pedal of a bicycle in motion</td><td></td></tr>
<tr><td>Motion of the Earth around the Sun</td><td></td></tr>
<tr><td>Motion of a swing</td><td></td></tr>
<tr><td>Motion of a pendulum</td><td></td></tr>
</table>
Then the teacher gives students time to work in their groups and identify the types of motion.
The teacher instructs that once they complete the table, they can identify scenarios from everyday life where they have seen each of the 3 types of motion.
The teacher lets students work creatively, they can draw or write about their scenario.
After the students have completed, she brings the class together and allows time for each group to present their work.
</td>
<td>
"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own."
Teacher writes down questions on the board and asks students to write their answers in the notebook.
1. Define the 3 types of motion.
2. If a ball is thrown directly up in the air, what kind of motion does it exhibit?
3. Is a stone falling from a high cliff, an example of periodic motion? Why or why not?
4. A toy car is rolling around a circular track. What will happen if you suddenly stop pushing the car?
</td>
</tr>
</table>

"What are some examples of linear motion that you have observed?" Students respond. 3. The teacher takes the stone tied to a string and holds the string in her hand and lets the stone hang from it. She then pulls the stone to one side with the other hand and lets it go. "What kind of motion does the stone exhibit now?" Students respond. "It exhibits periodic motion." "What are some examples of periodic motion that you have observed?" Students respond. **CFU (Open ended/ Factual)** Factual CFUs 1. What is rest and what is motion? 2. What are the different types of motion? Open ended CFUs 1. Write some examples of an object exhibiting more than one type of motion at the same time?		

Closing- 5 minutes

Teacher recalls the concepts taught:

Summary:

"What concept did we explore today?"

"How do you know if an object is in motion?"

"What are the types of motion?"

"How can the knowledge of types of motion help us in our everyday life?"

"Are there any other questions about motion and rest that you are curious to know more about?"

Students are given time to write their questions on the "Question corner" chart in the classroom.

Homework:

Identify examples of the 3 types of motion at home and the force or action that is required to change the state of motion in each example

Assessment of Concept 1:

1. Fill in the blanks: (*LO1)*

(i) Motion of an object or a part of it around a fixed point is known as .... motion.

(ii) A body repeating its motion after a certain interval of time is in .... motion.

(iii) In rectilinear motion, the object moves........... a .... line.

2. Write one example for each of the following types of motion. (*LO1)*

(i) linear

(ii) Circular

(iii) Periodic

(iv) Circular and periodic

3.Identify the different types of motion in the following words in the diagram (*LO1)*

Y	O	U	N	G	C	C	N	T	E	R
L	E	V	E	L	P	I	E	E	A	R
A	L	L	O	T	O	P	P	E	A	I
N	O	T	E	P	A	D	N	E	C	K
O	W	O	N	E	W	I	Y	Z	S	E
I	E	V	O	R	L	O	A	D	W	P
T	R	G	N	I	C	E	D	R	I	L
A	Z	H	T	O	N	G	U	E	N	A
T	X	C	R	D	E	P	T	H	G	R
O	E	Y	C	I	R	C	U	L	A	R
R	T	L	C	C	O	P	P	E	R	T

4.Hamsa was riding in her bicycle along a straight road. She classified the motion of various parts of the bicycle as (i) linear motion, (ii) circular motion and (iii) both linear as well as circular motion. List one part of the bicycle for each type of motion? Support your answer with reason.

Concept 2: Speed, uniform and non-uniform motion

Teaching Learning Process

Learning Objective/s:

Student will be able to:

- *Define* and *calculate* the speed of an object
- *Differentiate* between uniform and non-uniform motion

Induction/Introduction

In this concept, children will identify objects moving fast and slow. They will learn to define speed and to calculate the average speed of an object. They will also learn to define and differentiate between uniform and non-uniform motion.

Vocabulary:

Speed, uniform motion, non-uniform motion

Hook: 4 minutes

"Let's start the class with a small activity."

The teacher calls 1 student to the front of the class and says," Now you have to go from this end of the class to that end following my instructions. I am going to check the time it takes in the clock/watch."
First the teacher asks the child to walk.
"This took 30(example figure) seconds."
Next, the teacher asks the child to jog.
"This took 20(example figure) seconds."
Now, the teacher asks the child to run.
"This took 10(example figure) seconds."
"Now, which do you think was the fastest way to reach from here to there?"
Students will say by running.
"How do we know that?"
Students might respond that it took less time.
"Yes, he was covering the same distance while walking, jogging and running. But when he was running it took him lesser time. So that was the fastest.
In today's class, we will learn about slow and fast motion and what speed is. "

Experience and reflection:
Do you recall when you were late to school and had to rush to school? What did you do to reach school faster?

Period: 9.2: Speed - Uniform Motion, Non - Uniform Motion

LO: Students will be able to

- Understands the concept of speed
- Differentiate between uniform and non uniform motion.

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do
Teacher recalls the concepts taught in the previous class. "We learnt about rest and motion in the previous class. We also learned about types of motion." "Now let us explore more in detail about how an object moves." Teacher shows the following video: Slow to fast animals "Which was the slowest creature in the video?" Students respond – "Snail." "Which was the fastest creature in the video?" Students respond – "Cheetah" "How do we know when we observe any 2 objects in motion, which is slow or fast?"	**Activity 2:** Teacher divides students into groups. Each group is given a battery operated car, a smooth piece of cardboard and a stopwatch. (Images and video reference: IISER Pune Science Activity Centre) Note: If the teacher is unable to arrange for battery cars, she can do this activity using a simple toy car that is operated manually by students. If the students are manually operating the car, the activity needs to be repeated thrice to check for consistent results. In the first part of the activity, children study uniform motion.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is speed? 2. How can you calculate the speed of an object? 3. Differentiate between uniform and non-uniform motion.

Students respond.

"We can compare the distance covered by the 2 objects in a given time or we can compare the time taken by 2 objects to cover the same distance."

Teacher defines speed.

"We call the distance covered by an object in unit time as the **speed** of the object."

"In the video, in the bottom right corner, the speed of each of the animals was given. For example, the speed of the camel was mentioned as 65 kilometres per hour. This means that the camel can travel 65 kilometres in one hour. It might have travelled slower in the beginning and picked up pace later, but here we look at the total distance covered in the given time. So this is the average speed we are talking about."

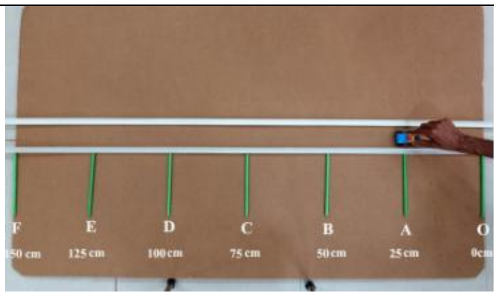
"Speed is the total distance covered by the total time taken."

$$\text{Speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$$

The teacher writes the definition and formula for speed on the board and gives children time to write down in their notebook.

"We learned that objects can move slow or fast. In everyday life, we see objects moving at different speeds. Suppose you are riding a bicycle, when you start riding you start slow, then you pick up speed. The same way a bus or car moves at different speeds on the road based on the traffic.

If the speed of an object moving along a straight line keeps changing, its motion is said to be **non-uniform**."



1. Children mark the distances on the cardboard (it can also be done on the floor if it is smooth) – 0 cm (starting point), 25 cm, 50 cm and so on upto 150 cms.
2. Children are instructed to use the stopwatch for recording the distance covered at different points of time.
3. Set the toy car in motion from the 0 cm mark.
4. Record the distance covered in a specific time interval to go from point A to B or A to C.
5. Use the information to fill in the following table:

Time in seconds	Distance covered by the car in cms
3	
6	
9	
12	
15	
18	

Once students finish this Activity, the teacher may ask the following questions:

- Is the same distance covered by the car over different intervals of time? Why?
- Is the speed of the toy car the same from point A to point B? Why?

The teacher can then discuss that this is an example of uniform motion.

Activity 3:

Teacher divides students into groups. Each group is given a battery operated car, a piece of cardboard with straws or sticks placed on it to make it rough and a stopwatch.

(Images and video reference: IISER Pune Science Activity Centre)

4. Think and give more examples of each type of motion from your daily life.

An object moving along a straight line with a constant speed is said to be in **uniform motion**."

The teacher gives students time to write the definitions in their notebooks.

CFU (Open ended/ Factual)

Factual CFUs:

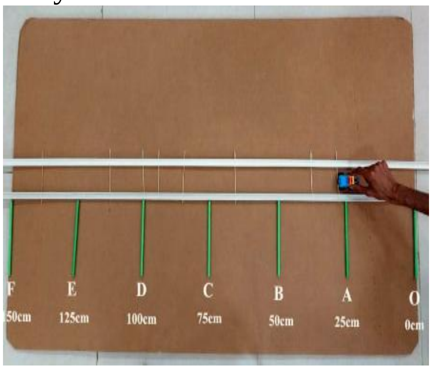
1. What is speed?
2. How do we know if an object is moving fast or slow?

Open ended CFUs:

1. Give examples of any situations where speed is important in your daily life?

Note: If the teacher is unable to arrange for battery cars, she can do this activity using a simple toy car that is operated manually by students. If the students are manually operating the car, the activity needs to be repeated thrice to check for consistent results.

In the first part of the activity, children study uniform motion.



1. Children mark the distances on the cardboard (it can also be done on the floor if it is smooth) – 0 cm (starting point), 25 cm, 50 cm and so on upto 150 cms.
2. Children are instructed to use the stopwatch for recording the distance covered at different points of time.
3. Set the toy car in motion from the 0 cm mark.
4. Record the distance covered in a specific time interval to go from point A to B or A to C.
5. Use the information to fill in the following table:

Time in seconds	Distance covered by the car in cms
3	
6	
9	
12	
15	
18	

Once students finish this Activity, the teacher may ask the following questions:

	• Is the same distance covered by the car over different intervals of time? Why? • Is the speed of the toy car the same from point A to point B? Why? The teacher can then discuss that this is an example of non-uniform motion.	

Closing

Teacher recalls the concepts taught:

Summary:

"What concept did we explore today?"

"What is speed?"

"How does the knowledge of speed of an object help us?"

"What is uniform and non-uniform motion?"

Homework:

1. Observe uniform and non-uniform motion in your surroundings and make a list of these observations.
2. Conduct a race with your toys. Which one takes the least time to reach the finishing line? Why?

Period: 9.3 : Speed - problems

LO: Students will be able to Slove the problems related to Speed

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. The teacher recalls the concept of speed, formula of speed and definitions and examples of uniform and non-uniform motion. "Today we will solve word problems based on the formula of speed." The teacher solves the following problem on the board. 1. If a car covers a distance of 80 kilometres in 2 hours, what is its speed? The teacher applies the formula of speed, that is, 80 kilometres/2 hours = 40 kilometres per hour. "For simplicity, we have expressed speed in kilometres/ hour. But the standard unit for speed is different. Do you recall what the SI unit of distance is?" Students respond – metres. "The SI unit for time is seconds. So, the SI unit for speed is metres/second (read as metres per second).	The teacher divides students into groups and gives them time to work on Worksheet 1. (The teacher can also write these problems on the board.) Students work in groups, discuss the answer and write it. The teacher moves around the class helping and guiding students as required. After the students complete it, the teacher brings the class together and discusses the answers.	Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Write the formula for calculating speed. 2. A train travels 120 kilometres in 2 hours. What is its speed? 3. You are running a race and your speed is 8 meters per second. How long will it take you to run 400 meters? 4. A cyclist rides at a constant speed of 12 kilometres per hour. How far will the cyclist travel in 4 hours?

"We will learn to convert the speed from km/hr to metres/second after we study in detail about time. But for now, it is important to know that we can express speed as km/hr or m/s." "Let us try a few more problems." 2. A train moves at a speed of 80 km/hr. How much distance will it cover in 3 hours?" The teacher shows the steps: Speed of the train = 80 km/hr Time = 3 hours Speed = Distance/time, Hence, distance = speed *time Distance covered by the train = 80*3 = 240 kms. 3. A cyclist is going at the speed of 12 km/hr. How much time will he take to cover 15 km? The teacher shows the steps: Speed of the cyclist = 12km/hour Distance = 3 km Speed = Distance/time, Hence time = Distance/speed Time taken by the cyclist = 15/12 = 1.25 hours **CFU (Open ended/ Factual)** Factual CFUs: 1. What is the formula for speed? 2. Calculate the time taken if the speed and the distance covered are given? Open ended CFUs: *3.* If you increase the speed of an object, what happens to the time it takes to cover a given distance? 4. Can two objects move at the same speed but travel different distances? How?	The teacher can also take this time to clear any questions children have.	5. Bhaskar and Raju are driving a car back from work. Bhaskar drives 64.8km from work at a speed of 48km/h. Raju drives 81.2km from work at a speed of 58km/h. They both leave work at the same time. a) Who arrives home first? b) How many minutes later is it before the second person gets home? 6. How do you think engineers use the relationship between speed, distance, and time when designing transportation systems (e.g., cars, trains, airplanes)?

Closing- 5 minutes

Teacher recalls the concepts taught:

Summary:

"What concept did we explore today?"

"How do we calculate speed given the time and distance travelled?"

" How do you think weather forecasters use the concept of speed when predicting the movement of storms or hurricanes?"

Homework:

1. If you are riding a bike at 10 km/h, how long will it take you to travel 50 kilometres?
2. Imagine your parents are planning a trip from Ongole to Vishakapatnam, a distance of roughly 500 kms. If you want to reach your destination in 5 hours, what should your speed be? Why is it important to calculate this speed before starting the trip? Which mode of transport can you use?

Assessment of Concept 2:

I. Choose the correct answer: (LO3)

1. If we denote speed by S, distance by D and time by T, the relationship between these quantities is
   (a) S = D × T
   (b) T = S/D
   (c) S = T/D
   (d) S = D/T
2. The correct symbol to represent the speed of an object is
   (a) 5 m/s
   (b) 5 mp
   (c) 5 m/hr
   (d) 5 s/m

II. Answer the following:

1. If a car takes 5 hours to travel the distance of 200 km while travelling with uniform motion, calculate its speed. (LO 2,3)
2. Differentiate between uniform motion and non-uniform motion. (LO2)
3. If you are riding a bike at 10 km/h, how long will it take you to travel 50 kilometres? (LO3)
4. A train travels 180 kilometers in 3 hours, and a bus travels the same distance in 4 hours. Which vehicle is traveling faster? (LO3)
5. A plane travels at a speed of 600 kilometres per hour. How far will it travel in 5 hours? (LO3)
6. A rocket travels at a speed of 25,000 kilometres per hour. How long will it take to travel to the Moon, which is approximately 384,400 kilometres away? (LO3)
7. A car travels at a constant speed of 60 km/h on a smooth road. How would its speed be affected if the road was bumpy or the weather was rainy? (LO2, 3)
8. How do athletes use the relationship between speed, distance, and time to improve their performance in races? (LO 3)

Concept 3: Measurement of time including simple pendulum

Teaching Learning Process

Learning Objective/s: Student will be able to :

- *Construct* their own models of time-measurement devices
- *Calculate* the time period of a simple pendulum

Induction/Introduction

In this concept, children will learn how time was measured in olden days and now. They will also learn the SI unit of time. They will be introduced to the concept of a simple pendulum and will learn to calculate its time period.

Vocabulary:

Sundial, water clock, sand clock, simple pendulum, time period, oscillations

Hook: 4 minutes

"Let's start the class with a small activity."

"I am going to give you a challenge. When I start the timer (or stopwatch) you have to close your eyes. When you think one minute has passed, raise a silent hand, do not open your eyes. When I tell you, you can open your eyes."

The teacher starts the timer and the students do the activity. After the minute is up, the teacher asks the students to open their eyes and compare their guesses to the actual time.
The teacher can have a short discussion on:
"Why was it hard to guess the time? Why do we need devices to measure time?"

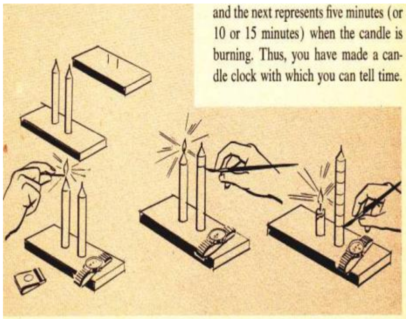
Experience and reflection:
Have you ever felt that the time passed sooner than you thought? When was it?
Do you recall any time when the clock at your home showed the wrong time? How did it affect the activities at home?

Period: 9.4: Measurement of Time, Types of clocks

LO: Students will be able to

- Define the term Time
- Apprecitiates the ancient way of measuring the time

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "We learned about speed, distance and time in the previous classes. We also learned how distance is measured and the standard units used for distance in class 6." "Now we will learn about how time is measured." "How do you think people knew the time when there were no clocks?" Students respond. "What are some events that repeat periodically?" Students respond. "The occurrence of day and night, the phases of the moon, the seasons etc. are some periodic events. Our ancestors used these events to estimate the time. For example, the sun rises in the morning every day. The time between the one sunrise and the next sunrise was called a day. A month was measured from one new moon to the next, and so on. " "But we also need to measure smaller time intervals like hours in a day. So, what can be a good way to measure that without a clock?" Students respond. "We can use the changes in the lengths of shadows as a measure of time during the day."	"We learnt about the use of sundials for measuring time. Now let us construct another device for measuring time." **Activity 5:** The teacher follows the following steps to construct a candle clock. ● Take two candles of equal height. ● Fix them on a wooden board as shown, using nails. This is to make sure that the candle does not fall over when it is lit. ● Light one of the candles and note the exact time when you lit it. ● When the candle has burned for five minutes (the teacher can change this time based on how much time is available for the activity), not how far it has burned and make a mark at the same level on the other candle. ● Wait for another five minutes and make another mark on the unlit candle.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What time-measuring devices do you use on a daily basis? 2. What are some repeating patterns in nature that were used by early man to tell time?

Activity 4: (Teacher demo) "Let's make a very simple sundial." "Have you observed when your shadow is the longest during the day?" Students respond. "It is longest during the mornings and late evenings." "When is your shadow the shortest?" Students respond. "It is shortest when the sun is right overhead at noon." "We can use this information to have a rough estimate of time." The teacher takes the students to a part of the playground that is sunny and plants a straight stick. (It is ideal if this is done early in the morning like 8 a.m so that children can observe the hourly changes in the shadows till they leave at say, 3 p.m.) "We are going to observe the shadow formed by the stick at every one-hour interval and see how it is different." "Discuss with the person next to you, what will happen? Will we be able to predict the time with this simple arrangement? How accurate will it be? Why?" The teacher gives students time to discuss and then takes their responses. **CFU (Open ended/ Factual)** Factual CFUs: 1. What are some devices we use to measure time? 2. What were some patterns in nature used by people to measure time before clocks were invented? Open-ended CFUs 3. How does it affect us when we do not have any devices to tell us the time?	• Do this for every five minutes until the candle burns out. • Now each marker on the unlit candle indicates five minutes time. • We have made a candle clock by which we can tell time.  After the activity, the teacher discusses the following questions: "What do you think were the advantages and disadvantages of using a candle clock?" "We observed two different methods of measuring time without using clocks. Which do you think is better? Why?" "If you were to design a more accurate candle clock, what changes would you make to ensure it measures time more precisely?"	3. If there were no clocks and you had to design a way of measuring time, what would you do?

Closing- 5 minutes

Teacher recalls the concepts taught:

Summary:

"What concept did we explore today?"

"What are some modern and ancient devices to measure time?"

"How do you think the invention of clocks changed our lives?"

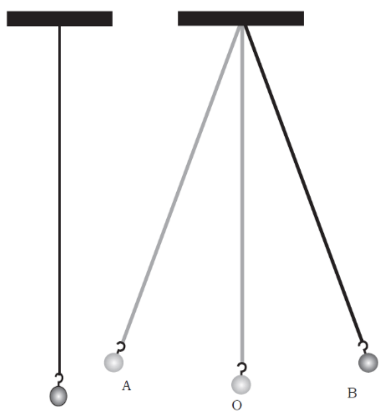
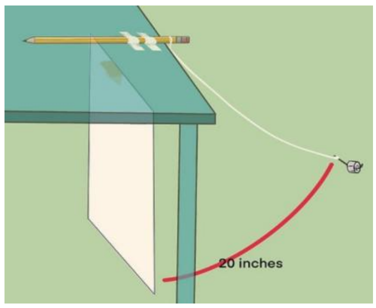
Homework:

Make your own sand clock with 2 old ink bottles or 2 old plastic bottles.

Period: 9.5 :Introduction to pendulum- Time Period

LO: Students will be able to

- Understands the definition of one complete oscillation
- Defines Time period

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "In the previous class, we learnt about different devices used to measure time. These days we use clocks, watches and digital devices to measure time." "Let's start with a short video". The teacher shows a few seconds of this video. Pendulum clock video "Have you seen this type of clock before?" Student respond. "What is different about this clock?" Students might notice the pendulum and say that is different. The teacher can then introduce the concept of a simple pendulum by showing a model of the pendulum.  	The teacher divides students into groups. **Activity 7:** Each group has to perform experiments to : - Calculate the time period of the pendulum - Check whether the change in the length of the string affects the time period of the pendulum - Check whether change in mass of the bob affects the time period. Each group has a stopwatch, string, thread, tape and a washer nut (because bobs are not easily available). The teacher can instruct the students to construct the pendulum as shown in the image: (Image link) (If stands are available for all groups, the teacher can use them. This set-up can be used if stands are not available. Alternatively, nails on the wall, sturdy door knobs can also be used to hang the pendulum.)  	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Draw a simple pendulum. 2. Define the time period of a simple pendulum. 3. Does the time period of the simple pendulum change when the mass of the bob is changed? 4. How does the time period of the simple pendulum change when the length of the string is changed? 5. What do you think would happen if you were to swing a pendulum in a different environment, such as on the Moon?

(Image taken from the textbook page number 28.)

"A simple pendulum consists of a small metallic ball suspended from a rigid stand by a thread. The metallic ball is called the **bob** of the pendulum."

"What will happen if I pull this string to one end and release it?"

Students might respond that the pendulum starts moving to and fro.

"Does this motion remind you of any other object you have seen?"

Children might respond that it is similar to the motion of a swing.

"Will the pendulum keep moving to and fro will it eventually stop? Why do you think so? Discuss with the person next to you for a few seconds."

The teacher allows students time to think and discuss and then takes a few student responses.

The teacher then demonstrates what happens and defines an oscillation and the time period.

"There are 3 positions of the pendulum here. The mean position, O, the extreme position A and the other extreme position B. When the string is pulled to one end and released the pendulum starts oscillating. It is said to have completed one **oscillation** when its bob starting from O moves to A, to B and then back to O. It is also said to have completed one oscillation when the bob moves from A to B and back to A.

The time taken for the pendulum to complete one oscillation is called the **time period."**

Activity 6:

- Tape a pencil horizontally to a table firmly so that it acts as a sturdy support.
- Tie a washer nut to one end of the thread as shown.
- Tie the other end of the thread to the pencil.
- Optionally, a white paper can be taped to the background as shown just for better visibility.

Activity 7.1

Students are instructed to use the stopwatch and measure the time taken for 20 oscillations and use to calculate the time period.

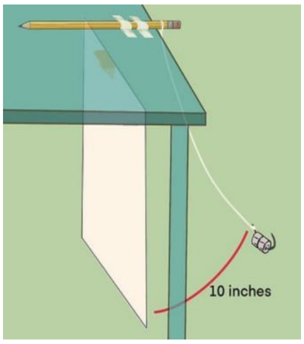
Trial number	Time taken for 20 oscillations	Time period

Students must perform 3 trials and record their observations.

The teacher can discuss if the time period of the pendulum was nearly the same in all the cases.

Activity 7.2

Students are instructed to tie another washer nut to the pendulum as shown, so that the mass of the bob increases. (Image link)



Students are to repeat the experiment and calculate the time period.

The teacher demonstrates how to count the oscillations and find the time period.
"Let us try and count 20 oscillations and I am going to use this stopwatch (or watch or clock) to measure the time. "
The teacher pulls the bob to end A and releases it. Then she counts 20 oscillations.
Suppose the time taken was 40 seconds, then she demonstrates that the time period for on oscillation can then be calculated as:
Time period = Time taken for 20 oscillations/20
= 40/20 = 2 seconds
We can repeat this experiment to verify if we get the same time period every time.

CFU (Open ended/ Factual)
Factual CFUs:
1. What type of motion does the simple pendulum exhibit?
2. What is an oscillation and time period of a pendulum?

Open ended CFUs:
1. What do you think will happen if we change the length of the string or the mass of the ball in the pendulum?
2. What will happen if we pull the pendulum further to one side and release it? Will it take longer time to complete one oscillation?

Trial number	Time taken for 20 oscillations	Time period

Students must perform 3 trials and record their observations.
The teacher can discuss if the time period of the pendulum was different than before.
(It should be nearly the same as we know that the mass of the bob doesn't affect the time period.)
Activity 7.3
Students are now instructed to make the length of the thread half of what it was in Activity 7.1 and repeat the experiment to calculate the time period.

Trial number	Time taken for 20 oscillations	Time period

Students must perform 3 trials and record their observations.
The teacher can discuss if the time period of the pendulum was different than before.
(It should be different as we know that the length of the string affects the time period. Here since the length is decreased, the time period will also reduce. The formula for time period need not be introduced as it will be discussed in higher classes.)

After students finish all the activities, the teacher discusses their observations. The teacher can also take this time to clear any questions children have.

Closing- 5 minutes

Teacher recalls the concepts taught:

Summary:

"What concept did we explore today?"

"What is a simple pendulum?"

"What kind of motion does a simple pendulum exhibit?"

"What is meant by the time period of a simple pendulum?"

"What are the two factors you investigated about the time period of a pendulum?

Teacher assigns Homework:

Observe how the motion of a swing is similar to that of the simple pendulum. Write about it.

If you push the swing harder, what happens to the time period of the swing (try this safely and without anyone sitting on the swing)?

Period: 9.6: Measuring the Speed - Use of Speedometer & Odometer

LO: Students will be able to

- Understands the units of Time and Speed
- Identifies the use of Speedometer & Odometer

<table>
<tr><th>Explicit Teaching / Teacher Modelling (I Do)</th><th>Group Work (We Do)</th><th>Independent Work (You Do)</th></tr>
<tr>
<td>Teacher recalls the concepts taught in the previous class.
"In the previous two classes, we learned about the measurement of time, devices used to measure time. We also learnt and did some experiments on the simple pendulum."
"We know that time can be expressed in hours, minutes, seconds, days, months and so on."
"The standard unit of time or the SI unit is seconds."
"We now have digital clocks that can measure milliseconds and microseconds as well. Think of any situations where such small intervals of time need to be measured."
Students respond.
"Very small time intervals need to be measured in scientific research and medicine. We also need to measure one tenth or one hundredth of a second in sports, like in the Olympics race video we watched."</td>
<td>Activity 8:
Teacher divides students into groups.
"Now you will be working in groups to complete the following table. Do you remember the video that we watched about the speed of different animals? In this table, the speed of animals is given in km/h. You have to calculate the speed in m/s." (Table 9.4 in the textbook)
<table>
<tr><th>S. No.</th><th>Name of the object</th><th>Speed in km/h</th><th>Speed in m/s</th></tr>
<tr><td>1.</td><td>Falcon</td><td>320</td><td>$\frac{320 \times 10\cancel{0}\cancel{0}}{6\cancel{0} \times 6\cancel{0}}$</td></tr>
<tr><td>2.</td><td>Cheetah</td><td>112</td><td></td></tr>
<tr><td>3.</td><td>Blue fish</td><td>40 – 46</td><td></td></tr>
<tr><td>4.</td><td>Rabbit</td><td>56</td><td></td></tr>
<tr><td>5.</td><td>Squirrel</td><td>19</td><td></td></tr>
<tr><td>6.</td><td>Domestic mouse</td><td>11</td><td></td></tr>
<tr><td>7.</td><td>Human</td><td>40</td><td></td></tr>
<tr><td>8.</td><td>Giant tortoise</td><td>0.27</td><td></td></tr>
<tr><td>9.</td><td>Snail</td><td>0.05</td><td></td></tr>
</table>
The teacher can walk around the class and guide groups that are struggling.

Activity 9:
Students stay in the same groups and do the following activity.</td>
<td>"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own."

Teacher writes down questions on the board and asks students to write their answers in the notebook.
1. What are the SI units for speed and time?
2. What are speedometers used for?</td>
</tr>
</table>

“Now that we know how to measure distance and how to measure time, we can use both of these to calculate the speed of an object.”
“Have you observed how the speed of moving objects like cars are calculated, while the car is in motion?”
“You must have seen this device in bikes and cars. It is called a **speedometer**.”
"Let's watch a short video on how it works.”
How speedometers work (watch from 1:54 to 2:50 mins)
The teacher then has a short discussion about why speedometers are important. They tell us the speed at which we are going and can be an indicator for if we need to slow down.
“You have learnt about the SI units of distance and time and also the formula for speed. Guess the SI unit of speed.”
Students respond.
“Since speed is distance/time, the SI unit for speed is m/s.”
“We have learnt that speed is also expressed in km/h, let’s learn how to convert this to the SI unit of speed – m/s.”
The teacher does the following example problem on the board.
The speed of a car is 50 km/h. Convert it to m/s.
Steps: Speed of the car = 50 km/h
1 km = 1000 m , so 50 km = 50,000 m
1 h = 60 x 60 s = 3600 s
Hence, the speed of the car in m/s = 50,000/3600 m/s = 13.88 m/s

CFU (Open ended/ Factual)
Factual CFUs:
1. What is the SI unit of speed?
2. What is a speedometer?

