`

# 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.

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 endeavours!

The Department of School Education, Andhra Pradesh acknowledges the unwavering commitment of educators, academic experts, and resource persons who contributed to the development of this Teacher Handbook.

**Department of School Education**



This handbook has been printed on 70 G.S.M. SS Maplitho paper. Title page printed on 220 G.S.M. White Art Card.

`

## Features of the Teacher's Handbook

The Teacher's Handbook serves as a practical and comprehensive guide to support teachers in planning, delivering, and reflecting on effective classroom instruction. It aligns with the **National Education Policy (NEP) 2020**, **National Curriculum Framework (NCF) 2023**, and the **State Curriculum Framework – Andhra Pradesh (SCF–AP)**. The handbook empowers teachers with structured guidance, tools, and strategies to enhance student learning and overall classroom engagement.

1. **Curriculum Interpretation**
    - Help teachers understand the curriculum's goals, competencies, and learning outcomes as outlined by SCERT–AP and NCF.
2. **Pedagogical Guidance**
    - Promote learner-centric, activity-based, and inquiry-driven teaching.
    - Encourage inclusive, experiential, and multidisciplinary approaches to meet diverse learner needs.
3. **Lesson Planning Support**
    - Provide sample lesson plans, creative TLM ideas, and assessment methods.
    - Integrate local context, values education, and 21st-century skills into classroom teaching.
4. **Assessment and Reflection**
    - Support teacher self-reflection and continuous professional development through guiding questions and tools.
5. **Integration of Teaching Supports**
    - Encourage the use of Science Labs and Science Clubs for hands-on learning and developing scientific temper.
    - Suggest joyful learning strategies—games, storytelling, simulations, and projects—for better engagement.
    - Provide guidance on using low-cost and digital TLMs.
    - Ensure alignment with the Academic Calendar for timely syllabus completion and assessment.

Table of contents

`

# GENERAL INFORMATION

| EXAMINATION SHEDULE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | FA1 | FA2 | SA1 | FA3 | FA4 | SA2 | Pre Final 1 For X Class | Pre Final 2 For X Class | Public Exams For X Class |
| Syllabus | Jun,July | Aug,Sep | June-Oct | Nov,Dec | Jan | | | | |
| Time Slot | Aug-25 4-7 | Oct-25 13-16 | Nov-25 10-19 | Jan-26 5-8 | FEB-26 9-12 | April-26 6-15 | FEB-26 18-27 | March-26 2-12 | 16.03.26 to 02.04.26 |

| MONTH | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | JANUARY | FEBRUARY | MARCH | APRIL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No of working days For General | 15 | 26 | 21 | 18 | 23 | 24 | 25 | 19 | 23 | 21 | 18 | 233 |
| No of Holidays For General | 4 | 5 | 10 | 12 | 8 | 6 | 6 | 12 | 5 | 10 | 5 | 83 |
| No of working days For Minority | 15 | 26 | 21 | 21 | 23 | 24 | 20 | 21 | 23 | 21 | 18 | 233 |
| No of Holidays For Minority | 4 | 5 | 10 | 9 | 8 | 6 | 11 | 10 | 5 | 10 | 5 | 83 |

FOR GENERAL SCHOOLS

| | |
|---|---|
| Dasara Holidays | 24.09.2025 to 02.10.2025 |
| Pongal Holidays | 10.01.2026 to 18.01.2026 |

FOR MINORITY SCHOOLS

| | |
|---|---|
| Dasara Holidays | 27.09.25 to 02.10.25 |
| Christmas Holidays | 21.12.25 to 28.12.25 |
| Pongal Holidays | 10.01.26 to 15.01.26 |

# 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 | The Fundamental unit of life | Jun | 6 | 3 | 9 |
| | | July | 9 | 7 | 16 |
| 2 | Tissues | Aug | 7 | 3 | 10 |
| | | Sep | 9 | 4 | 13 |
| 3 | Improvement of food resources | Nov | 4 | 2 | 22 |
| | | Dec | 8 | 6 | 14 |
| | | Jan | 4 | 4 | 8 |
| | | Feb | 2 | 10 | 12 |

`

# June 2025

No bag Day | Cluster Complex | Teacher Resources

| 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 | 13 NI | 14 Second Saturday |
| 15 Sunday | 16 1.1 to 1.2.1 Plasma membrane introduction + NI | 17 | 18 | 19 | 20 | 21 International Yoga Day ~~No Bag Day~~ |
| 22 Sunday | 23 1.2.1 to 1.2.2 + NI | 24 | 25 | 26 | 27 | 28 No Bag Day Mega PTM |
| 29 Sunday National Statistics ~~Day~~ | 30 NI | | | | | |

**Week1:**

**Week 2:**

**Week 3:** 1.1 – 1.2.1

**Week 4:** 1.2.1 – 1.2.2

**Week 5:** NI

**↓ TEACHER'S NOTES ↓**

`

# July 2025

N8D6E7 No bag Day

R8B1Q4 Cluster Complex

U7G8W3 Teacher Resources

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | 1 1.2.3 – 1.2.4 + NI | 2 | 3 | 4 | 5 No Bag Day |
| 6 Sunday Muharram | 7 1.2.5 – 1.2.5.2 + NI | 8 | 9 | 10 | 11 | 12 Second Saturday |
| 13 Sunday | 14 1.2.5.3 - 1.2.5.6 + NI | 15 | 16 | 17 | 18 | No Bag 19 Day Cluster meeting |
| 20 Sunday | 21 CELL DIVISION + 2 NI | 22 | 23 | 24 | 24 | No Bag 26 Day SMC Meeting |
| 27 Sunday | 28 NI | 29 | 30 | 31 | | |

**Week1:** 1.2.3, 1.2.4

**Week 2:** 1.2.5, 1.2.5.2

**Week 3:** 1.2.5.3 – 1.2.5.6

**Week 4:** Cell division

**Week 5:** Revision

**↓ TEACHER'S NOTES ↓**

`

# THE FUNDAMENTAL UNIT OF LIFE

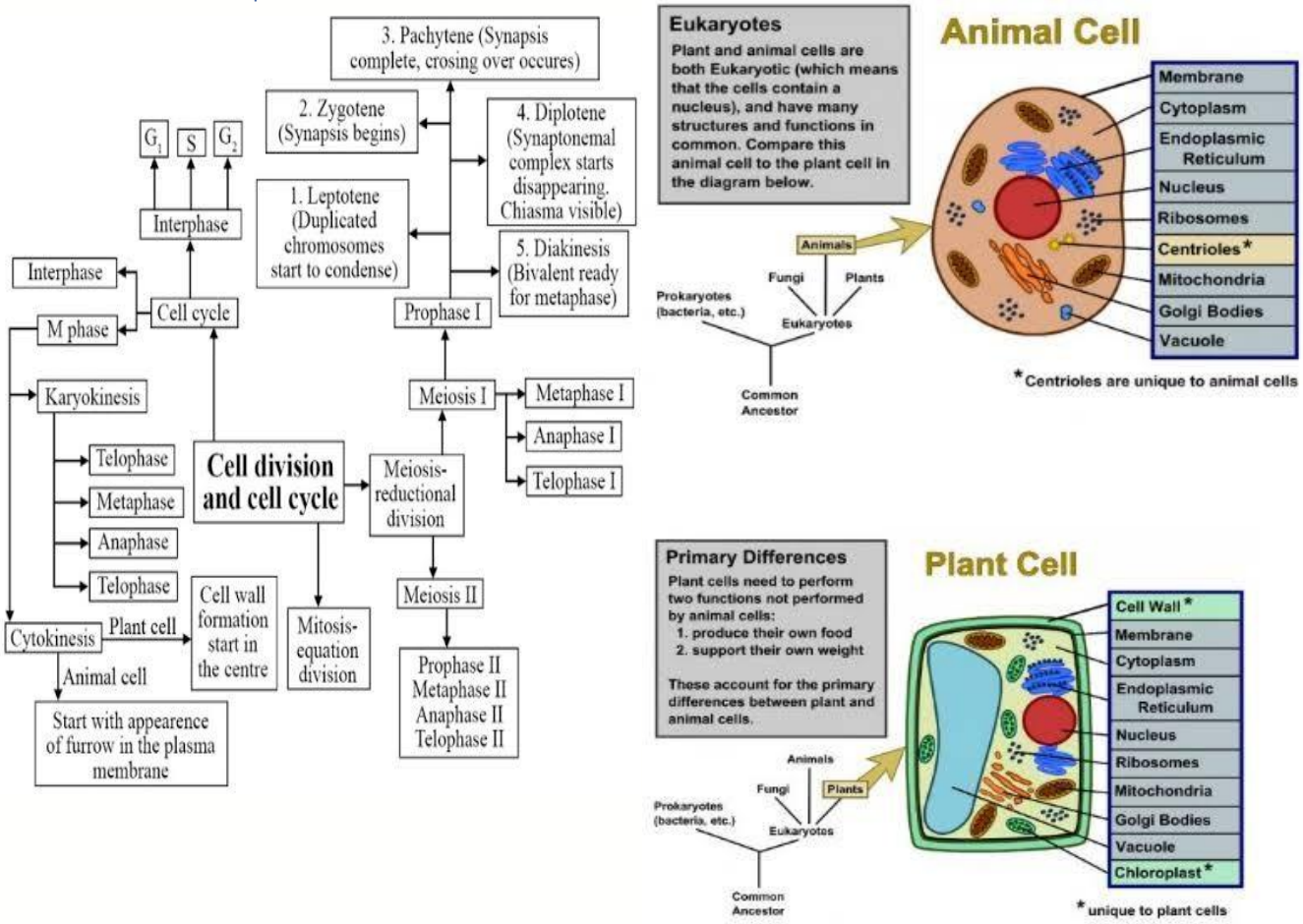
**NO OF TEACHING PERIODS: 15** **NO OF PRACTISE PERIODS: 10**

**Learning Outcomes: Learners …..**

1. understand the concept of cell
2. explain the structure and function of plasma membrane
3. conduct experiments related to osmosis
4. explain the structure and function of plasma membrane
5. explain the structure and function of cell wall
6. prepare temporary mount of cheek cells
7. explain the structure of nucleus
8. understand about cytoplasm
9. list out the cell organelles
10. understand about endoplasmic reticulum
11. understand about Golgi Apparatus
12. understand about Lysosomes, Mitochondria
13. understand about Plastids, Vacuoles
14. understand about Cell division

E9L4M2

## Mind Map:



`

## Period wise Topics

| Period | Topic |
|---|---|
| 1 | 5.1What are the living organisms made up of? |
| 2 | 5.2. Preparing temporary mounts of leaf peel. Tip of roots of onion peels of onions of different sizes<br>5.2 What is a cell made up of? What is the structural organization of a cells. |
| 3 | 5.2.1 Role of Plasma membrane or Cell membrane. |
| 4 | 5.2.1. Preparation of solutions of different concentrations. |
| 5 | Activity-5.3 (Osmosis with an egg) Activity-5.4(Dried raisins or apricots) and structure of plasma membrane |
| 6 | 5.2.2: Cell Wall, Activity-5.6 (Rhoeo leaf peel). |
| 7 | 5.2.3. Nucleus - Activity-5.7 (Observation of cheek cells) |
| 8 | Structure and functions of nucleus |
| 9 | 5.2.4. Cytoplasm, |
| 10 | 5.2.5-Introduction of Cell organelles. |
| 11 | 5.2.5.I Endoplasmic Reticulum. |
| 12 | 5.2.5.II Golgi apparatus. |
| 13 | 5.2.5.III Lysosomes. 5.2.5. IV Mitochondria, |
| 14 | 5.2.5. V Plastids, 5.2.5. VI Vacuoles. |
| 15 | 5.3. Cell division. |

**Chapter: Fundamental Unit of Life** **Grade: 9** **Subject: Biology** **Period:1**

**Concepts Covered:**

1. What are living organisms made up of?

**Learning Objectives:**

1. Explain Robert Hook experiment to reveal the structure of a cell.
2. Appreciate the efforts of Robert Hook.
3. Conduct the experiment to observe the onion peel cells and draw the observations.
4. Explain the structure of the cells observed
5. Appreciate the efforts of scientists to invent magnifying lens and microscope to reveal the facts about the cells
6. Differentiate between unicellular and multicellular organisms.

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

1. The knowledge about the differences between living organism and non-living organisms.
2. Use of Magnifying lens

**TLM Required:** Images of Robert Hook discoveries, Microscope and lab equipment for observing onion peel cells.

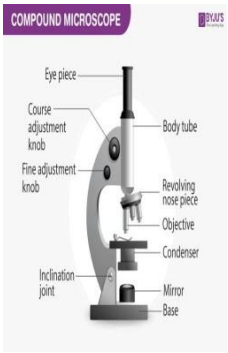
**Teacher Resources: (**External links from DIKSHA and web pages)

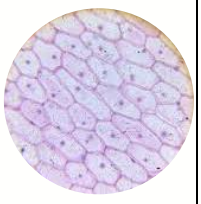
`

Images of unicellular and multicellular organisms in IFP

**Igniting Activity:**

The teacher draws a wall made of bricks and ask the students to speak about it something. Get a point from the students that small bricks make up a wall, walls to a room and further form a building. Then induce the concept that even the living organisms are also made of building blocks called as cells.

<table>
<tr><th>I do (Direct Instructions)</th><th>We do (Guided Practice)</th><th>You do (Independent Practice)</th></tr>
<tr>
<td>
• Teacher explains the effort of Rober Hook in discovering the cell in the year 1665 by showing the images.<br>
 <br>
• Explain the contribution of various scientists in the discovery of the cell.<br>
• Demonstrate the onion peel activity<br>
• Teacher takes an onion peel, take a leaf and peel the thin layer.<br>
• Demonstrate the skills involved in peeling, managing the specimen, placing it on a slide without folds or any damage to the specimen, observing under microscope.<br>


• Explains various part of microscope and its usage.<br>
Explains that the small structures that we see in peels of onion bulbs of different sizes are the basic building units of the onion bulb and are called as cells<br><br>
Explains the differences between unicellular organisms and multicellular organisms.
</td>
<td>
• Students practice the peeling of onion.<br>
• Involve in all the actions made by teacher in preparing the specimen.<br>
• Observe the cells in the onion peel, draw their diagrams in the notebook.<br>
• Analyze the<br>
 <br>
shape, size of cells in onion peel.<br><br>
Differentiate between unicellular and multicellular organisms with examples.
</td>
<td>
• Write the answers to the questions written on the board.
<table>
<tr><td>Robert Hooke</td><td>A. Discovered free livi cells in pond</td></tr>
<tr><td>Leeuwenhoek</td><td>B. Cells were first disc by him</td></tr>
<tr><td>Robert Brown</td><td>C. Proposed the Cell Theory</td></tr>
<tr><td>Schleiden and Schwann</td><td>D. Discovered Nucleus</td></tr>
</table>
• How discovered the cell for the first time? How<br>
• Tabulate the scientists and their contribution in the notebook as follows.<br><br>
• Write the experiment of Onion peel cells observation in the lab record.
</td>
</tr>
</table>

**Summary:** All the organism are made of small chambers called cells. Cells were first discovered by Robert Hook.

`

**CFU**

Factual Questions:

1. What is the basic unit of life?
2. What are the differences between unicellular and multicellular organisms?

Open Ended Questions:

1. What if the whole organism is made of a single cell?

Evaluation/Quiz/ Assignment: 1. All living organisms are made up of cells. Justify.

**Chapter: Fundamental Unit of Life** **Grade: 9** **Subject: Biology** **Period:2**

**Concepts Covered:**

5.2. Preparing temporary mounts of leaf peel. Tip of roots of onion peels of onions of different sizes.

5.2 What is a cell made up of? What is the structural organization of a cells.

**Learning Objectives:**

1. Prepare the temporary mounts of leaf peels of Rheo, root tips, onion peels of different sizes of onions, observe and analyze the shape and different types of cells.
2. Explain different types of cells and the need.
3. Explain the cell as basic unit of the organisms.

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

1. All the living organisms are made of cells.
2. Cell is the basic unit of life

**TLM Required:** Images of different types of cells, Microscope and lab equipment for observing leaf pee cells, different sizes of onions.

**Teacher Resources:**

Virtual lab manual in DIKSHA portal

**Igniting Activity:**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Ignite the question whether the size of cell varies from size of the organ.<br><br>• Plans an experiment with two different sizes of the leaves and onions.<br>Ask the students to guess and hypothesis the sizes of the cells in various sizes of the leaves and onions.<br>• Engage the students in specimen preparation and prepare the specimen slides of Rhoe leaf peal and onion peels of different sizes of the onions.<br>• Initiate the analysis about the relation between size of the cell and size of the organisms.<br>• Display the image of different types of cells | • Hypothesize the relation between size of the cell and size of the organism.<br>• Collect Rheo leaf and different sizes of onions.<br>• Participate in the leaf pealing and removing onion peel activity.<br><br>• Observe the Rheo leaf peel cells and draw the observations as well observe the | • Write answer to the question: Does the size of the cell vary with size of the organism.<br><br>• Draw the diagrams of various types of cells'<br><br>• Tabulate the different types of cells and their functions. |

`

| | | |
|---|---|---|
| such as Smooth muscle cell, Blood cell, Nerve cell, Ovum, Sperm cell, Bone cell, Fat cell.<br>• Initiate the discussion by asking why do we need to have such different types of cells.<br>• Explain the organization of the cell. | onion peel slides of different sizes of onions.<br>• Analyze relation between size of the cell and size of the organism.<br>• Participate in the discussion about the division of the work in the organism with various examples and analyze the need of various types of cells.<br>• Appreciate the organization of the cell. | |

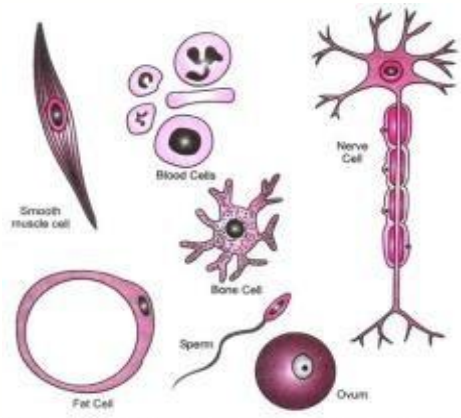



**Figure : VARIOUS CELLS FROM THE HUMAN BODY**

Teacher brings a large leaf and a small leaf as well a big onion and a small onion and ask the students to guess the size of the cells in the two different sizes of leaves and onions.

**Summary:**

- The size of the cell does not depend on size of the organisms.
- There are different types of the cells in our body to performing various functions specifically.
- As such the cell contains various cell organelles to perform different functions.

**CFU**

Factual Questions:

1. What is the relation between the size of the cell and size of the organism?
2. What kind of cells exist in our body?

Open Ended Questions:

1. What questions do you ask to learn more about various types of cells in our body?

2. What may happen if all the cells are similar in a multicellular organism?

Evaluation/Quiz/ Assignment:

1. Which of the following statements is true about the size of cells in living organisms?

A. Larger organisms always have larger cells.
B. Smaller organisms have more cells than larger ones.
C. The size of the cell does not depend on the size of the organism.
D. The size of the cell increases with the age of the organism.