Open ended CFUs:
1. How does having a speedometer help us?

- Draw a straight line on the ground with chalk.
- One person in the group has to stand 1 or 2 m away from it and roll a ball gently perpendicular to the line.
- Note the time at the moment the ball crosses the line and also when it comes to rest.
- Measure the distance between the point at which the ball crosses the line and the point where it comes to rest, using a ruler or measuring tape.
- Record the measurements in the table given below.
- Let different students in the group repeat the activity and the rest of the group take measurements.
- Calculate the speed in each case. (Table 9.3 in the textbook)

Name of the group	Distance moved by the ball (m)	Time taken (s)	Speed = Distance/ Time taken (m/s)

After the students finish the activities, the teacher brings the class together and discusses the activities. The teacher can also take this time to clear any questions children have.

3. A cyclist covers a distance of 10 kms in 1 hour. What is his speed in m/s?
4. The distance between two stations is 240 kms and a train takes 4 hours to cover the distance. Calculate the speed in km/h and m/s.
5. Charu takes 20 minutes from her house to reach the school. If she walks at the speed of 1 m/s, how far is her school from her home?

Closing- 5 minutes

Teacher recalls the concepts taught:

Summary:

"What concept did we explore today?"

"What are standard units of distance, time and speed?"

"What is the device used to measure speed in vehicles called?"

"Why do we need to convert quantities into SI units?"

Homework:

How would you explain the concept of speed to someone who has never heard of it before? What are some simple examples you could use to demonstrate speed in real life?

Assessment of Concept 3:

I. Answer the following:

1. How did people measure time when there were no clocks? (LO 5)
2. How does a sundial work? (LO 5)
3. Why were the devices used to measure time in olden days not as reliable as modern devices? (LO 5)
3. What is a simple pendulum? (LO 4)
4. A simple pendulum takes 32 seconds to complete 20 oscillations. What is the time period of the pendulum? (LO 4)
5. Your friend says that the time period of a pendulum will increase if the mass of the bob is increased. How will you test this statement? (LO 4)
6. What is the SI unit of speed? (LO 2)
7. A spaceship travels 36,000 km in one hour. Express its speed in km/s. (LO 2)

Concept 4: Distance-time graphs

Teaching Learning Process

Learning Objective/s:

Student will be able to:

- *Plot and interpret* distance-time graphs
- *Solve* word problems involving distance-time graphs

Induction/Introduction

In this concept, children will learn to plot and interpret distance time graphs. They will also learn to solve word problems based on distance-time graphs.

Vocabulary: Distance-time graph

Hook: 4 minutes

"Let's start the class with a small activity."

"I am going to take a vote. You can raise your hands only once during the polling. I am going to name the seasons and ask you which is your favourite season. There are 3 options – summer, winter and rainy season."

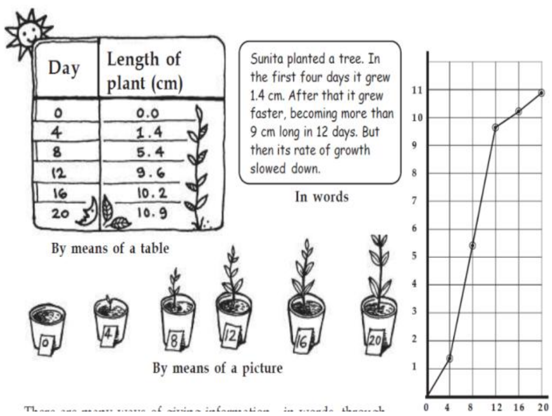
The teacher takes the poll and writes down the number of students who like each of the seasons.

"What can be some other way of representing this information?"
The teacher takes students' responses and plots a pie chart and a bar graph of the information.
"What do you think is the difference between these two graphs?"
Teacher takes students' responses and discusses.
"Graphs are ways to represent information in a visual manner. From this graph, we can also predict that most students would like _____ season. "

Experience and reflection:
Do you recall any places where you have seen graphs being used in daily life?

Period: 9.7 : Distance Time graph

LO: Students will be to understand the use of Distance Time graph

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "We learned about speed, distance and time, the relationship between them and how to measure them in the previous classes. Now we will learn another way of representing the information." "Suppose your friend grew a plant and recorded the growth of the plant for 20 days. She chooses to present the information in the following ways. (Picture reference: Bal Vaigyanik Class 7, Page 105) - Using a table - Using words - Using pictures - Using a graph  "Share with the person next to you, which of these do you think is the most useful and reliable way of presenting the information and why." The teacher gives students time to discuss and then takes a few student responses.	**Activity 10: Guess the graph** Teacher divides students into 6 groups. Each group gets a piece of chart paper with the X and Y-axis marked on it, markers or sketchpens. "Each group will be given a situation that you have to use to plot the graph on the chart paper. The X-axis denotes the time, so you have to use 24 squares for 24 hours. You will be starting from 12 am in the night , then 1 am and so on and end with 12 pm. The Y-axis shows the number of students. Assume that the total number of students in class 7 all sections together, is 100 for this graph. Based on the scenario, you have to plot how many students will be doing that activity at any given time of the day. For example, if you have to plot the number of students traveling, you might be plotting a higher number around the time 8 am to 9 am and 3 pm to 4 pm. (The teacher will have to demonstrate one scenario, so that students are able to understand.)	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What are the different ways of presenting data? 2. What are line graphs used for? 3. Think of a day-to-day scenario where you have seen line graphs being used.

"Graphs are a very reliable and useful method of presenting data because it is simple and easy to understand. It gives us the idea at one glance. It tells us the relationship between two variables. Here it tells us the relationship between the height of the plant and time. The time is on the X-axis and the height is on the Y-axis. " "Recall what are some types of graphs you have seen." Students respond. "There are many types of graphs like bar graphs, pie charts and line graphs." The teacher gives examples of each type of graph. "For the rest of the chapter, we will only be using line graphs." **CFU (Open ended/ Factual)** Factual CFUs: 1. What are some different ways of representing information? Open ended CFUs: 1. Why do we need different ways of presenting information? 2. How would it be if we used only words or paragraphs to present information?	You will also be given a group number. You have to write your group number on the graph after plotting. Then you will be displaying the graphs in the class. You cannot discuss or tell other groups what you are plotting, else the fun of the activity will be lost." Each group gets one of the following scenarios: Group 1: No. of students eating at each hour during the 24-hour period. Group 2: No of students in the classroom at each hour during the 24-hour period. Group 3: No of students talking to their friends at each hour during the 24-hour period. Group 4: No. of students doing physical exercise/sports/games at each hour during the 24-hour period. Group 5: No of students watching TV/phone at each hour during the 24-hour period. Group 6: No of students sleeping at each hour during the 24-hour period. The teacher goes around the class and guides students who are struggling. Once they complete, the charts are displayed in the classroom. "Now let's guess what each of the graphs represent. Students from all other groups can guess, the group that made the graph cannot reveal unless others have taken some guesses." The teacher points to each of the charts and asks, "What do you think graph 1 is about?" Students take their guesses. After 2-3 guesses, the teacher asks the group 1 to reveal what the graph is about and their idea behind how they made the graph. The teacher repeats this likewise for all other graphs.	

	(Through this activity, students will not only have fun, but also use their intuition and sense of inquiry to plot as well as interpret other graphs. This serves as a good starting activity before they start plotting and interpreting distance-time graphs.)	

Closing- 5 minutes

Teacher recalls the concepts taught:

Summary:

"What concept did we explore today?"

"What are graphs?"

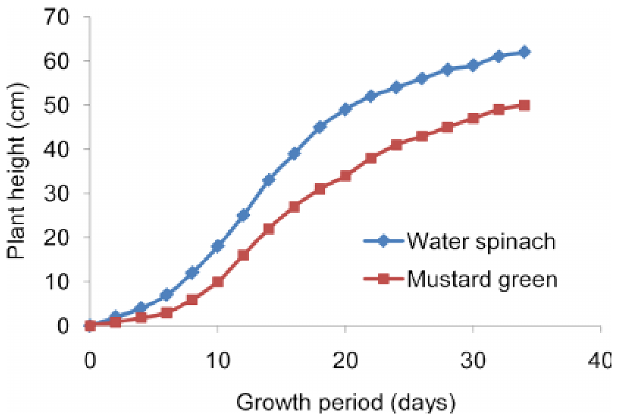
"What are line graphs used for?"

"Are there any other questions about graphs that you are curious to know more about?"

Students are given time to write their questions on the "Question corner" chart in the classroom.

Homework:

- Line graphs are used in many practical ways.
- The line graph below shows the growth of two different plants over a period of 40 days.



Which is the period in which the plants show maximum change in height? What can you conclude about the change in plant height between 30 and 40 days?

Period: 9.8: Distance Time graph

LO: Students will be able to interpret and prepare Distance Time graph

Explicit Teaching/Teacher Modelling

Teacher recalls the concepts taught in the previous class.

"In the last class, we learnt about different kinds of graphs and also plotted some rough line graphs. Today we will learn more in detail about plotting graphs. We will be plotting graphs of distance vs time."

"Let us take a scenario where we know the distance covered by a car and the time taken. (Table 9.6 in the textbook)

S. No.	Time (min.)	Distance (km)
1.	0	0
2.	1	1
3.	2	2
4.	3	3
5.	4	4
6.	5	5

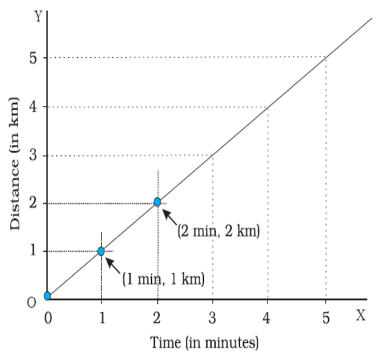
The teacher shows on the board how it can be plotted.

- Draw two perpendicular line to represent the two axes and mark X and Y.
- We will be showing the time on the X-axis and the distance on the Y-axis.
- Now, based on the data, I can choose a scale for the graph such that no data point goes out of the graph. Here it can be,

On the X axis, 1 min = 1 cm
On the Y-axis, 1 km = 1 cm
Based on this the points can be marked.

- Now, we have to mark the motion of the car by marking each set of data points.

The teacher demonstrates how each point is marked.
(Figure 9.3 in the textbook)



Group Work

Teacher divides students into groups and provides graph sheets and asks them to plot graphs based on [Worksheet -2]

After the students complete the activity, the teacher brings the class together and discusses the Worksheet.

The teacher can also take this time to clear any questions children have.

Independent Work (You Do)

"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own."

Teacher writes down questions on the board and asks students to write their answers in the notebook.

1. In your notebooks, plot the distance-time graph of a person running as follows:

Time(s)	0	10	20	30	40
Distance(m)	0	50	100	150	200

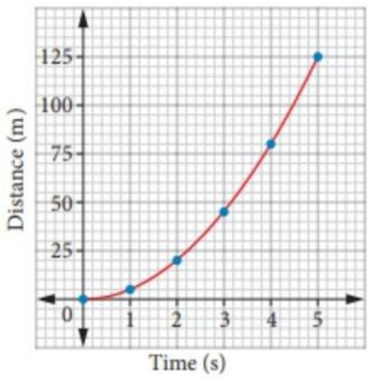
What does the graph tell you about the speed of the person running?

2. Plot the distance-time graph of a person walking as follows:

Time(s)	0	5	10	15	20
Distance(m)	0	8	20	40	60

What does the graph tell you about the speed of the person walking?

3. Plot a distance-time graph for a person cycling at the speed of 8 m/s

● Once all the points are marked, they can be joined and we will get a straight line that denotes the motion of the car. This means that the car is moving with constant or uniform speed. ● The teacher then has a discussion on the importance of determining the scale on the X-axis and Y-axis of the graph. ● The teacher demonstrates the same with the scale of X-axis : 1 cm = 0.5 mins y-axis : 1 cm = 0.5 kms Assuming that we can mark only 5 points on the graph, it will be seen that the last 2 data points cannot be marked on the graph. The teacher then discusses how this is different from the previous graph. ● The teacher demonstrates the same with the scale of X-axis : 1 cm = 3 mins y-axis : 1 cm = 3 kms Here the graph is a very short line and we cannot conclude anything clearly. The teacher then discusses that it is important to choose an appropriate scale so that we can clearly observe the patterns in a graph. Let us take a different scenario now: Suppose a car is travelling and we have the following information: | Time (s) | 0 | 1 | 2 | 3 | 4 | 5 | | Distance (m) | 0 | 5 | 20 | 45 | 80 | 125 | The teacher plots the distance-time graph, showing how the scales can be chosen and how the final graph looks:  "Here we see that the line showing the car's motion is not a straight line. What does this tell us about the motion of the car?"		

The teacher takes a few students' responses. "Yes, it shows that the car is not travelling at a constant speed, the speed is increasing with time." **CFU (Open ended/ Factual)** Factual CFUs: 1. What are distance-time graphs? 2. How can distance-time graphs be used to interpret the speed of an object? Open ended CFUs: 1. If we plot time on the Y-axis and distance on the X-axis, how would the graph look like? Which way of plotting the graph is better? Why?		

Closing- 5 minutes

Teacher recalls the concepts taught:

Summary:

"What concept did we explore today?"

"What is a distance-time graph?"

"What do distance-time graphs tell us about speed?"

Homework:

1. Plot the distance-time graph of a car moving as follows:

Time(s)	0	1	2	3	4
Distance(m)	0	2	6	12	20

What does the graph tell you about the speed of the car?

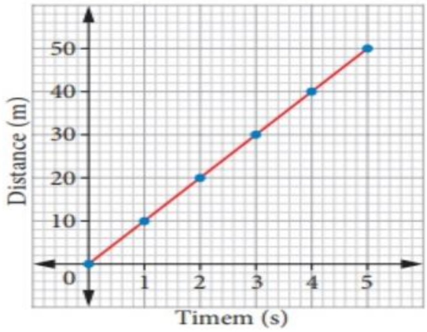
2. Salma walks a distance of 1 km in 20 minutes then she stops or 10 minutes at a shop and then walks another 0.5 km in 10 minutes. Plot the distance-time graph.

Period: 9.9: Distance Time graph

LO: Students will be able to draw Distance Time graph from the obtained data

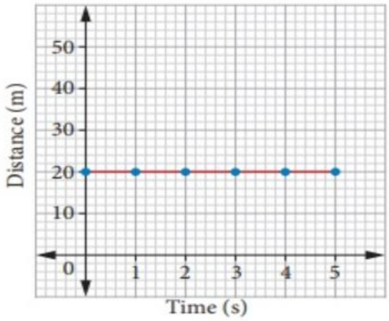
Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "In the previous class, we learnt how to plot distance-time graphs, in this class we are going to do some exercises on how we can interpret the distance-time graphs." "What are some of the things we can understand from a distance-time graph?" The teacher takes a few student responses. "Yes, we can find the speed of an object, which means we can know if an object is moving with a constant speed or its speed is varying over time."	Teacher divides students into groups and provides graph sheets and asks them to plot graphs based on Worksheet -3 After the students complete the activity, the teacher brings the class together and discusses the Worksheet. The teacher can also take this time to clear any questions children have.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher asks students to work independently on Worksheet -4 After the students finish, the teacher takes time to discuss the answers and clarify any questions that the children might have.

"For example, if we look at this graph, what can we say?



"Yes, the object is moving at a constant speed."

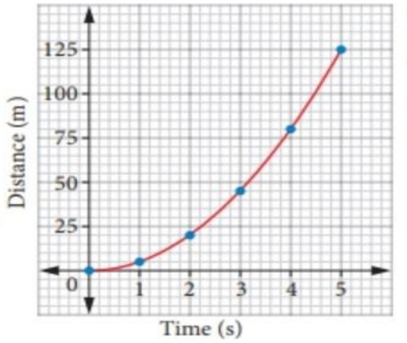
"What can we say from this graph?"



The teacher takes a few student responses.

"We see that at all times, the distance moved by the object remains the same. This means that the object is at the same position at all points of time. So, it is at rest."

"What can we say from this graph?"



The teacher takes a few student responses.

"Yes, we see that the object is not moving with uniform speed, it is covering less distance in the beginning and more distance later. So, its speed is increasing with time."

CFU (Open ended/ Factual)

Factual CFUs:

1. What does the slope of a distance-time graph represent? 2. In a distance-time graph, what does a horizontal line represent? Open ended CFUs: When interpreting a distance-time graph, how can you determine whether the object is moving away from or towards the starting point?		

Closing- 5 minutes

Teacher recalls the concepts taught:

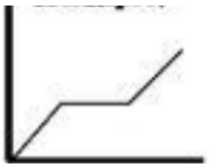
Summary:

"What concept did we explore today?"

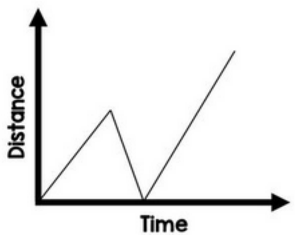
"What information can we gain by looking at distance-time graphs?"

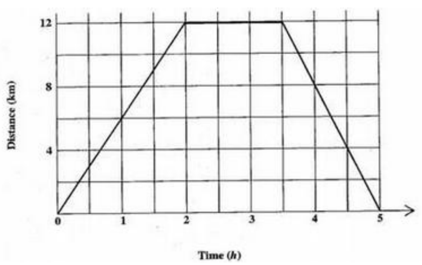
Teacher assigns Homework:

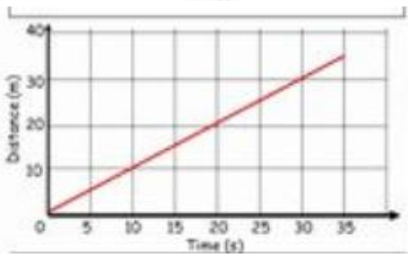
Write a story for each of the graphs given below:



Example: Rahul started from home to school on his cycle. He cycled for some distance and reached his friend Shafeek's house. There he waited for him for a few minutes, when his friend came, he started cycling to school again.







Assessment of Concept 4:

I. Answer the following:

1. Plot the distance-time graph for the following data sets: (LO 6)

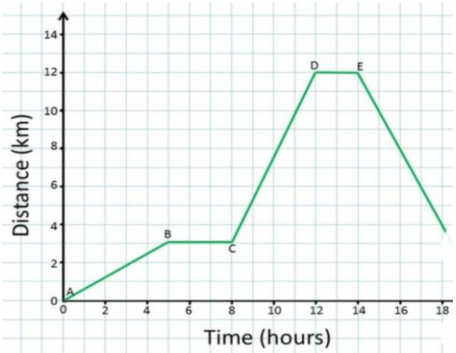
Table A

Distance moved (m)	0	10	20	30	40	50
Time (minutes)	0	2	4	6	8	10

Table B

Distance moved (m)	0	5	10	15	20	25
Time (minutes)	0	1	2	3	4	5

2. Plot the distance time graph for the motion of the following: (LO 6)
(a) A car moving with a constant speed
(b) A bus parked in the bus stop.
(c) The non-uniform motion of a cyclist
3. Observe the graph and answer the following questions: (LO 6,7)



(a) What can you say about the motion of the object between A and B?
(b) What do you think is happening between B and C?
(c) Why is the line going downwards after the point E?
(d) Create your own situation story for this graph.

Period 9.10: Summarizing the Lesson

Period 9.11: Student Independent Practice

Students practice– Worksheet 5 , Worksheet 6 , Worksheet 7

Period 9.12: Remedial Teaching

Period 9.13: Remedial teaching

Teacher's Diary

Name of the Teacher:				**Name of the Month:**	
Name of the Lesson:				**Class:**	
Peri od No	**Name of the Concept to be taught**	**Date**	**Activities Conducted durin the teaching**	**TLM Used**	**Remarks**
9.1	Concept Of Motion, Slow Or Fast, Typesof Motions				
9.2	Speed - Uniform, Non Uniform Motion				
9.3	Speed - Problems				
9.4	Measurement Of Time				
9.5	Activity 9.2, Time Period Of Simple Pendulum				
9.6	Measuring Speed				
9.7	Distance - Time Graph				
9.8	Distance - Time Graph				
9.9	Distance - Time Graph				
9.10	Summarizing The Lesson				
9.11	Student Independent Practice				
9.12	Remedial Teaching Period				
9.13	Remedial Teaching Period				

1.	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?
2.	Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
3.	What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
4.	How well did I adjust my teaching based on student reactions or unforeseen challenges?

Head Teacher's Signature Teacher's Signature

Head Teacher's Suggestions:

Teacher Notes:

Lesson Plan :

10.Electric Current and its Effects

I8M7T2

Name of the Teacher: **Name of the School:**

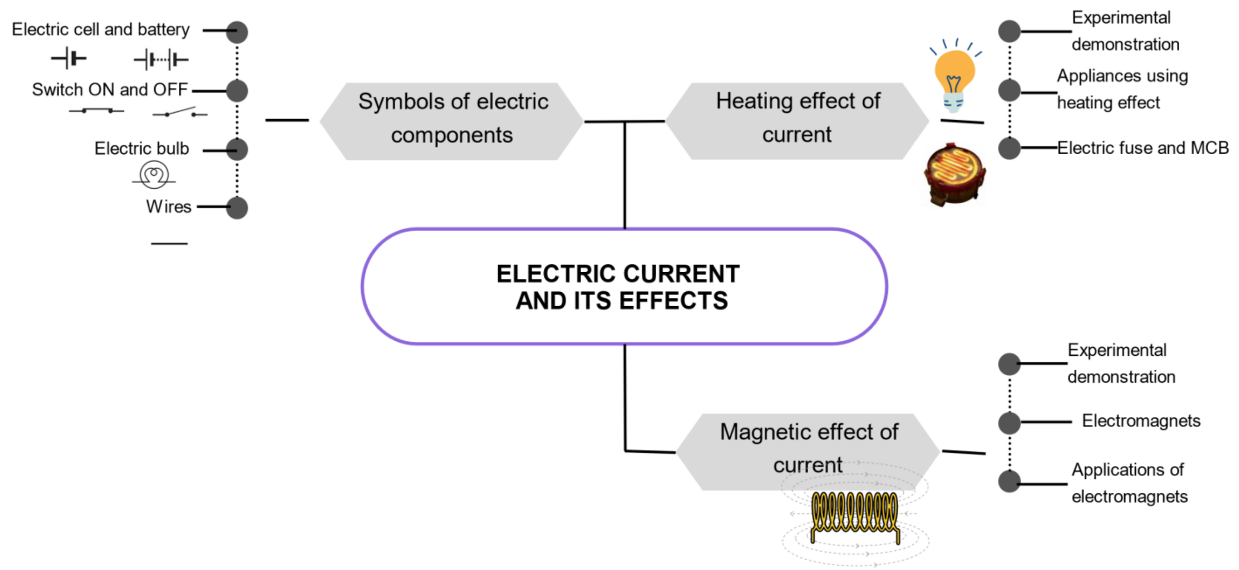
Grade: 7 **Subjects: Science**

Learning Outcomes:

Students will be able to:

1. *Recall* what is a simple electric circuit
2. *Represent* components of electric circuits with symbols
3. *Draw* circuit diagrams
4. *Conduct* simple experiments to infer the heating effect of electric current
5. *Explain* the heating effect of electric current
6. *Explain* the use of an electric fuse
7. *Conduct* simple experiments to infer the magnetic effect of electric current
8. *Explain* the working of an electromagnet
9. *Create* a simple electric bell

Concept map



Synopsis

- The path along which current flows is called an electric circuit.
- It is convenient to represent electric components by symbols. Using these, an electric circuit can be represented by a circuit diagram.
- Different components of an electric circuit like cell, battery, switch, connecting wires, bulb etc. can be denoted using symbols.

Heating effect of current

- When an electric current flows through a wire, the wire gets heated. It is the heating effect of current.
- The heating effect of current is used in many appliances like heating iron, electric stove, toaster etc.

- An electric fuse is a safety device which works on the heating effect of current. It breaks the electric circuit if there is excessive flow of current in the circuit.
- These days Miniature Circuit Breakers (MCBs) are used instead of fuses. MCBs are switches that automatically turn off when there is an overflow of current or when current exceeds the safe limit.

Magnetic effect of current

- When an electric current flows through a wire, it behaves like a magnet.
- The scientist called Hans Christian Oersted was the first person who noticed that a current carrying wire deflects a magnetic compass needle.
- A current carrying coil of an insulated wire wrapped around a piece of iron is called an electromagnet.
- The strength of an electromagnet can be changed based on the number of turns of the coil and the amount of current passed through the wire.
- An electric bell works on the principle of electromagnetism.
- Electromagnets are also used in speakers, cranes, electric motors etc.

Chapters and Concepts

Period number	Topic	Remarks
10.1	Introduction, Symbols of ELECTRIC COMPONENTS	
10.2	Battery - Series combination of cells	
10.3	Electric circuit Activity 10.1	
10.4	Heating Effect of electric current - Activity 10.2, 10.3	
10.5	Activity 10.4	
10.6	Magnetic Effect of electric Current - Activity 10.5	
10.7	Electromagnets - Activity 10.6	
10.8	Electric bell	
10.9	Summarizing the Lesson	
10.10	Student Independent Practice	
10.11	Student Independent Practice	
10.12	Remedial period 1	
10.13	Remedial period 2	

Prior Concept/ Skills: *(Essential concepts and skills to be bridged before teaching the concept.)*

- An electric cell can be used to produce electricity.
- Electric cells have 2 terminals, positive and negative.
- An electric circuit is the complete path for electricity to flow.
- A simple electric circuit can be made from a battery, wires and a light bulb or motor.

- Electric circuits can be open or closed circuits.
- Closed circuits are complete. The electric current flows from one terminal of the battery to the other terminal.
- Open circuits are incomplete. If there is a break in the circuit, the current cannot flow from one terminal of the battery to another.
- Materials that allow current to pass through them are called conductors. Examples include iron keys, steel spoon, pins, tap water etc.
- Materials that do not allow current to pass through them are called insulators. Examples include plastic scale, eraser, dry air etc.

Teacher References: *(Any external links that would help teachers to create activities on their own. This*

includes NCERT Material, OERs, Digital links etc.)

- NCERT Class 7 Textbook
- Bal Vaigyanik Class 7, Eklavya
- Let's experiment with electricity book
- How we found out about electricity - Isaac Asimov - Telugu book
- Electricity activities with everyday materials - Arvind Gupta
- How batteries work - TED-Ed video
- Electricity and Magnetism - IISER Science Activity Center
- Heating effect of electric current activities
- Exploratorium activities
- How an electric bell functions
- Howtoons simplest motor

Teaching Learning Material (TLM):

- Chart for "Question corner"
- A key, a copper wire, two nails, foam boards, a safety pin, two drawing pins, bulb, connecting wires, battery and bulb for Activity 1
- Electric cell, wires, bulb, safety pin, board pins, foam or cardboard piece for Activity 2 and 3
- How batteries work - TED-Ed video
- A cell, connecting wires, LED bulbs, a foam board and a safety pin or iron strip for Activity 4
- Heating effects of current
- Plastic box, board, rubber bands, iron nails, battery holder, battery (4 cells), connecting wires and copper wire for Activity 5
- Foam board, 2 nails, nichrome wire, cell, switch, connecting wires for Activity 6
- Devices using heating effect of current video
- A cell, connecting wires, switch, bulb for each group for Activity 7
- Foam board, 2 nails, steel wool, nichrome wire, copper wire , cell, switch, connecting wires for Activity 8
- Different types of fuses
- Copper wire, sandpaper, electric cell, horseshoe magnet for Activity 9
- An electric cell, copper wire, cello tape, sandpaper and 4 ring magnets for Activity 10
- Bar magnet and magnetic compass for Activity 11
- An electric cell, a switch, a bulb, the bottom half of a matchbox, a magnetic compass, a bar magnet and connecting wires for Activity 12

- A 1.5 V electric cell, insulated copper wire, Styrofoam ball, ball pin, measuring cylinder (smallest grade available) for Activity 13
- 2 electric cells, an iron nail, insulated copper wire, safety pin (to be used as a switch), ball pins, a bar magnet for each group for Activity 14
- Applications of electromagnets video
- Video reference for activity 15
- 2 cycle bells (or a single cycle bell), insulated copper wire, connecting wires, switch, plastic board, iron road or stick and spring for Activity 15
- Simplest motor Activity 16
- 2 ring magnets, 2 rubber bands, 1.5 V electric cell, 1.5 m insulated copper wire, sandpaper and 2 large safety pins for each group for Activity 16
- Why are electric wires made of copper and not silver video
- Electromagnetism video
- How do speakers work
- Flashcards with circuit components and their symbols on the other side of the card for remedial teaching
- electric bulb, switch, nichrome wire, steel wool wire, electric cell, connecting wires for remedial teaching
- flashcards with pictures of fuse and circuit breaker for remedial teaching
- magnetic compass, connecting wires, electric cell, bulb, bar magnet for remedial teaching
- copper wire, iron nail, pins, electric cells connecting wires for remedial teaching activity

Concept 1: Simple electric circuit and symbols

Teaching Learning Process

Learning Objective/s:

Students will be able to

- *Recall* what is a simple electric circuit
- *Represent* components of electric circuits with symbols
- *Draw* circuit diagrams

Induction/Introduction

In this concept, children will recall what is meant by a simple electric circuit. They will then learn the symbols of different components in electric circuits. Using these symbols, children learn to draw circuit diagrams.