2. Why are there different types of cells in the human body?

A. To store food for the body
B. To perform various functions specifically
C. To increase the size of organs
D. To reduce body temperature

**3. Which of the following is NOT a reason cells have different organelles?**

A. To perform specific functions efficiently
B. To help the cell float in the body
C. To carry out processes like energy production and waste removal
D. To maintain proper structure and function

`

**4. What are cell organelles?**

A. Tiny organs in the human body
B. Parts of a cell that perform specific functions
C. Bacteria inside the cell
D. Cells inside another cell

**Chapter: Fundamental Unit of Life** **Grade: 9** **Subject: Biology** **Period:3**

**Concepts covered:**

5.2.1 Role of Plasma membrane or Cell membrane.

**Learning Outcomes:**

1. Define the plasma membrane.
2. Give reasons for naming plasma membrane as selectively permeable membrane.
3. Explain the process of diffusion of O2 and CO2 in and out of the plasma membrane.
4. Define diffusion.

**Prior knowledge and skills:**

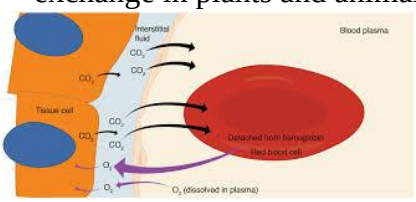
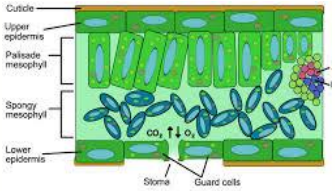
1. The cell is the basic unit of life and it performs various functions.
2. Slide preparation and usage of microscope.

**Teacher resources:** Videos of plasma membrane, gaseous exchange and water transportation.
https://youtu.be/QpcACa39YtA?si=HwdYMI1gKhkCe4h6

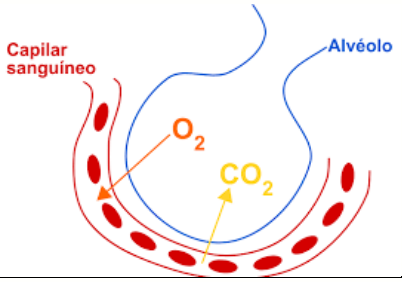
**TLM:** Image of gaseous exchange through the stomata, plasma membrane.

**Ignite activity:**

Teacher shows an image of an insect inside a cover tightly tied and initiates discussion about its survival. The students says that the insect dies as the O2 cannot enter inside the cover. Then teacher initiates discussion about the gaseous exchange in plants and animals as probing.

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Ignite with a question what if there is no water supply from roots to upper parts of the plant or if there is no water absorption by roots.<br>• Explain that outer most covering of the cell that separates contents of the cell from its environment is called as plasma membrane.<br>• Also, teacher explains that it allows/ prevents the entry and exit of some material in and out. Hence it is called as permeable membrane.<br>• Initiate the discussion about gaseous exchange in plants and animals.<br>  |  <br>Watch the gif or image of water movement from cell to cell and closing and opening of stomata.<br>• Discuss about permeability and due to the nature of permitting some kind of water in and out of the cell it is called as permeable membrane.<br>• Recalls that O2 and CO2 exchange through the stomata as well O2 and | • Write the answers to the questions:<br>1. What is plasma membrane?<br>2. Why is the plasma membrane called permeable membrane?<br>• Write the definition of diffusion.<br>• Write an explanation about the diffusion of O2 |

`

| | | |
|---|---|---|
| • Initiate discussion about diffusion with some examples such as diffusion of ink in the water, diffusion of jasmine smell throughout the surroundings   | CO2 exchange in lungs of huma beings.<br>• Discuss and infer that O2 &CO2 diffuse in and out according to the concentration gradient. | and CO2 through the plasma membrane. |

**Summary**:
1. The outer most layer of the cell that separates the contents of the cell form external environment is called plasma membrane.
2. Also, teacher explains that it allows/ prevents the entry and exit of some material in and out. Hence it is called as permeable membrane.

**CFU**

**Factual questions:**
1. What is semi permeable membrane?
2. Why plasma membrane is called as permeable membrane?
3. Define diffusion?

**Open Ended Questions:**
1. What may happen if plasma membrane ruptures?

**Assignment/Home work:**
1. Where is the plasma Membrane located in plant cell?
2. Why cell membrane is called selectively permeable membrane?
3. How does the movement of substances take place into and out of the cell?
4. How does movement of gases like Co2 and O2 takes place across the plasma membrane?
5. How diffusion plays an important role in gaseous exchange between the cells as well as the cell and its external environment?

**Chapter: Fundamental Unit of Life** **Grade: 9** **Subject: Biology** **Period:4**

**Concepts covered:**
5.2.1. Osmosis, Preparation of solutions of different concentrations and observation of movement of water in these three types of solutions.

**Learning Outcomes:**
1. Define Osmosis
2. Prepare the hypotonic, isotonic and hypertonic solutions.
3. Explaining the movement of water in and out of the cell when a cell is kept in these three types of solutions.

**Prior knowledge:**
The knowledge about Diffusion and plasma membrane

**Teacher Resources:**
https://www.youtube.com/watch?v=g0M9ND

**TLM:** Material for preparing different types of solutions.

**Induction:** Teacher induces the discussion by probing questions like:

1. Why do we keep lemon in the water before cutting?
2. Why does your mother put the dry vegetables in the water before cutting?

`

3. Why does the moong dal swell when they are soaked in water and at the same time why do we observe water after adding the salt to moong dal raw mix?
4. When salt is added to the vegetable curry we observe water in the bowl. Why?

**Summary:**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Initiates the discussion by probing question like:<br>1. Why do the resins swell when kept in water?<br>2. How osmosis help in absorption of water by root hairs?<br>• Teacher makes a statement that osmosis depends on the amounts of salts dissolved in it.<br>• Explains the solute, solvent and solution.<br>• Initiates the preparation of hypotonic solution and observation of water movement?<br>• Initiates the preparation of isotonic solution and observation of water movement?<br>• Initiates the preparation of hypertonic solution and observation of water movement?<br><br>• With all these observations teacher explains that Osmosis is a special case of diffusion through a selectively permeable membrane.<br><br>• Initiates the discussion about differences between Osmosis and diffusion. | • With the probing questions the students hypothesize that the salts may affect the water movement in and out<br>• The students prepare Hypotonic solutions with the guidance of the teacher.<br>• Keep a resin inside this solution and observe.<br>• Note the observations and discuss about the movement of water into the resin.<br><br>• The students prepare isotonic solution with the guidance of the teacher.<br>• Keep the resin inside this solution and observe.<br>• Note the observations and discuss about no movement of water in or out of the resin.<br>• The students prepare hypertonic solution with the guidance of the teacher.<br>• Keep the resin inside this solution and observe.<br>• Note the observations and discuss about the movement of water out of the resin. | • **How does roots absorb water from the soil?** |

1**.** Osmosis is a special case of diffusion through a selectively permeable membrane.

**CFU**

Factual questions

1. What are the differences between diffusion and osmosis.
2. What are the differences between hypotonic solution, isotonic solution and hypertonic solution?

Open ended questions

1. What may happen if plasma membrane does not control the movement of water in and out?
2. Write any questions to learn more about osmosis.

Assignment/ Home work/ quiz:

1. Prepare the tree types of solutions and dip the ground nut in them simultaneously and note your observations.

**MCQs:**

**1. What is the function of the plasma membrane in a cell?**

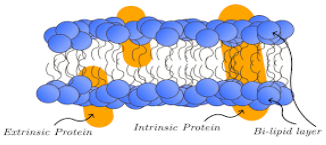
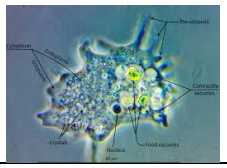
A. It produces energy for the cell
B. It transports blood to the cell

`

C. It separates the contents of the cell from its external environment
D. It controls the genetic information
**Answer:** C. It separates the contents of the cell from its external environment
**2. Why is the plasma membrane calling a selectively permeable membrane?**
A. Because it blocks all materials from entering or exiting the cell
B. Because it allows all materials to freely pass in and out
C. Because it allows only certain substances to pass in and out of the cell
D. Because it is impermeable to water
**3. Which process allows substances like oxygen and carbon dioxide to move across the cell membrane?**
A. Osmosis
B. Diffusion
C. Active transport
D. Endocytosis
**4. What causes carbon dioxide to move out of the cell through the plasma membrane?**
A. The cell's desire to absorb oxygen
B. High concentration of carbon dioxide outside the cell
C. High concentration of carbon dioxide inside the cell
D. Low concentration of oxygen inside the cell
**5. In which direction do substances move during diffusion?**
A. From low concentration to high concentration
B. In random directions
C. From high concentration to low concentration
D. Against the concentration gradient using energy

**Chapter: Fundamental Unit of Life Grade: 9 Subject: Biology Period:5**
**Concepts covered:**
1. Activity-5.3 (Osmosis with an egg)
2. Activity-5.4(Dried raisins or apricots)
3. Structure of plasma membrane
**Learning outcomes:**
1. Conduct the experiments to prove osmosis.
2.Give examples for osmosis in daily life.
3. Appreciates the benefits of osmosis in our daily life.
4. Explain the structure of plasma membrane.
**Prior knowledge and skills:**
1. The concept of diffusion
2. Movement of water molecules in and out when the cell is kept in hypotonic solution, isotonic solution and hypertonic solution
**Teacher resources:**
**https://youtu.be/rCNlG_j_gSM?si=w4UE28WCoq0HXTto**
**TLM:** Materials to do the osmosis experiment with egg, images of cell membrane
**Induction:** BY probing questions teacher induces thoughts to conduct the experiments.
Does the egg membrane act as plasma membrane? How can we prove it?

`

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| **LABACTIVITY**<br>• The teacher guides the students to perform the lab activity by using HCL, raw egg, salt solution and water.<br>• The teacher takes utmost care and instructs the students to be cautious while working with acid in the lab.<br>  <br>• Induces the observation while the egg is kept in dilute HCl by asking What happens when egg is placed in dilute HCL solution?<br>• After complete deshelling or complete dilution of calcium carbonate take out the egg carefully and place it in water.<br>• Asks to imagine what happens if this egg is placed in salt water<br>• The teacher guides the students to perform the activity of osmosis using raisins, water, sugar solution or salt solution.<br>• Initiates the discussion about the applications of diffusion and osmosis in our lives and nature.<br>• Display the image of plasma membrane and explain the structure as it is flexible and is made up of organic molecules called as lipids and proteins. It can be observed under only electron microscope.<br>• Exhibit the image of amoeba engulfing the food and discuss.<br>• Explains that the flexibility of the cell membrane also enables the cell to engulf in food and other material from its external environment and this is called as Endocytosis.<br>  <br>  | • Keenly observe the deshelling of the egg when it is dipped in HCl solution.<br>  <br>• Students hypothesize that the deshelled egg may swell when it is kept in pure water.<br>• Observe the changes when the deshelled egg is placed in pure water.<br>• Note the observation that the egg swells.<br>• Hypothesize that it shrinks.<br>• The students engage in placing the egg in salt water, observe and note the observations that it shrinks.<br>• Conduct the experiment with raisins.<br>• Appreciate the process of diffusion and osmosis in assisting the life processes.<br>• Prepare the model of plasma membrane. | • Report the whole experiment process in the lab record systematically.<br>• Report the procedure and observations in the experiment with raisins in the lab record.<br>• Write a note on structure and function of plasma membrane.<br>• Undertakes the project work on information collection about Electron microscope.<br>• Write a note on endocytosis in amoeba. |

**Summary:**

1. Osmosis and diffusion are the two processes that help in transporting the gases, other substances and water in and out of the cell as per the need to facilitate proper functioning of the

`

life processes.

**CFU**

Factual questions

1. What is endocytosis?
2. What are the applications of diffusion and osmosis?

Open ended questions

1. What may happen if osmosis/ diffusion takes place in reverse?

**Assignment/ Quiz/ Home work:**

**1. What happens when a de-shelled egg is placed in pure water?**

A. The egg shrinks due to loss of water
B. The egg remains the same
C. The egg swells due to water entering by osmosis
D. The egg dissolves completely

**2. Why does a de-shelled egg shrink in a concentrated salt solution?**

A. The egg shell reforms
B. The salt enters the egg
C. Water moves out of the egg due to osmosis
D. Salt breaks down the egg membrane

**3. What is observed when dried raisins or apricots are placed in plain water?**

A. They dissolve completely
B. They swell due to absorption of water
C. They shrink due to loss of water
D. Their colour changes

**4. Which of the following processes allows unicellular organisms and plant roots to absorb water?**

A. Endocytosis
B. Active transport
C. Diffusion
D. Osmosis

**5. How does Amoeba acquire its food from the environment?**

A. By osmosis
B. By endocytosis
C. By diffusion
D. By exocytosis

**Chapter: Fundamental Unit of Life Grade: 9 Subject: Biology Period:6**

**Concepts covered:**

- 5.2.2: Cell Wall,
- Activity-5.6 (Rhoeo leaf peel).

**Learning outcomes:**

1. Conduct plasmolysis experiment to observe the cell wall.
2. Explain the roll of cell wall.

**Prior knowledge:**

Cell membrane, functions of plasma membrane,

**Teacher resources:**

https://youtu.be/9L511cjGv7o?si=4ehC-sjS2l8AT2gq

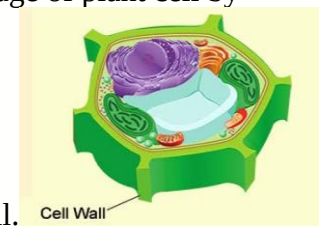
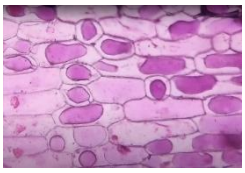
**TLM:** Materials to do plasmolysis experiment, images of cell wall

**Induction:**

Narrate a situation where you are waking on a natural bridge which is abundant with small plants to heavy trees beside a river and suddenly a heavy blow of air hits the bridge. Imagine the

`

consequences and present. Then the students may bring the responses such as they may fell down or may blow away along with the blow of air. Then the teacher asks about trees. What may happen to them? The students think about the plants or trees for not being affected. The teacher probes the questions "Why?"

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Induces the thinking by probing questions like why do the plants need to have a rigid cell covering?<br>• Display the image of plant cell by labelling cell wall.  <br>• Teacher explains about the cell wall that it is the rigid layer made up of cellulose.<br>• Ans also explains that by performing plasmolysis the cell wall can be observed.<br>• Plans the experiment to do plasmolysis.<br>• Teacher explains about the cell wall that can be observed in a plasmolyzed cell<br>• Teacher takes another leaf, boils it and then mounts it. Put some strong salt solution to it and observed.<br>• Teacher explains the functions of cell wall as Cell walls permit the cells of plants, fungi and bacteria to withstand very dilute external media without bursting. In such media the cells tend to take up water by osmosis. The cell swells, building up pressure against the cell wall. The wall exerts an equal pressure against the swollen cell. Because of their walls, such cells can withstand much greater changes in the surrounding medium than animal cells. and also explains the absence of cell wall in the animal cell. | • The students respond that the plants face lots of natural attacks. To withstand natural pressures, the plant cells need a rigid wall.<br>• Engage in removing leaf peal activity and followed by slide preparation.<br>• Teacher involves the students in discussion that what do we need to do to take out water from the cells.<br>• Gets the response that the salt solution to be added to the specimen.<br>• Perform the same action and observes the difference.<br>  <br>• The students do not observe the plasmolysis in the boiled leaf.<br>• Students and students engage in the discussion that in hypotonic media the cells tend to take up water by osmosis. The cell swells, building up pressure against the cell wall. The wall exerts an equal pressure against the swollen cell. Because of their walls, such cells can withstand much greater changes in the surrounding medium than animal cells. | • Draw the image of plant cell.<br>• Write the procedure of plasmolysis experiment in the lab record.<br>• Write a brief note on how the cell wall keep the plant cell to withstand the pressure exerted by osmosis. |

**Summary:**

1. Cell wall exists only plant cell which is rigid and permit the cells to withstand very dilute external media without bursting. It exerts equal pressure to withstand the pressure exerted by osmosis. It can be observed in a plasmolyzed cell.

**CFU**

`

**Factual questions**

1. What are the functions of cell wall?
2. What is it made of?
3. What is plasmolysis?

**Open ended questions**

1. What may happen if the cell wall is removed in a plant cell?

**Assignment/Quiz:**

**1. What is the main component of the plant cell wall?**

A. Protein
B. Starch
C. Cellulose
D. Glucose

**2. What phenomenon occurs when a living plant cell loses water through osmosis?**

A. Diffusion
B. Plasmolysis
C. Respiration
D. Transpiration

**3. What does the activity with boiled Rhoeo leaves demonstrate?**

A. Dead cells can still perform plasmolysis
B. Living cells cannot absorb water
C. Only living cells undergo plasmolysis
D. Boiling increases osmosis

**4. Why don't plant cells burst in hypotonic solutions?**

A. They don't absorb water
B. The cell membrane is impermeable
C. The cell wall provides structural support
D. The chloroplasts block water

**5. What happens to a plant cell in a hypotonic solution?**

A. It shrinks and dies
B. It bursts due to excess water
C. It swells and builds pressure against the cell wall
D. It undergoes plasmolysis

**Chapter: Fundamental Unit of Life** **Grade: 9** **Subject: Biology** **Period:7**

**Concepts covered:**

5.2.3. Nucleus - Activity-5.7 (Observation of cheek cells)

**Learning outcomes**

1. Prepare the temporary slide of human cheek cell and observe the nucleus

**Prior knowledge:** Knowledge about slide preparation.

**Teacher Resources:** https://youtu.be/1R4rpX3xNms?si=GEEj_RVx22PtkhtQ

**TLM:** Materials to observe the human cheek cell

**Induction:**

By asking some questions rise the interest to learn

1. In onion peel activity, we have observed dark colored structures in the cells. What are those dark - colored structures?
2. Do we find the same structure in animal cell too?

`

Summary:

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Teacher demonstrates the activity in human cheek cells<br>• Teacher asks the students observe and draw their observations by inducing the following lines.<br>• Do you observe dark colored structures in the cells?<br>• Teacher defines it as Nucleus<br>• Teacher starts discussion by comparing the nucleus in cheek cells and onion peel cell. | • Meanwhile asks questions and lead to some discussions.<br>1. What are the stains that are used to<br>• observe nucleus in the cells? (Iodine, safranin or methylene blue are used to stain the cells.)<br>2. What is the shape of the nucleus observed in the cells?<br>3. How many are there in each cell?<br>• Students observe the slide and draw their observations.<br>Students write their observation as they have observed different shapes of cells with round distinct rounded structures.<br>• Students compare and write that the nuclei in both cheek cell and onion peel cell are rounded structures but in onion peel cells the nucleus is pushed towards cell membrane whereas the nucleus in animal cell is at the center.<br>• Students hypothesize the reason for it. | • Write the detailed report about the cheek cell observation and the nucleus in it. |

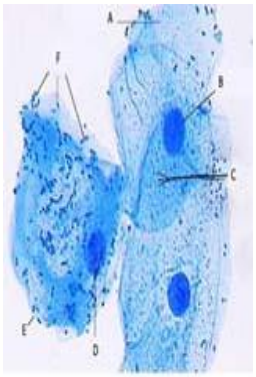


Figure 3.1

The Nucleus is rounded structure that is found in all the cells. It is placed near to the cell membrane in plant cell and at the center in animal cell.

**CFU**

Factual questions

1. Where is the nucleus located in plant cell and animal cell?

Open ended questions

1. What if the same stain used in slide preparation of cheek cell as we used in onion peel cell?

**Assignment/ Quiz:**

**1. Which of the following stains is commonly used to observe cheek cells?**

A) Iodine solution
B) Safranin
C) Methylene blue
D) Vinegar

**2. What is the darkly colored structure seen in the center of both onion and cheek cells?**

A) Cell wall
B) Cytoplasm
C) Nucleus
D) Vacuole

**3. Which of the following features is present in onion cells but absent in cheek cells?**

A) Cell membrane
B) Nucleus
C) Cytoplasm
D) Cell wall

**4. Methylene blue stain is commonly used to observe _____ cells.**

**5. Without using any stain, the internal parts of onion cells are clearly visible under the**

`

**microscope. (TRUE/FALSE)**

**Chapter: Fundamental Unit of Life** **Grade: 9** **Subject: Biology** **Period:8**

**Concepts covered:**

1. Structure and functions of Nucleus
2. Differences between prokaryotes and eukaryotes.

**Learning outcomes**

1. Explain the structure and functions of nucleus.
2. Hypothesize the consequences if the nucleus is removed from the cell.
3. Differentiate prokaryotes and eukaryotes with examples.

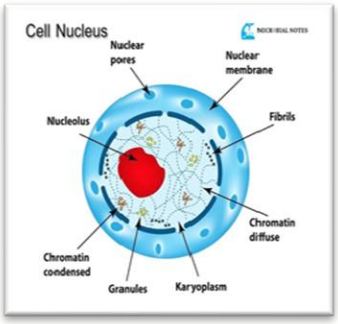
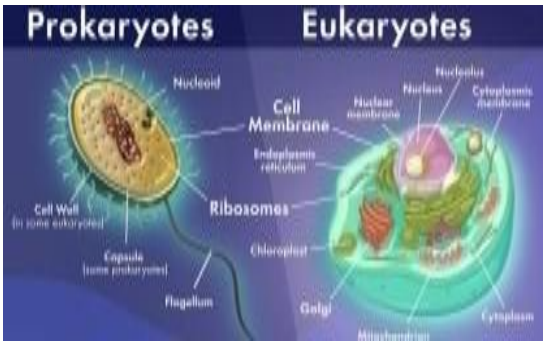
**Prior knowledge:** Knowledge about Nucleus presence in the cell.

**TLM:** Image of nucleus

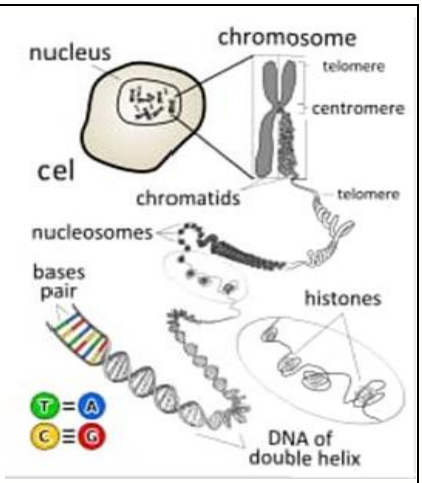
**Induction:**

Narrate the following situation: There is supermarket where there are some sweepers, shopkeepers and computer operator at billing section. But recently the owner has died. No one is there to look after the supermarket. What may be situation? What if instead of the owner any sweeper or any other leaves the job? Do we face same situation in both the scenario? What is the difference between Owner and a sales person? Who is there to coordinate all the people, material and finance? Is it owner or anyone else?

Thus induce the importance of Nucleus as the controlling unit of the cell.

| **Explicit Teacher Modelling** | **Group Work** | **Individual Work** |
|---|---|---|
| • Introduce the concept of the **nucleus** and show a labelled diagram of a **eukaryotic cell**, pointing out the **nuclear membrane**, **pores**, **chromosomes**, and **nucleoid**.<br>  | Students work in groups to **compare prokaryotic and eukaryotic cells** using a Venn diagram or chart.<br>  | Label a blank diagram of a **cell** (both prokaryotic and eukaryotic) showing the nucleus, nucleoid, and other relevant structures. |
| Explain the **structure of the nuclear membrane** and demonstrate how pores function for exchange of materials using an analogy or video. | Groups create a model (paper or clay) of a **nucleus**, indicating chromatin, DNA, and nuclear pores. | Write a short paragraph explaining the **role of the nuclear membrane and pores** in material exchange. |

`

| Explicit Teacher Modelling | Group Work | Individual Work |
|---|---|---|
|  <br>Use visuals or animations to show how **chromatin condenses into chromosomes** during cell division. | Discuss how **genes and DNA** influence characteristics passed from parent to offspring. Each group presents one real-life trait example. | Complete a worksheet identifying the **differences between chromatin and chromosomes**, and when each is visible. |
| Clarify the difference between **prokaryotic and eukaryotic cells**, and define terms like **nucleoid** and **organelles** with examples. | Groups read short case studies of a **prokaryote (e.g., bacteria)** and a **eukaryote (e.g., plant cell)** and list structural differences. | Answer textbook questions based on the structure and function of the nucleus. |
| Summarize the role of the **nucleus in reproduction and cell development**, emphasizing the role of DNA and genes. | In pairs, create a flowchart showing the process from **DNA → Gene → Trait → Cell Function/Development**. | Reflective journal: "Why is the nucleus often called the control centre of the cell?" |

Summary:

1. The **nucleus** is a key cell organelle enclosed by a **double-layered nuclear membrane** with pores that allow exchange of materials between the nucleus and cytoplasm.
2. It contains **chromosomes**, which are visible as rod-like structures only during cell division. These chromosomes are made of **DNA and proteins**, and they carry genetic information passed from one generation to the next.
3. DNA contains instructions for constructing and organizing cells, and its functional units are called **genes**.
4. In non-dividing cells, DNA exists as **chromatin**, a thread-like mass, which condenses into chromosomes during cell division.
5. The nucleus plays an important role in **cell reproduction** and in controlling the cell's development and activities.
6. In **prokaryotic organisms** like bacteria, a well-defined nucleus is absent.
7. Instead, they have a **nucleoid**, an undefined nuclear region without a membrane.
8. These organisms are called **prokaryotes**, whereas those with a membrane-bound nucleus are called

`

**eukaryotes**.

9. Prokaryotic cells also lack most organelles found in eukaryotic cells. In photosynthetic prokaryotes, **chlorophyll** is present in membranous vesicles instead of plastids.

**CFU**

**Factual questions.**

1. What are the functions of nucleus?
2. What are the differences between prokaryotes and eukaryotes.
3. What is the full form of DNA?
4. Which type of cells lack most of the cytoplasmic organelles found in eukaryotic cells?

**Open ended questions:**

1. Why do you think prokaryotic cells are considered more primitive compared to eukaryotic cells?
2. What if the nucleus is removed from the cell?
3. Why do you think the red blood cells cannot divide?

**Assignment/ Quiz:**

**1. What is the function of the nuclear membrane pores?**

A) To store genetic material
B) To help the cell divide
C) To allow transfer of materials between the nucleus and cytoplasm
D) To produce energy for the cell

**2. In a non-dividing cell, DNA is present in the form of:**

A) Chromosomes
B) Nucleoid
C) Genes
D) Chromatin material

**3. Which of the following is a functional segment of DNA?**

A) Chromosome
B) Gene
C) Nucleoid
D) Chromatin

**4. What is the nuclear region called in prokaryotic cells?**

A) Nucleus
B) Cytoplasm
C) Nucleoid
D) Chromosome

**Chapter: Fundamental Unit of Life** **Grade: 9** **Subject: Biology** **Period:9**

**Concepts covered:**

5.2.4. Cytoplasm

**Learning outcome:** SWAT

1. Explain about cytoplasm.

Prior knowledge:

1. The students must be aware of cell membrane and cell wall which cover the fluid content of the cell.
2. Give reason "Why viruses are not considered fully living?".

**Teacher resources:** NCERT text books

**TLM:** Images of plant cell ana animal cell

**Induction:** Induce the topic as cell as the city and cytoplasm as cell city environment.

**Cytoplasm = The City's Environment**

- Introduce cytoplasm as the **"air, roads, and water"** inside the city of the cell where everything floats

`

and moves.

- It connects all the organelles like roads connect buildings.

**Summary:**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Use the **"Cell as a City" analogy** to explain cytoplasm in a story format. Show a diagram of the cell and point to the cytoplasm.<br>• Show a **microscopic image** or video of cheek/onion cells. Explain how cytoplasm looks under the microscope. Use jelly/slime model to show how organelles are suspended. Emphasize cytoplasm = fluid + organelles.<br>• Demonstrate the **Jelly City in a Bag** model. Place beads/buttons inside slime/jelly to represent organelles. Explain how cytoplasm keeps things in place yet allows movement.<br>• Draw a T-chart on board: Prokaryotes vs. Eukaryotes. Explain using examples (bacteria vs. human cell). Focus on **membrane-bound organelles**. Use virus as an example of a non-living thing due to absence of membranes. | • Students listen, imagine, and draw<br>parallels from real life (e.g., school, city).<br><br>• Each group receives a zip lock bag, slime, and small items to build their own model. One member labels, one mixes, one explains.<br><br>  <br><br>• Students fill a comparison table on a worksheet with 3 key differences between prokaryotes and eukaryotes. Discuss in pairs. | • Students take notes, write down definitions of cytoplasm and cell organelles.<br>• Students observe and sketch their group's model in notebooks.<br><br>• Students write a short explanation: "Why viruses are not considered fully living." |

The cytoplasm is the fluid content inside the cell membrane that holds and supports various membrane-bound organelles. It plays a vital role in cell functions and is absent in prokaryotes, highlighting the difference from eukaryotic cells.

**CFU**

**Factual Questions:**

1. What is cytoplasm?
2. Name two things found in cytoplasm.
3. Why is cytoplasm important?

**Open ended questions:**

1. How do you think the cytoplasm helps in the overall functioning and survival of a cell?
2. Why do you think membrane-bound organelles are important in eukaryotic cells but not found in prokaryotic cells?

**Assignment/ Quiz:**

**1. What is the cytoplasm?**

A) The outer covering of a cell
B) The control centre of the cell
C) The fluid content inside the plasma membrane
D) A type of cell organelle

**2. Which of the following statements is true about prokaryotic cells?**

A) They have a well-defined nucleus

`

B) They contain membrane-bound organelles
C) They lack a defined nuclear region and membrane-bound organelles
D) They have all organelles found in eukaryotic cells

**3. In a cell, the cytoplasm helps by:**

A) Protecting the cell from outside harm
B) Transporting oxygen in the blood
C) Suspending and supporting organelles
D) Controlling cell division

**4. Which of the following is an example of a cell that shows absence of membranes and requires a host to function?**

A) 5Bacteria
B) Virus
C) Fungi
D) Amoeba

**5. Why are membrane-bound organelles important in eukaryotic cells?**

A) They help the cell float in water
B) They keep the cell warm
C) They perform specific functions separately and efficiently
D) They help in reproduction of viruses

**Chapter: Fundamental Unit of Life Grade: 9 Subject: Biology Period:10**

**Concepts covered:** 5.2.5-Introduction of Cell organelles.

**Learning outcome**:

1. List out the cell organelles found in the cytoplasm

**Prior knowledge:** The students must have the knowledge of cytoplasm inside the cell.

**TLM:** Material to make the model of cell

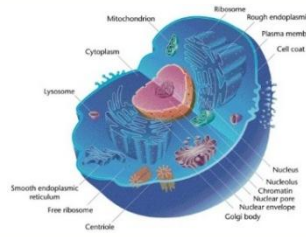
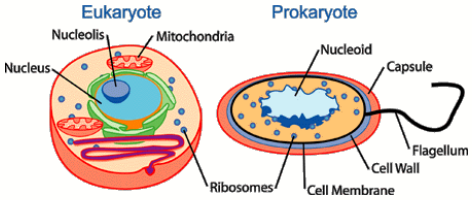
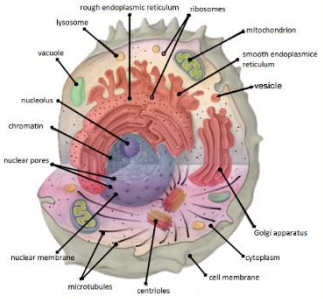
**Teacher resources:** https://youtu.be/GGW2_JMnIQI?si=L-k0zRAGiLWb0jht

**Induction:** Ask the students to bring the zip lock bag prepared in the last class and follow the discussion.

Cytoplasm = The City's Environment

- Introduce cytoplasm as the "air, roads, and water" inside the city of the cell where everything floats and moves.
- It connects all the organelles like roads connect buildings.
- Cell Membrane = City Boundary/Wall
- Controls what comes in and out—like gates.
  Organelles = Buildings/Factories
- Each one has a specific job (like a post office, power plant, etc.).
  Zip lock bag represents the same: "The jelly is like the cytoplasm—it holds everything in place but still allows things to move around. Just like your body needs space to work, a cell needs cytoplasm. The buttons are cell organelles that float in the cytoplasm."

`

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Begin with a question: *"Why do you think a large city has different departments for electricity, water, waste, etc.?"* Relate this to the **need for specialized organelles** in complex cell.<br>  <br><br>• Use a **diagram or animation** of a eukaryotic cell. Highlight each organelle: ER, Golgi apparatus, mitochondria, lysosomes, plastids. Explain the role of membranes in separating functions. Use a chart to compare **prokaryotic vs. eukaryotic** cells.<br>  <br><br>Use the **"Factory Analogy"**:<br>Nucleus = Manager's office<br>ER = Assembly line<br>Golgi = Packaging center<br>Mitochondria = Power plant<br>Lysosomes = Cleaning unit<br>Plastids = Storage and color unit (for plants) +<br>  <br><br>• Display a **T-chart** of Prokaryotic vs. Eukaryotic cells. Discuss lack of organelles in prokaryotes and how eukaryotes evolved complex structures. | • Participate in the discussion and write a quick answer: *"Why would a complex cell need many internal compartments?"*<br><br>• In groups, students build a **paper or clay model** of a eukaryotic cell showing different organelles with labels and analogies.<br><br>• Groups discuss: *"What might happen if a cell didn't have mitochondria or lysosomes?"* Share answers with class. | • List out the cell organelles.<br><br>• Students complete a worksheet matching each organelle with its correct function. |

**Summary:**

Eukaryotic cells contain membrane-bound organelles that help separate and perform various essential chemical activities.

Organelles like ER, Golgi apparatus, mitochondria, lysosomes, and plastids play crucial roles in maintaining cell functions.

**CFU:**

**Factual questions:**

1. What are the cell organelles?
2. List out the cell organelles.?

`

**Open ended questions:**

1. Which organelle did you find most interesting and why?
2. What may happen if all the cytoplasm comes out of the cell?

**Assignment/Quiz:**

**1. What is the main function of the cell membrane?**

A) To produce energy for the cell
B) To separate cell contents from the external environment
C) To store genetic material
D) To control cell division

**2. Why do complex eukaryotic cells need membrane-bound organelles?**

A) To reduce cell size
B) To store water
C) To separate different chemical activities within the cell
D) To increase the number of nuclei

**3. Which of the following is not a membrane-bound organelle?**

A) Mitochondria
B) Endoplasmic Reticulum
C) Golgi Apparatus
D) Ribosome

**4. Which microscope is required to see most membrane-bound organelles clearly?**

A) Simple microscope
B) Light microscope
C) Electron microscope
D) Compound microscope

**5. Which feature distinguishes eukaryotic cells from prokaryotic cells?**

A) Presence of cell wall
B) Presence of cytoplasm
C) Presence of membrane-bound organelles
D) Ability to divide

**Period:11**

**Concepts covered:**

5.2.5.I Endoplasmic Reticulum

**Learning Outcome:**

1. Explain the structure and functions of Endoplasmic reticulum
2. Draw the diagram of ER

**Prior knowledge:** The students must have the knowledge of Cell and cell organelles.

Teacher resources:

**Endoplasmic Reticulum and Golgi Bodies | Biology | Khan Academy**

https://youtu.be/6UqtgH_Zy1Y?si=_HZ6DB7rGmeMG0_r

**TLM:** Images of ER

**Induction:**

"Imagine a big factory. What happens there? How are things made and transported?"

Let students share responses: manufacturing, packaging, transporting, etc.

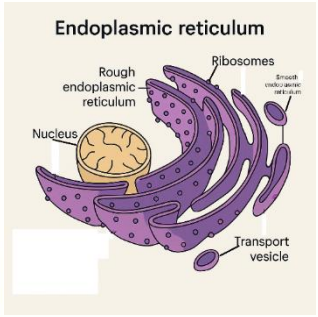
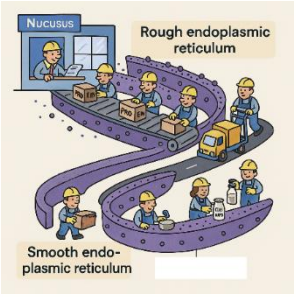
Now ask:

"Do you think something similar happens inside our cells? Where do proteins and fats get made? How are they transported?"

Transition to the topic:

`

"Today, we'll explore a very important part of the cell that works like a mini factory — the **Endoplasmic Reticulum (ER)**."

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Begin with a **trigger question**: "How do products move inside a factory?" to link to the idea of the ER.<br>  <br>• Show a **diagram or animation** of a cell highlighting the ER.<br>• Explain the **structure** of ER (tubules, vesicles, membrane).<br>• Differentiate between **RER and SER** using side-by-side images.<br>• Describe the **functions**:<br>• RER: Protein synthesis and transport<br>  <br>• SER: Lipid synthesis, detoxification, membrane biogenesis.<br>• Use a **factory analogy**: RER as an assembly line with workers (ribosomes), SER as the oil/lipid department. | • **"ER Role Play – The Cell Factory"** (10–15 minutes)<br>- Divide students into groups of 6–8.<br>- Assign each student a role: Nucleus, Ribosomes, RER, SER, Vesicles, Proteins, Lipids.<br>- Each group acts out the ER functioning:<br>• Ribosomes attach to RER and "build" proteins<br>• SER students make "lipids"<br>• Transport students move proteins/lipids to different areas<br>- Each group presents briefly to the class. | • Students complete a **worksheet** that includes:<br>1. Diagram labeling (RER, SER, Ribosomes, Nucleus)<br>2. Fill in the blanks (functions of RER and SER)<br>3. Short answer questions:<br>"What is membrane biogenesis?"<br>"Why does SER play a role in detoxification?"<br>• Draw and color the ER with proper labels and write 5 key functions in their notebooks.<br>• Make the model of ER |

**Summary:**

1. The endoplasmic reticulum (ER) is a network of membrane-bound structures that helps in the synthesis and transport of proteins (by RER) and lipids (by SER).
2. It also supports membrane biogenesis and detoxification in liver cells.