Vocabulary:

Electric circuit, circuit diagram

Hook: 4 minutes

Electric Circuit Pictionary:

The teacher can use this activity to recall the concept of electric circuits.

The teacher calls one student to the board and gives him a random circuit component (e.g., battery, wires, bulb etc.) and the student has to draw it quickly on the board.

The rest of the class guesses what the drawing represents. This helps recall components and their relationships in a circuit.

The teacher can do 3-4 rounds of this game.

Then the teacher recalls that these are all components of an electric circuit.

Experience and reflection:

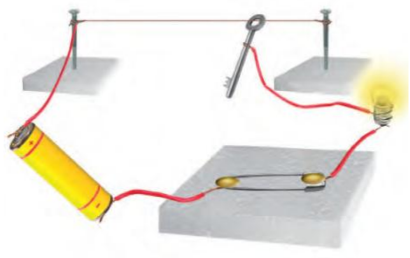
Do you recall a time when you noticed a circuit in action, like a light turning on when you turn a switch on? What happens in the circuit when you do that?

Period: 10.1: Introduction - Symbols of Electric components

LO: Students will be able to

- Identify various electric components
- Draws symbols for electric components

Explicit Teaching /Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
"We learned about electric circuits last year. We learnt about the different components of electric circuits." "What did we use to produce electricity in the simple circuit?" Students respond. "Yes, we used an electric cell. What else did we learn about an electric cell?"Students respond. "An electric cell uses chemical energy to produce electrical energy. It has two terminals, positive and negative." "What is the direction of flow of electric current?"Students respond. "The direction of current is taken to be from the positive to the negative terminal of the electric cell." "What did we learn about electric bulbs?" Students respond. The teacher recalls the parts of an electric bulb.	"Before we begin the activities in this chapter, we will have to recall a few precautions: - All electricity experiments must be performed with the cells we use in torches or TV remotes. Never experiment with the electric current flowing in the wires at your home, school or fields. It is very dangerous. - Do not touch the exposed end of wires when the circuit is fully connected. It will cause an electric shock. - Never connect the positive terminal of a cell directly to its negative terminal. This will cause the cell to get discharged immediately." The teacher then asks a student to recall the precautions she just mentioned. **Activity 1**	"Thank you for engaging in the group activity so well. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is an electric circuit? 2. You are provided with a bulb, connecting wires and a battery. Draw the diagram and explain how you will make the bulb glow. 3. You have a circuit with a battery, a light bulb, and a switch. The bulb is not lighting up. What are three possible reasons the circuit isn't working? How can you fix them?

The teacher calls any students to come and volunteer in front of the class and construct a simple circuit from a bulb, battery and electric wires. Then the teacher asks the following questions: "The bulb glows when the current from the cell reaches it through the ____." Students respond. (Answer: connecting wires) "This path of electricity is called a ________" Students respond. (Answer: circuit) The teacher recalls the concept of switches and closed and open circuits. "When current flows in a circuit it is called a ____ circuit." Students respond (Answer: closed) "When current does not flow in a circuit because of a break in the circuit, it is called a ______ circuit." Students respond (Answer: open) "How can you test whether or not current is flowing in a circuit?" Students respond. Teacher explains. "Can we use any other components instead of a bulb here?" Students respond. The teacher explains that other output devices like a motor, a fan etc can also be used. **CFU (Open ended/ Factual)** Factual CFUs 1. What are the components of a simple electric circuit?	The teacher then divides students into groups and provides instructions for constructing the following circuit: (Image taken from the textbook page number 56)  Each group gets a key, a copper wire, two nails, foam boards, a safety pin, two drawing pins, bulb, connecting wires, battery and bulb. ● Insert the nails on the foam boards as shown and fix the safety pin on another foam board using drawing pins. ● Connect the positive end of the battery to one of the nails and connect the negative end to one end of the safety pin as shown in the figure. ● Connect the other end of the safety pin to an electric bulb ● Connect the other end of the bulb to a key as shown. ● Use the copper wire to connect both the nails and place the key on the wire as shown. ● When the key is touching the wire, the bulb glows. ● When the key is not touching the wire, the bulb does not glow. ● The challenge is to move the key from one end of the wire to the other without the bulb glowing. Students in the group must take turns to try it out.	4. How could you design a simple circuit that saves energy? What parts would you include to help control the amount of electricity used?

2. How can you change an electric circuit from open to closed? Open ended CFUs **1.** Imagine you are designing a circuit for a new toy. What components would you choose, and how would you connect them to ensure the toy works properly?	The teacher gives students time to work in their groups and try out the experiment. The teacher instructs that once they complete the activity, they can draw the electric circuit in their notebooks. After the students have completed, she brings the class together and allows time to share about the activity and clarifies any questions they might have.	

Closing- 5 minutes

Teacher recalls the concepts taught:
"What concept did we explore today?"
"What is an electric circuit?" "What are some components of an electric circuit?"
"Give an example of an electric circuit used in an everyday item."
"What is the difference between an open circuit and a closed circuit?"
"Are there any other questions that you are curious to know more about?"
Students are given time to write their questions on the "Question corner" chart in the classroom.

Teacher assigns Homework:

Think of a household item (like a TV, flashlight, or electric fan) that uses a circuit. Describe the components that make up the circuit in that device and explain how they work together to make the device function.

Period: 2: Battery (Series combination of Cells)

LO: students will be able to

- Understands the components of the Battery
- Draw the symbol for Battery

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "We recalled about electric circuits in the previous class. Today we will learn about another aspect of electric circuits." **Activity 2:** The teacher builds the following simple circuit. (Image reference: Grade 6 Science Sem2 Textbook, Page 48)	The teacher shows the following video on how batteries work and discusses it. (The video explains oxidation and reduction, the teacher can explain the concept in a simple manner without going into	Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What are the symbols of the following components: Battery, cell, connecting wire, bulb, switch

<table>
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“What are the components of this circuit?”Students respond.
The teacher asks students to draw the circuit diagram in their notebook. Then the teacher takes students' responses about whether they found it easy or difficult to draw the diagram.

Students might respond that it was easy.
The teacher then constructs the following circuit. (Image reference: Grade 6 Science Sem2 Textbook, Page 52)

“What are the components of this circuit?” Students respond.
The teacher asks students to draw the circuit diagram in their notebook. Then the teacher takes students' responses about whether they found it easy or difficult to draw the diagram.
Students might respond that it was more difficult than the first one.
The teacher explains that as the number of components or the complexity of the circuit increases, it is difficult to draw realistic diagrams. So, we use symbols to represent electric components. These are standard symbols just like we have standard units for measurement. These symbols are used by people all over the world.
CFU (Open ended/ Factual)
Factual CFUs:

Why do we use symbols to represent electric components in a circuit?
Can we use any symbols we want or are there standard symbols?

Open ended CFUs:

What would happen if we used our own symbols instead of using standard

</td>
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depth).
How batteries work - TED-Ed video
</td>
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Why are standard symbols used?

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</table>

symbols? The teacher writes the symbols of various electrical components on the board, explains each of them and gives children time to write down in their notebook. The teacher explains each of the symbols of the components. The teacher must stress that there is a difference in the terminology between a battery and a cell. Though we tend to use the terms interchangeably, here we use the term battery only for a combination of two or more cells. The teacher explains that there are different ways of connecting batteries, end to end or side by side. The teacher then asks students to recall the following: “How are electric cells placed in a: - TV remote - Clock?” Students respond and the teacher explains each example		

Closing- 5 minutes

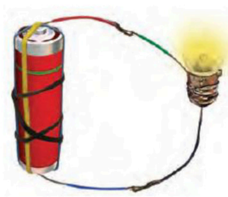
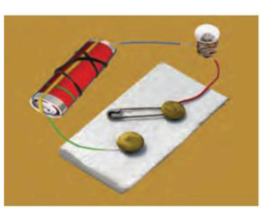
Teacher recalls the concepts taught:
“What concept did we explore today?”
“Why do we need symbols for electric components?”
“What is the difference between a battery and a cell?”

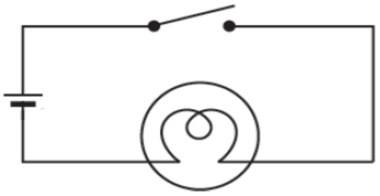
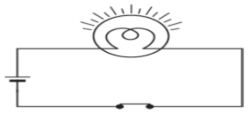
Homework:

1. How do you think different types of batteries (like AA, rechargeable, and lithium-ion) impact the way we use energy in our daily lives? Can you think of ways we could improve battery technology to make it more efficient or environmentally friendly?

Period: 10.3: Electric Circuit - Activity 10.1

LO: Students will be able to understand Electric circuit

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. The teacher recalls the concept of symbols for electrical components. “Today we will draw circuit diagrams using those symbols.” **Activity 3** The teacher builds the following simple circuit. (Image reference: Grade 6 Science Sem2 Textbook, Page 48)  “What are the components of this circuit?”Students respond. The teacher then draws the circuit diagram using the symbols.  The teacher solves the following problem on the board. The teacher then constructs the following circuit. (Image reference: Grade 6 Science Sem2 Textbook, Page 52)  “What are the components of this circuit?” Students respond.	The teacher divides students into groups and gives them time to work on Worksheet 1. Each group is provided with a cell, connecting wires, LED bulbs, a foam board and a safety pin or iron strip to be used as a switch. The students are instructed to make the circuits and draw the circuit diagrams as given in the worksheet. Students work in groups, perform the activity and discuss the answers and draw them. The teacher moves around the class helping and guiding students as required. After the students complete it, the teacher brings the class together and discusses the answers. The teacher can also take this time to clear any questions children have.	“Thank you for engaging in the group activity so well. Now it’s time for you to work on your own.” The teacher asks students to work on Worksheet-2 independently.

 The teacher then draws the circuit diagram using the symbols. The teacher then asks students to draw the circuit diagram of the circuit when the switch is closed. Then the teacher shows the circuit diagram:  **CFU (Open ended/ Factual)** Factual CFUs: 1. What symbol is used to represent a battery in a circuit diagram? 2. How does the battery symbol differ from the symbol for a cell? Open ended CFUs: **3.** A circuit with a battery, light bulb, and switch is not working. Draw a diagram to show how the components should be connected to make the circuit work.		

Closing- 5 minutes

Teacher recalls the concepts taught:
"What concept did we explore today?"
"How do you draw the circuit diagram with a bulb, switch, cell and connecting wires to make the bulb glow?"
"Can we find out from a circuit diagram if the circuit is working? How?"

Homework:

Imagine you're designing a circuit to power a small bulb.. You have a battery, a bulb , and a switch. Draw the circuit diagram. How would you connect the components if you wanted to add a second battery to make the bulb glow brighter?

Assessment of Concept 1:

1. Draw the symbols to represent the following components of electrical circuits: connecting wires, switch in the 'OFF' position, bulb, cell, switch in the 'ON' position, and battery. (LO 2)

2. The figure below shows four cells fixed on a board. Draw lines to indicate how you will connect their terminals with wires to make a battery of four cells. (LO 1)

3. If you wanted to create a circuit where the light bulb turns on only when two switches are closed, how would you represent this in a circuit diagram? (LO 3)

Concept 2: Heating effect of electric current

Teaching Learning Process

Learning Objective/s:

Student will be able to:

- *Conduct* simple experiments to *infer* the heating effect of electric current
- *Explain* the heating effect of electric current
- *Explain* the use of an electric fuse

Induction/Introduction

In this concept, children will learn about the heating effect of electric current. They will perform experiments to infer this effect. They will also learn the applications of the heating effect of current. They will also learn about the importance of a fuse.

Vocabulary:

Heating effect of electric current, electric fuse

Hook: 4 minutes

"Let's start the class with a small activity."

Activity 5

The teacher shows an electric iron and asks students what it is used for?

The teacher then asks students how they think the iron gets heated.

Can you recall any other devices that get heated up when switched on?

"In the next few classes, we are going to explore this effect of electric current and how we can use it."

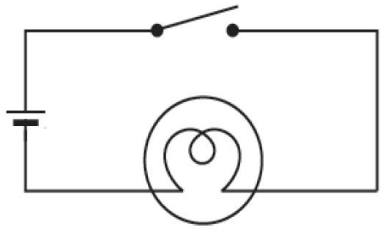
Experience and reflection:

Do you recall that the TV or some of your electronic toys become warm if they are ON for a long time? Have you noticed and wondered why devices like computers have inbuilt fans?

Period: 10.4: Heating effect of Electric current - (Activity 10.2, 10.3)

LO: Students will be able to

- Identifies the importance of Switch in circuit

Explicit Teaching / Teacher Modelling*(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. “In the previous classes, we learned about electric circuits and drawing circuit diagrams using symbols. In the next few classes, we will learn about the effect of electric current and how we can use it in our devices.” **Activity 6:** (Teacher demo) (Activity 10.3 in the textbook) The teacher makes the following circuit using nichrome wire. The nichrome wire  is tied between the two nails. (Alternatively, this experiment can also be performed using the set-up in Activity 5). When the battery is connected and the switch is turned ON, the teacher asks students to guess what will happen? After giving students time to discuss and collecting some student responses, the teacher performs the experiment. The wire heats up and starts glowing. The teacher then discusses what they observed and what they wonder.	The teacher divides students into groups and instructs them to perform the below activity and note down their observations. **Activity 7: (**Activity 10.2 in the textbook) Each group has a bulb,  connecting wires, switch and an electric cell. Students are instructed to make an electric circuit as shown and make the bulb glow. Let the bulb glow for a few seconds. Touch the bulb and discuss what you observe. Turn the switch OFF and then touch the bulb. Discuss what you observe. “What are some questions that come to your mind?” After the activity, the teacher discusses students’ observations and any questions that they have. The teacher then discusses the following question: “Give examples of any electronic devices that use the heating effect of current?” Students respond.	“Thank you for engaging in the group activity so well. I saw some interesting responses. Now it’s time for you to work on your own.” Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is meant by the heating effect of current? 2. Where have you observed the heating effect of current in your daily life? 3. Name any 3 devices that use the heating effect of electric current. 4. Why do you think some electronic devices, such as computers, have cooling fans or vents?

The teacher can ask a couple of students to volunteer and come and touch the wire and see (after the switch is turned OFF). The teacher explains that, "When electric current passes through the wire it gets hot. This is called the **heating effect of electric current**. The part of the wire which gets heated is called **the element.**" **CFU (Open ended/ Factual)** Factual CFUs: 1. What is meant by the heating effect of electric current? 2. What experiment can you perform to observe the heating effect of current? Open-ended CFUs 3. Think of any other ways in which you can design an experiment to observe the heating effect of current.	The teacher takes students' responses and explains that electric irons, toasters, ovens, electric stoves and filament bulbs all of them use this principle of heating effect of current. The teacher shows the following video: Devices using heating effect of current After showing the video, the teacher has a discussion with the students.	

Closing- 5 minutes

Teacher recalls the concepts taught:

"What concept did we explore today?"

"What is meant by the heating effect of current?"

"How is this property useful for us in electrical devices?"

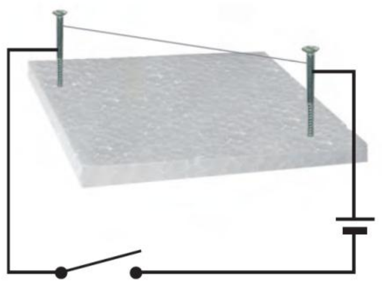
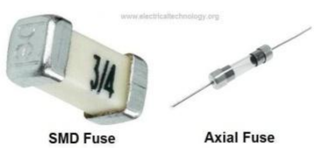
Teacher assigns Homework:

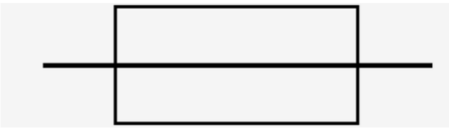
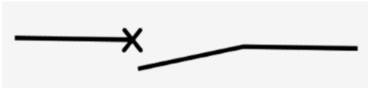
1. Design and create a model of a small electric heater using a nichrome wire and a battery. Your project should demonstrate how electric current heats the wire. Explain the materials used, how the heating element works, and what safety precautions you included in your design.
2. Discuss with parents about what it means when a bulb is fused? Why does it happen? Can it be repaired?

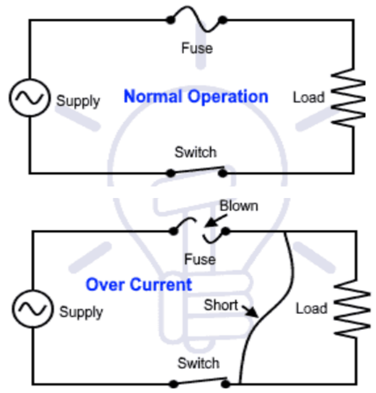
Period: 10.5 : Heating effect of electricity - Fuse (Activity 10.4)

LO: Students will be able to understand the importance of Fuse

Explicit Teaching / Teacher Modelling *(I Do)*	Group Work *(We Do)*	Independent Work (You Do)

Teacher recalls the concepts taught in the previous class. “In the previous class, we learnt about the heating effect of electric current.” The teacher recalls some devices that work on the heating effect of electric current. “In this class, we will learn about yet another important device that is present in all our homes”. **Activity 8** (Activity 10.4 in the textbook) The teacher performs the following experiment with a copper wire (after removing its insulation with sandpaper) and steel wool wire (used in kitchen scrubs). “You recall the experiment we performed last class. Let’s repeat it with different kinds of wires and see what happens. But this time we will use 4 electric cells instead of one.”  The teacher performs the experiment with nichrome wire, steel wool and copper wire and asks students to guess what will happen in each case before performing the experiment. The teacher performs the experiment. It is seen that in case of the copper wire and steel wool, the wire slowly burns out.	The teacher then has a group discussion on the importance of fuses in our houses. ‘Discuss with the person next to you what could be the importance of fuses. Why are they used in our houses? Think about how this is related to the concept of open and closed circuits that we studied.’ (Think-pair-share activity) After giving time for students to discuss, the teacher takes some student responses. Then she explains that: “An electric fuse is very important for safety. There is a maximum limit on the current which can safely flow through a circuit. If by any chance, the current flowing through, exceeds the safe limit, it can cause an electric fire. If a fuse is there in the circuit, it will melt and break the circuit, thus preventing current from flowing. Thus, the fuse prevents damage to electric circuits and possible fires.”  The teacher shows different types of fuses used.  “There is also another kind of device being used instead of fuses; it is called a **circuit breaker**.”  	“Thank you for engaging in the group discussion so well. I saw some interesting responses. Now it’s time for you to work on your own.” Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Define a fuse and a circuit breaker. 2. What is the importance of a fuse in a building? 3. If you were to design a fuse, what material would you use? Why? 4. If a circuit breaker trips because of an overload, why is it important to investigate the cause before resetting it? What might happen if the breaker is reset without addressing the issue?

The teacher then has the discussion about what happened when we performed the experiment with nichrome wire, copper wire and with steel wool? The teacher then explains that wires made of some special materials melt quickly and break when large electric currents pass through them. These wires are used for making **electric fuses.** "A fuse is a protective device with a metal wire or strip that melts when  too much current flows through it. It interrupts the circuit that it connects." Its symbol is denoted by: (Image link) **CFU (Open ended/ Factual)** Factual CFUs: 1. What is a fuse? 2. Why do different wires behave differently when current is passed through them? Open ended CFUs: 3. What would happen if there were no fuses used in houses and factories?	"It is a protective device with an electromechanical element for making and breaking a circuit under normal or abnormal conditions. It is also a device capable of automatically interrupting the power supply in the event of an overload current and fault current. It is denoted as below (Image link)  "You may have seen this device at home. Have you heard elders at home say that the current has *tripped*?"  "These switches automatically turn off when the current in a circuit exceeds the safe limit. Once they are turned ON, here when we lift the switch up, the circuit is closed and current starts flowing." "Think of some reasons that the current exceeds the safe limit or there is a short circuit." Students discuss answers with their partners. Then the teacher takes a few student responses. The teacher explains that it could happen if there is direct touching of wires if the insulation has worn off, or there are too many devices connected to the same socket etc. "Work with the students at your desk and come up with a simple circuit diagram with the fuse intact and when the fuse melts?"	

	After giving students time to discuss and draw, the teacher then illustrates the following circuits on the board: ([Image link])  The teacher explains the circuit diagrams.	

Closing-

Teacher recalls the concepts taught:
"What concept did we explore today?"
"What is an electric fuse?"
"How is an electric fuse different from a circuit breaker?"
"Why do we need fuses and circuit breakers?"
"What kind of materials are used to make fuses?

Homework:

- Why do you think many homes today use circuit breakers instead of fuses? Compare the advantages and disadvantages of using each in a home electrical system.
- Visit a nearby electric shop - to learn about different types of batteries, wires, fuses, bulbs and their different uses

Assessment of Concept 2

1. Name 2 devices that use the heating effect of electric current. (LO 5)
2. These days CFLs are used instead of filament bulbs. What could be the advantages of a CFL compared to a filament bulb or tube-light? (LO 5)
3. Does the heat produced in a wire due to electric current depend on the length of the wire? Design an experiment to test your hypothesis. (LO 4)
4. Which property of a conducting wire is utilised in making electric fuse? (LO 6)
5. Name the device used these days in place of electric fuses in electrical circuits. (LO 6)
6. Draw a circuit diagram to indicate how a fuse works. (LO 6)
7. In devices like electric heater, geyser, iron box etc, the heating effect of current can be put to good use. Think of situations where this effect results in wastage of energy. (LO 5)

Concept 3: Magnetic effect of current

Teaching Learning Process

Learning Objective/s: Students will be able to

- *Conduct* simple experiments to infer the magnetic effect of electric current
- *Explain* the working of an electromagnet
- *Create* a simple electric bell

Induction/Introduction

In this concept, children will learn about the magnetic effect of current. They will perform experiments to test this effect, create an electromagnet and make a simple model of an electric bell.

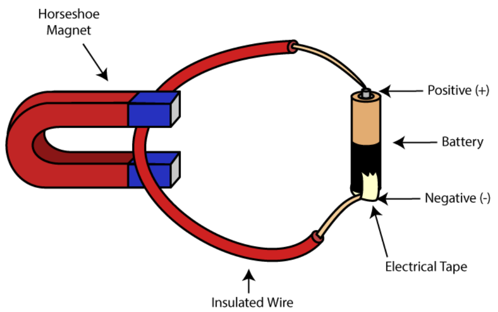
Vocabulary:

Magnetic effect of current, Electromagnet

Hook:

Activity 9:

The teacher performs the following simple activity: (Image link)



1. Strip 1 inch of insulation of a connecting wire.
2. Place the horseshoe magnet on its side on a flat surface.
3. Use a small piece of electrical tape to tape the metal part of one end of the wire to the negative terminal of the battery.
4. Pass the wire between the legs of the horseshoe magnet.
   "What if I told you this electric current can actually make the wire move? Let's try to make it happen!"
5. Holding the insulated part of the wire, touch the open end of the wire to the positive terminal of the battery.
6. Observe what happens.
   The wire will bend away from the poles of the magnet.

"In the next few classes, we will explore why this happens and how we can use this effect of electric current."

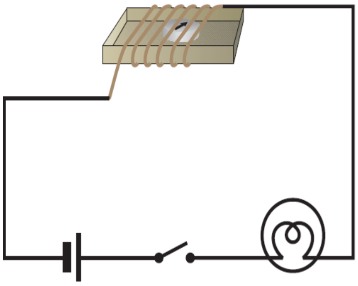
Experience and reflection:

Have you ever used an electric motor (e.g., in a fan, blender, or toy)? Think of how the magnetic effect of current might be involved in making it work.

Period: 10.6: Magnetic effect of electric current (Activity 10.5)

LO: Students will be able to understands the electromagnetic effect

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "In the previous classes, we learned about the heating effect of electric current." "We also learned how the heating effect can be used in many appliances." "Now we are going to learn about another effect of electric current. As we saw in the previous activity (Activity 9), the wire was deflected from the magnet. Take a guess why it is so?" The teacher gives students time to discuss among themselves and takes a few responses. "When current is passed through a wire, the wire behaves like a magnet, so it is deflected by one of the poles of the magnet." "Let us perform a few more experiments to test this effect." **Activity 10** The teacher can demonstrate this activity with the help of a student volunteer. This activity requires an electric cell, copper wire, sandpaper and 4 ring magnets.	"What did we learn about magnetic compass in class 6?"  "What happens when we bring a magnet near a magnetic compass?" "Let us try out the activity." **Activity 10** The teacher demonstrates the following activity using a compass and a bar magnet. When the North pole of a magnet is brought closer to the North pole of the compass needle, it moves away. When the South pole of the magnet is brought closer to the North pole of the compass needle, it moves closer. "Hence, we know that when a magnet is brought near a compass, the needle gets deflected if the like poles are brought close together. We will use this knowledge to prove that a current carrying wire has magnetic properties. This effect was first proved by a scientist called Hans Christian Oersted. We will repeat his experiment today." **Activity 12:**	"Thank you for engaging in the group discussion so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is meant by the magnetic effect of current? 2. Design an experiment to test the magnetic effect of current. 3. Where do you think this effect can be used in our daily life?

  The following steps need to be followed: 1. Remove the insulation from the ends of the wire using the sandpaper. 2. Tape the electric cell near the edge of the table. 3. Near the cell's terminals, tape the  ends of the wire to the table as shown. Allow the remainder of the wire to hang over the table edge in a loop. 4. Group the ring magnets into a single cylindrical pile. 5. The teacher can have a student hold the grouped magnets next to the bottom of the loop of wire over the side of the table. 6. On top of the table, the teacher can connect one end of the wire to the positive side of the cell and touch the other end of the wire to the negative side.	(Activity 10.5 in the textbook) Teacher demonstrates the activity followed by group discussion: (Alternatively, the teacher can let students perform the activity in groups if the school has enough magnetic compasses.) For this activity, an electric cell, a switch, a bulb, the bottom half of a matchbox, a magnetic compass, a bar magnet and connecting wires will be required.  The following steps need to be followed: 1. Place a small magnetic compass inside the cardboard tray of a matchbox. 2. Wrap an electric wire around the tray. 3. Now connect the free ends of this wire to an electric cell through a switch as shown. 4. Note the direction in which the compass needle is pointing. (The teacher can draw the position of the compass needle on the board.) The teacher asks students to discuss in pairs what will happen if we switch ON the current in the circuit. The students can relate it to the previous activity where we brought a bar magnet near a compass and saw the effect. After giving students time to discuss and taking a few student responses, the teacher performs the activity. 5. While watching the compass needle carefully, move the switch to the 'ON' position. The teacher asks students to observe what happens.	

The wire loop will jump one direction or another. If the teacher reverses the direction of the battery, the wire will jump in the opposite direction. After this activity, the teacher discusses why this happens. The teacher can then use this to explain the magnetic effect of current. **CFU (Open ended/ Factual)** Factual CFUs: 1. What happens when a current carrying wire is brought near a magnet? Why? Open ended CFUs: 1. What experiment can you think of to test whether a current carrying wire behaves like a magnet?	The needle of the compass gets deflected. "Discuss with the person next to you why this happens." After giving students time to discuss and taking a few student responses, the teacher relates both the activities (Activity 11 and 12), to infer that a current carrying wire behaves like a magnet. "Now what do you think will happen if we reverse the direction of the current, by reversing the direction of the battery?" The teacher gives students time to discuss and takes a few student responses. Then the teacher performs the activity. When the direction of current is reversed by changing the direction of the battery, the needle gets deflected in the opposite direction. "This was the experiment performed by the scientist Hans Christian Oersted. From this experiment, we understand that when current is passed through a wire it behaves like a magnet."	

Closing- 5 minutes

Teacher recalls the concepts taught:

"What concept did we explore today?"

"How did scientists first observe that current can cause a wire to behave like a magnet?"

"Why do you think it is important to know about the magnetic effect of current?"

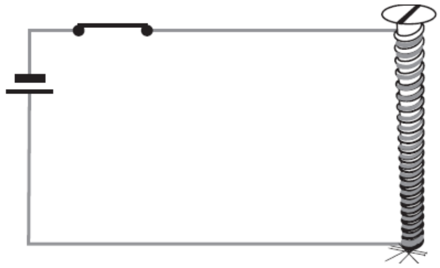
Homework:

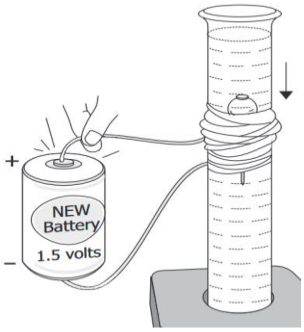
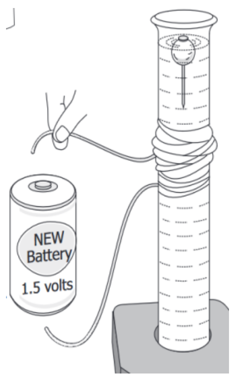
Observe the electrical devices used at your home. In case of the electric doorbell, it is based on the principle of electromagnets. Find out how the magnetic effect of current contributes to its working.

Period: 10.7: Electromagnets (activity 10.6)

LO: Students will be able to appreciate the use of electromagnets in daily life.