**CFU**

**Factual questions:**

1. How many types of Endoplasmic reticulum exist in a cell? What are they?
2. What are the functions of SER and RER? / Differentiate SER and RER.

**Open ended questions:**

1. Why do you think the cell needs two types of Endoplasmic Reticulum – RER and SER – instead of just one?
2. How would the functioning of a cell be affected if ribosomes were not attached to the RER?
3. Can you think of real-life examples or analogies where something is made in one part and then transported to another, similar to what happens in the ER?
4. If you were to design a cell as a factory, what departments would you compare RER and SER to, and why?

**Assignment/ Quiz:**

**1. Which of the following structures gives the rough endoplasmic reticulum (RER) its rough**

`

**appearance?**

A. Lipids

B. Ribosomes

C. Vesicles

D. Nucleus

**2. The smooth endoplasmic reticulum (SER) is mainly involved in the synthesis of:**

A. Carbohydrates

B. Nucleic acids

C. Proteins

D. Lipids

**3. Which of the following is *not* a function of the endoplasmic reticulum?**

A. Transport of materials

B. Protein and lipid synthesis

C. Photosynthesis

D. Membrane biogenesis

**4. In which type of animal cells does SER help in detoxifying drugs and poisons?**

A. Insect cells

B. Fungi cells

C. Vertebrate liver cells

D. Blood cells

**5. Which of the following best describes the structure of the endoplasmic reticulum?**

A. Fluid-filled sacs and mitochondria

B. Network of tubes and vesicles

C. Single-layered cell wall

D. Spherical organelles

**Period:12**

**Concepts covered:**

5.2.5.II Golgi apparatus.

Learning Outcome:

1. Explain the structure and function of Golgi apparatus.
2. Appreciate the efforts of Camillo Golgi in the discovery of Golgi apparatus.

Prior knowledge: The students must have the knowledge about the proteins, Cell and Cell organelles briefly.

**Teacher resources:**

https://www.y outube.com/w atch?v=VG8sBr y45DE&t=34s

**TLM:** Golgi complex images

**Induction activity:**

1. Set the Scene: Begin by asking: "What happens to a package when you order something online? Who processes it, packages it, and sends it out?"
2. Group Simulation: Divide students into small groups and assign them roles:

a. ER workers: write or draw a product (like a protein or simple sugar)

b. Golgi workers: receive the product, label it, modify it (add notes, stickers, or fold it), and pack it into an “envelope” or “box”

c. Delivery team: decide where the product goes — within the “cell” or outside it

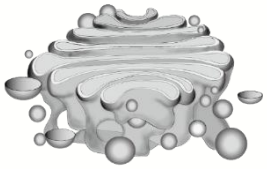
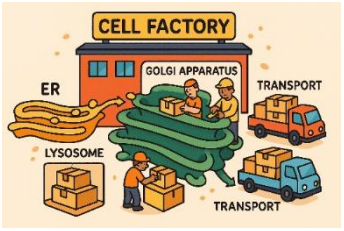
d. Debrief Discussion

After the mini-roleplay, discuss:

- “Which part of the system modified and packaged the items?”
- “What does that remind you of inside a cell?”

`

- Introduce the Golgi apparatus as the ‘post office’ of the cell — modifying, packaging, and sending off cellular materials

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
|  <br>• Introduction with Analogy: Introduce the cell as a factory and the Golgi apparatus as the “Post Office” or Shipping Department of the cell.<br><br>• Explain Structure<br>Use a diagram/chart to explain the structure:<br>- Stacks of cisterns<br>- Vesicles<br>- Connection to ER<br>• Explain Functions<br>Discuss the functions:<br>- Modification and packaging<br>- Formation of lysosomes<br>- Sugar conversion<br><br>• Camillo Golgi’s Life and Contribution<br>Share a short story-style narrative about Camillo Golgi’s life, the invention of the ‘black reaction’, and his Nobel Prize. | • Discuss real-world systems (like a post office or courier service) and relate them to parts of the cell. Provide cell<br>  <br>diagrams (blank or partially labelled) for groups to label and identify the Golgi apparatus and ER.<br><br>• Create flashcards with each function written on one side and its explanation on the other; quiz each other in groups.<br><br>• Arrange a timeline puzzle with key events from Golgi's life (date cards and event cards to be matched). | • Share examples of how products are packed and shipped in real life and connect them to what might happen inside a cell.<br><br>• Label the diagram individually and identify the cisterns and vesicles.<br>• Complete a table: Function of Golgi Apparatus<br><br>• Undertake a project work on the research work of Camillo Golgi |

**Summary:**

1. The Golgi apparatus is a stack of membrane-bound sacs that modifies, stores, and packages materials from the ER for transport inside and outside the cell.
2. It also helps form lysosomes and can convert simple sugars into complex sugars.

**CFU:**

**Factual questions:**

1. What are the functions of Golgi apparatus?
2. Who discovered Golgi apparatus?

**Open ended questions:**

1. What could happen to a cell if the Golgi apparatus stopped functioning properly?
2. Why do you think the ability to convert simple sugars into complex sugars is important for the cell?

**Assignment/ Quiz:**

**1. Who first discovered the Golgi apparatus?**

A) Robert Hooke
B) Anton van Leeuwenhoek
C) Camillo Golgi

`

D) Rudolf Virchow

**2. What are the flattened membrane-bound sacs of the Golgi apparatus called?**

A) Vesicles

B) Cisterns

C) Mitochondria

D) Ribosomes

**3. Which organelle is directly connected to the Golgi apparatus and helps in transporting materials to it?**

A) Nucleus

B) Mitochondria

C) Endoplasmic Reticulum (ER)

D) Ribosomes

**4. What is one of the main functions of the Golgi apparatus?**

A) Photosynthesis

B) Respiration

C) Protein synthesis

D) Packaging and transporting materials

**5. The Golgi apparatus is involved in the formation of which of the following?**

A) Ribosomes

B) Chloroplasts

C) Lysosomes

D) Nucleolus

**Period:13**

**Concepts covered:**

- 5.2.5.III Lysosomes.
- 5.2.5. IV Mitochondria

**Learning Outcomes:**

1. Explain the structure and function of lysosomes.
2. Explain the structure and function of mitochondria.
3. Give reason for naming mitochondria as power house of the cell.
4. Give reason for naming lysosomes as suicidal bags of the cell.

**Prior knowledge:** The students must have the basic knowledge of cell and cell organelles. **Teacher resources:** https://www.you tube.com/watch? v=pVWJz0jjFZo

**TLM:** Images of mitochondria and lysosomes.

**Induction activity:** Trigger Curiosity with a Story

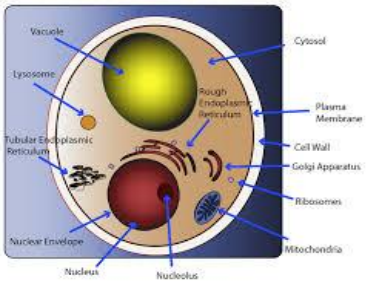
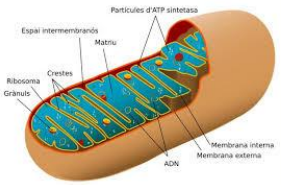
- Tell a short story: “Imagine your house has two important systems:
- A **cleaning robot** that eats garbage, broken furniture, and even invaders like pests.
- A **power station** that keeps your lights, fridge, and everything running smoothly.

What do you think would happen if either one stopped working?”

Pause and let students reflect or share thoughts.

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Start with an engaging question: "What do you think happens to a cell when it does not gets rid of waste?" | • In small groups, ask students to discuss what they think happens to waste in | |

`

| | | | |
|---|---|---|---|
| - Introduce lysosomes and mitochondria as key organelles of the cell.<br>• Display an image of lysosome.<br>  <br><br>• Explain the structure of lysosomes: membrane-bound sacs filled with digestive enzymes.<br>- Discuss their role in digestion and waste disposal.<br>- Introduce the concept of lysosomes as "suicide bags" (when they burst and digest the cell). | cells and what makes mitochondria unique.<br>• Observe the diagram and engage in discussion about the structure and function of lysosome. As a part of discussion, the factory<br>  <br>analogy image is displayed.<br>• Discuss why the lysosomes are called as suicidal bags. | • Work with peers to label diagrams and write a brief description of lysosome functions.<br>• Write a note on lysosomes as suicidal bags. |
|  <br>  <br><br>• Display an image of mitochondria.<br>• Introduce the mitochondria as the "powerhouses" of the cell.<br>- Show a 3D model or diagram of mitochondria and highlight the outer and inner membranes, emphasizing the folds of the inner membrane.<br>- Explain ATP production and its importance. | • In groups, students research and discuss how the structure of the mitochondria supports its function (e.g., inner folds for surface area).<br>- Share findings with the class. With the help of a teacher generate a factory analogy image of mitochondria. | • Write a not on structure and function of mitochondria and draw the diagram. |

Summary:

1. Lysosomes are membrane-bound sacs with digestive enzymes that break down waste, foreign materials, and worn-out organelles, earning them the name "suicide bags" due to their self-destructive potential.
2. Mitochondria, known as the cell's powerhouses, have a double membrane with inner folds that aid ATP production—the energy currency of the cell.
3. They release energy needed for cellular activities and mechanical work.
4. Unusually, mitochondria have their own DNA and ribosomes, allowing them to produce some proteins independently.

**CFU:**

**Factual questions:**

1. Why lysosomes are called as suicidal bags?
2. What is the function of lysosome?
3. Why the mitochondria are known as power houses of the cell?
4. What is the main function of mitochondria?

**Open ended questions:**

1. What could happen to a cell if its mitochondria were damaged or not functioning properly?
2. Can you think of any diseases or conditions that might result from problems with lysosomes or mitochondria?

**Assignment/Quiz:**

**1. What is the primary function of lysosomes in a cell?**

`

A) Protein synthesis
B) Energy production
C) Digestion of waste and foreign materials
D) Transport of nutrients

**2. Why are lysosomes called the "suicide bags" of the cell?**

A) They produce toxic substances
B) They can digest their own cell when they burst
C) They stop the cell from growing
D) They consume all the cell's energy

**3. Which organelle is known as the "powerhouse of the cell"?**

A) Lysosome
B) Endoplasmic reticulum
C) Ribosome
D) Mitochondrion

**Period:14**

**Concepts covered:**

- 5.2.5. V Plastids
- 5.2.5. VI Vacuoles.

**Learning outcomes:**

1. Explain different types of plastids, their location, structure and function.
2. Differentiate chloroplast, chromoplast and leucoplast.
3. Explain the function of vacuole.

**Prior knowledge:** The students must have the understanding about the water absorption by plants, photosynthesis and different colors of flowers.

**Teacher resources:** https://ww w.youtube.com/watch?v=FuVw8VhXb9w

**TLM:** Images of plastids and vacuoles

**Induction:**

- **Set the Scene:** Begin by saying, *"Today, you're explorers inside a plant cell! Your mission is to find two hidden treasures—one that makes food and one that stores it."*

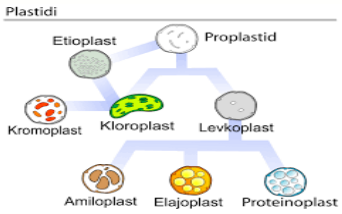
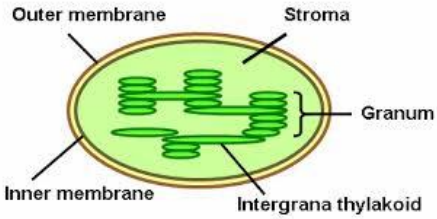
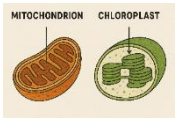
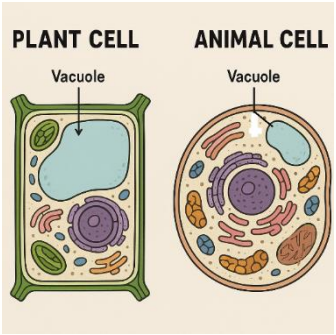
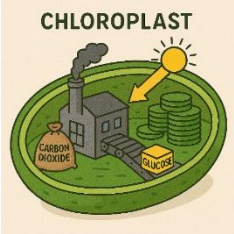
**Clue Hunt:**

- Give students short **clue cards** describing **chloroplasts** (e.g., "I use sunlight to make food") and **vacuoles** (e.g., "I store important things like water and sugar").
- Ask students to match the clues to parts of the plant cell on the model/chart.
- **Discovery Moment:** Once students guess the organelles, reveal their names—**Plastids (Chloroplasts & Leucoplasts)** and **Vacuoles**.
- **Discussion Prompt:** Ask:

*"Why do you think only plant cells have chloroplasts?"*
*"What would happen to the cell if the vacuole wasn't there to store water?"*

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Briefly introduce cell organelles; show diagram of a plant cell with labelled organelles. | • In groups, sort "plastid function cards" into two categories: chloroplasts vs leucoplasts. | • Write a note on similarities between mitochondria and |

`

| | | |
|---|---|---|
| Explain types of plastids using diagrams and real images (if possible). Use analogy (e.g., solar panel for chloroplasts).<br>  <br>  <br>• Compare mitochondria and chloroplasts in terms of structure (double membrane, own DNA).<br>  <br>• Show vacuole structure in plant vs. animal cells using visuals.<br>  <br>Demonstrate turgidity with a balloon analogy. | • With the help of teacher generate analogy diagram of chloroplast.<br><br>• Group discussion: Similarities between mitochondria and chloroplasts.<br>  <br>• Group brainstorm: Why might plant cells need larger vacuoles than animal cells? | chloroplasts.<br><br>• Fill out a table comparing chromoplasts and leucoplasts (name, pigment, function).<br><br>• Make a note on similarity and difference between mitochondria and chloroplasts.<br><br>• Label parts of a plant cell diagram including the vacuole and write its functions.<br><br>• Make a note on size of the vacuole in plant cell and animal cell. |

**Summary:**

1. Plastids are plant cell organelles involved in photosynthesis (chloroplasts) and storage (leucoplasts), and they have their own DNA and ribosomes.
2. Vacuoles are storage sacs that help maintain cell rigidity in plants and manage storage and waste in both plant and unicellular organisms.

**CFU**

Factual questions:

What are the three types of plastids and their functions?

Why there is larger vacuole in plant cell when compare to animal cell?

Open ended questions?

1. What may be the consequence if the vacuole is smaller in plants?

**Assignment/ Quiz:**

`

**1. Which of the following plastids is responsible for photosynthesis?**
A) Leucoplast
B) Chromoplast
C) Chloroplast
D) Vacuole
**2. What is the primary function of leucoplasts in plant cells?**
A) Photosynthesis
B) Storage of materials like starch, oils, and proteins
C) Giving colour to flowers
D) Providing turgidity to the cell
**3. What substance inside the vacuole helps provide turgidity and rigidity to plant cells?**
A) Chlorophyll
B) Starch
C) Cell sap
D) Ribosomes
**4. Which of the following is true about plastids and mitochondria?**
A) Both are found only in animal cells
B) Both have their own DNA and ribosomes
C) Both are involved in waste removal
D) Both store food materials
**5. In unicellular organisms like Amoeba, what is the function of food vacuoles?**
A) Photosynthesis
B) Energy production
C) Storage of pigments
D) Contain and digest food items consumed

**Period:15**

**Chapters covered:**
5.3. Cell division.

**Learning Outcomes**

- Explain the role of cellular organization in performing life processes.
- Understand the cell as a structural and functional unit of life.
- Differentiate between mitosis and meiosis.
- Describe the purpose and outcomes of cell division processes.

**Prior Knowledge**

- Basic understanding of cells as the building blocks of life.
- Awareness of life processes like growth, repair, and reproduction.
- Basic structure of a plant and animal cell.

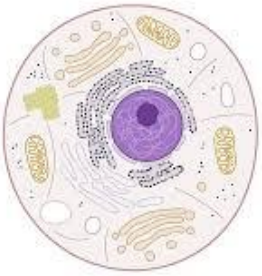
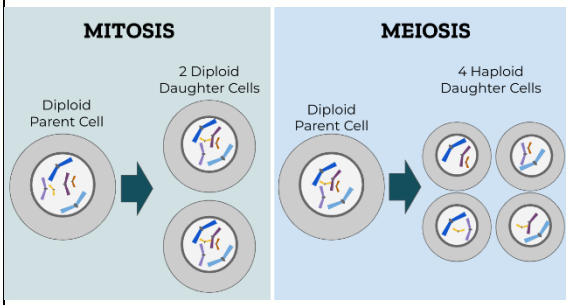
**TLM (Teaching-Learning Material)**

- Model of a cell (3D or paper craft)
- Slides or printed diagrams of mitosis and meiosis
- Flashcards with stages of cell division
- Cut-and-paste activity sheets for mitosis/meiosis

**Igniting Activity "What If Cells Never Divided?"**

Pose this thought-provoking question to the class:
*"Imagine your body never formed new cells – what do you think would happen?"*
Let students brainstorm and share responses to connect real-life importance of cell division.

`

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • Use diagrams to revise the cell membrane and organelles.<br>   <br>• Highlight how structure supports functions like respiration,<br>• nutrition, waste removal, protein synthesis<br>• Ignite with a question that how do the organisms grow and repair the damaged parts.<br><br>• Explain types of cell division, its purposes (growth, repair, reproduction).<br>•<br>• Use images and animations to show steps of mitosis and meiosis.<br>  <br><br>• Emphasize chromosome number differences in mitosis (same) and meiosis (half).<br>• Ask the class: "Why must gametes have half the chromosome number?" and guide thinking. | • Groups examine diagrams of animal and plant cells and analyze the organization of all the cell organelles for proper functioning of cell and facilitate life processes. Students form 2 groups: one for mitosis, one for meiosis.<br><br>• Each group prepares a flowchart showing the division process.<br>- Present to the class. | • Match organelles with their functions using cards or digital quiz.<br>• Draw and label the stages of mitosis and meiosis.<br>• Answer the question in writing: "Why is chromosome number halved in meiosis?"<br>• Complete a worksheet comparing mitosis and meiosis. |

**Summary**

1. "The cell is the basic structural and functional unit of life."
2. **Mitosis** is essential for growth and repair, while **meiosis** is crucial for reproduction.

**CFU:**

Factual questions:

1. What is cell division? How does it help the organism?
2. How many types of cell divisions are there?

Open ended questions:

1. What may happen if number of chromosomes are not doubled during mitosis?

**Assignment/Quiz:**

**1. Which of the following is called the basic structural and functional unit of life?**

A) Tissue
B) Organ
C) Cell
D) Organ system

**2. What is the main function of mitochondria in a cell?**

A) Protein synthesis
B) Digestion
C) Respiration

`

D) Reproduction

**3. Which process results in the formation of two identical daughter cells?**

A) Meiosis

B) Fertilisation

C) Budding

D) Mitosis

**4. Why is the chromosome number reduced by half in meiosis?**

A) To avoid growth

B) To maintain the species' chromosome number after fertilization

C) To form four identical cells

D) To increase chromosomes in offspring

**Teacher's Diary**

| Period No | Name of the Concept to be taught | Date | Activities Conducted during the teaching | TLM Used | Student Response 1/2/3/4/5 | Topics Intended to Reteach | Additional Resources Used to Reteach |
|---|---|---|---|---|---|---|---|
| **1** | Introduction, 1.1 What Are Living Organisms Made Up Of | | | | | | |
| 2 | 1.1 What Are Living Organisms Made Up Of | | | | | | |
| 3 | 1.2 .1What Is a Cell Made Up Of-(Plasma Membrane) | | | | | | |
| 4 | 1.2.1 What Is a Cell Made Up Of-(Plasma Membrane) | | | | | | |
| 5 | 1.2 .1What Is a Cell Made Up Of-(Plasma Membrane) | | | | | | |
| 6 | 1.2.2 Cell Wall | | | | | | |
| 7 | 1.2.3 Nucleus | | | | | | |
| 8 | 1.2.3 Nucleus | | | | | | |
| 9 | 1.2.4 Cytoplasm | | | | | | |
| 10 | 1.2.5 Cell Organelles | | | | | | |
| 11 | 1.2.5.1 Endoplasmic Reticulum | | | | | | |
| 12 | 1.2.5.2 Golgi Apparatus | | | | | | |

`

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13 | 1.2.5.3 Lysosomes, 1.2.5.4 Mitochondria | | | | | | |
| 14 | 1.2.5.5 Plastids,1.2.5.6 Vacuoles | | | | | | |
| 15 | Cell division | | | | | | |

Signature of the HM Signature of the teacher

| Teacher reflections | Action plan |
|---|---|
| What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time? | |
| 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? | |
| What additional resources or modifications could improve the effectiveness of this lesson in future implementations? | |
| How well did I adjust my teaching based on student reactions or unforeseen challenges? | |

Any other specific information:

……

……

……

# August 2025

No bag Day | Cluster Complex | Teacher Resources

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | | | | 1 NI | 2 No Bag Day |
| 3 Sunday | 4 FA - 1 | 5 | 6 | 7 | Vara 8 Lakshmi Vratham NI | 9 Second Saturday |
| 10 Sunday | 11 2.1 – 2.2 + NI | 12 | 13 | 14 | Independence day 15 | Sri 16 Krishna Ashtami |
| 17 Sunday | 18 2.2.1 – 2.2.2.1 + NI | 19 | 20 | 21 | 22 | No Bag Day 23 Cluster meeting |
| 24 Sunday | 25 2.2.2.1 | 26 2.2.2.1 | Sri 27 Vinayaka Chavithi | 28 2.2.2.2 | National Sports day 29 NI | No Bag Day 30 |
| 31 Sunday | | | | | | |

**Week1:** FA - 1

**Week 2:** 2.1 – 2.2

**Week 3:** 2.2.1 – 2.2.2.1

**Week 4:** 2.2.2.1 – 2.2.2.2

**TEACHER'S NOTES**

# September 2025

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | 1 2.2.2 to 2.3.1 | 2 | 3 | 4 | 5 Milad -Un -Nabi National Teacher's Day | 6 No Bag Day |
| 7 Sunday | 8 International Lit... Da... | 9 2.3.2 – 2.3.3 + NI | 10 | 11 | 12 | 13 Second Saturday |
| 14 Sunday Hindi Diwas | 15 International Day of Demo... | 16 2.3.3 - 2.4 + 2NI | 17 | 18 | 19 | 20 No Bag Day Cluster and SMC meeting |
| 21 Sunday | 22 NI | 23 NI | 24 Dussera Holiday | 25 | 26 | 27 |
| 28 Sunday | 29 Dussera Holiday | 30 Durgaa shtami | | | | |

N8D6E7 No bag Day

R8B1Q4 Cluster Complex

U7G8W3 Teacher Resources

**Dasara Holidays** 24.09.25 to 02.10.25

**Dasara Holidays for Minority Institutions**

27.09.25 to 02.10.25

Week1: **2.2.2 – 2.3.1**

Week 2: **2.3.2 – 2.3.3**

Week 3: **2.3.3 – 2.4**

Week 4:

Week 5:

↓ TEACHER'S NOTES ↓

`

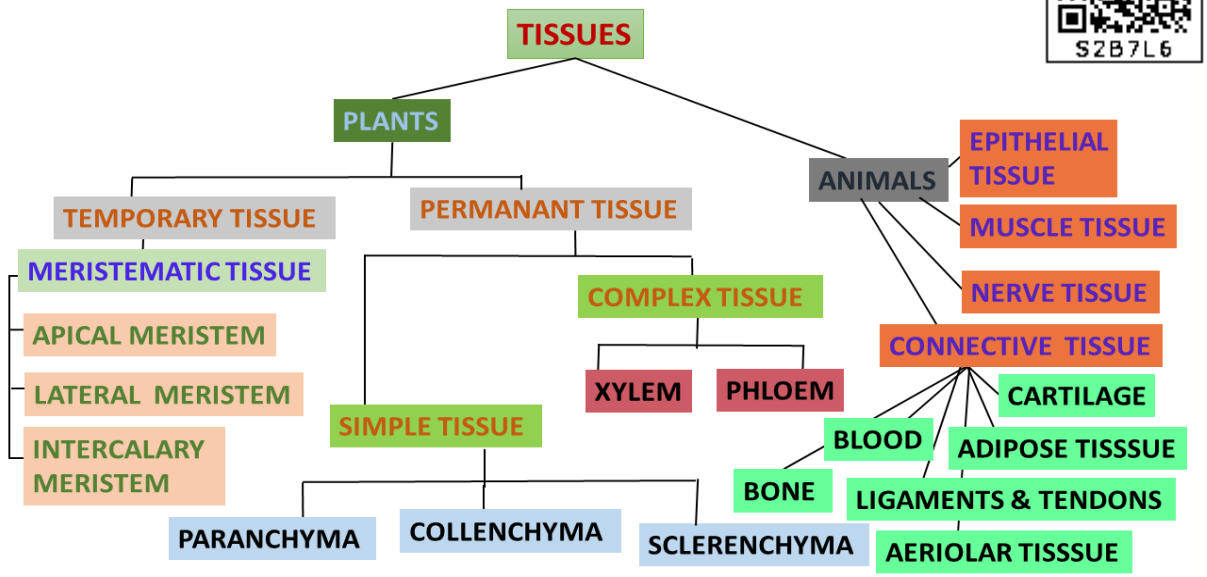
**Name of the Chapter: Tissues**

**No. Of Teaching Periods: 16** **No. of Practice Periods: 7**

**Learning Outcomes: Learners…..**

| | |
|---|---|
| Make a list of plant and animal tissues. | Compare and contrast plant and animal tissues. |
| Find the body organs having particular tissues. | Observe different tissues in plant and animal parts. |
| Identify the tissues basing on their characteristics. | Explain the role of various tissues. |

**Mind Map:**


**Period wise Topics**

| Period No. | Topic | Period No. | Topic |
|---|---|---|---|
| 1. | Introduction<br>2.1 Are Plants and Animals Made of Same Type of Tissues? | 9. | 2.2.2.2 Complex Permanent Tissue |
| 2. | 2.2 Plant Tissues<br>6.2.1 Meristematic Tissue | 10. | 2.3 Animal Tissues |
| 3. | 2.2.1 Meristematic Tissue | 11. | 2.3.1 Epithelial Tissue |
| 4. | 2.2.2 Permanent Tissue | 12. | 2.3.2 Connective Tissue |
| 5. | 2.2.2.1 Simple Permanent Tissue | 13. | 2.3.2 Connective Tissue- Blood and Bone |
| 6. | 2.2.2.1 Simple Permanent Tissue | 14. | 2.3.2. Connective Tissue – Other Tissues |
| 7. | 2.2.2.1 Simple Permanent Tissue | 15. | 2.3.3. Muscle Tissue |
| 8. | 2.2.2.2 Complex Permanent Tissue | 16. | 2.3.4 Nervous Tissue |

`

**Period 1**

**Concepts Covered:**

1. Introduction
2. Are Plants and Animals Made of Same Type of Tissues?

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

- Cells – Cell organelles
- Unicellular & multicellular organisms

**TLM Required:**

- Pictures of cells, organisms and tissues
- Video link https://youtu.be/EXnCEegLXgg
- APSCERT IX class textbook
- Plant tissues https://youtu.be/gms6BrFl6mc
- Animal tissues https://youtu.be/9NCvTNcS2lU

**Teacher Resources:**

- **APSCERT IX class textbook**

**Period 1**

**Igniting Activity:** Use pictures of animal cell, plant cell, unicellular organisms like Amoeba or Paramecium and multicellular organisms like elephant or human being.

- Ask the following questions by showing those pictures.
- (By showing a plant cell) Name the cell shown in the picture.
- (By showing the animal cell) Name the cell.
- How do the functions like protein synthesis, transportation carried inside these cells?
- Are there any special structures present?
- (By showing the picture of unicellular organism) Name this organism.
- Why does this called unicellular?
- How can it manage its functions like digestion, respiration and food collection? Are there any specialized structures inside its cell?
- (By showing the picture of multicellular organism) You know that this animal's body is made of plenty of cells and they have numerous body organs in its body. Do you imagine why do the multicellular organisms contain number of body parts like ears, eyes, legs etc.?
- The discussion can lead to the concept Tissues and the teacher continues the discussion whether both the plants and animals contain same type of tissues or not. The following work sheet helps for discussion.

Basing on the differentiation in the structure and functioning in plant and animal bodies, students can conclude they are made of different type of tissues.

**2**: Period

| **I do (Direct Instructions)** | **We do (Guided Practice)** | **You do (Independent Practice)** |
|---|---|---|
| The teacher can introduce Meristematic Tissue after the activity and explain its structure.<br>**Meristematic Tissue:** Dividing tissue, confined to the growth | The teacher can encourage students to bring two onions and keep them in water, let them observe for two days and then cut the roots of one plant about 1 cm. Then the teacher can encourage them to observe the growth of new roots in an onion. | Students can note down their observations during the activity in the following table<br>**Length** / **Day1** / **D2** / **D3** / **D4** / **D5**<br>**Onion** |

`

| | | |
|---|---|---|
| regions of stems and roots. They are located at the tips of stems and roots. Cells of meristematic tissue are very active, they have dense cytoplasm, thin cellulose walls and prominent nuclei. They lack vacuoles. | The teacher can discuss the following:<br>1. Which of the two onions has longer roots? Why?<br>2. Are the roots continue growing even after the tip of removed?<br>3. Why would the tips stop growing in jar 2 after we cut them.<br>The students can conclude that there are the growing cells in the tips of the roots. | <table><tr><td>**1**</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>**Onion 2**</td><td></td><td></td><td></td><td></td><td></td></tr></table><br>They can discuss the readings in this period. |

**Factual Questions:**

- " The tissues made by both the plant and animal body are different to one another." Support the statement.
- What is the need for multicellular organisms to have tissues?

**Open Ended Questions:**

- 'Tissues are the intermediary components in the structural arrangement of multicellular organisms" Comment.

**Evaluation/Quiz/ Assignment:**

- Explain the procedure for observing the regions of meristematic tissues in the roots of plants.

**Home Work:**

- Compare and contrast the tissues of plants and animal basing on the following factors.

(a) Motility (b) Feeding behavior (c) Growth regulating regions (b) Cellular growth

**Period 3 2.2 Plant Tissues 2. 2.1 Meristematic Tissue**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can explain the types of meristematic tissues as- Meristematic Tissue are of three types; Apical meristem is present at the growing tips of stems and roots and increases the length of the stem and the root. The girth of the stem or root increases due to lateral meristem (cambium). Intercalary meristem seen in some plants is located near the node. Cells of meristematic tissue are very active, they have dense cytoplasm, thin cellulose walls and prominent nuclei. They lack vacuoles. | The students can play the matching game by using flash cards.<br>They are divided into three groups. One groups should take the flash cards showing the names of three meristematic tissues, the second group can take the location of the tissues and the third group can have the flash cards showing the functions of meristems.<br>If the first group show the flash card showing intercalary meristem, the second group can show the flash card nodes and the third group can show the flash card | **1**. Regions in plants where Meristematic tissue is present_____ _.<br><br>2. Growth of the plants is possible due to the presence of _____ tissue.<br>3. Apical meristem is present at_____.<br><br>4. Purpose of the lateral meristem_____. _____. |

**Factual Questions:** .

- How does the meristematic tissue helpful in overall growth of the plant?

**Open Ended Questions:**

`

- Lasya grows rose plants in her garden. She cut off the tips of stems and after one week she observed that there are the traces of growth of partial branches to the stem. What could bathe reason for such growth especially after cutting the tips of the stem?

**Evaluation/Quiz/ Assignment:**

- Match the following

| | | |
|---|---|---|
| (1) Multicellular organism | ( ) | (a) Apical meristem |
| (2) Growth throughout the lifetime | ( ) | (b) Intercalary meristem |
| (3) Growth in length | ( ) | (c) Tissue |
| (4) Nodes | ( ) | (d) Animals |
| | | (e) Plants |

**Home Work:**

- Explain various types of meristematic tissues and their functions.

**Period 4 2.2.2 Permanent Tissues**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can start the discussion by asking the question –<br>What type of cells does the cells in meristematic tissue produce?<br>The teacher then conducts the activity using a dicot plant stem, a sharp blade, a watch glass with some water, saffranine, a slide, a coverslip and a compound microscope.<br>After discussion, the teacher can explain that the tissues formed from the meristematic tissue are called Permanent Tissue.<br>These tissues are of two types- Simple and Complex Tissues.<br>Then the teacher can introduce the types of simple permanent tissues.<br>The teacher can also introduce the concept of Differentiation. | The students can observe the various cells present in the stem of a dicot plant.<br><br>They can discuss which tissue they are formed from. | 1. Which one is the example of permanent tissue?<br>a) Apical meristem<br>b) Intercalary meristem<br>c) Parenchyma<br>d) Meristematic Tissue<br><br>2. The tissues produced from the meristematic tissue undergo the process_____.<br><br>3. The tissue formed from the meristematic tissue are called_____. |

**Factual Questions:** .

- What is the need of containing various type of tissues in plants?

**Open Ended Questions:**

- What will be the future of the cells produced from the meristematic tissue if differentiation does not occur in them?
- IN what aspects do various types of tissues differ from one another?

**Evaluation/Quiz/ Assignment:**

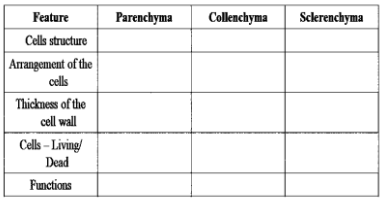
- Draw the diagram of transverses section of Dicot stem showing various types of tissues.

**Home Work:**

- Explain the procedure undergone to observe various types of tissues in Dicot plant stem? What precautions did you take in conducting the experiment?

`

**Period 5 2.2.2.1 Simple Permanent Tissues**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can introduce the three types of simple tissue Parenchyma, Collenchyma and Sclerenchyma. | Students can differentiate the cell structure, arrangement, thickness of the cell wall and function of the three types of cells. | Students can note down their learning in this tabular form.  |

| Feature | Parenchyma | Collenchyma | Sclerenchyma |
|---|---|---|---|
| Cells structure | | | |
| Arrangement of the cells | | | |
| Thickness of the cell wall | | | |
| Cells – Living/ Dead | | | |
| Functions | | | |

**Factual Questions: .**

- Why do some of the permanent tissues are called simple permanent tissues?

**Open Ended Questions:**

- Give reasons for plants having various types of permanent tissues at different regions of the plant body.

**Evaluation/Quiz/ Assignment:**

- **Match the following**

(1) Aerenchyma ( ) (a) Tendrils
(2) Collenchyma ( ) (b) Coconut
(3) Chlorenchyma ( ) © Water plants
(4) Sclerenchyma ( ) (d) Photosynthesis

**Home Work:**

- Describe various simple permanent tissues in the plants and their significance.
- Draw various types of simple permanent tissues in plants.
- Answer the following:

The tissue that helps in floating of plant parts on water_____.
Flexibility of plant parts is possible due to this tissue_____.
This tissue provides Mechanical strength to the parts of large plants_____.

**Period 6 2.2.2.1 Simple Permanent Tissues**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can conduct the activity using a rhoeo leaf, a glass slide, a coverslip, and a compound microscope.<br>The teacher helps the students to discuss the functions of stomata and transpiration. | Students can observe the epidermal cells on the leaf and understand the arrangement of dermal tissue on plant parts. They can see the structure of the stomata and discuss its functions as well. | Students can draw the epidermal tissue that they observed in the sample. |

**Factual Questions: .**

- What is called transpiration? How is it useful to the plants?
- What will be the rate of transpiration in a sunny daytime?

`

**Open Ended Questions:**

- What will happen if stomata are absent in the plants?
- Think why the number of stomata is more on the lower surface of the leaf?

**Evaluation/Quiz/ Assignment:**

- Draw the diagram of stomata. What is the function of guard cells surrounding the stomata?

**Home Work:**

- Write the procedure followed in your laboratory for observation of epidermal cells on leaf?

**Period 7 2.2.2.1 Simple Permanent Tissues**

| I DO | WE DO | YOU DO |
|---|---|---|
| The teacher can introduce the tissue covers the plant body, that is dermal tissue.<br>The teacher then discusses the functions of Dermal tissue by comparing the dermal tissue as the compound wall of the school.<br>The teacher can present various types of leaves like aloe vera, lotus, picture of cactus, a piece of bark for demonstrating the functions of the Dermal Tissue.<br>  | Students can identify the outermost covering of the Dicot plant stem. | Students can note down the functions of dermal tissue. |

**Factual Questions: .**

- How does the dermal tissue protect plants to withstand during the unfavorable and abnormal conditions?

**Open Ended Questions:**

- What will happen if dermal tissue is thinner on the leaves of desert plants?

**Evaluation/Quiz/ Assignment:**

- What is called dermal tissue? How do the cells in dermal tissue arranged?

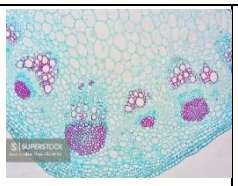
**Home Work:**

- Why does the dermal tissue called simple permanent tissue?
- How does the dermal tissue protects the stems of large trees from herbivores?