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)

Teacher recalls the concepts taught in the previous class. "We learned about the magnetic effect of current in the previous class and we also did some experiments to test it. Today, we will perform more experiments to understand this effect and look at some of its uses." The teacher recalls the concept of magnetic effect of current and the activities performed. **Activity 13** The teacher performs the following activity to illustrate the working of an electromagnet: Magnetic diver: For this activity, the following materials are requires, a 1.5 V electric cell, insulated copper wire, Styrofoam ball, ball pin, measuring cylinder (smallest grade available) 1. Fill the measuring cylinder with water and wrap the insulated copper wire around its center. 2. Poke the ball pin in the Styrofoam ball, such that the ball and pin must just float in water. 3. Scrape the insulation from the ends of the coil and attach them to the electric cell.	**Activity 14** (Activity 10.6 in the textbook) Teacher divides students into groups. Each group has 2 electric cells, an iron nail, insulated copper wire, safety pin (to be used as a switch, this is optional, the circuit can be made without the switch also), ball pins, a bar magnet  Activity 14.1 The teacher draws the above circuit diagram on the board and instructs students to construct the circuit with the following steps: 1. Wind the copper wire tightly around the nail (10 windings) in the form of a coil. 2. Connect the free ends of the wire to the terminals of a cell through a switch as shown. 3. Place some pins on or near the end of the nail. Now turn the switch ON. "Discuss in your groups what you observe. Also write down any questions that you wonder about. We will have time to investigate the answers." The teacher allows students time to construct the circuit and discuss their observations. Then the teacher has a whole class discussion on what students observed. The teacher discusses the following questions: - Does the nail attract iron objects? What does that tell you about the nail? - Does the nail attract objects even if it is switched OFF?	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is an electromagnet? 2. Draw the circuit diagram for a simple electromagnet and explain its working. 3. Which type of material do you think is best to make an electromagnet? Why? 4. Would the result of the experiment be different if we used a shorter nail? Why or why not?

Before connecting the ends of the wire to the battery, the teacher must ask the students what they think will happen. Then the teacher connects the ends to the cell and asks students to observe. 4. The coil will become an electro-magnet and the pin-ball will take a deep dive. On  disconnecting the cell, the pin-ball diver will pop up.  The teacher uses this activity to define an electromagnet.	The teacher then explains that, “The coil in the above activity behaves like a magnet when electric current flows through it. When the electric current is switched off, the coil generally loses its magnetism. Such coils are called **electromagnets**.” The teacher then asks students to share the questions they wrote about the experiment. Some of the questions might be covered in the below investigations: Activity 14.2 The teacher asks the students to observe what happens when the current is switched ON and a magnet is brought near the nail. “Now, use the magnet to identify the poles of the nail?” The teacher gives students time to perform the experiment, discuss it in their groups and then share it with the rest of the class. Activity 14.3 “What do you think will happen if the number of turns of the wire are increased?” The teacher takes a poll of the number of students who think the magnet becomes stronger, weaker or remains the same. The teacher then asks students to repeat the activity, but this time increase the number of turns to 50 turns of the copper wire. “Observe what happens? Does the nail still behave as a magnet? Is the nail a stronger or weaker magnet compared to the first time?” The teacher gives students time to perform the experiment, discuss it in their groups and then share it with the rest of the class. Activity 14.3	

"An **electromagnet** is a type of magnet that is created by passing an electric current through a wire that is coiled around a metal object, often made of iron. When electricity flows through the wire, it generates a magnetic field around it, turning the metal object into a temporary magnet." **CFU (Open ended/ Factual)** Factual CFUs: 1. What is an electromagnet? Open ended CFUs: 2. We have seen that electricity can generate magnets, do you think magnets can also generate electricity?	"What do you think will happen if the number of electric cells are increased?" The teacher takes a poll of the number of students who think the magnet becomes stronger, weaker or remains the same. The teacher then asks students to repeat the activity, but this time creates a battery by increasing the number of cells to two. "Observe what happens? Does the nail still behave as a magnet? Is the nail a stronger or weaker magnet compared to the first time?" The teacher gives students time to perform the experiment, discuss it in their groups and then share it with the rest of the class.	

Closing-

Teacher recalls the concepts taught:

"What concept did we explore today?"

"What are electromagnets?"

"How can you make a simple electromagnet?"

"What are some changes you can do to make the electromagnet stronger?"

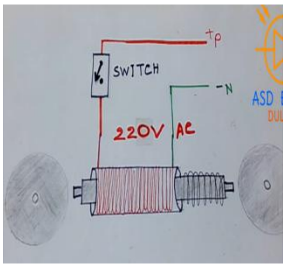
Homework:

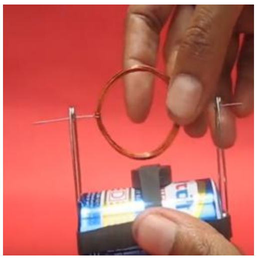
What is the main difference between an electromagnet and a permanent magnet? Think and name examples of where each type of magnet might be used.

Period: 10.8: Electric bell

LO: Students will be able to understand the working of electric bell.

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)

Teacher recalls the concepts taught in the previous class. "In the last class, we learnt about electromagnets and how we can create a simple electromagnet." The teacher recalls what electromagnets are and how they are created. "What are some uses of electromagnets in our daily life?" The teacher takes student responses and then elaborates on the applications of electromagnets. "Electromagnet are used in the following ways: • Electromagnets are used in telephones, telegraphs, electric bells, generators etc. • Powerful electromagnets are used in cranes. • Bullet trains use this principle. • Electromagnets are used in hospitals by surgeons to remove steel splinters from eyes or wounds. • Electromagnets are used to lift heavy loads of iron and steel. • Most importantly, they are used in electric motors." The teacher shows the following video about applications of electromagnets: [Applications of electromagnets]()	"We learnt about the uses of electromagnets. Now let us build two simple models of devices that use electromagnets. We will first build an electric doorbell together. Then you will be working in your groups to create a simple motor." **Activity 15:** ([Video reference for activity]())  For this activity, 2 cycle bells (the experiment can also be done with a single cycle bell), insulated copper wire, connecting wires, switch, plastic board, iron road or stick and spring are required. The teacher follows the below steps to make the electric bell model: 1. Fix the holder with the copper wire wound around it, on the plastic board. 2. Insert an iron nail with a spring on one end of the holder, so that the nail can pass through the holder. 3. Fix the cycle bells on both sides so that the iron nail can touch them when it springs in and out. 4. Connect the ends of the copper wire to a switch. 5. Connect the switch to a battery or to power supply as shown. When the switch is ON, the coil becomes a magnet, making the nail spring in and out, causing the doorbell to ring.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is an electromagnet? 2. Write some uses of electromagnets. 3. Explain the working of an electric doorbell. 4. How can the strength of an electromagnet be adjusted to suit different applications? Explain the factors that affect the electromagnet's strength and how they apply to real-world uses. 

Factual CFUs: 1. What are some uses of electromagnets? 2. Are electromagnets permanent or temporary magnets? **Open ended CFUs:** 1. You are tasked with designing an electromagnet for use in a robot that picks up small metallic objects. . What would you need to make this electromagnet? 2. How could you make the electromagnet stronger or weaker? (Hint: Think about how many times you wrap the wire around, or the type of battery you use.) 3. What would you need to do to make the robot pick up the metal object and then release it?" (Hint: Think about how you can turn the electromagnet on and off.)	The teacher then draws the circuit diagram and discusses the working of the electric bell. The teacher then divides students into groups for the next activity. **Activity 16** Each group gets the following materials for the activity: 2 ring magnets, 2 rubber bands, 1.5 V electric cell, 1.5 m insulated copper wire, sandpaper and 2 large safety pins. Students construct the model following the instructions given below: The teacher can also show this video: Simplest motor  ● Take the copper wire and wind it around the cell 10 times.  ● Remove the coil from the cell, like a spring and take one end and tie a knot tightly and stretch it out. Do the same thing on the other end. ● Make sure that both the free ends are in line with the center of the coil. ● Trim both the ends such that there is 3 cm of wire stretching out on both sides. ● Take one free end of the copper wire and scrap off insulation on all sides using sandpaper. ● On the other free end of the coil, scrap off insulation on 3 sides only, so that one side of the wire still has the insulation. ● Now the coil is ready. ● Take the rubber bands and stretch them on the cell, one across and one along its cylinder.	

	• Place the ring magnets on one of the rubber bands, as shown in the picture. • Fix the two safety pins on the two terminals of the cell as shown in the picture. • Now take the copper coil and fix the two ends on the two holes of the safety pins. • Give the coil a slight flip and observe what happens. The coil continues to spin, mimicking a motor. Students can also try to vary the shape of the coil and observe what happens. The teacher can ask students to observe what happens when a magnet is brought near the coil. It will be seen that the coil spins faster if the opposite poles are brought close to the coil. The coil slows down if the same poles are brought close to the coil.	

Closing- 5 minutes

Teacher recalls the concepts taught:

"What concept did we explore today?"

"What are some uses of electromagnets?"

"What is the principle of working of an electric motor?"

"How does an electric doorbell work?"

Homework:

Describe how you would design an electromagnet for a motor that powers a small toy car. What factors would you need to consider in your design?

Assessment of Concept 3:

I. Choose the correct answer: (LO 7,8,9)

1. The magnetic field around a current-carrying coil lasts
   (a) for three hours
   (b) as long as current flows through it
   (c) till its half-time period
   (d) field is permanent
2. When the switch of an electric bell is pushed, then

(a) flow of the current stops through the electromagnet in the bell
(b) a current starts to flow through the electromagnet
(c) voltage and current decreases in the electromagnet
(d) None of these.

3. Which of the following appliances does not use an electromagnet?
(a) Washing machine
(b) Refrigerator
(c) Electric heater
(d) Electric bell

II. Answer the following:

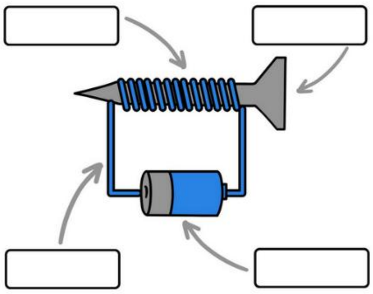
4. Give reasons for the following:

(i) Electromagnets are temporary magnets. (LO 8)

(ii) A compass needle gets deflected when placed near a current carrying wire. (LO 7)

5. What is an electromagnet? (LO 8)

6. Label the components of the circuit to make a simple electromagnet. How will you prove that the nail is an electromagnet? (LO 7)



7. Write two applications of the magnetic effect of current. (LO 8)

8. What are some factors that affect the strength of an electromagnet? (LO 8)

9. How can you demonstrate the magnetic effect of current? (LO 7)

10. Explain the working of an electric bell. (LO 9)

Period 10.9: Summarise the lesson

Period 10.10 : Student Independent Practice

Students practice the Worksheet 3

Period 10.11 : Student Independent Practice

Students practice the Worksheet 4

Period 10.12: Remedial Teaching Period

Period 10.13: Remedial teaching period

Teacher's Diary

Name of the Teacher:				Name of the Month:	
Name of the Lesson:				Class:	
Period No	**Name of the Concept to be taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	**Remarks**
10.1	Introduction, Symbols of ELECTRIC COMPONENTS				
10.2	Battery - Series combination of cells				
10.3	Electric circuit Activity 10.1				
10.4	Heating Effect of electric current - Activity 10.2, 10.3				
10.5	Activity 10.4				
10.6	Magnetic Effect of electric Current - Activity 10.5				
10.7	Electromagnets - Activity 10.6				
10.8	Electric bell				
10.9	Summarizing the Lesson				
10.10	Student Independent Practice				
10.11	Student Independent Practice				
10.12	Remedial period 1				
10.13	Remedial period 2				

Head Teacher.s Signature

Teacher's Signature

January 2026

C2M1S3 No bag Day | F1S8Y2 Cluster Complex | E5F4M6 Teacher Resources

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 New year NI	2 11.1	3 No Bag Day
4 Sunday	5 FA - 3	6	7	8 NI	9 11.2	10 Second Saturday
11 Sunday National Youth Day	12 Pongal Holidays	13	14	15	16	17 No Bag Day
18 Sunday D.R.Kaprekar Jayamti	19 11.3	20 11.4	21 11.5	22 11.6	23 11.7	24 No Bag Day, Cluster, PTM, SMC meeting
25 Sunday Republic day	26 11.8	27 School Annual Day NI	28 NI	29 NI	30 NI Gandhi Vardhanti	31

Pongal Holidays 10-01-2026 TO 18-01-2026,
Pongal Holidays for Christian Minority Schools 10-01-2026 TO 15-01-2026

Week 1:	11.1
Week 2:	FA-3,11.2
Week 3:	NA
Week 4:	11.3 - 11.7
Week 5:	11.8

TEACHER'S NOTES

Lesson Plan :

11.Light

Name of the Teacher: **Name of the School:**

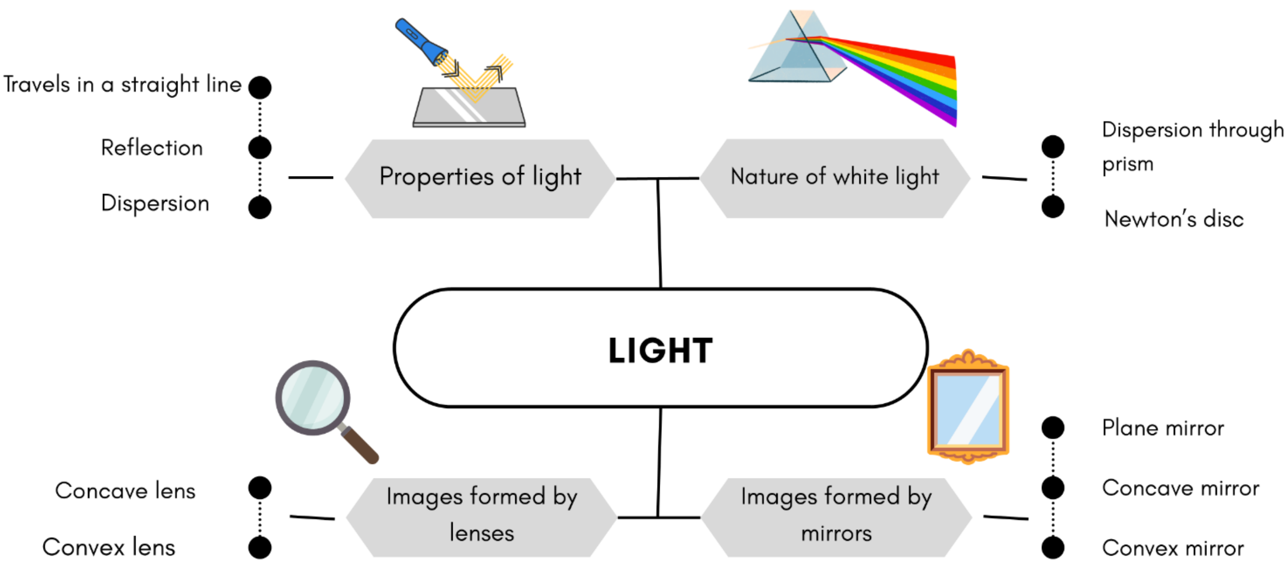
Grade: **7** **Subjects: Science**

Learning Outcomes:

Students will be able to:

1. *recall* that light travels along a straight line
2. *define* reflection and perform simple experiment to *demonstrate* reflection
3. *investigate* the nature of image formed by plane mirrors
4. *experiment* with different types of mirrors
5. *differentiate* between the image formed by concave and convex mirrors
6. *infer* the types of images formed by different types of lenses
7. *list* the applications of different mirrors and lenses in daily life
8. *investigate* if white light is composed of lights of many colours
9. *explain* the working of Newton's disc

Mind Map



Synopsis

- Light travels in a straight line.
- When light hits a polished surface, it bounces back. This phenomenon is called **reflection.**

Images formed by mirrors

- A virtual image is an image that cannot be obtained on a screen.
- A real image is an image that can be obtained on a screen.
- A plane mirror forms an image that is erect, virtual and of the same size as the object. The image is at the same distance behind the mirror as the object in front of the mirror.

- In the mirror image, the right side appears as left and the left side appear as right. This is called **lateral inversion.**

- A concave mirror can form a real and inverted image. When the object is very close to the mirror, the image formed is virtual, erect and magnified.
- Concave mirrors are used in the reflectors of torches, headlights of cars and bikes, as shaving and make-up mirrors, as examining mirrors by doctors and dentists.
- A convex mirror forms an image that is erect, virtual and smaller in size than the object.
- Convex mirrors are used in vehicle side-view mirrors, as anti-theft mirrors in shops and malls etc.

Images formed by lenses

- A lens is a transparent optical device made from materials such as glass or plastic and it has a curved surface.
- Convex lenses feel thicker in the middle and thinner at the edges. Concave lenses feel thinner in the middle and thicker at the edges.
- A convex lens can form a real and inverted image. When the object is placed very close to the lens, the image formed is virtual, erect and magnified.
- Convex lenses are used in magnifying glasses, spectacles etc.
- A concave lens always forms an erect, virtual and smaller image than the object.
- Concave lenses are used in spectacles, flashlights, cameras, projectors etc.

Dispersion of light

- White light is made up of seven colours. The splitting of white light into the seven constituent colours is called **dispersion**.
- Rainbows are formed in the sky due to dispersion. We can observe dispersion of light through a prism.
- A Newton's disc is a circular disc divided into coloured segments, each representing a different colour of the rainbow. When the disc is spun rapidly, it is perceived as white light.

Chapters and Concepts

Period number	Topic	Remarks
11.1	Introduction To Light, Light Travels In a Straight Line	
11.2	Reflection Of Light, Activity 11.2,11.3	
11.3	Right Or Left - Activity 11.4, 11.1	
11.4	Playing With Sperical Mirrors, Activity 11.5	
11.5	Activity 11.6, 11.7	
11.6	Activity 11.8,	
11.7	Images Formed By Lens, Activity 11.9, 11.10	
11.8	Dispersion Of Light - Newton's Disc - Activity 11.12	
11.9	Summarizing The Lesson	
11.10	Student Independent Practice	
11.11	Remedial Teaching Period	
11.12	Remedial Teaching Period	

Prior Concept/ Skills: *(Essential concepts and skills to be bridged before teaching the current concept.)*

- Light helps us see objects.
- Objects that emit light of their own are called luminous objects.
- Objects can be classified into transparent, translucent and opaque based on how much light they allow to pass through them.
- Shadows are formed when an opaque object is in the path of light.
- Light travels along a straight line.
- When an object is placed in front of a mirror, we see its reflection.

Teacher References: *(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)*

- NCERT Class 7 Textbook
- Bal Vaigyanik Class 7, Eklavya
- Simple light experiments - Arvind Gupta
- Basic Science Series - Light
- I have discovered light
- Experiments with mirrors
- How we found out about speed of light
- Fun with light rays experiment

- Playing with light

Teaching Learning Material (TLM):

- Chart for "Question corner"
- Period 1:
  - ✓ A flat-sided bottle, such as a square-shaped plastic water bottle or a cell culture flask for Activity 1
  - ✓ Chart paper roll, candle (or 3 empty matchboxes and wooden blocks) for Activity 2
  - ✓ Light sources for each group, objects of different shapes, shiny objects, translucent objects (the teacher can select local easily available materials for each category) for Activity 3
- Period 2:
  - ✓ Rubber or tennis ball
  - ✓ Plane mirror for Activity 4
  - ✓ Torchlight, chart paper, gum, scissors, plane mirror, wooden board for fixing the plane mirror for Activity 5
- Period 3:
  - ✓ Plane mirror, candle for Activity 6
  - ✓ Chess board, plane mirror for Activity 7
- Period 4:
  - ✓ Glass of water, square piece of chart paper for Activity 9
  - ✓ Rubber ball, knife
  - ✓ Concave mirror for Activity 10
  - ✓ Stainless steel spoon for Activity 11
  - ✓ Concave mirror, stand, screen, candle for Activity 12
- Period 5:
  - ✓ Convex mirror for Activity 13
  - ✓ Concave mirror, stand, screen, candle for Activity 14
- Period 6:
  - ✓ Convex lens or magnifying glass and concave lens for Activity 15
  - ✓ Convex lens, concave lens, stand, screen, candle for Activity 16
- Period 7:
  - ✓ Benham's disc printed on a circular piece of cardboard with a pencil or refill in the centre for spinning for Activity 17
  - ✓ Glass of water for Activity 18
  - ✓ Video reference: 5 simple ways to make a rainbow
  - ✓ Soap solution, film can (or any plastic container, black paper, gum), shallow dish for Activity 19
  - ✓ Prism for Activity 20
- Period 8:
  - ✓ Glass bowl, water, milk, torch light for Activity 21
  - ✓ Video reference: Why the sky appears blue
  - ✓ Circular cardboard piece, colours, gum for Activity 22
- Period 9:
  - ✓ Glass of water and straw

  - ✓ Fish bowl or round glass bowl, cardboard, black paper, white paper, candle
  - ✓ Foam board, pencils or straws
  - ✓ Video (up to 1:16 minutes). [Why do clouds appear white]
- Period 10
  - ✓ Worksheet 1
- Period 11
  - ✓ Worksheet 2
- Period 12
  - ✓ Candle, 3 empty matchboxes, wooden blocks for Learning station-1
  - ✓ Plane mirror for Learning Station-2
  - ✓ Concave mirror, stand, screen, candle for Learning station-3
  - ✓ Convex mirror, stand, screen, candle for Learning station-4
  - ✓ a shaving mirror, a vehicle rear-view mirror, a plane mirror as used at home for Learning station-5
- Period 13
  - ✓ Convex lens, stand, screen, candle for Learning station-1
  - ✓ Concave lens, stand, screen, candle for Learning station-2
  - ✓ Eyeglasses with concave lens and eyeglasses with convex lens (if any other types of convex and concave lenses are available they can also be used.) for Learning station-3
  - ✓ Prism for Learning station-4
  - ✓ Newton's disc for Learning station-5

Concept 1: Light and reflection

Teaching Learning Process

Learning Objective/s: Students will be able to

- *recall* that light travels along a straight line
- *define* reflection and perform simple experiment to *demonstrate* reflection
- *investigate* the nature of image formed by plane mirrors

Induction/Introduction

In this concept, children will recall that light travels in a straight line. They will recall about light and shadows learnt in class -6. Then they will recall about reflection and conduct some simple investigations into the nature of images formed by a plane mirror.

Vocabulary:

Light, reflection, plane mirrors.

Hook: 4 minutes

The teacher introduces the concept of light with the following activity.

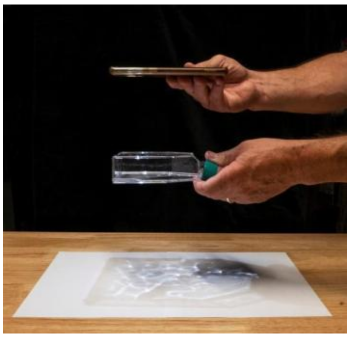
Activity 1:

The teacher takes a clear, flat-sided bottle, such as a square-shaped plastic water bottle or a cell culture flask.

To this flask, she adds already prepared soap solution, little bit more viscous than water.

She asks students to gather around.

She places a white paper on the floor/table. Then turns on the flashlight as shown in the picture, holding the bottle 6 to 12 inches (15 to 30 cm) above the paper and holding the flashlight about 4 inches (10 cm or more) above the drip chamber, pointing down.
Then the teacher can quickly turn the bottle over, so the "floor" of the chamber becomes the "ceiling." As the light shines through the bottle, students will be awed to watch the show on the paper screen as the drips ooze down.



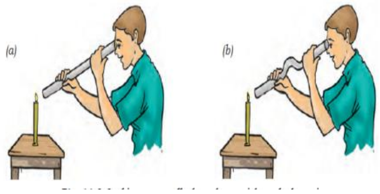
(This is caused by refraction of light and though this topic is not directly covered in this chapter, this activity will intrigue students and make them curious about lights and reflection patterns.)
In this chapter, we will be learning about light

Experience and reflection:
Do you recall the reflections formed by different kinds of light like streetlights, light bulbs or the sunlight as it passes through the trees?

Period 11.1: Introduction to Light, Light travels in straight line

LO: Students will be able to understands the straight line path of light

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
"We learned about light and reflections in class -6. Do you recall what are luminous objects?" Students respond and the teacher explains. "Do you recall what are transparent, translucent and opaque objects?" Students respond and the teacher explains. "What are shadows?" Students respond and the teacher explains. "Do you recall the experiment we did in class – 6. In the activity we looked at a lighted candle first through a straight roll of chart paper and then with a bent pipe?" The teacher replicates the experiment using a roll of chart paper. **Activity 2**	"Now let's work in our groups for the next activity." Before starting the activity, the teacher asks students to work in their groups and write in their notebooks: <table><tr><th>What do I *know* about light?</th><th>What do I *want* to know about light?</th></tr><tr><td></td><td></td></tr></table> **Activity 3** The teacher divides the students into groups and each group is provided with: a light source such as a bulb, 3 categories of items from everyday life (the teacher can decide what items to provide in each category based on what is locally available.) Category 1 – objects of different shapes Category 2 – polished or shiny objects like mirrors, glass or any reflective objects Category 3 – coloured translucent objects like plastic cups or scales of different colours, oil or ink bottles, coloured plastic wrap etc. The students can use the walls of the classroom as walls to cast the shadows or observe how light travels through each.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own. In this chapter we will be learning many things about light." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Why can we not see light through a bent pipe?



The teacher calls a few students to come and try the activity in front of the class and share what they noticed.
The teacher explains that when the paper was bent we couldn't see the candle because light travels in a straight line.
The teacher explains that light continues to travel in a straight line until it meets an obstruction.
"In this class, you will be performing an activity to further explore the nature of light."

CFU (Open ended/ Factual)

Factual CFUs

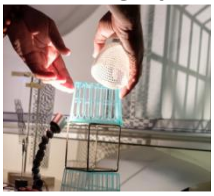
1. What are transparent, translucent and opaque objects?
2. What are shadows?

Open ended CFUs

1. What could be a simple experiment to prove that light travels in a straight line?
2. Where have you seen examples of light travelling in a straight line in real life?

	Category -1	Category -2	Category -3
Shadow drawing			
Colour of shadow			
Size of the shadow			
Any other observations			

The teacher encourages students to work in their groups and set up their light source and screen. Then they can explore the light play with each category of items by placing the objects between the light source and the screen.
Students are encouraged to draw and write what they see for each category of objects.



Category 1 – objects of different shapes

Category 2 – reflective objects

Category 3: translucent coloured objects

After giving all the groups some time to explore the nature of light and how it behaves with each object, the teacher brings the class together and asks students to share their observations or questions they wonder about.
Some discussion questions could be:

- What did you observe about the shadows of objects in Category-1? Were they of the same shape as the object? What were some surprising distortions?
- How did the shadows look when you used multiple light sources instead of using just one?
- What did you observe about how light behaves when it hits shiny surfaces?

2. Draw and explain a simple experiment to prove that light travels in a straight line.
3. What are transparent, translucent and opaque objects?
4. Write any two examples from your life where you have seen light travel in a straight line.

	- What did you observe about coloured translucent objects? What happened to the shadows? How do these shadows compare with the shadows in category-1? - What did you observe when you changed the colour of the light source, to a different coloured LED light? - The teacher can ask each group to share one interesting thing they observed during their exploration.	

Closing- 3 minutes

Teacher recalls the concepts taught:
"What concept did we explore today?"
"What are some things you enjoyed learning about light today?"
Homework:

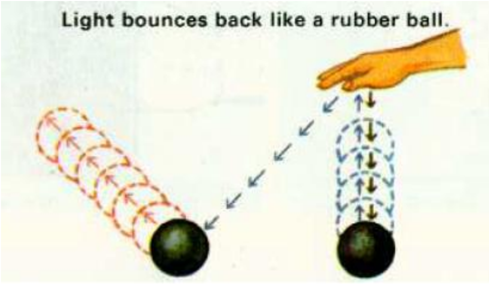
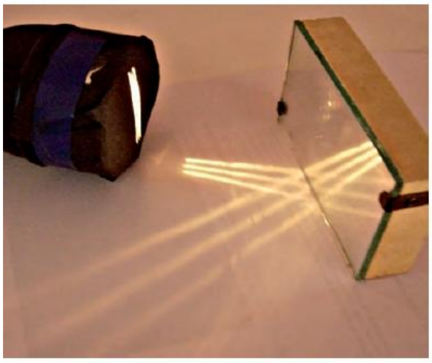
1. Imagine you are sitting in a completely dark room and you shine a torch light on one wall. What do you notice? What would happen if the light didn't travel in a straight line?

Period 11.2: Right or Left (Activity 11.4, 11.1)

LO: Students will be able to

- Understands the lateral inversion

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "We learnt about light and how it travels. You did experiments where you set up different objects and observed what happened when light hit each of them. What did you observe when the light fell on a shiny surface like a mirror?" Students respond.	**Activity 4** (Activity 11.4 in the textbook) The teacher places a plane mirror on the table or fixes it on the wall. She calls a student in front of the class and asks them to do some simple activities in front of the mirror, like raising his right hand, touching his nose with the left hand etc. The teacher asks students what they observe in the reflection. The students would have observed that right appears as left and vice versa in the image. The teacher can explain that this is **lateral inversion.** The teacher can write something on a chart and show how it appears in the mirror.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is meant by reflection? 2. Name some objects that reflect light.Name some objects that do not reflect light.