**Period:8 2.2.2.2 Complex Permanent Tissue**

| **I do (Direct Instructions)** | **We do (Guided Practice)** | **You do (Independent Practice)** |
|---|---|---|
| The teacher can discuss the following-<br>• What type of cells are present in these tissues living/non-living?<br>○ Parenchyma<br>○ Collenchyma<br>○ Sclerenchyma<br>○ Dermal tissue | Students can compare the simple and complex tissues as containing single type of cells and more than one type of cells.<br>Students can identify the pictures of vascular bundles in the diagram showing | Give examples for<br>• Simple Tissue ____<br>• Permanent Tissue___<br>• Temporary Tissue____<br>• Complex Tissue ____ |

`

| | | |
|---|---|---|
| Then the teacher can introduce the complex tissues, their structure, functions, types of cells they contain and the concept of vascular bundles. | various tissues in dicot plant stem.  | |

**Factual Questions: .**

- Why do the xylem and Phloem called complex tissue? What is their role in plants?

**Open Ended Questions:**

- What will happen if xylem is absent in plants?
- What will happen if bark of the branches of the trees cut like a ring?

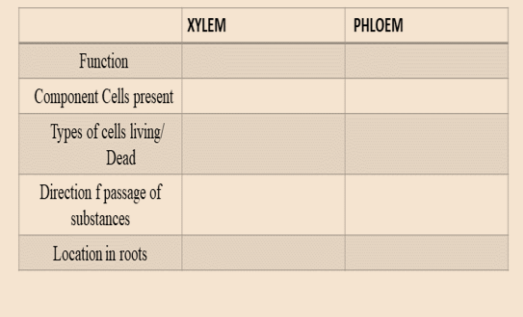
**Evaluation/Quiz/ Assignment:**

- What are called vascular tissue? Why do they called so?
- How do the xylem vessels made possible the life of terrestrial plants?

**Home Work:**

- Describe the structure of vascular tissue in plants.

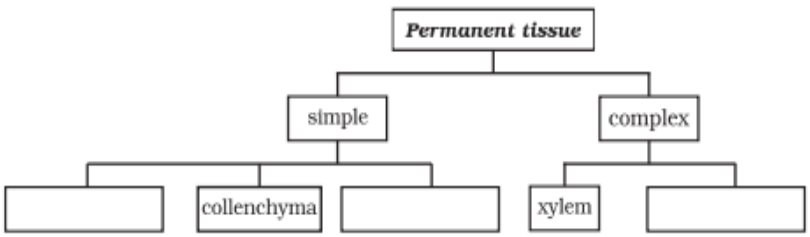
**Period:9 2.2.2.2 Complex Permanent Tissue**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can present the worksheet to allow students to compare the vascular tissue xylem and Phloem.<br>  | Students can draw pictures of component cells in the xylem and phloem. | Students can fill out the following worksheet.<br>1. Tissue that transports food in plants_____.<br>2. Element cells in Xylem are_____.<br>3. Function of xylem in plants_____.<br>4. Dead cells in the phloem are_____. |

| | XYLEM | PHLOEM |
|---|---|---|
| Function | | |
| Component Cells present | | |
| Types of cells living/ Dead | | |
| Direction f passage of substances | | |
| Location in roots | | |

**Evaluation/Quiz/ Assignment:**

- Differentiate xylem and Phloem.
- Complete the following block diagram showing tissues in plants.



`

**Period:10 2.3 Animal Tissues**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can start the class by making students recall the plant tissues. The teacher can pose the following questions-<br>• What are the various tissues present in the plant body?<br>• What is the function of meristematic tissue?<br>• What is the function of the dermal tissue in plants?<br>• What is the function of vascular tissue in plants?<br>• Which tissue in plants forms bulk in the plant body?<br>After recalling the plant tissue, the teacher can drive the class toward the animal tissue. The teacher can introduce animal tissues such as Epithelial Tissue, Connective Tissue, Muscle Tissue and Nervous Tissue and their functions | Students can compare epithelial and connective tissue functions with suitable plant tissues | Students can fill out the worksheet.<br>1. Function of the epithelial tissue_____.<br>2. Function of the Muscle tissue_____.<br>3. Function of the Nervous Tissue is _____.<br>4. Name the tissues made up the animal body. |

**Factual Questions:**

- Name the tissues in animals and their functions.

**Open Ended Questions:**

- What is the reason for possessing different tissues in plants and animals?

**Evaluation/Quiz/ Assignment:**

- **Match the following:**

(1) Epithelial Tissue ( ) (a) Body movements
(2) Nervous Tissue ( ) (b) Support
(3) Muscle Tissue ( ) (c) Covers body parts
(4) Connective Tissue ( ) (d) Transmission of information

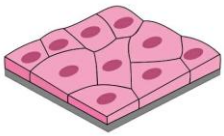
**Home Work:**

- Draw a concept map showing animal tissues and their functions.

**Period:11 2.3.1 Epithelial Tissue**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can introduce the Epithelial Tissue and its function. | The students can give examples of body organs where epithelial Tissue is found. | Students can draw pictures of a variety of epithelium tissue. Students can fill the worksheet:<br>1. Epithelial tissue at the skin is_____. |

`

| | | |
|---|---|---|
| The teacher can present pictures of simple and striated epithelium and explain the structure.<br>  <br>  <br><br>Now the teacher can present the pictures of squamous, cuboidal and columnar epithelium and describe how these tissues are arranged as simple or stratified.<br>Then The teacher explains the locations where the variety of tissue are located. | | 2. The type of epithelial tissue present inside the intestine ____. _____.<br>3. Epithelium present in the salivary glands_____.<br>4. _____ epithelium is present in the respiratory tract. |

**Factual Questions:**

- Explain the structure of cells in epithelial tissue.
- How does the Epithelial Tissue protect our body and help with the functions involved in life processes such as absorption, secretion and elimination?
- How does the glandular epithelium formed? What is its purpose?

**Open Ended Questions:**

- What will happen if ciliated epithelium is not present in the respiratory tract?
- Epithelial tissue is found variable at variety of locations in our body. What may be the reason?
-

**Evaluation/Quiz/ Assignment:**

- **Match the following:**

(1) Respiratory tract ( ) (a) Cuboidal epithelium
(2) Oesophagus ( ) (b) Ciliated epithelium
(3) Urethra ( ) (c) stratified squamous epithelium
(4) Skin ( ) (d) Simple squamous epithelium

**Home Work:**

- Differentiate between simple and stratified epithelium.
- Compare and contrast various types of the epithelial tissues squamous, cuboidal and columnar epithelium.

**Period:12 2.3.2 Connective Tissue -Blood**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can pose the questions to introduce The Connective Tissue.<br>• Recall the ground tissue/ simple permanent Tissue in plants? What is its function? | The students can discuss the functions of connective tissue. | Students can fill out the worksheet:<br>1. Fluid connective tissue__<br>a) Bone |

`

| | | |
|---|---|---|
| • Connective tissue in animals can be compared to the simple permanent tissue in plants by providing similar functions in animals.<br>Then the teacher can discuss the functions of connective tissue –<br>○ Transportation<br>○ Alignment of other tissues<br>○ Repair of tissues<br>○ Mechanical support<br>○ Storage of substances<br>Then the teacher can conduct activity 2.4 by using a glass slide, a sterilized pin and a compound microscope. | Students can observe the blood cells especially RBC in the sample. | b) Epithelial Tissue<br>c) Ligament<br>d) Blood<br>2. The cells in blood are ___, _____ & ____.<br>3. Which of the following is not the function of connective tissue?<br>a) Transportation<br>b) Secretion<br>c) Repair of the tissues<br>d) Connecting other tissues |

**Factual Questions:**

- Why does the blood called Connective Tissue?
- What are the functions of connective Tissue.

**Open Ended Questions:**

- Describe the role of connective Tissue in our body. How do you conclude that the tissue occupies all over the animal body?

**Evaluation/Quiz/ Assignment:**

- **Match the following:**

(1) Respiratory tract ( ) (a) Cuboidal epithelium
(2) Oesophagus ( ) (b) Ciliated epithelium
(3) Urethra ( ) (c) stratified squamous epithelium
(4) Skin ( ) (d) Simple squamous epithelium

**Home Work:**

- Describe various connective Tissues and their functions.

**Period: 13 2.3.2 Connective Tissue – Blood & Bone**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can explain the functions of various blood cells. Then the teacher can explain the components of blood.<br><br>The teacher can introduce the structure of bone and its function. | The students can discuss the nutritional habits one has to acquire to maintain Haemoglobin levels and bone strength. | Students can fill out the worksheet:<br>1. Function of the white blood cells_____. __<br>a) Transport oxygen<br>b) Blood coagulation<br>c) Fight against germs<br>d) Transport Carbon dioxide<br>2. Blood transports ___<br>a) Hormones<br>b) Oxygen<br>c) Food materials<br>d) All the above<br>3. Fluid connective Tissue: Blood: : Dense connective Tissue: ?<br>4. Which of the following is not connected |

`

| | | |
|---|---|---|
| | | to the bone?<br>a) Provide Mechanical strength<br>b) Provide health against diseases<br>c) Provide shape to the body<br>d) Production of blood cells |

**Factual Questions:**

- What is the function of blood in our body?
- What are the functions of bone and skeletal system?

**Open Ended Questions:**

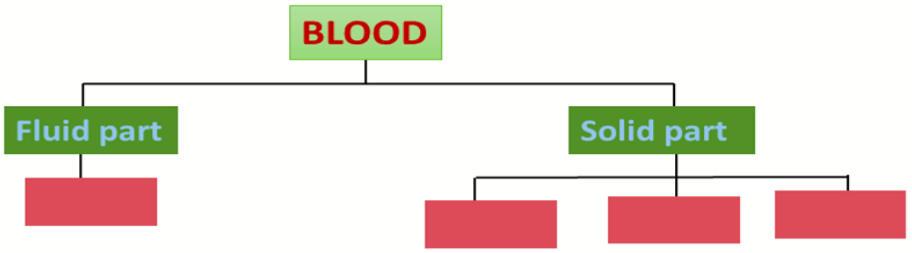
- Bone is a tough and hard substance. What is the advantage of its property to our body?
- What will happen if blood platelets are absent in our blood?

**Evaluation/Quiz/ Assignment:**

- **Match the following:**

(1) Red blood cells ( ) (a) Blood coagulation
(2) Platelets ( ) (b) Framework
(3) Bone ( ) (c) Transportation
(4) Plasma ( ) (d) Fluid

**Home Work:** Fill the blanks of the concept map.




**Period:14 2.3.2 Connective Tissue – Other Tissues**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can introduce other types of connective tissue such as<br>○ Ligament<br>○ Tendon<br>○ Cartilage<br>○ Areolar Tissue<br>○ Adipose Tissue | | Students can fill out the worksheet:<br>1. Tissue that connects two bones at the joints_____. _<br>a) Tendon<br>b) Cartilage<br>c) Ligament<br>d) Plasma<br><br>2. Tissue that connects bones to the muscles ___<br>a) Tendon<br>b) Cartilage<br>c) Ligament<br>d) All the above<br>3. The tissue that stores the fat_____. |

**Factual Questions:**

- How does the connective Tissue helps in various functions in our body?

`

- What is the benefit of the presence of cartilage apart from the bone in our body?

**Open Ended Questions:**

- What is the reason for intolerance of cold in old people?
- How does the Adipose Tissue act as an insulator?

**Evaluation/Quiz/ Assignment:**

- **Match the following:**

(1) Adipose Tissue ( ) (a) Connecting bone with muscles
(2) Tendon ( ) (b) Framework
(3) Cartilage ( ) (c) Storage of fats
(4) Bones ( ) (d) Flexibility of body organs

**Home Work:**

- Write about the various types of connective tissue.

**Period:15 2.3.3 Muscle Tissue**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can introduce the Muscle Tissue by posing the questions.<br>• Which body organs in our body help in our body movements like moving hands and walking?<br>• What do you think the reason for tendons connecting bones and muscles?<br>Then the teacher introduces the structure, function and types of muscle tissue. | Students can discuss the differences among the three types of muscle tissue. | |

**Factual Questions:**

- How does the Muscle Tissue help in body movements?

**Open Ended Questions:**

- What will happen if cardiac muscle tissue fails to function?
- What will be the consequences if the smooth muscle tissue in the esophagus fails to function?

**Evaluation/Quiz/ Assignment:**

- Write about the various types of muscle tissue?

**Home Work:**

- Fill the blanks in the table.

| Feature | Striated Muscle | Smooth Muscle | Cardiac Muscle |
|---|---|---|---|
| Structure | | | |
| Location | | | |
| Function | | | |
| Number of Nuclei in the cell | | | |
| Other Name | | | |

**Period:16 2.3.4 Nerve Tissue**

| I do (Direct Instructions) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher can introduce the Nerve Tissue by posing the questions. | Students can draw the diagram of the | Students can fill out the worksheet: |

`

| | | |
|---|---|---|
| • Which sensory organ is useful for the vision of surroundings?<br>• Which body organ is involved in the perception of the surroundings apart from the eyes and other sensory organs?<br>• Do you know about the cells that connect the eye and the brain and pass the information between them?<br>Then the teacher introduces the structure of neuron and their functions. | neuron. | 1. The part of the neuron that draws information from other cells? _____.<br><br>2. The part of the neuron that connects the receiving and transmitting parts?<br><br>3. The part of the neuron that transmits the information from the cell body? |

**Factual Questions:**

- Where does the nerve cells located? What is their function?

**Open Ended Questions:**

- How does the Nerve Tissue help in showing the responses to the stimuli?

**Evaluation/Quiz/ Assignment:**

- Write about the various types of muscle tissue?

**Home Work:**

- Draw a neat labeled diagram of the neuron/ Nerve cell.

**Teacher Diary**

| Period no. | Name Of the Concept | Date | Activities Conducted during the teaching | TLM Used | Student Response 1/2/3/4/5 | Topics Intended to Reteach | Additional Resources Used to Reteach |
|---|---|---|---|---|---|---|---|
| 1 | **Introduction 2.1 Are Plants and Animals Made of Same Type of Tissues?** | | | | | | |
| 2 | **2 Plant Tissues**<br><br>**2.2.1 Meristematic Tissue** | | | | | | |
| 3 | **2.2.1 Meristematic Tissue** | | | | | | |

`

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **4** | **2.2.1 Meristematic Tissue** | | | | | | |
| **5** | **2.2.2.1 Simple Permanent Tissue** | | | | | | |
| **6** | **2.2.2.1 Simple Permanent Tissue** | | | | | | |
| **7** | **2.2.2.1 Simple Permanent Tissue** | | | | | | |
| **8** | **2.2.2.2 Complex Permanent Tissue** | | | | | | |
| **9** | **2.2.2.2 Complex Permanent Tissue** | | | | | | |
| **10** | **2.3 Animal Tissues** | | | | | | |
| **11** | **2.3.1 Epithelial Tissue** | | | | | | |
| **12** | **2.3.2 Connective Tissue** | | | | | | |
| **13** | **2.3.2 Connective Tissue- Blood and Bone** | | | | | | |

`

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **14** | **2.3.2. Connective Tissue – Other Tissues** | | | | | | |
| **15** | **2.3.3. Muscle Tissue** | | | | | | |
| **16** | **2.3.4 Nervous Tissue** | | | | | | |

Signature of the HM Signature of the teacher

| Teacher reflections | Action plan |
|---|---|
| What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time? | |
| 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? | |
| What additional resources or modifications could improve the effectiveness of this lesson in future implementations? | |
| How well did I adjust my teaching based on student reactions or unforeseen challenges? | |

Any specific information:

……

……

……

……

……

# October 2025

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| N8D6E7 No bag Day | R8B1Q4 Cluster Complex | U7G8W3 Teacher Resources | 1 Dussera Holiday | 2 Mahatma Gandhi Jayant Vijayadashami | 3 NI | 4 No Bag Day Sakunthala Devi Jayanti |
| 5 Sunday International Teacher's Day | 6 NI | 7 NI | 8 NI | 9 NI | 10 NI | 11 Second Saturday |
| 12 Sunday | 13 FA - 2 | 14 | 15 | 16 | 17 NI | 18 No Bag Day Cluster meeting |
| 19 Sunday | 20 Deepavali | 21 NI | 22 NI | 23 NI | 24 NI | 25 No Bag Day SMC Meeting |
| 26 Sunday | 27 NI | 28 NI | 29 NI | 30 NI | 31 National Unity Day NI | |

Week1:

Week 2:

Week 3:

Week 4:

Week 5:

↓ TEACHER'S NOTES ↓

# November 2025

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| N8D6E7 No bag Day | R8B1Q4 Cluster Complex | U7G8W3 Teacher Resources | | | | 1 No Bag Day Andhra Pradesh Avatarana |
| 2 Sunday | 3 NI | 4 NI | 5 NI | 6 NI | 7 NI | 8 Second Saturday |
| 9 Sunday | 10 SA - 1 | 11 Day | 12 | 13 | 14 Day | 15 No Bag Day |
| 16 Sunday | 17 SA - 1 | 18 | 19 | 20 NI | 21 3.1 | 22 No Bag Day Cluster meeting Fibonacci Day |
| 23 Sunday | 24 3.1.1 – 3.1.2.1 + NI | 25 | 26 National Constituti | 27 Sanjeevaraya | 28 | 29 No Bag Day SMC Meeting |
| 30 Sunday | | | | | | |

14 - 20 National Library Week

**TEACHER'S NOTES**

Week1: **REVISION**

Week 2:

Week 3: **NI**

Week 4: **3.1.1 – 3.1.2.1**

# December 2025

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | 1 World AIDS | 2 | 3 | 4 | 5 | 6 No Bag Day Mega PTM/SMC |
| 7 Sunday | 8 | 9 | 10 Human | 11 | 12 | 13 Second Saturday |
| 14 Sunday | 15 | 16 | 17 | 18 | 19 | 20 No Bag Day Cluster Meeting |
| 21 Sunday | 22 Mathematics | 23 | 24 National Day | 25 | 26 | 27 No Bag |
| 28 Sunday | 29 NI | 30 NI | 31 NI | | | |

3.1.2.1 – 3.1.2.2 + NI

3.1.2.3 – 3.1.3 + NI

3.1.3 – 3.2.1 + NI

Christmas Holiday

N8D6E7 R8B1Q4 U7G8W3

No bag Day | Cluster Complex | Teacher Resources

Christmas Holidays for
Christian Minority Institutions
21.12.25 to 28.12.25

**TEACHER'S NOTES**

Week1: 3.1.2.1 – 3.1.2.2

Week 2: 3.1.2.3 – 3.1.3

Week 3: 3.1.3 – 3.2.1

Week 4:

Week 5:

# January 2026

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | No bag Day | Cluster Complex | Additional Resources | 1 New year NI | 2 NI | 3 No Bag Day |
| 4 Sunday | 5 FA - 3 | 6 | 7 | 8 | 9 | 10 Second Saturday |
| Sunday 11 National Youth Day | 12 Pongal Holidays | 13 | 14 | 15 | 16 | 17 No Bag Day |
| 18 Sunday D.R.Kaprekar Jayamti | 19 3.2.1 – 3.2.3 | 20 | 21 | 22 | 23 | 24 No Bag Day Cluster,PTM, SMCmeeting |
| 25 Sunday Republic day | 26 | 27 School Annual Day | 28 3.2.3.1 + NI | 29 | 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