The teacher explains that when light hits a polished surface, it bounces back like a rubber ball does when it hits the ground. The teacher can demonstrate and explain using a tennis ball in the class.  The teacher explains that this phenomenon of light bouncing back is called **reflection.** The teacher then shows how light is reflected by placing a mirror on the window such that the sunrays fall on it and are reflected on any wall of the classroom. The teacher then asks students to think about what are some objects that reflect light? The teacher takes students' responses and elaborates that any shiny or polished surface would reflect light, like mirrors, stainless steel plates etc. "Have you heard the story of the lion and the clever rabbit?" The teacher narrates the Panchatantra story of the rabbit and the lion and how the rabbit fooled the lion into thinking there was another lion in the well by showing it its own reflection.	After this, the teacher divides students into groups and assigns them a role-play. One student in the group has to act as the object and another student has to act as their reflection or image in the mirror. The two students sit opposite to each other. The student who acts as object must make movements like raising a hand, touching their ear etc. The student who acts as the reflection has to mimic whatever the first student does, as does a reflection. The teacher can point out that if the first student touches his right ear with the right hand, the student acting as the image has to touch his left ear with the left hand. The other students in the group have to watch if the 'reflection' is making the correct movement. If the student fails, they are out of the game and another student from the group will take his place. The game continues till everyone in the group has had a chance to be the reflection. **Activity 5** (Activity 11.1 in the textbook) The teacher instructs students to perform the experiment in the following manner.  ● Make three slits in a piece of chart paper such that the slits cover the glass of the torch. ● Fix a plane mirror on the wooden board.	3. Draw and explain a simple experiment to demonstrate reflection. 4. What are some activities in your daily life where you use the reflection of light? 5. Suppose you do not have a mirror at home, but you have different colours of paint. Suggest how you can make an object that behaves like a mirror.

 "What does this story tell us about how light behaves in water?" The teacher takes students' responses and explains that when light hits water, some of it is reflected back (reflection) and some of it travels through it (refraction). This makes us see our own image in the water. (The teacher need not explain refraction here, as that is a concept students will learn in higher classes.) **CFU (Open ended/ Factual)** Factual CFUs: 1. What is reflection? 2. What are some objects that reflect light? Open ended CFUs: 1. Observe the images formed by your face on various surfaces/objects. How do you know which of them reflect light? **2.** Do you think the images of objects that you see in water, a mirror and a spoon are the same? If not, how are they different?	● Direct the beam of light from the torch with slits, onto the mirror. ● Place the torch in such a way that its light is seen along the chart paper on the board as shown. ● Adjust the position of the torch so that the light from the torch strikes the plane mirror at an angle. The teacher must encourage students to draw and write down their observations. The teacher asks students to observe the following: "Does the mirror change the direction of light that falls on it?" "What happens when the light is moved in either direction? How does the reflected light change?" "Do you see the image of the slits in the mirror? How do they appear?" After students have finished the experiment and discussed among their groups, the teacher brings the class together and discusses the activity, students' observations and questions.	

Closing- 5 minutes

Teacher recalls the concepts taught:
"What concept did we explore today?"
"What is reflection?"
"What is a mirror?"
"How does the reflection in a mirror change when the position of the object is changed?"

Homework:
1. Find out and write about some applications of mirrors in our life.

2. Have you observed reflective road lights (small red lights on the edges on the roads) at night? Find out how they work.

Period 11.3: Reflection of light (Activity 11.2, 11.3)

LO: Students will be able to

- Comprehend the reflection of Light

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent work** (You Do)
Teacher recalls the concepts taught in the previous class. The teacher recalls the concept of light, reflection of light on a plane mirror and the torch with 3 slits experiment. "In this class, we will learn more about reflections in plane mirrors." The teacher performs the below activity. **Activity 6** (Activity 11.2 in the textbook) The teacher places a plane mirror on the table, with support so that the mirror is  perpendicular to the table. (This activity can be done using any object like a toy or pencil or any other objects that can be made to stand upright, the picture is only for representation purposes.) She places a candle in front of the mirror. She asks students what they observe in the mirror? "Do you see a candle in the mirror? Where does it appear to be?" After taking a few student responses, the teacher explains that the candle in the mirror appears to be behind the mirror. The teacher explains that this is the **image** of the object and the candle that is placed on the table is the **object.** The teacher moves the candle to different positions in front of the mirror and asks students what they notice.	The teacher divides students into groups and gives them instructions to perform the following activities. **Activity 7** (Activity 11.3 in the textbook)  • Take a chess board and place a plain mirror vertically at the center (where the board folds into two parts). (If a chessboard is not available, the teacher can print the chess board pattern on a paper and use it.) • Choose any small object that would fit into the squares like an eraser or sharpener. • Place the object at the third square from the mirror. • Observe where the image of the object is formed. • Move the object to a different square and observe how the image shifts. The teacher asks students to work in their groups and make a note of the characteristics of the image formed by a plane mirror:	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. List the characteristics of the image formed by a plane mirror. 2. Find out which letters of the English alphabet and Telugu alphabet appear exactly the same in the image formed in the plane mirror. 3. Write any 3 uses of a plane mirror. 4. How will you show that the image formed in a plane mirror is formed at the same distance as the distance of the object from the mirror?

After taking a few students' responses, the teacher explains that the image is upright in all the cases, such an image is called an **erect** image.

The teacher asks students what they observe about the size of the image compared to that of the candle? Are both of the same size or is the image smaller or larger than the candle?
After students respond, the teacher points out that the image is the same size as that of the object.
"We also observed that the image seems to be behind the mirror. Do you think we can capture this image on a screen like a shadow?"
The teacher places a white paper at different distances behind the mirror as well as in front of the mirror, but the image cannot be obtained on the paper.
The teacher explains that this kind of image that cannot be captured on a screen is called as a **virtual** image.

CFU (Open ended/ Factual)

Factual CFUs:

1. What is an image?
2. Is the image of an object formed on a plane mirror smaller, larger or equal to the object?

Open ended CFUs:

3. Your friend says that if we change the size of the mirror, the size of the image will change. Do you agree? Why or why not?

Size of the image	
Can it be red on a n?	
Inverted or erect?	
Distance of the image as compared to the distance of the object in front of the mirror	

After the students complete the activity, the teacher brings the class together and discusses the answers. The teacher can also remind students that lateral inversion is another property of the images formed by a plane mirror.

Closing- 5 minutes

Teacher recalls the concepts taught:
"What concept did we explore today?"
"What are the characteristics of the image formed by a plane mirror?"
"What is lateral inversion?"
"What is meant by a virtual image?"

Homework:

1. Observe yourself or the image of an object using mirrors of various sizes. Does the size of the image change?
2. Observe yourself in a big mirror in a shop or elsewhere. Does the size of your image change as you move closer or farther from the mirror?

Assessment of Concept 1:

I. Choose the correct answer: (LO 1, 2 ,3)

1. If an object is placed at a distance of 0.5 m in front of a plane mirror, the distance between the object and the image formed by the mirror will be
    (a) 2 m
    (b) 1 m
    (c) 0.5 m
    (d) 0.25 m
2. Which of these are the properties of the image formed by a plane mirror?
    I. The image is at the same distance as the object.
    II. The image is upright.
    III. The image is laterally inverted.
    (a) I only
    (b) I and II only
    (c) II and III only
    (d) I, II and III
3. The rear-view mirror of a car is a plane mirror. A driver is reversing his car at a speed of 2 m/s. The driver sees in his rear view mirror the image of a truck parked behind his car. The speed at which the image of the truck appears to approach the driver will be
    (i) 1 m/s (ii) 2 m/s
    (iii) 4 m/s (iv) 8 m/s

II. Answer the following:

4. Find out the letters of the English alphabet or any other language known to you in which the image formed in a plane mirror appears exactly like the letter itself. Discuss your findings. (LO 3)
5. What is meant by reflection of light? (LO 2)
6. With the help of an experiment, prove that light always travels in a straight line. (LO 1)

Concept 2: Spherical mirrors and lenses

Teaching Learning Process

Learning Objective/s:

Student will be able to:

- *experiment* with different types of mirrors
- *differentiate* between the image formed by concave and convex mirrors
- *infer* the types of images formed by different types of lenses
- *list* the applications of different mirrors and lenses in daily life

Induction/Introduction

In this concept, students will learn about different types of spherical mirrors. They will investigate the nature of images formed by concave and convex mirrors. They will also learn to distinguish between concave and convex lenses. They will perform experiments to infer the characteristics of images formed by concave and convex mirrors. Finally, they will learn about the applications of different kinds of mirrors and lenses in daily life.

Vocabulary:

Spherical mirrors, Concave, convex, real image, lenses

Hook: 4 minutes

"Let's start the class with a small activity."

Activity 8

The teacher can do this activity by drawing an arrow on a piece of paper and sticking it on a cardboard. Place it vertically on the table.

Take a empty glass. Ask students what will happen if we place the glass in front of the arrow.
The students may guess that since the glass is a transparent object, the arrow can be seen through it.
Asks students what will happen if we pour water in the glass.
Students might say that since water is also transparent, the arrow will be seen.Now the teacher tells students she is going to show some magic and asks students to observe the arrow closely.

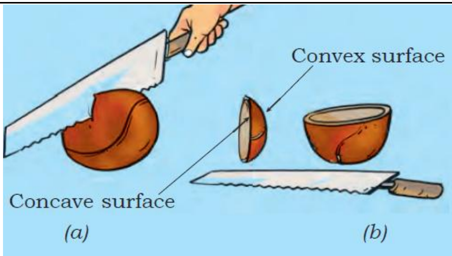
When she pours water into the glass, the arrow changes direction “magically”! (The glass must be placed atleast 10 cms away from the arrow. If it is placed too close to the arrow, the image will not be laterally inverted. The glass acts as a convex lens here.)
The teacher can explain that we will be learning many such interesting things about spherical mirrors and lenses.
Experience and reflection:
Have you observed anything interesting about your image in the side mirrors of vehicles? Have you observed your image in different curved utensils at home? How does it look different?

Period 11.4: Playing with spherical mirrors (Activity 11.5, 11.6, 11.7)

LO: Students will be able to

- Understand images formed by concave mirror

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. “We learnt about reflections and we also learnt about plane mirrors. But not all mirrors are plane. There are also mirrors that are curved.” The teacher shows a spoon and explains that it is an example of a curved shining surface that acts as a mirror. The mirror can either be curved inwards or curved outwards like the two sides of a spoon.	The teacher divides students into groups for the activity. “In your groups, you will be doing two different activities.” **Activity 10** (Activity 11.5 in the textbook) ● Take a stainless steel spoon and bring the outer side of the spoon near your face and look into it. ● Make a note of the following: - Is your image erect or inverted? - Is the image different from what you see in the mirror? - Is the size of the image same, smaller or larger?	“Thank you for engaging in the group activity so well. I saw some interesting responses. Now it’s time for you to work on your own.” Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Draw and explain the difference between concave and convex mirrors.



Then she takes a rubber ball and shows that the ball has two kinds of surfaces as well. She cuts the ball into two and shows the inner surface of the ball is **concave**. The outer surface of the ball is **convex**.
(Image reference: Textbook Page number 96, 97)
She then explains that if the reflecting surface of a spherical mirror is concave, then it is called a **concave mirror**, like the inside surface of a spoon.
If the reflecting surface of a spherical mirror is convex, then it is called a **convex mirror**, like the outer surface of a spoon.

She then draws the following image on the board: (Image reference: Textbook: Page number 94,95)

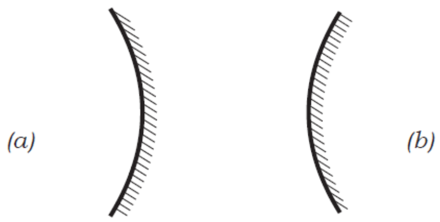


Fig. 11.12 *(a) A concave and (b) a convex mirror*

The teacher then recalls, "when we tried to capture the image formed by a plane mirror on a screen, we were unable to do that. Let's see what happens with a concave mirror."
Activity 9(Activity 11.6 in the textbook)
The teacher takes a concave mirror and holds it facing the sun.

- Try varying the distance between your face and spoon and note what you observe.

- Now look at your image using the inner side of the spoon.
- Make a note of the following:
  - Is your image erect or inverted?
  - Is the image different from what you see in the mirror?
  - Is the size of the image same, smaller or larger?
  - Try varying the distance between your face and spoon and note what you observe.

After the students finish the activity, the teacher brings the class together and discusses the findings and observations.
For the next activity, the teacher gives clear instructions for students to handle the candle very carefully.

Activity 11 (Activity 11.7 in the textbook)


- Fix the concave mirror on a stand or any arrangement just to keep it steady.
- Paste a piece of white paper on a cardboard sheet to act as a screen.
- Keep a lighted candle at a distance of about 50 cm from the mirror.

2. Draw and explain an experiment to study the nature of image formed by a concave mirror.
3. List the characteristics of the image formed by a concave mirror.
4. What are some applications of concave mirrors. Why are they used instead of plane mirrors?

The teacher tries to get the light reflected by the mirror on a sheet of paper. The teacher must try to adjust the  distance of the paper until a sharp bright spot is obtained on it. This spot is the image of the sun. The teacher then explains that an image that can be obtained on the screen is called a **real image**. The teacher recalls that the image which cannot be obtained on a screen is called a **virtual image**. The teacher then asks students to guess what will happen if we continue to hold the mirror and the paper steady for a while. The teacher performs the activity and shows that the paper will start to burn. The teacher can explain that this happens since the light rays are focussed on a point and hence it generates heat enough for the paper to burn. **CFU (Open ended/ Factual)** Factual CFUs: 1. What are concave and convex mirrors? 2. What are real and virtual images? Open-ended CFUs **3.** If you are given two mirrors of the same size, one is a spherical mirror and another is a plane mirror. How will you distinguish the mirrors without touching them?	● Try to obtain the image of the flame on the screen. For this, move the screen back and forth until a clear image of the candle flame is obtained. ● Make a note of the following: - Is your image erect or inverted? - Is the image different from what you see in the plane mirror? - Is the size of the image same, smaller or larger? - Try varying the distance between the candle and the mirror and note what you observe. After the students finish the activity, the teacher brings the class together and discusses the findings and observations. She explains that the image formed by a concave mirror is smaller or larger in size than the object. It can be real or virtual. The image is inverted except when the object is closer to the mirror. The teacher explains that concave mirrors are used by doctors for examining eyes, ears, nose, throat, teeth etc. The reflectors of torches, headlights of cars and bikes are also concave in shape. They are also used as shaving and make-up mirrors.	

Closing- 2 minutes

Teacher recalls the concepts taught:

Summary:

“What concept did we explore today?”

“What are spherical mirrors?”

“What kind of image is formed by a concave mirror? Where are such mirrors used and why?”

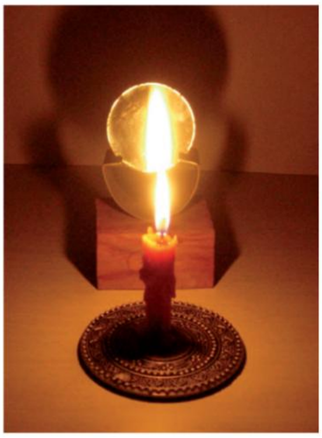
Homework:

Find an example of a concave mirror used in real life. Draw and describe the object, and explain how the concave mirror helps in this device.

Period 11.5 : Images formed by convex mirror (Activity 11.8)

LO: Students will be able to

- Understand the characteristics of images formed by convex mirror
- Differentiate between images formed by convex and concave mirrors.

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "In the previous class, we learnt about the characteristics of the image formed by a concave mirror." The teacher recalls the nature of the image formed by a concave mirror. "Today we will investigate about the nature of image formed by a convex mirror." The teacher recalls what is a convex mirror and how it is different from a concave mirror. The teacher does the following activity with the convex mirror. **Activity 12** • Place a convex mirror in the center of a table or classroom. • Arrange various objects (e.g., small pencils or toy cars) in a row around the room. • Ask students to use the convex mirror to see how many objects they can view at once, noting how the mirror lets them see a wide area.	The teacher divides students into groups. For this activity, the teacher gives clear instructions for students to handle the candle very carefully. **Activity 13:** (Activity 11.8 in the textbook) • Fix the convex mirror on a stand or any arrangement just to keep it steady. • Paste a piece of white paper on a cardboard sheet to act as a screen. • Keep a lighted candle at a distance of about 50 cm from the mirror. • Try to obtain the image of  the flame on the screen. For this, move the screen back and forth until a clear image of the candle flame is obtained. • Make a note of the following: - Is your image erect or inverted?	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Draw and explain an experiment to study the nature of image formed by a convex mirror. 2. List the characteristics of the image formed by a convex mirror. 3. Differentiate between the nature of image formed by a concave mirror and that of a convex mirror. 4. What are some applications of convex mirrors. Why are they used instead of plane mirrors?

The teacher then has a discussion about how convex mirrors are used in real life, such as in vehicle side mirrors. She explains that convex mirrors are also used in shops and malls because they give such a wide view and can be used to stop theft. **CFU (Open ended/ Factual)** Factual CFUs: 1. What is a convex mirror? 2. What are convex mirrors used for? Open ended CFUs: 3. What is the advantage of using a convex mirror as a side-view mirror? 4. Do you think the light rays (a) reflect in straight lines, (b) spread out, or (c) come together? Explain your answer.	- Is the image different from what you see in the plane mirror? - Is the size of the image same, smaller or larger? - Try varying the distance between the candle and the mirror and note what you observe. After the students finish the activity, the teacher brings the class together and discusses the findings and observations. She explains that the image formed by a convex mirror is upright and virtual. The image formed is smaller than the object.	

Closing :
Teacher recalls the concepts taught:

Summary:
"What concept did we explore today?"
"What is a convex mirror?"
"What are some characteristics of images formed by a convex mirror?"
"What are some applications of convex mirrors?"

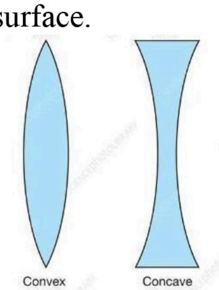
Homework:
1. If you stand in front of a convex mirror, how does your reflection compare to a flat mirror? How does your image change when you move closer or farther from the convex mirror?
2. If you are standing in front of a convex mirror and you see a car reflected in the mirror, how does the car appear compared to its actual size? Why does it appear this way?

Period 11.6 : Images formed by lenses (Activity 11.9, 11.10)

LO: Students will be able to

- Understand the characteristics of the images formed by lenses.

<table>
<tr>
<th>Explicit Teaching/Teacher Modelling (I Do)</th>
<th>Group Work (We Do)</th>
<th>Independent Work (You Do)</th>
</tr>
<tr>
<td>
Teacher recalls the concepts taught in the previous class.
“In the previous two classes, we learned about the nature of images formed by concave and convex mirrors.”
The teacher recalls the activities performed and the characteristics of images formed in the spherical mirrors and how it was different from a plane mirror.

The teacher then shows a magnifying glass and asks students what they think it does. She writes something on the board and then shows students what happens when we look through the magnifying glass.
She then explains that the magnifying glass is a type of lens. A lens is a transparent optical device made from materials such as glass or plastic. Lenses have at least one curved surface.
The teacher then defines concave and convex lenses.


Convex lenses are thicker in the center and become thinner at the edges. Concave lenses are thinner in the center and thicker at the edges.

The teacher performs the following activity.
Activity 14 (Activity 11.9 in the textbook)

Take a convex lens or a magnifying glass and put it in the path of sunrays.
Place a sheet of paper below the lens.
Adjust the distance between the lens and the paper till you get a bright spot on the paper.

</td>
<td>
The teacher divides students into groups. For this activity, the teacher gives clear instructions for students to handle the candle very carefully.

Activity 15: (Activity 11.10 in the textbook)

Fix the convex lens on a stand or any arrangement just to keep it steady.
Paste a piece of white paper on a cardboard sheet to act as a screen.
Keep a lighted candle at a distance of about 50 cm from the lens.
Try to obtain the image of the flame on the screen. For this, move the screen back and forth until a clear image of the candle flame is obtained.
Make a note of the following:
- Is your image erect or inverted?
- Is the image different from what you see in the convex mirror?
- Is the size of the image same, smaller or larger?
- Try varying the distance between the candle and the lens and note what you observe.

After the students finish the activity, the teacher brings the class together and discusses the findings and observations.
</td>
<td>
Thank you for engaging in the group activity so well. I saw some interesting responses. Now it’s time for you to work on your own.”
Teacher writes down questions on the board and asks students to write their answers in the notebook.

Draw and explain the difference between a convex and a concave lens.
Draw and explain the nature of image formed by a concave lens.
Draw and explain the nature of image formed by a convex lens.
List any two applications of convex lenses.

</td>
</tr>
</table>

The teacher recalls the experiment performed with the concave mirror and asks students to guess what is the image they are seeing.

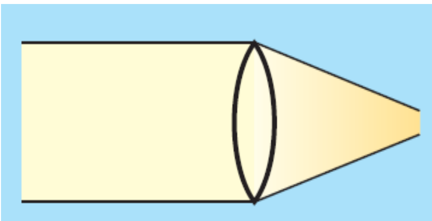
The teacher explains that it is the image of the sun.

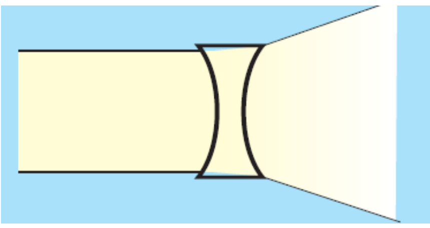
The teacher then asks students to guess what will happen if we continue to hold the lens and the paper steady for a while.

The teacher performs the activity and shows that the paper will start to burn. The teacher can explain that this happens since the light rays are focussed on a point and hence it generates heat enough for the paper to burn.

The teacher asks students to guess what would happen if we repeat this activity with a concave lens. After taking student responses, the teacher repeats the activity and shows that the image of the sun cannot be obtained on the paper using the concave lens.

The teacher then explains that this is because the convex lens converges the light rays falling on it. It is also called a converging lens. The concave lens diverges the light rays that fall on it and is called a diverging lens.





She explains that the image formed by a convex lens is virtual, erect and magnified when the lens is held close to the object. When the lens is held far away from the object, it forms a real and inverted image and the size of the image depends upon the distance of the object from the lens.

Now, the teacher can ask students to repeat the activity with a concave lens. Make a note of the following:

- Is your image erect or inverted?
- Is the image different from what you see in the convex mirror?

- Is the size of the image same, smaller or larger?
- Try varying the distance between the candle and the lens and note what you observe.

After the students finish the activity, the teacher brings the class together and discusses the findings and observations. She explains that the image formed by a concave lens is virtual, erect and diminished when the lens is held close to the object. When the lens is held far away from the object, it forms a virtual, erect and diminished image for all positions of the object.

CFU (Open ended/ Factual) Factual CFUs: 1. What are lenses? 2. What are convex and convex lenses? Open ended CFUs: 1. Why do you think a magnifying glass uses a convex lens? 2. What kind of lenses do you think are present in our eyes?		

Closing- 4 minutes

Teacher recalls the concepts taught:

Summary:

"What concept did we explore today?"

"What are convex and concave lenses?"

"Where do we see lenses used in real life?"

"What kind of images are formed by concave lenses and convex lenses?"

Homework:

Find out what kind of lenses are used in spectacles, cameras and any other household applications. Do all spectacles use the same kind of lenses?

Assessment of Concept 2:

I. Choose the correct answer:

1. Rahul and Hamsa were given one mirror each by their teacher. Rahul found his image to be erect and of the same size whereas Hamsa found her image erect and smaller in size. This means that the mirrors of Rahul and Hamsa are, respectively
   (a) plane mirror and concave mirror.
   (b) concave mirror and convex mirror.
   (c) plane mirror and convex mirror.
   (d) convex mirror and plane mirror.

2. Which of the following can be used to form a real image?
   (a) Concave mirror only.
   (b) Plane mirror only.
   (c) Convex mirror only.
   (d) Both concave and convex mirrors.

3. On holding a stainless steel spoon near our face, we see
   (a) Our inverted image on the outer side of the spoon
   (b) Our erect image on the inner side of the spoon
   (c) Our inverted image on the inner side of the spoon
   (d) Our laterally inverted image on the inner side of the spoon.

II. Fill in the blanks:

(a) The inner surface of a steel spoon acts as a ____________ mirror.
(b) The outer surface of a flat steel plate acts as a ____________ mirror.
(c) The outer shining surface of a round bottom steel bowl acts as a ___________ mirror.

(d) The inner surface of the reflector of a torch acts as a __________ mirror.

II. Answer the following:
1. The side mirror of a scooter got broken. The mechanic replaced it with a plane mirror. Mention any inconvenience that the driver of the scooter will face while using it?
2. The concave reflecting surface of a torch got rusted. What effect would this have on the beam of light from the torch?
3. Suppose we wish to obtain the real image of a distant tree. Explain two possible ways in which we can do it.
4. Give one use each of a concave and a convex mirror.
5. You are provided with (a) plane mirror (b) concave mirror (c) convex mirror. How will you distinguish between them without touching?
6. State two differences between a convex and a concave lens.

Concept 3: Dispersion of light

Teaching Learning Process

Learning Objective/s:

Student will be able to:

- *investigate* if white light is composed of lights of many colours
- *explain* the working of Newton's disc

Induction/Introduction

In this concept, students will learn that white light is composed of seven colours. They will learn the definition of dispersion. They will also make a Newton's disc and infer and explain how it works.

Vocabulary:

White light, dispersion, prism, rainbow, Newton's disc

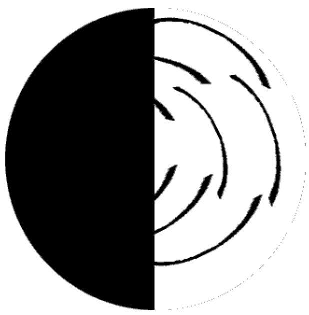
Hook: 4 minutes

"Let's start the class with a small activity."

Activity 16

The teacher must have this material already prepared.

[The teacher can print or draw the below pattern on a paper and stick it on a round piece of cardboard. (Image reference: Benham's disc). Poke a hole in the center of the circle with the toothpick. Insert the toothpick into the hole. The toothpick should stick out about half an inch. Break or cut the toothpick in half. Twist the toothpick to spin the spinner.]



The teacher shows the pattern on the disc and asks students what colours they see. The students will respond that they see black and white.

"Now I am going to show you something very interesting. I am going to spin this pattern and you have to tell me what you observe,"

Then the teacher spins the circle. Students will be intrigued to see that they can see some colours on the disc when it is spinning.

The teacher can then explain that this happens because of the colour vision cells in our eyes and how they perceive light. She can further say that light is not white as we think, but there is more to it.

"We will be exploring an interesting property of light in the next 2 classes."

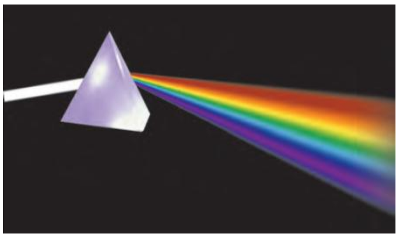
Experience and reflection:

Do you recall seeing a rainbow? Where else have you seen a rainbow-like pattern forming?

Period 11.7: Dispersion of Light (Activity 11.11)

LO: Students will be able to

- Understand the dispersion of Light

Explicit Teaching / Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "We learned about different types of mirrors and lenses. Today we will learn about another very interesting property of light." "What do you think is the colour of sunlight?" Students might respond saying white. "Have you seen a rainbow form? Let us make a simple rainbow now and observe it." **Activity 17** Video reference: 5 simple ways to make a rainbow The teacher can create a rainbow in the classroom using a glass of water and keeping it in the path of sunlight, or use a flashlight. The teacher asks the students to describe what they see and which colours are visible. The teacher then asks students to think and share where else they have seen this kind of pattern in their daily life. The teacher then explains that white light is actually made up of seven colours. The splitting of white light into the seven constituent colours is called **dispersion**. Light disperses into different colours because different colours of light travel at different speeds through various materials, which causes them to bend by different amounts. (Since students are not introduced to the concept of refraction and wavelengths in this grade, the teacher can explain without using those terms.)	The teacher divides students into groups and gives them instructions to perform the next two activities. **Activity 18:** (Activity 11.11 in the textbook) The teacher provides each group with a prism. She explains that a prism is a special type of transparent object that has flat, smooth surfaces and two identical ends. She explains that it has a special property which students will discover when they experiment with it. ● Find a place with sunlight. Place the prism in the path of sunlight. ● Observe the light coming out of the prism on the other side. Make sure that it falls on a white paper or white wall.  ● Identify the colours you observe. Are these the same as in a rainbow? What does this tell you about the nature of white light? After the students finish the activity, the teacher brings the class together and discusses the findings and observations.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is dispersion of light? 2. Does a rainbow form every time it rains? Why or why not? 3. Draw and explain how you will use a prism to show that white light consists of seven colours.

For dispersion to occur, light has to pass from one medium to another. For example, in the case of the rainbow, the light passes from air to water. A similar effect can be observed when light passes from air through glass like in the case of a prism. **CFU (Open ended/ Factual)** Factual CFUs: 1. What is dispersion of light? 2. When does dispersion of light occur? Open ended CFUs: 1. Why do need water or glass to see dispersion? **2.** Where do you think the concept of dispersion is useful to us in our lives?		

Closing- 5 minutes

Teacher recalls the concepts taught:

"What concept did we explore today?"

"What is dispersion?"

"When does dispersion of light occur?"

"What does white light consist of?"

Homework:

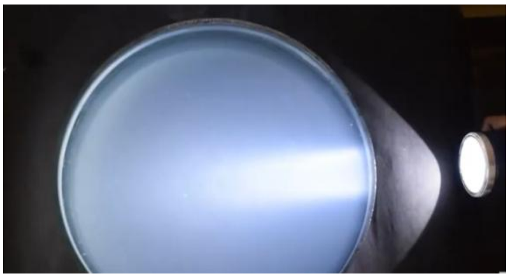
- Take a clear plastic water bottle and let sunrays pass through it. Do you see a separation of colours on a white surface or wall? What happens if you add some ink to the water? Does the coloured water affect the dispersion of light?
- Try the same experiment with oil. Draw and explain your results in both the cases.