Week1:

Week 2:

Week 3:

Week 4: 3.2.1 – 3.2.3

Week 5: **3.2.3.1**

**TEACHER'S NOTES**

# February 2026

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| Sunday 1 | 2 | 3 | 4 | 5 | 6 | No Bag Day 7 |
| | 4NI | | | | | |
| Sunday 8 | 9 | 10 | 11 | 12 | 13 | Second Saturday 14 |
| | FA - 4 | | | | NI | |
| Sunday 15 Maha Sivaratri | 16 | 17 | 18 | 19 | 20 | No Bag Day 21 Cluster, PTM, SMC meeting |
| | 3.2.3.2 – 3.2.4 + 2NI | | | | | |
| Sunday 22 | 23 | 24 | 25 | 26 | 27 | No Bag Day 28 National Science Day |
| | 4NI | | | | | |

N8D6E7 No bag Day

R8B1Q4 Cluster Complex

U7GBW3 Teacher Resources

**↓ TEACHER'S NOTES ↓**

Week1:

Week 2:

Week 3: 3.2.3.2 – 3.2.4

Week 4:

Week 5:

`

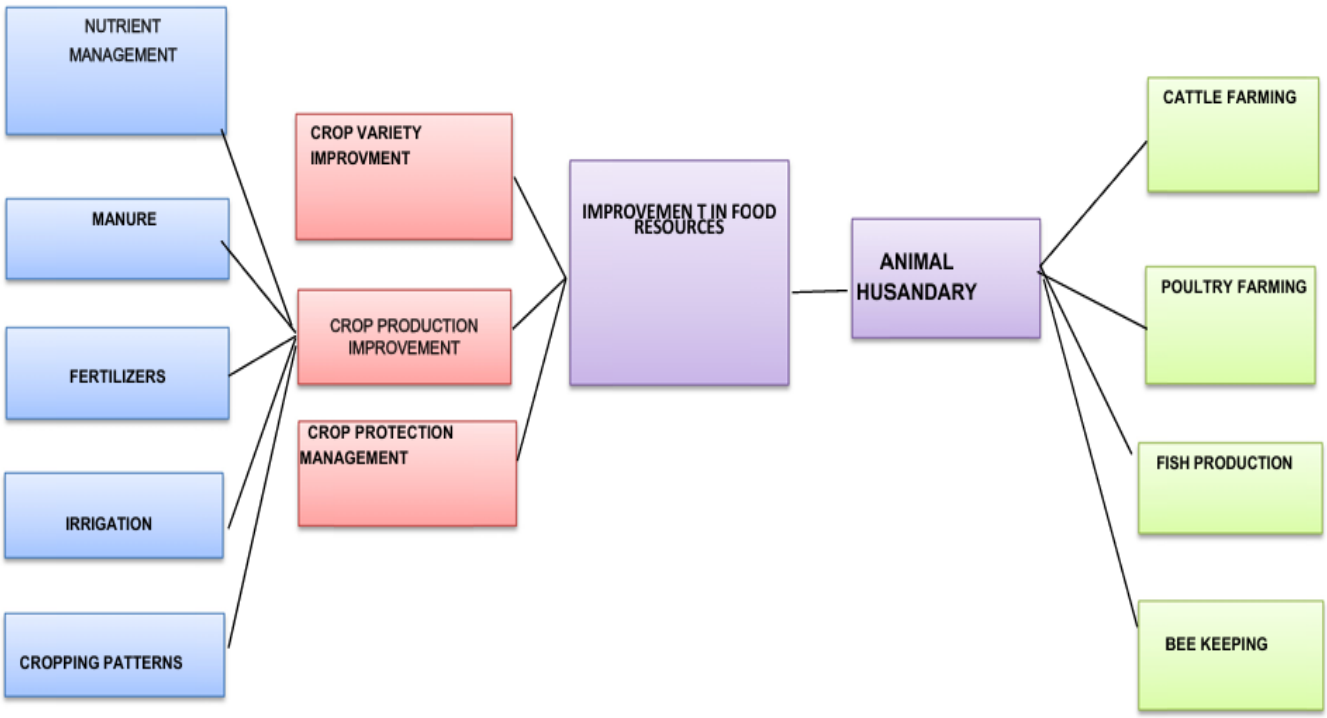
# IMPROVEMENT IN FOOD RESOURCES

No of teaching periods: 14. practice periods: 5 No of activities: 4

**Learning Outcomes:**

explain the need of improvement in crop yields
explain the methods of improving crop yield
relate plant production with the use of fertilizers
explain the supply of nutrients to plants
explains about manures and fertilizers
explain the need of irrigation
understand about cropping patterns
understand about crop protection management
explain the need of storage of grains
describe animal-based farming like cattle
describe animal-based farming like cattle
explain poultry farming
differentiate between capture fishing ,mari-culture and aqua-culture
explain the importance of bee keeping

**MIND MAPPING:**



`

# Period wise Topics

| S.NO | Topic | S.NO | Topic |
|---|---|---|---|
| 1 | Introduction | 9 | 3.1.3. Crop Protection Management- Activity 3.1 |
| 2 | 3.1 Improvement in crop yields | 10 | Storage of Grains – Activity 3.2 |
| 3 | 3.1.1. Crop variety Improvement- Rabi & Kharif | 11 | 3.2 Animal Husbandry-<br>3.2.1. Cattle farming |
| 4 | 3.1.1. Crop Variety Improvement – Improvement factors | 12 | 3.2.2. Poultry farming |
| 5 | 3.1.2. Crop Production management – (i) Nutrient management | 13 | 3.2.3. Fish Production<br>3.2.3(i) Marine fisheries |
| 6 | 3.1.2. Crop Production management – Manure/fertilisers | 14 | 3.2.3 (iii) Inland fisheries |
| 7 | 3.1.2 (ii) Irrigation | 15 | 3.2.4 Bee keeping |
| 8 | 3.1.2 (iii) Cropping Patterns | | |

## PERIOD PLAN -1

Chapter name: Improvement in food resources

**Concepts covered:** Introduction

Necessity of an increase in food production by farming and animal husbandry.

**Learning Objectives:**

1. Identifies the cause- a n d - e f f e c t relationship between the growing population and the need for sustainable practices in agriculture and animal husbandry.
2. Identifies the need to increase our production efficiency for both crops and livestock
3. Applies the scientific management practices to obtain high yields from agricultural farms.
4. Implement the different cropping methods such as mixed farming, intercropping and integrated farming practices, such as combining agriculture with livestock/ poultry/ fisheries/bee-keeping, etc.

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

The teacher tests the previous knowledge:

- What are our basic needs?
- Can we live without food?
- What does food supply us with?
- Why do we need food?
- What are the sources of food for us?
- Where do we get food from?
- Why do we need food for our survival?

`

- You saw someone growing plants or taking care of animals. Why do they do so?
  TLM Required: charts showing the population and the current food production
  Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher elicits through simple questions.<br>Mention the various components present in the food we eat.<br>Where do we obtain most of our food from?<br>Is the food production able to meet the needs of the increasing population?<br><br>Today, let us explore why increasing production efficiency for both crops and livestock is so important!<br>India is a very populous country. Our population. Our population is more than one billion people. As food for this growing population, we will need more food production.<br>India is already intensively cultivated. We do not have any major scope for increasing the area of land under cultivation.<br>Green revolution: contributed to increased food grain production.<br>White revolution: increased milk production.<br>Due to revolutions, our natural resources are being used more intensively. As a result, there is a greater chance of causing damage to our natural resources.<br>Therefore, it is important to increase food production without degrading our environment.<br>Hence, there is a need for sustainable practices in agriculture and animal husbandry.<br>Increasing grain production for storage in warehouses cannot solve the problem of malnutrition and hunger.<br>Food security depends on both the availability of food and access to it.<br>Most of our population depends on agriculture for their livelihood.<br>Increasing the incomes of people working in agriculture is necessary to combat the problem of hunger. | • How do we increase the yields of crops and livestock?<br>• Why is it important to increase food production without degrading our environment and disturbing the balances that maintain it?<br><br>India, being the most populous country and already intensively cultivated, is there any scope for increasing the area of land under cultivation?<br>• Is it enough if we grow only one type of crop in a large quantity?<br>• Will it meet the demands of the growing population?<br>• How can we improve the production of Crop yield with the limited resources available?<br><br>• What are the contributions of the green revolution?<br>• What is the conflict between | • Collect information and make a project on the contributions of M.S. Swaminathan in increasing food production.<br>• What is meant by the White revolution?<br>• To solve the food problem of the country, which of the following is necessary?<br>o Increased production and storage of food grains<br>o Easy access for people to the food grains<br>o People should have money to purchase the grains<br>o All the above<br><br>Fill in the blanks<br>• The green revolution contributed to increased ---------- production.<br>• There is a need for ---------- practices in agriculture and animal husbandry.<br>Identify the given statements as True/false<br>• The green revolution led to increased milk production.<br>• Increasing food production should be done while considering the environment.<br>• Storing more grain in warehouses is a complete |

`

| | | |
|---|---|---|
| Scientific management practices should be undertaken to obtain high yields from farms.<br>For sustained livelihood, one should undertake mixed farming, intercropping and integrated farming practices such as combining agriculture with livestock/poultry/fisheries/bee-keeping. | increasing food production and protecting the environment? | solution to malnutrition and hunger.<br>• India has a lot of unused land that can be brought under cultivation.<br>• What are integrated farming practices?<br>• What does food security depend on? |

**Summary**: We must increase the yield of crops and livestock by using scientific management practices for the growing population in India.

**Factual Questions:**

- Why is it necessary to increase our production efficiency for both crops and livestock?
- What are the problems that can arise if storage for food warehouses is not properly managed?

**Open-ended questions:**

- What is necessary to increase production to meet the food demand?

**Evaluation/ Quiz/Assessment:**

- ✓ Define green revolution.
- ✓ Food security depends on …….

**Homework:**

- Find out the wrong statement from the following:

(a) The white revolution is meant to increase milk production
(b) Blue revolution is meant for an increase in fish production
(c) Increasing food production without compromising environmental quality is Sustainable agriculture
(d) None of the above

- What do you mean by sustainable practices in agriculture and animal husbandry?

## PERIOD PLAN -2

Chapter name: Improvement in food resources Grade : 9
Subject: Biological science
**Concepts covered:** 3.1 Improvement in crop yields
**Learning Objectives:**

- Give examples of different types of components of food.
- Give examples of cereal crops that provide carbohydrates.
- Classify crops based on the component of food they provide
- Differentiates Rabi and Kharif crops
- Identify the stages involved in crop varieties.

**Prior Concept / Skills**: (*Essential concepts and skills to be checked/bridged before teaching the current concept*)
The teacher tests the previous knowledge:

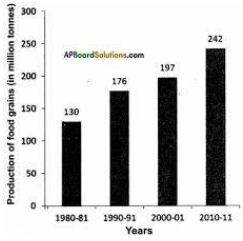
- What are the components of our food?
- Which component of food gives us energy?
- Which component of food is known as a body-building food?
- Which component of food provides energy to store for future use?
- Why should we eat vegetables and fruits?

TLM Required: Flash cards consisting of various pictures of crops as sources of Carbohydrates, Proteins, Fats, Vitamins and minerals and Fodder, a Chart showing Kharif

`

crops, and Rabi crops

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher provides students with pictures and names of various crops and explains the nutrients present in them and the importance of nutrients for our body's needs. They are as follows.<br><br>Cereals: Wheat, rice, maize, millets, and sorghum – Carbohydrates – for energy<br>Pulses: gram, pea, black gram, green gram, pigeon pea, lentil – provide protein.<br>Oil seeds: soya bean, groundnut, sesame, castor, mustard, linseed, and sunflower – provide fats.<br>Vegetables, spices, and fruits provide a range of vitamins and minerals in addition to small amounts of proteins, carbohydrates, and fats.<br>Fodder crops: berseem, oats, or Sudan grass- food for livestock.<br>-Crop growth and completion of their life cycle depend on<br>• Climatic conditions<br>• Temperature<br>• Photoperiods.<br>-Photoperiod: The duration of sunlight.<br>-The growth of plants and flowering is dependent on sunlight<br>- The practices involved in forming a divide into 3 stages.<br>1. The choice of seeds for planting<br>2. Nurturing of the crop plants<br>3. Protection of the growing and harvested crops from loss.<br>Thus, the major groups for improving crop yields can be classified as:<br>• Crop variety improvement<br>• Crop Production improvement<br>• Crop protection management. | • Students recall that plants manufacture their food in sunlight by the process of photosynthesis.<br>• Discussion about rainy season crops and winter season crops.<br>Rainy season- kharif season – June – Oct<br>-Winter season – Rabi season – Nov – Apr<br><br>Kharif crops: Paddy, soyabean, pigeon pea, maize, cotton, Green gram and Black gram.<br><br>Rabi crops: Wheat, gram, peas, mustard, linseed.<br>• Teacher presents a graph for analysis of the production of food grains from 1952-2010.<br>• It is observed that food grain production increased four times, with only a 25% increase in the cultivable land area.<br>  <br><br>• What does the graph indicate?<br>• If only a 25% increase in cultivable land area has taken place, how has this increase in food grain production been achieved? | • Classify the following and tabulate them as energy-yielding. Protein-yielding, oil-yielding and fodder crops:<br>**Wheat, rice, berseem, maize, gram, oat, pigeon gram, Sudan grass, lentil, soyabean, groundnut, castor and mustard**<br><br>• Identify crops grown in the Rabi season from the following crops given below:<br>Paddy, soyabean, Maize, Cotton, Wheat, Mustard, Green gram<br><br>• How many stages are there in the practices involved in farming?<br>• Which stage deals with the choice of seeds for planting?<br>• Which stage helps in the nurturing of the crop plants?<br>• What is the stage – protection of the growing and harvested crops from loss |

**Summary**:

`

- There are different types of crop plants based on the nutrients, such as carbohydrate-yielding, oil-yielding, oil yielding and fodder plants.
- **Cereals** provide carbohydrates for energy**, pulses** provide proteins, **oil seeds** provide necessary fats, vegetables provide vitamins and minerals, and fodder crops are food for livestock.
- The growth of plants and flowering is dependent on sunlight.
- **Photo period** is related to the duration of sunlight.
- The kharif season in India is from June to October, and crops grown in this season are called kharif crops.
- Rabi season November to April, and crops are grown during this is called Rabi crops.
- The farming practices can be broadly categorized into three stages: 1. The choice of seeds for planting,2. Nurturing of the crop plants. 3 . Protection of the growing and harvested crops from loss.
- The major groups for improving crop yields can be classified as: 1. Crop variety improvement, 2. Crop production improvement 3. Crop protection management.

**Factual Questions:**

- What practices helped to increase the production?
- What are the different components of food we get from food crops?
- Find the odd man out: Rice, Millets, Gram, Sorghum
- If a farmer in Guntur, AP, wants to plant a crop in July, which season would it better for him? Give a reason.

**Open-ended questions:**

- What are kharif and rabi crops? Give examples.
- What are some factors that different crops require for their growth?
- Mention the three major groups of activities for improving crop yields.

**Evaluation/ Quiz/Assessment:**

- What is photoperiod related to?
- Photoperiod affects the.
- The crops that are grown in the rainy season are called crops.
- Kharif crops are grown from.
- Name some Kharif crops?
- _____ Crops grow in the wi**n**ter season.
- What is the duration of the Rabi season?
- Give examples of Radi crops?

**Homework:**

- Cultivation practices and crop yield are related to environmental conditions. Explain.
- Differentiate rabi and kharif crops?

## PERIOD PLAN -3

**Concepts covered:** 3.1.1. Crop variety Improvement

**Learning Objectives:**

- Identify three factors for which crop variety improvement is done
- Differentiates intervarietal, Interspecific, and Intergeneric hybridization

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

The teacher tests the previous knowledge:

The teacher tests the previous knowledge:

- What do cereals provide?
- Why should we eat vegetables and fruits?
- Why are fodder crops raised?

`

- Can we grow crops in any season or climatic condition?
  TLM Required: charts showing the population and the current food production
  Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher introduces the approaches of Crop Variety Improvement:<br>-Varieties or strains of crops can be selected by breeding for various useful characteristics such as disease resistance, response to fertilizers, product quality and high yields.<br>One way of incorporating desirable characters into crop varieties is by hybridization.<br>The teacher introduces the terms **species** and **genus** to provide further clarification<br>Hybridization – crossing between genetically dissimilar plants. It is 3 types<br>1. Inter varietal – between different varieties<br>2. Inter-specific- between two different species of the same genus<br>3. Inter-generic – between different genera<br>Another way of improving the crop is by introducing a gene that would provide the desired characteristics – genetically modified crops.<br>-For new varieties of crops to be accepted, it is necessary that the variety produces high yields under different conditions that are found in different areas.<br>-Cultivation practices and crop yield are related to weather, soil quality and availability of water.<br>Since weather conditions such as drought and flood situations are unpredictable, varieties that can be grown in diverse climatic conditions are useful.<br>Varieties tolerant to high soil salinity have been developed. | The teacher elicits the necessities for the acceptance of new varieties of crops.<br>Are the conditions the same for growing crops in different areas?<br>For the acceptance of new varieties of crops, what should be the yield of the plant?<br>How do new plants grow from?<br>What would farmers be provided with a particular variety?<br>Are the weather conditions predictable?<br>How does the crop yield depend on weather?<br>Is there any relation between crop yield and soil quality?<br><br>Discuss the role of hybridization in crop variety improvement.<br><br>Suppose you have plants – prone to disease/ disease resistant, low yield/ high yield, Low product quality/ High product quality, which desirable characteristics in plants would one select? | What do you mean by Plant Breeding?<br>Why is crop variety improvement important in cultivation?<br>Name two useful characteristics that can be introduced into crop varieties through breeding.<br>What is the term used for crossing genetically dissimilar plants?<br>Introducing a gene that provides a desired characteristic result in:<br>Naturally grown crops<br>Hybrid crops<br>Cross-bred crops<br>Genetically modified crops |

**Summary**:

`

- Incorporating desirable characters into crop varieties is called hybridization.
- Hybridization is 3 types, i.e. intervarietal, interspecific and intergeneric.
- Another way of improving the crop is by introducing a gene that would provide the desired characteristics – genetically modified crops.
- Cultivation practices and crop yield are related to weather, soil quality and availability of water.

**Factual Questions:**

✓ Imagine you are a plant breeder. What are the key factors you would consider when developing a new crop variety for a specific region?
✓ What is the primary goal of crop variety improvement?
✓ Give one example of a type of cross used in hybridization.

**Open-ended questions:**

- Differentiate between intervarietal and interspecific hybridization.
- What are the factors that influence the cultivation practices and crop yield?