Period 11.8: Dispersion of Light - Newton's disc

LO: Students will be able to

- Understands that white light consist of seven colour

Explicit Teaching/Teacher Modelling *(I Do)*	**Group Work** *(We Do)*	**Independent Work** (You Do)
Teacher recalls the concepts taught in the previous class. "In the last class, we learnt what is dispersion. We learnt that white light is formed by seven colours. Today we will learn more about dispersion and white light. In the previous class, you observed that using a prism you can 'split' light into seven colours and each colour bends light to a different extent."	Teacher divides students into pairs and gives them instructions for the below activity. **Activity 20** (Activity 11.12 in the textbook) ● Take a circular cardboard disc of about 10 cm diameter. ● Divide this disc into seven segments.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook.

<table>
<tr>
<td>
"Today we will start with a simple activity that demonstrates dispersion in nature as well as another phenomenon."
Activity 19

Video reference: Why the sky appears blue
● Take some water in a glass bowl.
● Add a few drops of milk to it and mix it well.
● Now shine a torch/flashlight on the bowl through the side and observe what colour the water to appears to be.
The water appears light blue in colour.
The teacher asks students to discuss with the person next to them why it is so and how they think it is related to the concept of dispersion.
After giving students time to discuss and taking a few student responses, the teacher explains that white light is made up of seven colours. Each of these colours travels in a different way. The air particles in the atmosphere scatter the blue light more than the other colours. Blue light is scattered more than the other colors because it travels as shorter, smaller waves. This is why we see a blue sky most of the time.
The teacher can then ask students what will happen if more milk is added to the bowl and why. Then the teacher can perform it and show that when more milk is added, the water appears more blue.

CFU (Open ended/ Factual)
Factual CFUs:
1. What is dispersion?
</td>
<td>
● Paint the seven rainbow colours on these segments in the same order in which they appear in the rainbow. You can also paste, coloured papers on these segments.
● Make a small hole at the centre of the disc and fix the disc loosely on the tip of a refill of a ball pen or pencil. Ensure that the disc rotates freely.
● Rotate the disc. When the disc is rotated fast, the colours get mixed together and the disc

appears to be whitish. Such a disc is popularly known as Newton's disc.

Discuss with your partner and make a note of the following:
- Why do you think the colours mix together in this way? How is this different from mixing paints or pigments?
- What does this tell us about the nature of white light?
After the students complete the activity, the teacher brings the class together and discusses the questions. She explains that this activity further goes on to prove that white light consists of seven colours.
The teacher can also take this time to clear any questions children have.
</td>
<td>
1. Draw and explain how you will use a prism to show that white light consists of seven colours.
2. What are some examples where dispersion of light occurs in nature?
</td>
</tr>
</table>

2. Write any 2 examples where you observe dispersion. Open ended CFUs: 1. What would the world look if there were no dispersion of light? (ESR: There will be no rainbows, all light would be white including the sky, all objects would appear black and white or greyish)		

Closing- 5 minutes

Teacher recalls the concepts taught:
"What concept did we explore today?"
"What is dispersion?"
"What is a Newton's disc? How can you use it to demonstrate that white light consists of seven colours?"

Homework:

1. Make a Newton's disc at home and try these:
   - If we remove a colour from the spinning disc, what do you think would happen to the appearance of the light?
   - If you were to change the size of the segments on the disc, how do you think that would affect the blending of colours? Would it still appear white, or would it change?

Assessment of Concept 3

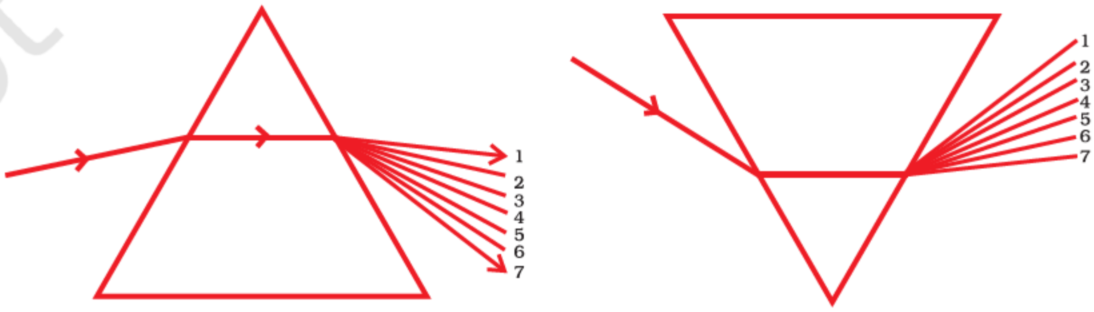
I. Choose the correct answer:

1. Which of the following statements regarding a rainbow is correct?
   (a) It is always seen as a circle.
   (b) The order of colours is always (from the top to bottom as seen from the ground) violet, indigo, blue, green, yellow, orange, red.
   (c) Its order of colours is always (from the top to bottom as seen from the ground) red, orange, yellow, green, blue, indigo, violet.
   (d) The order of colours can be either violet ot red or red to violet depending on the time of the day.

2. If the speed of rotation of Newton's colour disc is fast enough, the various colours would blend and produce this colour
   (a) blue
   (b) red
   (c) white

II. Answer the following:

1. What is dispersion of light?
2. State the correct sequence (1-7) of colours in the spectrum formed by the prisms A and B, shown in the figure below.



A B

3. How will you prove that light consists of seven colours using Newton's colour disc?

Period 11.9: Summarize the lesson

Period 11.10 – Student Independent Practice

Students will practice Worksheet 1,

Period 11.11 – Student Independent Practice

Students will practice Worksheet 2

Period 11.12 : Remedial Teaching Period

Period 11.13: Remedial teaching

Teacher’s Diary

Name of the Teacher:				**Name of the Month:**	
Name of the Lesson:				**Class:**	
Period No	**Name of the Concept to ben taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	**Remarks**
11.1	Introduction To Light, Light Travels In a Straight Line				
11.2	Reflection Of Light, Activity 11.2,11.3				
11.3	Right Or Left - Activity 11.4, 11.1				
11.4	Playing With Spherical Mirrors, Activity 11.5				
11.5	Activity 11.6, 11.7				
11.6	Activity 11.8,				
11.7	Images Formed By Lens, Activity 11.9, 11.10				
11.8	Dispersion Of Light - Newton’s Disc - Activity 11.12				
11.9	Summarizing The Lesson				
11.10	Student Independent Practice				
11.11	Student Independent Practice				
11.12	Remedial Teaching Period				
11.13	Remedial Teaching Period				

Head Teacher's Signature

Teacher's Signature

February 2026

No bag Day | Cluster Complex | Teacher Resources

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Sunday 1	2 12.1	3 12.2	4 12.2	5 NI	6 NI	7 No Bag Day
Sunday 8	9 FA - 4	10 FA - 4	11 FA - 4	12 NI	13 12.2	14 Second Saturday
15 Sunday Maha Sivaratri	16 12.3	17 12.3	18 12.3	19 NI	20 NI	21 No Bag Day Cluster, PTM, SMC meeting
Sunday 22	23 NI	24 NI	25 NI	26 NI	27 NI	28 No Bag Day National Science Day

Week 1: **10.1-10.5**

Week 2: **10.6-10.7**

Week 3: **10.8-11.1**

Week 4: **11.2-11.6**

Week 5: . . . .

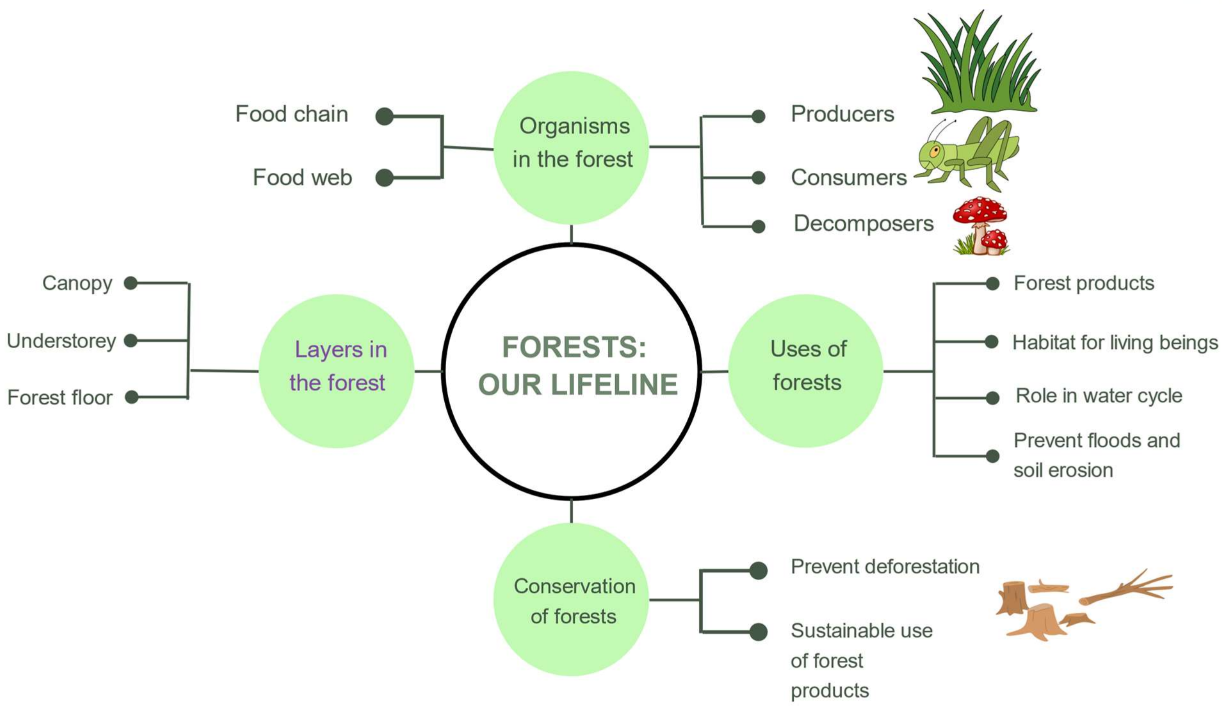
TEACHER'S NOTES

12 FORESTS : OUR LIFELINE

Learning Outcomes:

1. define a forest and outline the living beings present in a forest
2. justify that forests are a dynamic living entity
3. name products obtained from forests
4. list the uses of forest
5. identify different kind of trees in a forest
6. predict what would happen if there were no forests
7. define and illustrate food chains
8. propose steps for conservation of forests
9. explain the inter-relationship of plants, soil and decomposers in a forest

CONCEPT MAP



Period-wise Topics

Chapters and Concepts

Period number	Topic	Remarks
12.1	12.1 Visit to a forest, Activity 12.1	
12.2	Activity 12.2	
12.3	Uses of Forest	
12.4	Role of Forest in maintaining balance between oxygen and carbon dioxide	
12.5	Forest as lifeline for dwelling communities	
12.6	Activity 12.3 - Inter relationship of plant, soil, decomposers	
12.7	Influence on climate, water cycle	
12.8	Influence of Forest on air quality'	
12.9	Products obtained from Forest	
12.10	Student Independent Practice	
12.11	Student Independent Practice	
12.12	Remedial Period	

SYNOPSIS

- A forest is a complex ecosystem with various plants, animals, and other organisms interacting in a natural environment.

Layers in a forest

- In a forest, trees form the uppermost layer, followed by shrubs. The herbs form the lowest layer of vegetation.
- The branchy part of a tree above the stem is known as the **crown** of the tree.
- The **canopy** of a forest is the uppermost layer formed by the tops of trees.
- **Under storeys** in a forest refer to the layer of vegetation that grows beneath the taller trees of the forest canopy.
- The **forest floor** is the bottom layer of a forest, located beneath the understorey. It is covered with soil, fallen leaves, branches, and decaying plant material.

Living beings in the forest

- The various living beings in the forest are interdependent on one another.
- Living beings in the forest can be classified as producers, consumers and decomposers.
- A food chain tells us who eats whom in the environment.
- A food web consists of several inter-connected food chains.
- In the forest there is interaction between soil, water, air and living organisms.
- A forest changes and regenerates over time. It is a dynamic living entity.

Uses of forests

- We get many products from the forest like gum, wood, honey etc.
- The forest is the habitat for many living beings.
- Forests prevent floods and soil erosion.
- Forests influence climate, water cycle and air quality.

Conservation of forests

- Steps must be taken to prevent deforestation.
- We must ensure sustainable use of forest products.

I. Concept: Introduction, visit to a forest and uses of forests

Topics covered:

- Experience the life in forests
- Various types of plants
- Uses forests

Learning Objectives: Students will be able to

- define a forest and outline the living beings present in a forest
- name products obtained from forests
- identify different kind of trees in a forest

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- Trees can be of different types based on the climate and terrain. Plants can be herbs, shrubs, creepers and climbers.
- The surroundings where organisms live is called a habitat. The organisms depend on their habitat for their food, water, air and shelter. A forest is an example of a habitat.

TLM Required:

- Period 1
  - ❖ Rain sound
  - ❖ Sound of wind
  - ❖ Sound of river flowing
  - ❖ Sound of thunder
  - ❖ Bird song
  - ❖ Sound of ocean waves
  - ❖ Peacock call

- Welcome to the forest story
- Chart paper and sketchpens for Activity 2

- Period 2
  - Worksheet 1
- Period 3
  - The giving tree story

Teacher Resources: *(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)*

- NCERT Class 7 Textbook
- Trees and forests book
- Reference for identifying Indian trees
- My book of trees
- Reference to find Forest stories -Pratham books
- AP forest department website – reference for data about forests in Andhra Pradesh

Igniting Activity: The teacher greets the class and tells them they are going to learn about a new and interesting topic. “Today, we will start our class with an activity.”

Activity 1:

The teacher tells students that she is going to play some sounds, the students have to close their eyes and identify what these sounds are. The teacher plays the (5-10 seconds of) nature sounds from the following videos: (The teacher can play all or choose some sounds to play)

Rain sound, Sound of wind, Sound of river flowing, Sound of thunder, Bird song, Sound of ocean waves, Peacock call

After playing each sound, she asks students what they thought the sound was of.

Experience and reflection:

What are some of the sounds you hear near your home? Do you hear different sounds during different times of the day?

Period 12. 1: Experience the life in forest

<table>
<tr><th>Explicit Teaching/Teacher Modelling (I Do)</th><th>Group Work (We Do)</th><th>Independent Work (You Do)</th></tr>
<tr>
<td>The teacher introduces the topic.
“In the next few classes, we will be learning about forests and how they are important for the Earth.”
The teacher starts the class with the read-aloud of the following story “Welcome to the forest story”
After reading the story, the teacher starts a discussion about what is meant by a forest.
“Let us first discuss what is meant by a forest. Can you discuss with the person next to you and tell me what is a forest?”
The teacher gives students time to</td>
<td>“Now let’s work in our groups for the next activity.”
Before starting the activity, the teacher asks students to work in their groups and write in their notebooks:<table><tr><th>What do I know about forests?</th><th>What do I want to know about forests?</th></tr><tr><td></td><td></td></tr></table>Activity 2
Each group is given chart papers and colours or sketch-pens.
The teacher instructs the students to draw/write about how they imagine a forest</td>
<td>“Thank you for engaging in the group activity so well. I saw some interesting responses. Now it’s time for you to work on your own.”
Teacher writes down questions on the board and asks students to write their answers in the notebook.
1. List some characteristics of a forest.</td>
</tr>
</table>

discuss and then takes a few student responses. Students might say that forests are large areas covered by trees. The teacher can probe further saying, “Your friend says that a row of trees along a road or railway line can be called a forest. Do you agree? Why or why not?” The teacher gives students time to discuss and then takes a few student responses. “What about a park or a field? Can it be called a forest? Why or why not?” The teacher gives students time to discuss and then takes a few student responses. The teacher then explains that, “A row of trees or even a group of trees, does not by itself make a forest. A forest is much more than a collection of trees. A forest is a complex ecosystem with various plants, animals, and other organisms interacting in a natural environment. A true forest typically has a variety of tree species, undergrowth, and wildlife, and it functions as an ecological system, often shaped by natural processes rather than human planting.” The teacher can also explain further that a mature forest evolves over a period of many years during which it undergoes successive changes. A forest has different layers and there are different life forms that live in it. “You may recall that the surroundings where organisms live is called a habitat. The organisms depend on their habitat for their food, water, air and shelter. A forest is an example of a habitat.” The teacher defines a forest as a large area covered predominantly with trees, plants, and other	looks like.**[TCM 1.i.c, 1.i.d, 2.i.c]** The teacher asks them to discuss and think about the following questions as they complete the activity. ●Include as many different trees or plant that you think exist in the forest ●Are there different layers of plants and trees in a forest? ●Include as many life forms as you think are present in the forest and if possible, include where they are found. ●Think about the forest floor - Is it covered with leaves, fallen branches, or mushrooms? What do you imagine is under the ground? ●Write about what sounds and smells you think you would experience in a forest like birds singing, sounds of animals, smell of fresh wood etc. ●Finally, also think about what time of day or season is it in your forest?Is it daytime with sunlight or is it nighttime with animals coming out? Is it summer with green leaves or winter with dew and fog? The teacher goes around the class and guides students or clarifies any questions while the students do the activity. After students complete the activity, the teacher discusses the questions and gives each group time to present their work.	2. How is a forest different from a row of trees planted on the roadside? 3. Imagine you are an animal living in the forest. Describe a day in your life. 4. Do you think forests can be cleared for making houses or roads for us? Give reasons for your answer.

vegetation. It is a complex ecosystem that provides habitat for various animals, insects, fungi, and microorganisms. The teacher can give some examples of nearby areas in Andhra Pradesh that have forest cover. **CFU (Open ended/ Factual)** Factual CFUs 1. What are forests? 2. What are some living beings that you can find in forests? Open ended CFUs 1. How does a park differ from a forest? 2. Do you think forests can be man-made also? Why or why not?		

Summary:
Teacher recalls the concepts taught:
"What concept did we explore today?"
"What are some things you enjoyed learning about forests today?"
"Are there any other questions about forests that you are curious to know more about?"
Students are given time to write their questions on the "Question corner" chart in the classroom.

Quick Quiz/ Assignment: (Home Work)

1. Watch that tree project. (Students have to perform this project over a period of a month making regular observations.)

Choose a tree in your school or near your home to observe.

- What is the first thing you observe about your tree?
- Write the name of the tree or take the help of an elder to identify the tree.
- Draw the outline of the tree as you see it. It does not have to be exactly the same like a photo.
- What do you think is the height of the tree? (You can compare it to a nearby building)
- What is the shape of the tree above the main trunk?
- How is the bark of the tree (is it smooth or rough)?
- How do the leaves of the tree look? Draw the leaves and write anything unique you notice about them.
- How do the fruits or flowers of the tree look? Draw them and write anything unique you notice about them.
- What are some living beings you find in the tree?

Observe the tree every day and add to your notes with the date and time of the day.

Period 12. 2: Various types of Plants

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Teacher recalls the concepts taught in the previous class. "We learnt about forests and what are some characteristics of forests in the previous class. In this class, we will learn more about forests. We had already spoken about layers in a forest. " The teacher shows the following image (from page number 130,131) of the textbook. The teacher defines the canopy, crown and understorey of trees in a forest. The branchy part of a tree above the stem is known as the **crown** of the tree. The **canopy** of a forest is the uppermost layer formed by the tops of trees. It consists of the branches and leaves that form a dense cover over the layers below. **Understoreys** in a forest refer to the layer of vegetation that grows beneath the taller trees of the forest canopy. This layer consists of smaller trees, shrubs, young saplings, ferns, and other plants that thrive in the lower light conditions of the forest. The **forest floor** is the bottom layer of a forest, located beneath the understorey. It is covered with soil, fallen leaves, branches, and decaying plant material.  Then the teacher tells the students that the class will be going for a nature walk. (Activity 12.2 in the textbook) (The teacher can organize a trip to a forest as per the instructions given in the textbook page number 148,149. In case, that is not possible, the teacher can take students on a nature walk to a nearby place like a park or a field. The teacher can also plan for the class to be accompanied by a community elder who can recognize or talk about the trees.) "Before we go, there are some things that you can write down in your notebooks for observation. You will be working in pairs for the activity.) Observe each tree carefully. How many different trees do you see?	The teacher takes the students on a nature walk and pairs up the students. She asks the students to work on Worksheet -1 during the walk. If the teacher has arranged for the field trip or nature walk outside of class hours, she can use the time in this period to ask students to share what they have written in their worksheets and discuss about them. The following questions can be given for independent work: 1. What are the different layers found in a forest? 2. Name some of the trees, plants and shrubs you observed in your field trip. 3. How do the types of trees in a forest influence the animals that live there? 4. Write a letter to your friend living in a different city/village about your field trip.	

What is unique about each tree? Is it the leaf shape, bark, flowers etc? Walk very silently and notice the sounds you hear. Are any of the sounds familiar to you? Can you locate the bird, animal or insect making the sound? (The teacher can also tell them a few specific living beings that are locally present, so the students can look out for them.) As you watch upwards, also watch what is on the f202orest floor. You might spot some mushrooms or interesting insects. **CFU (Open ended/ Factual)** Factual CFUs: What are some things about trees that you will be observing? What are the different layers in a forest? Open ended CFUs: Do you think every forest has the same type of trees? Why or why not? What are some things you think you might see on the forest/park floor?		

Summary:
"What did we do today?"
"What was the best part of the field trip for you?
"Are there any other questions that you are curious to know more about?"
Students are given time to write their questions on the "Question corner" chart in the classroom.

Quick Quiz/ Assignment: (Home Work)
1. Continue working on "Watch that tree" project.
2. Observe what are some things in your home made from materials from the forest. Make a list. (Activity 12.1 in text book)

Period 12.3: Uses of Forests

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Teacher recalls the concepts taught in the previous class. "In the previous class we visited/ spoke about a forest and the things we saw there. As homework, you have written some of the things we get from forests. Trees give us many things." Let us watch this short video and then discuss further. The giving tree story The teacher asks students what they saw in the story and what were some of the products the boy made from the tree. Then teacher asks students to share their homework.	The teacher divides students into groups and gives them instructions to perform the following activities. Students are given the following list of trees and instructed the same tree can have multiple uses. List of trees: bamboo, Moringa, neem, teak, deodar, sal, aamla, peepal, oak,coconut, eucalyptus, rubber, rosewood (If the students are unfamiliar with any of the trees, the teacher can help the students by showing an image of the tree.) (This list is given as an example. The teacher can use the list of trees observed during the field trip so that children are familiar with the names of trees.) (Answer key: Gum - Moringa, rubber, neem Timber: Teak, oak, bamboo, deodar, sandalwood, rosewood, sal Medicine: Neem, aamla, peepal, eucalyptus Oil: Neem, coconut, sandalwood, eucalyptus)	● Write the answers for the questions that are written by teacher on the board. ● List a few forest products and where they are obtained from. ● How can you ensure the sustainable use of forest products?

After taking a few student responses, the teacher explains that there are many products that we get from the forest. The most noticeable products are those that are made from the timbre or wood like furniture, matchsticks, paper, plywood etc. But we also get different kinds of medicines from plants like from the Neem tree. We also get different kinds of oils from plants like coconut oil. Other than these, there are also products like gums and spices that we get from the forest.

The teacher then asks students to look around the classroom and name some of the forest products. The teacher gives students time to think and discuss with their partners and then collects some student responses.

CFU (Open ended/ Factual)

Factual CFUs:

1. Give some examples of forest products.
2. Your friend says that only products made from wood are forest product. Do you agree? Why or why not?

Open ended CFUs:

3. You feel concerned that if we use too many forest products then it will affect the forests. What ways would you suggest to reduce the usage of these products?

The teacher asks students to work in their groups and complete the table given below. (Table 12.2 in the textbook.)

Gum	Timber	Medicinal	Oil
Babool	Sheesham	Neem	Sandalwood

After students complete the activity, the teacher brings the class together and discusses the answers and clears doubts.

The teacher then divides the group into 2 groups and conducts a debate for and against the use of forest products.

The group that is debating for the use of forest products can say that:

- We need to use forest products and they have become an essential part of our everyday life like furniture, paper etc.
- We also get medicines and oil from the forest which are necessary for human life.
- There are ways to use forest products sustainably.
- Using forest products helps the rural and local communities.
- Products like wood are more environmentally friendly alternatives to non-renewable materials like concrete or steel, which can cause more damage to the environment.

The group that is debating against the use of forest products can talk about:

- How human activity is destroying the habitats of living beings in the forest
- Large scale harvesting of forest products effects the rural and local communities as well as beings in the forest.
- Since the population of the world is rising, if we continue to use forest products, then we will end up eliminating forests altogether.
- The use of forest products is faster than the rate at which forests are able to regenerate themselves.
- Suggesting alternatives for forest products.

The teacher can end the debate by stressing on sustainable use of forest products and taking care of the forests.

Summary:
Teacher recalls the concepts taught:
"What concept did we explore today?"
"What are some forest products?"
"What are some advantages and disadvantages of using forest products?"
"Are there any other questions that you are curious to know more about?"
Students are given time to write their questions on the "Question corner" chart in the classroom.

Quick Quiz/ Assignment: (Home Work)

1. Continue working on "Watch that tree" project.
2. Choose one forest product. Trace its journey from the forest to your home, describing or illustrating each stage of its transformation.
3. Imagine you are working with the Minister of Environment, Forest and Climate Change. What steps would you suggest to ensure the forest products are not depleting the forests?

Assessment of Concept 1

I. Choose the correct answer: (LO 1,2 3)

1. Raziya visited a forest near her town with her classmates and her teacher. As they were entering the forest, their class teacher told them not to make noise in the forest as noise could disturb the
   (a) birds (b) animals (c) both birds and animals (d) plants
2. Which of the following has the strongest stem?
   (a) A tree (b) A creeper (c) A climber (d) A bush
3. Which of the following is not prepared from the wood obtained from forest?
   (a) Paper (b) Thermocol (c) Matchsticks (d) Plywood

II. Answer the following:

4. Give names of any four birds which you expect to see in a forest. (LO 1)
5. Name any four useful products other than wood, which we get from forests. (LO 2)
6. What is meant by a canopy and an understory? (LO 1)
7. Explain why there is a need of variety of animals and plants in a forest. (LO 1,3)

II. Concept: Forest as a dynamic living entity

Topics covered:

- The concept of food chain and its importance
- Role of forests in balancing between O2 and CO2
- Inter relationship of plant, soil, decomposers

Learning Objectives:

- define and illustrate food chains
- explain the inter-relationship of plants, soil and decomposers in a forest
- justify that forests are a dynamic living entity

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- Living beings are classified into autotrophs, heterotrophs and saprotrophs.
- Plants synthesise food in the presence of sunlight, through a process called photosynthesis. During this process they use up carbon dioxide and give out oxygen.
- When animals respire, we take in air rich in oxygen and breathe out air rich in carbon dioxide.

TLM Required:

- Period 4
  - Circle of life -Lion king video
  - Balls of wool for food chain and food web activity

- ❖ Name cards with names of organisms written on them
- Period 5
  - ❖ The living soil beneath our feet video
  - ❖ Tools for digging a pit, vegetable waste or other kitchen waste, waste pieces of paper for Activity 5
  - ❖ 2 litre plastic bottle, knife/scissors, soil, nails, kitchen waste for Activity 6
- Period 6
  - ❖ Water cycle video
  - ❖ Chart paper and sketch pens for Activity 7
  - ❖

Teacher Resources: *(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)*

- NCERT Class 7 Textbook
- Trees and forests book
- Reference for identifying Indian trees
- My book of trees
- Reference to find Forest stories -Pratham books
- AP forest department website – reference for data about forests in Andhra Pradesh

Igniting Activity:

"Let's start the class with a small video."
The teacher shows the first 2 minutes of this video: Circle of life -Lion king
"What are some of the living beings you noticed in the video?"
The teacher takes a few student responses.
"As you must have noticed the song is called the circle of life. Why do you think it is called so? Do you think the living beings need each other?"
The teacher takes a few responses and tells students that they are going to discuss about how organisms depend on each other, especially in a forest.

Experience and reflection:

Think about different organisms and the food they eat. How do organisms differ in their food needs? Where does most of the food we eat come from?

Period 12.4: The Concept of food chain and its importance

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Teacher recalls the concepts taught in the previous classes. "We learnt about forests and forest products. Today we will go deeper into the lives of living things inside a forest." The teacher recalls the concept of autotrophs, heterotrophs and saprotrophs learnt in the first chapter. The teacher also recalls that animals can be herbivores, carnivores and omnivores.	**Activity 4** The teacher calls a group of 10 students to the front of the class to demonstrate the activity. ● Each student is given the name of a plant, animal, insect or bird and they have to tape it to their dress so that it is visible to others. ● One student stands in the center as the sun and has the ball of wool. ● All the students in the circle introduce themselves as the living being they represent. Every student in the circle must think:	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own."

Activity 3 Then the teacher calls 6 students in front of the class and assigns each of them a role. The teacher can make them stand in front of the board and write the labels or use chart paper labels. The first student is the Sun. Then she assigns the other 5 students to be eagle, frog, snake, grass, insect. She gives the first student a ball of wool. This ball represents energy. "We know that the sun is the ultimate source of energy. So I am going to give this ball to the sun. Who uses energy from the sun to make food?" Students respond. The student acting as sun holds one end of the wool and passes it on to the grass. "Who uses energy from the grass?" Students respond. The student acting as grass holds one end of the wool and passes it on to the insect. The teacher continues the activity till the students form the following chain: Sun -> Grass ->Insect ->Frog -> Snake ->Eagle. The teacher explains that a **food chain** is a series of organisms each dependent on the next as a source of food. It shows how energy and nutrients flow from one organism to another in an ecosystem. The green plants that obtain energy from the sun are called producers. The organisms that consume the plants or other animals are called consumers. She further explains that there are micro-organisms that convert dead plants and animals into nutrients that are returned to the soil. These are called decomposers.	▪ Who in the circle would I give my energy to? (Who might eat me?) ▪ Who in the circle could give me energy? (Whom could I eat?) ● As before, the ball of wool represents energy. The sun holds one end of the wool and passes it to anyone whom he thinks can use the sun's energy (plants). ● The plant then holds one end of the yarn and passes it on to any living being that feeds on plants and the food chain goes on like this till a decomposer is reached. ● Then the wool is returned to the sun and the next food chain is made.  ● To make the activity more interesting and life-like, the teacher can make students pass the thread to multiple other students at a time. For example, the plant can be eaten by a bird, insect or an animal. Similarly, an animal like a goat can be eaten by a tiger, lion or human. ● Once the food web is completed, each student will be holding multiple threads. ● To see what would be the effect if any one living thing disappeared, the teacher can take an example. For example if we take the scenario that all the deer disappeared, then the person acting as the deer has to slowly pull his thread. All those who felt the pull, must give a pull on their threads. After a few seconds, the teacher can ask all those who felt a pull to raise their hands. This way, students see how all organisms are connected and even if one organism goes extinct, it affects all others in the ecosystem. Depending on the class strength the teacher can have the whole class do the activity or divide students into groups and ask them to repeat the activity.	Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Draw and explain the difference between a food chain and food web. 2. How does a food chain in a forest differ from a food chain in an ocean? 3. If a new species was introduced into an existing food web, what do you think could happen?

The teacher recalls the levels of soil as studied in chapter 9. The decomposers convert the dead plants to a dark coloured substance found in the uppermost layer of soil called **humus.** The teacher further explains that all living beings are dependent on each other in an ecosystem. "We will be doing another activity to understand this process." **CFU (Open ended/ Factual)** Factual CFUs: 1. What is a food chain? 2. Give examples of producers and composers. Open-ended CFUs 3. What do you think happens when one of the organisms in the food chain becomes extinct?	The teacher can discuss the following questions at the end of the activity: ▪ What is the difference between a food chain and a food web? ▪ What were some of the organisms in a forest food web? ▪ What did we learn from the food web activity? ▪ Do you think it's important to protect all levels of a food web? Why or why not? ▪ If a new species was introduced into an existing food web, what do you think could happen?	

Summary:

"What concept did we explore today?"
"What are food chains and food webs?"
"Give an example of a food chain found in the forest."
"Are there any other questions that you are curious to know more about?"
Students are given time to write their questions on the "Question corner" chart in the classroom.

Quick Quiz/ Assignment: (Home Work)

1. Continue working on "Watch that tree" project.
2. Observe the animals and plants near your home. Do you identify any food chains or food webs? Draw and explain any 2 food chains.

Period 12.5: Role of forests in balancing between O2 and CO2

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Teacher recalls the concepts taught in the previous class. "In the previous class, we learnt about food chains and food webs." "Name any two organisms that are producers in a forest ecosystem." Teacher takes student responses. "Name any two organisms that are consumers in a forest ecosystem." Teacher takes student responses. "Name any two organisms that are decomposers in a forest ecosystem." Teacher takes student responses. "Today we will understand a little more about the interdependence of organisms in the forest."	Teacher and student together plan a role play regarding the exchange of Oxygen and Carbon Di Oxide between plants and animals on this Earth.	The students prepare posters to represent the gaseous exchange between plants and animals. Students prepare the speech about the topic "Forests as the lungs of the Earth".

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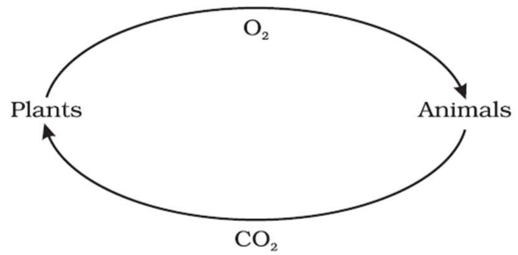
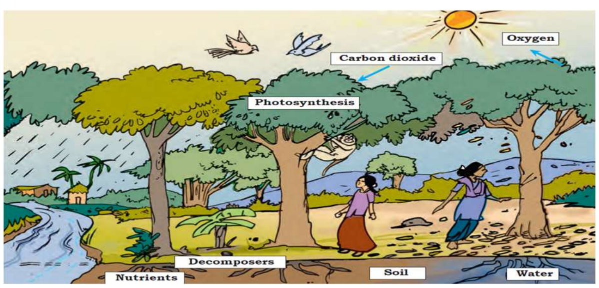
<td>
The teacher then recalls the concept of photosynthesis



learnt in previous chapters. She recalls that plants use carbon dioxide and give out oxygen during photosynthesis. When we breathe in, we take in air rich in oxygen and breathe out air rich in carbon dioxide. She explains the balance of oxygen and carbon dioxide in the atmosphere and explains why forests are called as green lungs.
(Figure 12.10 in the textbook)

The teacher explains how all organisms in the forest play a role to maintain a balance and how nothing is wasted in a forest.
The teacher shows the following picture from the textbook (Figure 12.9 in the textbook) and explains what happens in a forest.
The plants use sunlight to perform photosynthesis.



Humans, birds and animals take in oxygen and release carbon dioxide that is used by the trees.
CFU (Open ended/ Factual)
Factual CFUs:

Why are forests called green lungs?
How is the balance of oxygen and carbon dioxide maintained in the forest?

Open ended CFUs:

Raju thinks that trees are the only important beings in a forest and the other living things have no role to play. Do you agree? Why or why not?

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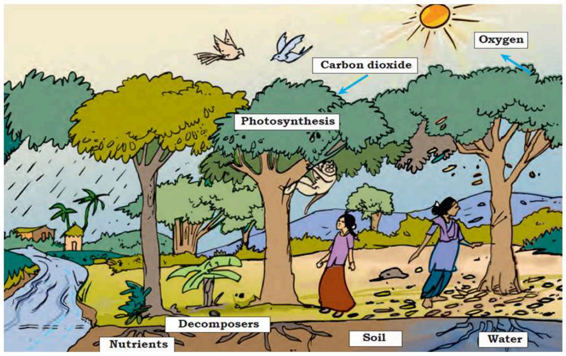
Summary:
Teacher recalls the concepts taught:
"Forests are the lungs of the Earth."
"The plants take CO2 abundantly for the process of photosynthesis as well release out O2 which is abundantly utilized by animals for the process of respiration."
Assignment/Homework:
1. Continue working on "Watch that tree" project.
2. Draw a poster about the gaseous exchange of O2 and CO2.



Period 12.6: Inter relationship of plant, soil, decomposers

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Teacher recalls the concepts taught in the previous class Today we will understand a little more about the interdependence of organisms in the forest." The soil contains several organisms and micro-organisms that act as decomposers and convert dead matter to nutrients. The teacher shows the following video of what happens beneath the soil. The living soil beneath our feet After showing the video the teacher discusses about the organisms present under the soil and how they replenish the soil and help the trees, as well as what they gain from trees.	**Activity 5** (Activity 12.3 in the textbook) For this activity, the teacher must have already chosen a place in the school grounds or near the school garden to dig a compost pit. The teacher takes the students out and performs the following activity. Dig a small pit. Put vegetable waste and leaves in it. Cover them with soil. Add some water. Add another layer of soil and then a layer of vegetable waste and add some water. Close the pit with a little soil (without closing it completely) and mark the area where the pit is. After three days, remove the upper layer of the soil. Does the pit feel warm inside? In this teaching period, the teacher can ask students to write down their predictions of what they think would happen in the compost pit. **Activity 6** After students are back in the class, the teacher can divide students into groups and instruct them for the following activity. This is a mini-model of the previous activity, which can be done with a 2-litre plastic bottle. Carefully cut the bottle just below the neck.	"Thank you for engaging in the group activity so well. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. Draw and explain the inter-relationship of soil, plants and decomposers in a forest. Why do we say that nothing in a forest goes waste? What is humus, and how is it formed in the forest floor?

The teacher explains that the forest is full of life and vitality. By harbouring a great number of plants, the forest provides greater options for food and habitats for the herbivores. Greater number of herbivores means increased availability of food for the carnivores. The wide variety of animals helps the forest to regenerate and grow. Decomposers help in maintaining the supply of nutrients to the growing plants in the forest. Thus, the forest is a dynamic living entity.

CFU (Open ended/ Factual)

Factual CFUs:

1. What do decomposers do?

Open ended CFUs:

Raju thinks that trees are the only important beings in a forest and the other living things have no role to play. Do you agree? Why or why not?

How do you think living things in a forest communicate? Do you think plants can also communicate?

Use a nail to punch 8 to 10 small air and drainage holes along the sides and bottom of the bottle.

Put the bottle on a tray. Put some dirt, old newspaper bits and dry

leaves inside the bottle. This is the compost starter.

Pour little water to wet the compost starter.

You're ready to add to your compost! (kitchen waste, grass clippings, coffee grounds, or eggshells, but not dairy or meat.)

Then add another layer of soil, kitchen waste and dry leaves.

Keep adding layers till you reach about three-fourths of the bottle but do not fill it completely.

Pour some water to wet the compost.

Turn the bottle top upside down and place it in the open top of the bottle (as shown in the figure). It will act like a funnel for adding a little bit of water each day to keep the contents damp.

Measure and mark the level of the compost. Make a note of it in your notebook.

Place in a spot where sunlight can reach it. Cover the top of your compost with a paper or tissue when not in use.

Check the mini-composter everyday and make a note of the following:

Date	Level of compost	Colour	Smell	Texture

Stir the compost once in 3 days and add more water to keep it damp.

At the end of the activity, the compost can be used to plant some seeds in the school garden.

How do changes in the population of decomposers, such as fungi or bacteria, affect plant growth in a forest? Provide examples to support your answer.

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Summary:
Teacher recalls the concepts taught:
"What is a compost?"
"How do plants, soil and decomposers work together in a forest?"
"Are there any other questions that you are curious to know more about?"
Students are given time to write their questions on the "Question corner" chart in the classroom

Assignment/ Homework:

1. In your backyard or a nearby park, find an area where fallen leaves or plant material have been left to decompose. Look for signs of decomposers like fungi, insects, or small organisms. What types of decomposers can you identify in your area?
2. Observe the soil in different areas near various plants. Is the soil near healthy plants different from soil near unhealthy or dying plants? Describe any differences you observe in the texture, color, or moisture content of the soil. How might these differences relate to plant growth?

Assessment of concept 2

I. Choose the correct answer and complete the sentences: (LO 4, 5 ,6)

1. Recycling of nutrients in environment is done by _______ (producer/decomposer).
2. Plants are _________ (producers/decomposers).
3. Animals are the examples of ________ (producers/consumers).
4. The branched part of a tree above the stem is called __________ (canopy/crown).

II. Answer the following:

1. Paheli wrote a food chain in the following way:
   frog __ eagle __ insects __ grass __ snake
   The chain is not in the correct order. Help her to write the food chain correctly. (LO 3)
2. "A bunch of seedlings were seen sprouting on a heap of animal dropping in a forest." How do you think is the seedling benefited from the animal dung? (LO 4)
3. People say that nothing goes waste in a forest. Can you explain, how? (LO 3, 4)
4. Explain the role of forest in maintaining the balance between oxygen and carbon dioxide in the atmosphere. (LO 4)
5. Why are forests considered a dynamic entity? (LO 5)

III. Concept: Conservation of forests

Topics covered:

- The climate change
- Influence of forests on air quality &The effects of deforestation

Learning Objectives: Students will be able to

- list the uses of forest
- predict what would happen if there were no forests
- propose steps for conservation of forests

Prior Concept/ Skills: *(Essential concepts and skills to be checked/bridged before teaching the current concept.)*

- (Basic idea of water cycle)-Water evaporates from the surface of the earth and forms the clouds. The clouds get cooled and fall again to the surface in the form of rain. This continuous cycle is called the water cycle.

TLM Required:

- Period 7
  - ❖ How trees communicate? video
  - ❖ Our Forests: Google Earth video
  - ❖ India deforestation report
  - ❖ Chart paper and sketch pens for group work
- Period 8
  - ❖ Arrangements for display of student projects
- Period 9
  - ❖ Worksheet -2

Teacher Resources: *(Any external links that would help teachers to create activities on their own. This includes NCERT Material, OERs, Digital links etc.)*

- NCERT Class 7 Textbook
- Trees and forests book
- Reference for identifying Indian trees
- My book of trees
- Reference to find Forest stories -Pratham books
- AP forest department website – reference for data about forests in Andhra Pradesh

Igniting Activity:

The teacher starts the class with the following creative visualization activity.

 The teacher asks students to close their eyes and take a deep breath. The teacher can also play any forest music if needed.

"Imagine standing in the middle of a lush forest. The air smells fresh, and you hear the rustling of leaves and chirping of birds. You feel the cool shade of towering trees above you, and the ground is soft beneath your feet. You can almost taste the clean, crisp air as the sunlight filters through the trees. This forest is alive, vibrant, and essential for life around it. But now, picture that forest starting to fade away—one tree at a time, until only stumps remain."

"Think for a moment: *What happens when the trees start to disappear?* "

The teacher gives students a few seconds to silently reflect.

"The forest we just imagined is crucial for the balance of life on Earth. Forests help us breathe, protect wildlife, regulate water, and provide many other benefits. In the next few classes, we'll learn why it's so important to conserve our forests, and how each of us can help in this effort."

Experience and reflection:

What changes have you noticed when one or few trees are cut in your neighborhood?

Period 12.7: Influence on climate, water cycle

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Teacher recalls the concepts taught in the previous class. "In the previous two classes, we learned about the interdependence of organisms in the forest. Now, we will learn in what other ways forests help us."	The teacher divides students into groups. The teacher gives instructions for the following activity. **Activity 7**	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own."

<table>
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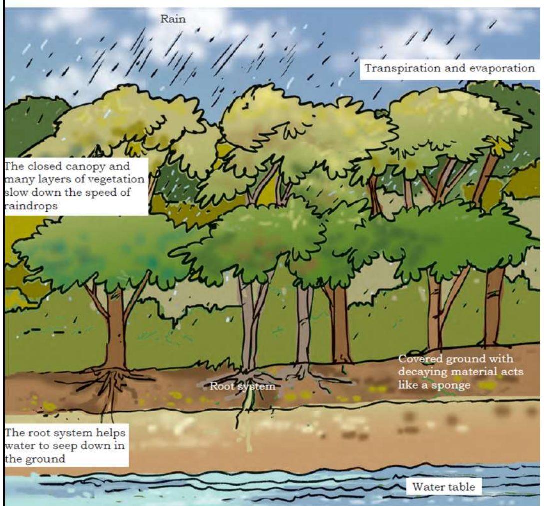
<td>The teacher recalls the water cycle as learnt in earlier grades. She recalls the definition of evaporation, condensation and precipitation with this short video - Water cycle
The teacher then asks students to discuss with a partner what they think is the role of the forest in the water cycle.


After giving students time to discuss, the teacher collects a few student responses.
The teacher then shows the below image (Figure 12.13 in the textbook) and explains it.
When it rains in the forest, the uppermost layer or the canopy intercepts the raindrops and most of the water comes down through the branches or leaves of the trees. The roots of the trees help the water to seep down in the ground. The forest floor, that is covered with dry leaves or decaying matter, acts as a sponge and absorbs the water. Hence, even when it rains heavily, the forest doesn’t get flooded and it prevents nearby regions from getting flooded. Without trees the soil is also carried away with the running water, causing soil erosion. The trees ‘return’ some water to the atmosphere through transpiration.
The teacher explains that forests help us in many ways and even when a small area of forest is lost for construction or any other activity, it has an effect on all living beings.
CFU (Open ended/ Factual)
Factual CFUs:
1. What is the role of the forest in the water cycle?
2. How do forests prevent floods?
Open ended CFUs:
1. How do you think different types of plants or trees contribute to soil protection in various environments?</td>
<td>Set up a simple experiment using materials such as soil, sand, water, and a slope (e.g., a slanted tray or cardboard). Create two different “landscapes”: one with a layer of leaves or grass on top (to represent a forest) and one without (representing a deforested area). Gently pour water over both landscapes and observe the differences in how the water moves across the surface and how much soil is washed away. Write a short explanation of the experiment. What did you observe about how trees and plants help prevent soil erosion?
After giving students time to work in their groups , the teacher asks each group to present their work.</td>
<td>Teacher writes down questions on the board and asks students to write their answers in the notebook.
1. What is the role of forests in the water cycle?
2. What would happen if an area of forest is cleared in a flood-prone area?
What would happen if all forests disappeared?</td>
</tr>
</table>

Summary:
Teacher recalls the concepts taught:
"What concept did we explore today?"
"What is the role of forests in the water cycle?"
"How do forests prevent soil erosion?"
"Are there any other questions that you are curious to know more about?"
Students are given time to write their questions on the "Question corner" chart in the classroom.
Assignment/Homework:
1. Continue working on "Watch that tree" project.
2 "Imagine a scenario where all forests disappear, what do you think would happen? Think about various living beings, think about the climate, think about short-term and long-term changes. Write/draw it in your notebook.

Period 12.8: Influence of forests on air quality & The effects of deforestation

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
Teacher recalls the concepts taught in the previous class. "We learned about the role of forests in preventing floods and soil erosion. In this class we will spend some time discussing questions from the Question corner and then you will be doing a group activity." Below are some possible questions and discussion ideas: ***Q: Can trees communicate? If yes, how do they communicate?*** Discussion: "You will be surprised to know that trees do communicate and it has been a very recent finding. In fact they communicate with more than one tree at a time, this network has been nick-named the wood wide web (like the internet- world wide web). Trees communicate through the fungi that are attached to their roots. These fungi have long threads that form the web like a spider web under the soil and through this web, chemical signals and nutrients are passed between one tree to another. The teacher can show the following video: How trees communicate? ***Q. Trees cannot move from one place to another, how do they spread their seeds across the forests or across different forests?***	The teacher divides students into groups. The teacher gives instructions for the following activity. **Activity 8** The teacher shows the following video about how the forest cover has changed across the world over the years: Our Forests: Google Earth The teacher also provides each group with a copy of the India deforestation report and asks students to read carefully and note the points.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is deforestation? 2. Suggest a few steps for forest conservation. 3. The Department of Environment is to decide whether some portion of a forest in your area could be cleared for a housing complex. Write a letter to the department explaining your point of view as a concerned citizen.

Discussion: The teacher can recall the concept of seed dispersion learnt in earlier chapters and explain that though trees cannot move, the seeds are dispersed through animals, birds and even insects. The teacher can take the specific example of insects and their role in pollination, or how animals and birds eat fruits and travel to different places and disperse the seeds through their droppings. ***Q: What are some examples of different kinds of forests which we can see in our area?*** Discussion: The teacher can give the specific example of the Corringa mangroves on the Godavari river, which is a unique type of forest ecosystem. The teacher can explain that this ecosystem is only found where the sea and river meet and have some very unique characteristics. **CFU (Open ended/ Factual)** Factual CFUs: 1. What are some methods of seed dispersion? 2. How do trees communicate? Open ended CFUs: 3. What do you think trees communicate about?	"Imagine a scenario where a forest near your area or city is being cleared for a factory to be opened. What are the steps you will take to conserve the forest?" Discuss in your groups about the steps you can take to prevent the forest from being cleared. Make a skit/drama about it and create a poster in the chart provided about it and other general steps that can be taken to prevent forests from being cleared and at the end of 10 minutes each group can present their work. After giving students time to work on their projects, the teacher asks each group to present their work.	

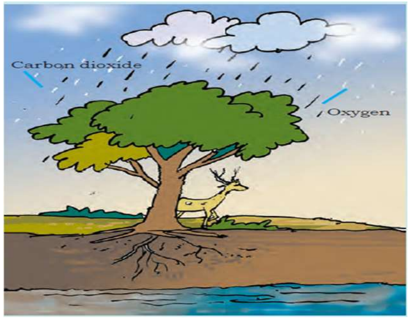
Teacher recalls the concepts taught:

Summary:

"What concepts did we explore today?"

"How does deforestation affect us?"

Teacher assigns Homework:



The teacher asks students to prepare their "Watch your tree" project as an exhibit. "You can write all your observations so far. Draw or write about your tree creatively and you will be given space to display it and talk about it. You can even make a model of your tree or collect leaves and flowers from your tree. In the next class we will have an exhibition of all the projects. "

Assessment of concept 3

I. Fill in the blanks: (LO 7, 8, 9)

(a) The insects, butterflies, honeybees and birds help flowering plants in __________ .

(b) A forest is a purifier of _____ and __________ .

(c) The decaying leaves and animal droppings in a forest enrich the ____________.

II. Answer the following:

- In the figure shown, the artist has forgotten to put the labels and directions on the arrows. Mark the directions on the arrows and label the diagram using the following labels:
- clouds, rain, atmosphere, carbon dioxide, oxygen, plants, animals, soil, roots, water table. (LO 7)
- Why should we worry about the conditions and issues related to forests far from us? (LO 7)
- Give any four factors which are responsible for the destruction of forests. (LO 8)

- Deforestation may lead to floods. Why? (LO 7,8)
- List any 3 steps for conservation of forests. (LO 9)

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)
In this class, the teacher helps students prepare their exhibits of the "Watch that tree" project. The teacher recalls that these were some of the questions asked: *Choose a tree in your school or near your home to observe.* ● *What is the first thing you observe about your tree?* ● *Write the name of the tree or take the help of an elder to identify the tree.* ● *Draw the outline of the tree as you see it. It does not have to be exactly the same like a photo.* ● *What do you think is the height of the tree? (You can compare it to a nearby building)* ● *What is the shape of the tree above the main trunk?* ● *How is the bark of the tree (is it smooth or rough)?* ● *How do the leaves of the tree look? Draw the leaves and write anything unique you notice about them.* ● *How do the fruits or flowers of the tree look? Draw them and write anything unique you notice about them.* ● *What are some living beings you find in the tree?* *Observe the tree everyday and add to your notes with the date and time of the day* The teacher helps students display their projects around the classroom as well as the other objects they have collected about the trees. She arranges the students to put up their displays in a circle, so that the other students can walk around and observe the projects.	She divides the class into groups of 10 each and tells them that each group has 10 minutes to arrange their display. During this time, the other students will walk through and see each of the projects and ask any questions. After 10 minutes, the next group will arrange their displays and the other students will walk through and observe. This continues till all the students have had the opportunity to display and present their work.	

Period 12.9: Watch that tree-project work

Summary:

Teacher recalls the concepts taught:

"What did you like about the projects of your friends?"

"What is something new you learnt from any of your friend's projects today?"

Teacher assigns Homework:

The teacher assigns homework to revise the chapter and prepare for the assessments.

Period 12.10

Student Independent Practice – Worksheet -2

Period 12.11

Student Independent Practice – Worksheet -3

Period 12.12

Remedial Teaching Period -1

Teacher starts the class with a quick summary of concepts taught in the chapter

- Define forests. What are some living beings you would find in a forest?
- What is a canopy and understorey?
- How are the organisms in the forest dependent on each other?
- What is a food chain and food web?
- Why is it said that nothing goes waste in a forest?
- What is the role of forests in preventing floods and soil erosion?
- What would happen if there were no forests?
- Suggest some steps for conservation of forests.

If the teacher found from the student assessments that there are particular topics that students didn't understand well, teacher can re-teach those topics.

The teacher can use this class to creatively recap and remediate the concepts in the chapter. The teacher divides students into 5 groups and tells them they have to work in their groups for this activity. The teacher writes the following activities on strips of paper and lets one student from each group pick a chit. The activity written on the piece of paper. The teacher gives students 15 minutes to prepare and the next 15 minutes to present their work.

Activities:

- Create a "soundscape" of a forest. What are some of the sounds you hear in a forest? Create a forest scene with some of the sounds you hear in the forest
- Collect a few products obtained from forests in the school and talk about them.
- Drama on what would happen if forests disappear.
- Create a poster on steps for forest conservation. The poster should be attractive and should inspire others to follow the steps you suggest.
- Story writing as an organism in the forest – create a story in a day of a forest animal/bird/insect/tree/plant/micro-organism.

The teacher can go over and help the groups that require guidance. After giving time to prepare, the teacher asks each group to present their work.

At the end of the class, the teacher gives the students the following table to fill up:

The student has to write what they used to think about forests in the left column. In the right column they write what they think now.

I used to think	Now I think

TEACHER'S DIARY

Name of the Teacher:				Name of the Month:	
Name of the Lesson:				**Class: 7**	
Period No	**Name of the Concept to be taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	**Remarks**
12.1	12.1 Visit to a forest, Activity 12.1				
12.2	Activity 12.2				
12. 3	Uses of Forest				
12. 4	Role of Forest in maintaing balance between oxygen and corbandioxide				
12. 5	Forest as lifeline for dwelling communities				
12. 6	Activity 12.3 - Inter relationship of plant, soil, decompiosers				
12. 7	Influence on climate, water cycle				
12.8	Inflence of Forest on air quality				
12.9	Products obtained from Forest				
12.10	Student Independent Practice				
12.11	Student Independent Practice				
12.12	Remedial				

1	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?
2	Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
3	What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
4	How well did I adjust my teaching based on student reactions or unforeseen challenges?
Head Teacher's Signature	Teacher's Signature

Head Teacher's Suggestions:

Teacher Notes:

March 2025

No bag Day | Cluster Complex | Teacher Resources

C2M1S3 | F1S8Y2 | E5F4M6

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 Sunday	2 13.1	3 13.2	4 Holi	5 13.3	6 13.4	7 No Bag Day
8 Sunday International Women's Day	9 13.4	10 13.5	11 13.6	12 13.7	13 13.8	14 Second Saturday International day
15 Sunday	16 Srirama Navami Potti Sriramulu Jayanti	17	18	19 Ugadi	20	21 No Bag Day Ramadan
22 Sunday	23	24	25	26 Srirama Navami	27	28 No Bag Day
29 Sunday	30	31				

TEACHER'S NOTES

Week1: 13.1-13.4

Week 2: 13.4-13.8

Week 3: NI

Week 4: NI

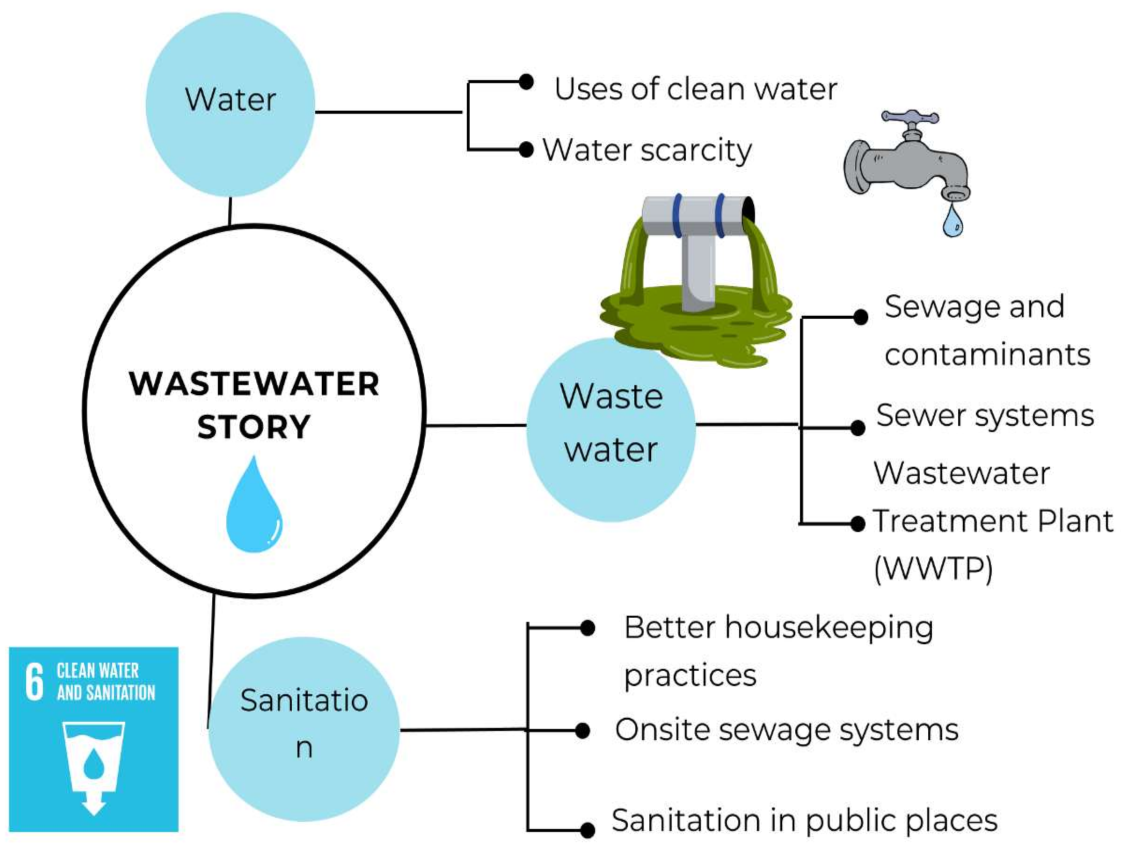
Week 5: NI

13 WASTE WATER STORY

Learning Outcomes:

1. Outline The Importance Of Water For Our Life
2. Define Sewage And List Contaminants
3. Experiment And Explain The Steps In The Treatment Of Wastewater
4. Describe The Processes Involved In A Wastewater Treatment Plant
5. Suggest Better Housekeeping Practices
6. Relate Sanitation And Disease
7. Outline Sanitation Practices In Public Places

CONCEPT MAP



Period-wise Topics

Chapters and Concepts

TEACHER CAN REVISE FOLLOWING CONCEPTS (SYNOPSIS)

Period No	Topic/Concept	Remarks
13.1	Water: our lifeline	
13.2	What is sewage	
13.3	Water freshens up	
13.4	Treatment of polluted water	
13.5	Treatment of Waste Water	
13.6	Better Housekeeping practices	
13.7	Sanitation and Diseases	
13.8	Alternative Arrangement for Sewage Disposal	
13.9	Sanitation in Public Places	

Water-our lifeline

- Clean water is a basic need for all living beings.
- We use clean water for various purposes like drinking, cooking etc.
- More than one billion human beings have no access to safe drinking water.
- World water day is celebrated on March 22nd.

Wastewater

- The black brown water that is mixed with oil and rich in lather, discharged from the sinks, showers, toilets etc is wastewater.
- Sewage is wastewater released by homes, industries, hospitals, offices etc.
- Sewage has dissolved and suspended impurities called **contaminants.**
- Contaminants can be organic contaminants, inorganic impurities, nutrients, bacteria or other microbes.
- Networks of big and small pipes that carry waste water form the sewerage.
- A Wastewater Treatment Plant (WWTP) uses physical, chemical and biological processes to decontaminate waste water at a large scale.

- There are several steps in wastewater treatment like passing it through bar screens, through grit and sand removal tanks, removal of sludge, aeration, chlorination etc before the water is discharged into a water body like a river or a sea.

Sanitation

- Sanitation is defined as the practices and systems that ensure the proper disposal of waste, the provision of clean drinking water, and the maintenance of hygienic conditions to prevent disease and promote public health.
- We must follow good personal hygiene practices and better housekeeping practices to reduce wastewater and improve sanitation.
- Unsanitary conditions lead to water-borne diseases like cholera and typhoid.
- Alternate sewage disposal systems like onsite sewage disposal systems are now gaining popularity.
- We must ensure that good sanitation practices must be followed in public places like bus depots, airports, hospitals etc.

Prior Concept/Skills:

- We obtain water through many sources like rivers, lakes, ponds, wells etc.
- Water is recycled in nature through the water cycle.
- Micro-organisms like bacteria can decompose waste matter.
-

Teacher References:

- NCERT Class 7 Textbook
- Water - a precious resource – Chapter from old NCERT textbook
- Freshwater scarcity-an introduction to the problem
- Our water our life book
- Water water book

Period 13.1

Learning Objectives: Understands the importance of water

Teaching Learning Material (TLM):

- ❖ Medium-sized bucket, bath mug, glass, spoon for Activity 1
- ❖ Water video
- ❖ The journey for water video
- ❖ Chart papers and sketch pens for Activity 2

Igniting Activity:




The teacher asks students how much water they think they use every day. Students respond.
Then she asks how much water do they think we have on the Earth, that we can use? Students respond.
The teacher fills up a medium-sized bucket with water. It contains about twenty litres of water.
“Let’s assume this is the total amount of water on the Earth.”
The teacher takes out some of the water, say about 500 ml in a bath mug.
“This represents total freshwater on the Earth which is about 3% only out of the total amount of water. The water leftover in the bucket is saline water in the seas and oceans and hence not fit to use.

From the bath mug the teacher takes out about 150 ml of water in a glass.
“This is the amount of usable water present as groundwater. The water leftover in the mug is frozen in glaciers, icecaps and permanent snow and not ready to use.”
Now the teacher takes out 1/4th spoonful of water from the glass.
“This represents the water that is in readily usable form in the rivers and lakes. which is less than 1% of the total amount of water on earth”
“We often think that we have limitless amount of water, but isn’t it a very small quantity of water that is available for our use? What does this activity make you think about?”
The teacher takes student responses.

Concept	**I Do**	**We do**	**1. You Do**
Water our life line	The teacher introduces the topic of water with the following activity. The teacher divides the whole class into 2 groups and calls them Team A and Team B. “We will have a small game, I will start by saying ‘Water is used for..’ and Team A has to name one use of water, then Team B has to say one use of water. You have to keep saying uses of water alternately and we will see which team is able to go on for maximum time.” The teacher starts the game and the students respond with the uses of water. The teacher continues the activity till on of the teams wins. The teacher shows the following video about water - Water Then the teacher talks about the importance of water and why World Water day is celebrated – in order to raise awareness about water scarcity.	The teacher shows the following video of a girl in a village walking long distances to fetch water for her family - The journey for water Then the teacher has a discussion about the availability of water in different places. Each group is given chart papers and colours or sketch-pens. The teacher instructs the students to work in their groups and create a poster on World Water Day. **[TCM 1.i.c, 1.i.d, 2.i.c]** The teacher asks them to discuss and think about the following questions as they create the posters: Think about why World Water day is celebrated Think about the challenges faced by you or other people when there is water scarcity. What are some ways in which we can conserve water? Think of creative ways to talk about the importance of water and using it wisely. The teacher goes around the class and guides students or clarifies any questions while the students do the activity. After students complete the activity, the teacher gives time for each group to present their posters.	List some uses of water. What are some difficulties people face when there is no clean water for use? Why is World Water Day celebrated? What are some ways in which we can prepare ourselves for dry months when we have less water available?

SUMMARY:

The earth is covered with 70% of water and 30% of land. In the water 97% is marine water and only 3% is fresh water. In fresh water 2% is in the frozen form of ice at poles, the remaining 1% is palatable water which is flowing in rivers, canals, ponds and lakes.

Assignment:

1. What are some uses of water?
2. When is World Water Day celebrated?
3. Why do you think some people do not have access to safe drinking water?
4. Have you faced water scarcity in your village/area during summer months? How did your family overcome that?
5. What are some of the common sources of water available to you?
6. What are some ways in which we can conserve water?
7. What are some things that made you think about water today?

Period 13.2

Learning Objectives: Understand the components of sewage water.
Discuss about sewer systems in their surroundings

Teaching Learning Material (TLM):

- Drainage water,
- 2 water bottles,
- Fresh water

Igniting Activity:

Take two water bottles, fill one bottle with fresh water and another with sewage water and find the differences between them. Identify the sources of sewage water.

Concept	I Do	We do	You Do
What is sewage	. Teacher recalls the concepts taught in the previous class. "We discussed about the importance of water and water scarcity in the previous class. One of the ways to overcome water scarcity is to reuse wastewater." The teacher takes students responses and explains that water that goes down the drains from sinks, showers, toilets, laundries is dirty, rich in lather, mixed with oil, black– brown. It is called **wastewater**."	The teacher divides students into groups for the next two activities. **Activity 3** (Activity 13.2 in the textbook): Part 1: Inspect the water in a local drain near your school or think about one you have observed previously. Discuss in your groups and write down the characteristics of the water in the drain like the color, odour or any other observation.	The teacher takes the students on a walk to study the sewage route near the school and instructs students for the following: Make a line diagram of the sewage route. Walk down the street or survey the campus to find the number of manholes.

The teacher discusses the differences between clean water and wastewater and lists them on the board.

The teacher then discusses what is meant by sewage.
"We get clean water from the pipes at home. Where do you think the used water from the sink, washroom etc go?"

The teacher takes students' responses and explains that **sewage** is wastewater released by homes,
industries, hospitals, offices and other users. It also includes rainwater that has run down the street during a storm or heavy rain. The water that washes off roads and rooftops carries harmful substances with it. Sewage is a liquid waste. Most of it is water, which has dissolved and suspended impurities.

Safe, potable and wholesome	Water should not have
1 Pleasant to taste or tasteless	1 Unpleasant or bad taste
2 Colourless or crystal clear	2 Cloudy or turbid appearance
3 Odourless	3 Foul smelling
4 Free from harmful chemicals	4 Harmful chemicals
5 Free from harmful germs.	5 Harmful germs.

S. No.	Type of sewage	Point of origin	Contaminants	Any other remark
1.	Sullage water	Kitchen		
2.	Foul waste	Toilets		
3.	Trade waste	Industrial and commercial organisations		

In case there is no sewerage system in your locality,how sewage is being disposed off.

Independent work (5 minutes):

The following questions can be given for independent work:
1. What is seweage?
2. Name some contaminants found in drainage water.
3. In what ways can we reduce the amount of contaminants that enter sewage systems?
4. What are sewer systems and manholes?

Summary:
The **sewage** is wastewater released by homes,

Industries, hospitals, offices and other users. It also includes rainwater that has run down the street during a storm or heavy rain. The water that washes off roads and rooftops carries harmful substances with it. Sewage is a liquid waste. Most of it is water, which has dissolved and suspended impurities.

Assignment:
1. What is sewage and what are some contaminants in it?
2. Are there any other questions that you are curious to know more about?
3. Make a line diagram of the sewage route.
4. Walk down the street or survey the campus to find the number of manholes.

Period 13.3

Learning Objectives: Comprehends importance of sewage system

Teaching Learning Material (TLM):
- Water pollution video
- Plastic bottle with dirty water, test-tubes, aerator or mechanical stirrer for Activity 5

Concept	I Do	We do	You Do
Water freshens up	Teacher recalls the concepts taught in the previous class. "In the previous class we learnt about wastewater and the contaminants present in it. Today we will learn more about water pollution and we will learn how to treat polluted water." "What do you think are some reasons for water pollution?" The teacher takes students responses. Then the teacher explains about water pollution and shows the following video - Water pollution then discusses about the causes and effects of water pollution.	The teacher divides students into groups and gives them instructions to perform the following activity. **Activity 5** (Activity 13.4 in the textbook) The teacher briefs students that they are going to conduct an experiment on treating polluted water. For this the teacher shows a pre-prepared solution of polluted water and asks students to work in their groups and perform the activity. Record observations at each stage: (The teacher must have performed steps 1 and 2 before 2 days and kept the waste water ready for the experiment.)	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook.

		Day -0 (to be performed by the teacher in advance) Fill a large plastic bottle 3/4 full of water. Add some dirty organic matter such as grass pieces or orange peels, a small amount of detergent, and a few drops of an ink or any colour. Cap the bottle, shake it well and let the mixture stand in the sun for two days. Day 2 (to be performed by students in groups) Look at the waste water in the bottle. Shake the mixture and pour a small sample into test tube. Label this test tube **“Before treatment; Sample 1”**. How does it smell? Use an aerator from an aquarium to bubble air through the sample in the bottle. Allow some time for aeration; leave the aerator attached overnight. If you do not have an aerator, use a mechanical stirrer or a mixer. You may have to stir it several times. Students discuss in their groups and write down their observations about the colour, odor and other particles they observed in the water.	List a few causes of water pollution. What are some adverse effects of water pollution? How can you find out if water is polluted or safe to drink? Talk to the staff at your school and find out how the water is reused or treated for reuse. Write a report

		After students complete the observation, the teacher asks the groups to share with the rest of the class. The teacher then gives time for the students to brainstorm in their groups and come up with ideas on how they think this water can be purified. After giving students time to discuss, the teacher brings the class together and allows students time to share their ideas. Then she tells them that in the next class, they will be continuing the activity, where they will try to purify the wastewater in their bottles.	

SUMMARY & ASSIGNMENT:

What concept did we explore today?"
"What is water pollution? What are its causes and effects?"
"Are there any other questions that you are curious to know more about?"

1. What are some causes of water pollution?
2. How does water pollution affect us?
3. What do you think are some steps we can take to avoid water pollution?
4. Do you think water pollution can be stopped completely? Why or why not?

Period 13.4

Learning Objectives: Identifies the need for treatment of polluted water

Constructs a simple model of wastewater treatment

Teaching Learning Material (TLM):

- How a wastewater treatment plant works video
- Filter paper, funnel, fine and medium sized gravel, beaker, chlorine tablet for Activity 5

Concept	I Do	We do	You Do
13.4 Treatment of polluted water	Teacher recalls the concepts taught in the previous classes. "We learnt about water pollution and wastewater treatment. We started an activity to treat wastewater in a bottle. Today we will learn how waste water is treated on a large scale. After that, during the group activity time, you will complete the activity we started yesterday." The teacher explains that there is an elaborate system to treat the wastewater produced on a large scale. The teacher shows the following video of how a Wastewater Treatment Plant (WWTP) works - How a wastewater treatment plant works. Then she discusses and elaborates the steps in the WWTP process and what happens at each stepWater is passed through grids or bars, where large waste materials are removed. Water passes through a grit and sand removal tank. Here the sand, grit and pebbles settle down. The water is then allowed to settle in a large tank that is sloped towards the middle. **Sludge** is the thick, semi-solid waste material that remains after wastewater has been treated, consisting of organic matter, solids, and contaminants. Sludge settles at the bottom and is removed with a scraper. A skimmer removes floating solids like oil and grease. This cleared water. This water is now called clarified water. Sludge is transferred to a separate tank and is decomposed by anaerobic bacteria (microorganisms that thrive and grow in environments without oxygen.) This process produces biogas that can be used as a fuel or for producing electricity.	Students continue Activity 5 in their groups. **Activity 5** (Activity 7.4 in the textbook): Day 3 (to be performed by students in groups) The next day, pour another sample into a second test tube. Label it as **"After aeration; Sample 2"**.  Fold a piece of filter paper to form a cone. Wet the paper with tap water and then insert the cone in a funnel. Mount the funnel on a support. Place layers of sand, fine gravel and finally medium gravel in the funnel (as shown in the figure). (An actual filtration plant does not use filter paper, but the sand filter is several metres deep). Pour the remaining aerated liquid through the filter into the beakers. Do not allow the liquid to spill over the filter. If the filtered liquid is not clear, filter it a few times till you get clear water. Pour a sample of the filtered water into a third test tube labelled **"Filtered; Sample 3".** Pour another sample of the filtered water into a fourth test tube. Add a small piece of a chlorine tablet. Mix well until the water is clear. Label the test tube "**Chlorinated; Sample 4".**	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. List the steps involved in treating water in a Waste Water Treatment plant? How is sludge and activated sludge used?

	Air is pumped into the clarified water to help aerobic bacteria (microorganisms that need oxygen to thrive and to grow). Bacteria consume waste and matter in the clarified water. After several hours, the suspended microbes settle at the bottom of the tank as activated sludge. The water is then removed from the top. The activated sludge is about 97% water. The water is removed by sand drying beds or machines. Dried sludge is used as manure, returning organic matter and nutrients to the soil. The treated water has a very low level of organic material and suspended matter. Water is further disinfected using chlorine before discharging it. The water is then discharged into a sea, a river or into the ground. Nature cleans it up further.	Observe carefully the samples in all the test tubes. Do not taste! Just smell them! Discuss in your groups and answer the following questions: (a) What changes did you observe in the appearance of the liquid after aeration? (b) Did aeration change the odour? (c) What was removed by the sand filter? (d) Did chlorine remove the colour? (e) Did chlorine have an odour? Was it worse than that of the wastewater? After students complete the activity, the teacher brings the class together and discusses their observations. She then discusses what similarities and differences they saw between their method of wastewater treatment and how it is done in WWTPs.	

SUMMARY:

1. Water is passed through grids or bars, where large waste materials are removed.
2. Water passes through a grit and sand removal tank. Here the sand, grit and pebbles settle down.
3. The water is then allowed to settle in a large tank that is sloped towards the middle. **Sludge** is the thick, semi-solid waste material that remains after wastewater has been treated, consisting of organic matter, solids, and contaminants.
4. Sludge is transferred to a separate tank and is decomposed by anaerobic bacteria
5. Air is pumped into the clarified water to help aerobic bacteria
6. The activated sludge is about 97% water. The water is removed by sand drying beds or machines.

ASSIGNMENT:

1. What is a wastewater treatment plant?
2. What is sludge?
3. What do you think will happen if the wastewater is not treated before discharging it into a river or sea?
4. “What concept did we explore today?”
5. “What is a Waste Water treatment plant?”
6. “List the steps involved in waste water treatment on a large scale.”
7. “Are there any other questions that you are curious to know more about?”

Period 13.5

Learning Objectives: comprehends the process of treatment of water Treatment of polluted water

Teaching Learning Material (TLM): Field Observation sheet

Concept	I Do	We do	You Do
Treatment of waste water	Teacher recalls the concepts taught in the previous class. “We learnt about how wastewater is treated on a large scale. “ The teacher takes student responses and tells them how they can be active citizens if they see wastewater breeding in puddles or drains leading to flies and mosquitoes. Then the teacher tells the students that the class will be going to visit a Wastewater treatment plant. (The teacher can ask students to bring masks for the field trip in the previous class “Before we go, there are some things that you need to know for observation. You will be working in pairs for the activity. ● Observe each step carefully and make a note or drawing. ● Talk to the guide respectfully and ask questions. ● Think about the area where the plant is and what could be some specific challenges. ● Check if it is for treatment of industrial waste or household waste. ● Do not touch anything during the visit. Maintain distance and hygiene as mentioned by the guide.	The teacher takes the students on the field trip and pairs up the students. She asks the students to work on Field Observation sheet during the visit. If the teacher has arranged for the field trip outside of class hours, she can use the time in this period to ask students to share what they have written in their worksheets and discuss about them.	The following questions can be given for independent work: 1. What are the different steps in waste water treatment? 2. How many houses or what area (approximately) does this WWTP serve? 3. Where is the water discharged from the WWTP? 4. How far away was the WWTP from your school? Were there any houses nearby? 5. What is the importance of having a WWTP farther away from residential areas?

SUMMARY:

After visiting a waste water treatment plant the students are able to know the different steps if waste water treating steps.

ASSIGNMENT:

“What was the best part of the field trip for you?

“Are there any other questions that you are curious to know more about?”

1. What are some things that you will be observing?

2. What are some things you are curious about?
3. Do you think each wastewater treatment plant is different? Why or why not?

Period 13.6

Learning Objectives: Appreciates good housekeeping practices

Interpret the importance of personal hygiene practices to maintain sanitation

Teaching Learning Material (TLM):

- What is water to you? Video
- Handwashing steps image
- Shallow dish/mug, water, pepper powder, soap solution for Activity 6
- 5 bread slices, 5 plastic bags, soap, hand sanitizer for Activity 7

Igniting Activity:

The teacher starts the class with the following 1-minute video - What is water to you?

The teacher asks students to think about the question, "What is water to you?"

"Share with the person next to you and why you came up with this answer."

After giving students time to discuss among themselves, the teacher takes a few student responses.

Then the teacher explains that in the next few classes, they will be learning about sanitation and why it is extremely important for everyone.

Concept	I Do	We do	You Do
Better House Keeping practices	Teacher recalls the concepts taught in the previous class. "In the previous classes, we learnt about wastewater treatment. Now, we will learn about another important aspect of water." The teacher introduces the concept of sanitation and defines it as the practices and systems that ensure the proper disposal of waste, the provision of clean drinking water, and the maintenance of hygienic conditions to prevent disease and promote public health.	The teacher divides students into groups. The teacher gives instructions for the following activity. **Activity 6** • Each group has a shallow dish/mug filled with water • Add some pepper powder into the water. (The teacher must explain that the pepper represents germs.) • Let the pepper spread all around the dish. • Ask the students to dip their fingers into the dish. • See how the "germs" can stick to them. After giving students time to finish the activity, the teacher brings the class together and discusses their findings. Then the teacher explains and performs the following activity with the class. **Activity 7**	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. What is sanitation? 2. What are some ways in which you can maintain personal hygiene? 3. What do you think will happen if you eat food without washing your hands?

	"You must all have learnt about the steps to washing your hands well during the Corona period. Let us recap the steps in washing our hands."	● Take 5 bread slices in 5 separate sandwich bags. ● Place one of the bags untouched. ● Let the second one be touched by children who didn't wash their hands. ● The third is to be touched by children after washing their hands with soap and water. ● The fourth is to be touched by children after using hand sanitizer. ● The fifth piece of bread can be rubbed over the students' desks. ● Place all these slices in the bags and keep them for display. Ask students to observe the slices of bread on a daily basis for the next 2-3 days. Guess what they think will happen to the 	Draw/write about all the steps involved in hand washing

SUMMARY:

"You must all have learnt about the steps to washing your hands well during the Corona period. Let us recap the steps in washing our hands."
The teacher demonstrates the steps given below and asks students to follow-along. (The teacher can also make a poster of the below steps and put it up in the classroom.)
Image reference: [Handwashing steps]

ASSIGNMENT:

1. "What is sanitation? Why is it important?"
2. Why is it important?
3. Why do you think hand washing was so important during the Corona period?

Period 13.7

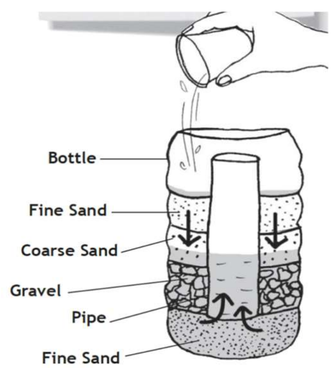
Learning Objectives: Understands the relation between sanitation and disease

- *List* good housekeeping practices and practices to maintain good sanitation practices in public places.

- *Demonstrate* how underground water resources get polluted by improper sanitation practices

Teaching Learning Material (TLM):

One 1 litre water bottle, Length of pipe 1 inch diameter, that is 8-9 inches long, fine Sand, coarse sand, gravel, water, stick, pen (to mark the stick with), a bottle of ink with an ink dropper, a new ink dropper for Activity 8

Concept	I Do	We do	You Do
Sanitation and Diseases	Teacher recalls the concepts taught in the previous class. "We learned about the sanitation and the role of personal hygiene. Today we will learn about some water-borne diseases." The teacher asks students to share some of the common diseases that people suffer from during the rainy season. Some of these could be caused by stagnating water. Then the teacher explains that diseases like cholera, typhoid, meningitis etc. spread because of drinking unclean water. The teacher explains that germs spread through water causing water and soil pollution. The teacher discusses with the students about preventing waste water home by adopting good house-keeping practices, that is being aware of the water that we are releasing down the drain. ● Cooking oil and fats should not be thrown down the drain.	The teacher divides students into groups. The teacher gives instructions for the following activity to show how the water in our wells and underground sources gets polluted due to human activity. **Activity 8** • Cut off the top of the bottle about 2 inches from the cap.  • Pour 2-inch layer of sand into the cut bottle. • Now place the pipe inside the bottle, in the center. • Fill the space around the pipe with a layer of gravel, then coarse sand, and finally fine sand. Leave about 3 inches free at the top. • Slowly pour 1 glass of water into the bottle. • Watch as the water seeps into the ground, filling the gaps in the layers. • Your well will slowly fill up with water as the water inside and outside the well finds its own level. • Your well in now ready. Remember the pipe /cylinder is the well and the sand in the bottle represents the land.	"Thank you for engaging in the group activity so well. I saw some interesting responses. Now it's time for you to work on your own." Teacher writes down questions on the board and asks students to write their answers in the notebook. 1. Name a few water-borne diseases. 2. List some good housekeeping practices to avoid waste water. 3. Suggest a few steps to maintain sanitation in public places. Why is it important?

	● Chemicals like paints, insecticides, motor oil medicines etc should also not be thrown down the drain. Used tee-leaves, solid food remains etc should be thrown in the dustbin and not into the drain.	Now try the following, discuss in your groups and write the answers: 1. Measure the depth of your well using the stick and make a note. 2. Now remove some water from your well using an ink dropper. How is the water level in the well affected? 3. Carefully add half a cup of water to the sand. This represents 'rain'. How did the water level change? 4. Now, add five to six drops of ink as the "pollutant" to that site. After a few minutes, use the ink dropper to remove water from the well and make a note of your observations. Is the water in the well affected? After students complete the activity, the teacher brings the class together and discusses the findings.	

SUMMARY:

- Cooking oil and fats should not be thrown down the drain.
- Chemicals like paints, insecticides, motor oil medicines etc should also not be thrown down the drain.
- Used tee-leaves, solid food remains etc should be thrown in the dustbin and not into the drain.

ASSIGNMENT:

1.What are some methods to reduce waste water at home?
2.What sanitation practices must be followed in public places?
3. "What are water-borne diseases? Why is sanitation important?"

I. Fill in the blanks in the following statements using words given below:

air, hand pumps, cholera, water, large, ground

A very _________ number of our people defecate in the open. It may cause _________ pollution and soil pollution. Both the surface water and _________ water get polluted. _________ water is the source for wells, tube wells and _________. Thus, it becomes the most common route for _________ borne diseases like _________, dysentery, etc.

II. Answer the following:

1. Name two alternative arrangements for sewage disposal where there is no sewerage system.
2. A man travelling in a train threw an empty packet of food on the platform. Do you think this is a proper waste disposal method? Elaborate.
3. Why should we not throw?
   (a) Used tea leaves into sink? (b) Cooking oil and fats down the drain?

Period 13.8

Learning Objectives: Identifies Alternative arrangement for Sewage Disposal

Teaching Learning Material (TLM):

Chart, sketch pens, A4 sheets for Activity 9

Concept	I Do	We do	You Do
Alternative arrangement for Sewage Disposal	In this class, the teacher summarizes the concepts learnt in the previous classes and gives students time to do a project in their groups. Summary: ● What is water scarcity? ● What is waste-water? ● What are some impurities present in waste water? ● List the steps involved in waste water treatment on a large scale. ● What are sewers and why are sewerage systems important? ● What is meant by the term sanitation and how can we practice it at home and in public places?	The teacher divides the class into groups and gives them the following project activity: **Activity 9** 1. Decide on a creative water-related name for your team. 2. Think about what are some major global water and sanitation issues and how do they also connect to local issues? ● Target 6.1: Safe and Affordable Drinking Water ● Target 6.2: End open defecation and provide access to sanitation and hygiene ● Target 6.3: Improve water quality, wastewater treatment and safe reuse ● Target 6.4: Increase water-use efficiency and ensure freshwater supplies ● Target 6.5: Implement integrated water resources management ● Target 6.6: Protect and restore water-related ecosystems ● Target 6.7: Expand water and sanitation support to developing countries ● Target 6.8: Support local engagement in water and sanitation management.	The teacher can then ask students to read the You will use this information to do the following tasks: a. Create at least 3 questions that you want to ask your city/town/village's local water experts.

SUMMARY

Some organizations offer hygienic on-site human waste disposal technology. These toilets do not require scavenging. Excreta from the toilet seats flow through covered drains into a biogas plant. The biogas produced is used as a source of energy.

ASSIGNMENT:

1. "What is something new you learnt from any of your friend's projects today?"
2. Which wastes are producing by hospitals?

Period 13.9

Learning Objectives: Understands the need and importance of sanitation in public places

Teaching Learning Material (TLM): Worksheet

Concept	I Do	We do	You Do
Sanitation in public Places	Teacher explains In our country fairs are organized periodically. A large number of people participate in them. In the same way railway stations, bus depots, airports, hospitals are very busy places. Thousands of people visit them daily. Large amount of waste is generated here. It must be disposed of properly otherwise epidemics could break out. The government has laid down certain standards of sanitation but, unfortunately, they are not strictly enforced	Discussion about the measures taken to reduce the waste at public places.	Write a note on maintaining cleanliness in public places

SUMMARY:

The public places should maintain cleanliness.

Assignment:

1. What type measure should be taken to maintain the public places clean?
2. Give examples for public places?

TEACHER'S DIARY

Name of the Teacher:				Name of the Month:	
Name of the Lesson:				**Class: 7**	
Period No	**Name of the Concept to be taught**	**Date**	**Activities Conducted during the teaching**	**TLM Used**	**Remarks**
12.1	12.1 Visit to a forest, Activity 12.1				
12.2	Activity 12.2				
12. 3	Uses of Forest				
12. 4	Role of Forest in maintaing balance between oxygen and corbandioxide				
12. 5	Forest as lifeline for dwelling communities				
12. 6	Activity 12.3 - Inter relationship of plant, soil, decompiosers				
12. 7	Influence on climate, water cycle				
12.8	Inflence of Forest on air quality				
12.9	Products obtained from Forest				
12.10	Student Independent Practice				
12.11	Student Independent Practice				
12.12	Remedial				

1	What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time?
2	Were there any concepts or activities that students found particularly difficult? How will I adapt my approach to address these difficulties in the next lesson?
3	What additional resources or modifications could improve the effectiveness of this lesson in future implementations?
4	How well did I adjust my teaching based on student reactions or unforeseen challenges?

Head Teacher's Signature　　　　　　　　　　Teacher's Signature

Head Teacher's Suggestions:

Teacher Notes:

April

No bag Day | Cluster Complex | Teacher Resources

C2M1S3 | F1S8Y2 | E5F4M6

2026

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3 Good Friday	4
5 Sunday Babu Jagjivan	6	7	8	9	10	11 Second Saturday
12 Sunday	13	14 Dr. B R. Ambedkar Jayanthi	15	16 Kandukuri Veeresalingam Jayamti	17	18 PTM & SMC meeting
19 Sunday	20	21	22 Earth Day	23	24	25
26 Sunday	27	28	29	30		

Week1:

Week 2:

Week 3:

Week 4:

Week 5:

TEACHER'S NOTES