**Evaluation/ Quiz/Assessment:**

- The following question consists of two statements – Assertion (A) and Reason (R). Answer it by selecting the appropriate option given below: Assertion (A): Hybridization is defined as the crossing of genetically dissimilar plant species.
  Reason (R): Farmers need to protect the harvested crop from loss.

a) Both A and R are true, and R is the correct explanation of A.
b) Both A and R are true, and R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

**Homework: True/False questions.**

- Crop variety improvement only focuses on increasing the yield of crops.
- Genetically modified crops are produced through the process of hybridization.
- Farmers need good quality seeds of a particular variety for the successful cultivation of that variety.

## PERIOD PLAN -4

**Concepts covered:** 3.1.1. Crop Variety Improvement – Improvement factors

**Learning Objectives:**

- Relates the cultivation practices and crop yield to environmental conditions.
- Explains the factors for which crop variety improvement is done

**Prior Concept / Skills**: (*Essential concepts and skills to be checked/bridged before teaching the current concept*)
The teacher tests the previous knowledge:
TLM Required: charts showing the population and the current food production
Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher discusses regarding the factors for which crop variety improvement is done:<br>*Higher yield: To increase the productivity of the crop per acre.<br>*Improved quality: quality considerations of crop | | List out some useful traits of an improved crop. |

`

| | | |
|---|---|---|
| products vary from crop to crop. Ex. Baking quality – wheat<br>Protein quality – pulses<br>Oil quality – oil seeds<br>Preserving quality – fruits and vegetables<br><br>*Biotic and abiotic resistance: crop stresses may be biotic and abiotic under different situations.<br>1. Biotic stresses – diseases, insects, nematodes<br>2. Abiotic stresses - Drought, salinity, water logging, heat, cold and frost.<br>Varieties resistant to these stresses can improve crop production.<br><br>*Change in maturity duration: the shorter the duration of the crop from sowing to harvesting, the more economical.<br>Short durations allow farmers to grow multiple rounds of crops in a year.<br>Short duration also reduces the cost of crop production.<br>Uniform maturity makes the harvesting process easy and reduces losses during harvesting.<br>*Wider adaptability: it helps in stabilizing the crop production under different environmental conditions. One variety can then be grown under different climatic conditions in different areas.<br>*Desirable agronomic characteristics: Tallness and profuse branching are desirable characteristics for fodder crops. Dwarfness is desired in cereals, so that fewer nutrients are consumed by these crops. | Describe the important factors for which variety improvement is done. | How do biotic and abiotic factors affect crop production?<br>Drought is a type of:<br>a) Biotic stress.<br>b) Abiotic stress.<br>c) Nutritional deficiency.<br>d) Genetic modification<br><br>Short-duration crops allow farmers to grow multiple rounds of crops in a year. (True/False)<br>Wider adaptability means a crop variety can only be grown in specific climatic conditions. (True/False)<br>What are the desirable agronomic characteristics for crop improvement? |

**Summary**:

- Variety improvement factors are higher yield, improved quality, biotic and abiotic stress resistance, change in maturity duration, wider adaptability and desirable agronomic characteristics.
- Thus, developing varieties of desired agronomic characters helps give higher productivity.

**Factual Questions:**

- If there is low rainfall in a village throughout the year, what measure will you suggest to the farmers for better cropping?

**Open-ended questions:**

- ✓ Differentiate between biotic and abiotic stresses, giving one example of each that affects crop production.
- ✓ Explain two advantages of developing crop varieties with shorter maturity durations.
- ✓ Why is "wider adaptability" considered an important characteristic in crop improvement programs?

**Evaluation/ Quiz/Assessment:**

- Which of the following is an example of improving the protein quality of a crop?
  a) Increasing the yield of wheat.
  b) Developing a variety of pulses with higher protein content.
  c) Enhancing the oil content in oilseeds.
  d) Extending the shelf life of fruits.
- Tallness and profuse branching are desirable agronomic characteristics for _____ crops.

`

- Developing crop varieties with _____ helps in stabilizing crop production under different environmental conditions.
- Dwarfness in cereals is desirable because it leads to fewer _____ being consumed by the crop.

**Homework:**

✓ Resistance to diseases in crop plants is an example of:
a) Abiotic stress resistance.
b) Biotic stress resistance.
c) Improved agronomic characteristics.
d) Change in maturity duration.

## PERIOD PLAN -5

Chapter name: Improvement in food resources Grade : 9
Subject: Biological science

**Concepts covered:** 3.1.2. Crop Production management – (i) Nutrient management

**Learning Objectives:**

- Classifies the nutrients as macro nutrients and micro nutrients.
- Explains the supply of nutrients to plants.
- Hypothesize the impact of nutrient deficiency in plants.
- Advise the farmers on how to enrich the plants to avoid nutrient deficiency.

**Prior Concept / Skills**: (*Essential concepts and skills to be checked/bridged before teaching the current concept*)
The teacher tests the previous knowledge:

- How many stages are there in the practices involved in farming?
- Which stage deals with the choice of seeds?
- Why is crop variety improvement important in cultivation?
- What are the important factors for which variety improvement is done?
- Which stage helps in the nurturing of the crop plants?

TLM Required: Chart showing various nutrients required by plants and their sources
Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher explains the crop production management<br><br>*In India, as in many other agriculture-based countries, farming ranges from small to very large farms.<br>Different farmers thus have more or less land, money and access to information and technologies.<br>There is a correlation between higher inputs and yields. Thus, the farmer's purchasing capacity for inputs decides the cropping system and production practices. Therefore, production practices can be at different levels. They include 'no cost' |  <br><br>Discussion about nutrients supplied by air, water and soil. | In agriculture practices, higher inputs give higher yields. Discuss how? Mention some physiological |

`

| | | |
|---|---|---|
| production, 'low cost' production and 'high cost' production practices.<br>Plants require nutrients for growth. Nutrients are supplied to plants by air, water, and soil.<br>There are several nutrients that are essential for plants. Air supplies carbon and oxygen, hydrogen comes from water, and soil supplies the other thirteen nutrients to plants.<br>There are two types of nutrients<br>1. Macro Nutrients – plants require in large quantities.<br>2. Micro nutrients – plants require in small quantities.<br>Deficiency of these nutrients affects physiological processes in plants, including reproduction, growth and susceptibility to diseases. | Table 12.1: Nutrients supplied by air, water and soil<br>Source \| Nutrients<br>Air \| carbon, oxygen<br>Water \| hydrogen, oxygen<br>Soil \| (i) *Macronutrients*: nitrogen, phosphorus, potassium, calcium, magnesium, sulphur (ii) *Micronutrients:* iron, manganese, boron, zinc, copper, molybdenum, chlorine<br>• What do we need food for?<br>• Where do plants get nutrients from? | processes in plants?<br>How does a deficiency of nutrients affect plants?<br>In what forms are the nutrients supplied to plants? |

**Summary**:

✓ Farming in India ranges from small to very large farms.
✓ Different farmers have varying access to land, money, information, and technologies.
✓ Production practices can be categorized into 'no cost', 'low cost', and 'high cost' production.
✓ Plants require nutrients for growth, supplied by air, water, and soil.
✓ There are two types of nutrients:
○ Macro Nutrients: Required by plants in large quantities. ○ Micro Nutrients: Required by plants in small quantities.
✓ Deficiency of these nutrients negatively affects physiological processes in plants, including reproduction, growth, and susceptibility to diseases.

**Factual Questions:**

- What happens if plants do not get essential nutrients?
- How does a deficiency of nutrients affect the crop?

**Open-ended questions:**

- Name any two physiological processes in plants that are affected by a deficiency of nutrients.
- Why are macronutrients called so?
- Differentiate macronutrients and micronutrients?

**Evaluation/ Quiz/Assessment:**

- What mineral nutrients are supplied to the plants by air, water and soil?
- A total of ……. nutrients are essential to plants.
- ..... and ……are supplied by air to plants.
- Hydrogen is supplied by …….. to plants.
- Soil supplies …….. nutrients to plants.
- Nutrients required in large quantities by plants are called …….
- ..... are needed in small quantities for plants.

**Homework:**

- Crop production management practices can be …… and ……production practices.
- What allows farmers to take up different farming practices and agricultural technologies?
- What are the levels of production practices?

## PERIOD PLAN -6

**Concepts covered:** 3.1.2. Crop Production management – Manure/fertilizers

`

**Learning Objectives:**

- Relates the farmer's purchasing capacity inputs and production practices
- Analyses and interprets the role of various nutrients required by plants and their sources
- Applies the knowledge of preparing the manure and its uses in daily life.
- Classifies manure based on the kind of biological material used
- Gives examples of fertilizers
- Differentiates manure and fertilizers
- Explains the benefits of organic farming

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

The teacher tests the previous knowledge:

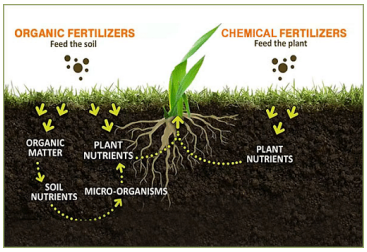
- What do plants need to grow healthy?
- Where do plants get their food from?
- Have you ever seen someone add anything to the soil where plants are growing? What was it?

TLM Required: Sample of Vermi compost and earthworms, fertilizers.

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher elicits from students their previous experience with manure making and its importance<br>-Manure contains large quantities of organic matter and supplies small quantities of nutrients to the soil.<br>-Manure is prepared by the decomposition of animal excreta and plant waste.<br>**Uses of Manure:**<br>-Manure helps in enriching soil with nutrients and organic matter and increasing soil fertility.<br>-Manure helps in improving the soil structure.<br>-This involves increasing the water holding capacity in sandy soils.<br>-In clayey soils, the large quantities of organic matter help in drainage and in avoiding waterlogging.<br>-In using manure, we use biological waste material, which is advantageous in protecting our environment from excessive use of fertilizers.<br>-Using biological waste material is also a way of recycling farm waste.<br>*Based on the kind of biological material used, manure can be classified as:<br>1. compost and vermicompost<br>2. Green manure<br>**Compost:** - livestock excreta (cow dung, etc.), vegetable waste, animal refuse, domestic waste, sewage waste, straw, eradicated weeds, etc., is decomposed in pits, and is known as composting. | Prepare compost pits in school by using MDM waste.<br>  <br>  <br><br>Visiting a farmer to learn about the preparation of vermicompost.<br>  | Ram observed that his mother throws away the vegetable waste. He suggested that his mother dump the waste in a pit in the kitchen garden. Why did he ask so?<br><br>What are the constituents of manure?<br><br>How is compost prepared?<br><br>In what way is Vermicompost better than chemical fertilizers?<br><br>Why are earthworms used in preparing vermicompost? |

`

| | | |
|---|---|---|
| **Vermicompost:** Compost is also prepared by using earthworms to hasten the process of decomposition of plant and animal refuse. This is called vermi-compost.<br>Both are rich in organic matter and nutrients.<br>Green Manure: Before the sowing of the crop seeds, some plants like sun hemp or guar are grown and then mulched by ploughing them into the soil. These green plants thus turn into green manure, which helps in enriching the soil with nitrogen and phosphorus.<br>-Fertilizers: commercially produced plant nutrients.<br>Fertilizers supply nitrogen, phosphorus, and potassium. They are used to ensure good vegetative growth, giving rise to healthy plants. Fertilizers are a factor in the higher yields of high-cost farming.<br>-Fertilizers should be applied carefully in terms of proper dose, time, and observing pre- and post-application precautions for their complete utilization.<br>Ex-fertilisers get washed away due to excessive irrigation and are not fully absorbed by the plants. This excess fertilizer then leads to water pollution.<br>-Continuous use of fertilizers in an area can destroy soil fertility because the organic matter in the soil is not replenished, and microorganisms in the soil are harmed by the fertilizers used.<br>-Organic farming: minimal or no use of chemicals as fertilizers, herbicides, pesticides in farming. Maximum input of organic manures, recycled farm-wastes, use of bio-agents such as culture of blue green algae in preparation of biofertilizers, neem leaves or turmeric specifically in grain storage as bio-pesticides, with healthy cropping systems, mixed cropping, inter-cropping and crop rotation. |  <br>  <br>Discussion about dis advantages of fertilizers and the usage of alternative farming, which reduces the usage of chemicals. | Describe the process of preparing vermicompost.<br>What do fertilizers supply to the plant? Give examples of chemical fertilizers.<br><br>Why is the excess use of fertilizers detrimental to the environment?<br><br>What care should be taken in applying fertilizers? |

**Summary**:

- Manure and fertilizers are the main sources of nutrient supply to crops.
- Manure is important for enriching the soil. It increases soil fertility, improves soil structure, increases water holding capacity, drainage and avoids water logging.
- Based on the kind of biological material used, manure can be classified as compost, vermicompost and green manure.
- Compost includes livestock excreta, vegetable waste, sewage waste, straw, eradicated weeds, etc.
- Vermicompost prepared by using earthworms hasten the process of decomposition of plant and animal refuse.
- Fertilizers are commercially produced plant nutrients.
- Excess fertilizers can be washed away by over irrigation, not fully absorbed by plants and lead to water pollution.
- Continuous usage of fertilizers can destroy soil fertility by depleting organic matter and harming soil microorganisms.

`

- Organic farming is minimal or no use of chemical fertilizers, herbicides and pesticides.

**Factual Questions:**

- Why are leguminous plants good for soil?
- What will happen if those plants are mulched by ploughing them into the soil?
- What happens to soil fert**i**lity if we use chemical fertilizers continuously?
- Compare the use of manure and fertilizers in maintaining soil fertility.

**Open-ended questions:**

- Manure is prepared by composting farm waste materials. How are fertilizers prepared?
- What do we call the ma**n**ure prepared by using cow dung, vegetable waste, animal refuse, straw and eradicated weeds?
- How do you appreciate e**a**rthworms in helping farmers?

**Evaluation/ Quiz/Assessment:**

- Excess use of fertilizers leads to water pollution. Justify.
- What is the primary focus of organic farming?

a) High-yield crop production
b) Use of synthetic pest**i**cides
c) Sustainable and natural practices
d) Genetic modification

- What is the primary sour**c**e of nutrients in biofertilizers?

a) Synthetic chemicals b) Organic matter
c) Minerals d) Fossil fuels

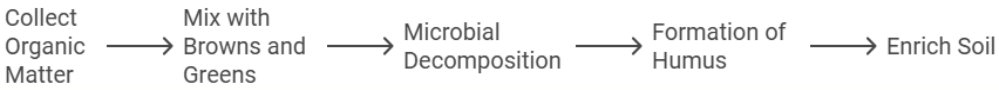
- Organic farming promotes and preserves biodiversity. How?

**Homework:**

- Arrange in the correct sequence:

(a) Green plants are decomposed
(b) Green plants are cultivated
(c) Green plants are ploughed and **m**ixed into the soil
(d) After decomposition, it becomes green manure.

- **Prepare an essay by following the given flow chart.**




## PERIOD PLAN -7

**Concepts covered:** 3.1.2 (ii) Irrigation

**Learning Objectives:**

- Differentiates kinds of irrigation sources
- Applies learning of irrigation methods to hypothetical situations
- Explain the need for irrigation
- Initiates the rainwater harvesting and watershed management to increase the groundwater levels.

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

The teacher tests the previous knowledge:

- Apart from nutrients, what do plants need?
- What are the requirements in a crop field?

TLM Required: Chart showing various irrigation resources

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|

`

| | | |
|---|---|---|
| The teacher introduces the concept of irrigation through simple questions:<br>• India is an agrarian country; what is needed for growing the crops?<br>• What will happen if we do not get timely rain?<br>• What will happen if crops do not get water at the right stages during their growing season?<br>• What occurs because of the irregular distribution of rain?<br>• What do farmers need when there is no rain?<br>Most agriculture in India is rain-fed, that is, the success of crops in most areas is dependent on timely monsoons and sufficient rainfall spread through most of the growing season.<br>Poor monsoons cause crop failure.<br>The crops get water at the right stages during their growing season can increase the expected yields of any crop.<br>Kinds of Irrigation resources several different kinds of irrigation systems are adopted to supply water to agricultural lands, depending on the kinds of water resources available. These include wells, canals, rivers and tanks.<br>Wells: Two types of wells, namely, dug wells and tube wells. In a dug well, water is collected from water-bearing strata. Tube wells can tap water from the deeper strata. From these wells, water is lifted by pumps for irrigation.<br>Canals: It is an elaborate and extensive irrigation system. In this system, canals receive water from one or more reservoirs or rivers.<br>River Lift Systems: where canal flow is insufficient or irregular due to inadequate reservoir release, the lift system is more rational.<br>Tanks: These are small storage reservoirs, which intercept and store the run-off of smaller catchment areas.<br>Fresh initiatives for increasing the water available for agriculture include rainwater harvesting and watershed management.<br>Check dams lead to an increase in groundwater levels. The check-dams stop the rainwater from flowing away and also reduce soil erosion. |  <br>*Prepare a model of a canal irrigation system and discuss it in class. | Briefly explain why timely and sufficient rainfall is important for agriculture in India.<br>What can poor monsoons lead to?<br>What is collected in a dug well?<br>Where can canals typically receive water from?<br><br>Prepare a model of the drip and sprinkler method using **e**co-friendly resources. |

**Summary**:

- Most agriculture in India relies on rainfall (rain-fed), making crop success dependent on timely monsoons and sufficient rainfall throughout the growing season.
- Poor monsoons lead to crop failure.
- Providing water to crops at the right growth stages can increase yields.
- Various irrigation systems are used to supply water for agriculture, depending on available water resources.
- Common irrigation resources include wells, canals, rivers, and tanks.

**Factual Questions:**

- What is the judicious use of irrigation?
- If there is low rainfall in a village throughout the year, what measures will you suggest to the farmers for better cropping?
- What is the primary source of water for agriculture in most areas of India?

**Open-ended questions:**

- What is irrigation?
- What are the different types of irrigation systems?

`

- What are the two main types of wells, and how do they differ in terms of water source?

**Evaluation/ Quiz/Assessment:**

- Fresh initiatives for increasing the water available for agriculture include …….. and ……..
- Most agriculture in India is:

a) Irrigated b) Rain-fed c) Dependent on rivers only d) Dependent on tanks only

- Crop failure is primarily caused by:

a) Excessive irrigation b) Poor monsoons c) The use of fertilizers d) Planting the wrong crops

- Tube wells can tap water from:

a) Shallow ponds b) Deeper strata c) Nearby canals d) Rainwater harvesting

- Canals receive water from:

a) Groundwater only b) Rainfall directly c) Rivers or reservoirs d) Dug wells

**Homework:**

- Describe the main irrigation systems that are adopted in India.
- Describe the basic function of a canal irrigation system.

## PERIOD PLAN -8

Chapter name: Improvement in food resources Grade : 9

Subject: Biological science

**Concepts covered:** 3.1.2 (iii) Cropping Patterns

**Learning Objectives:**

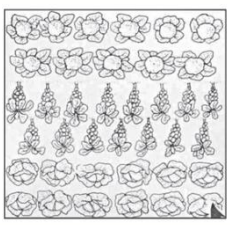
- understand cropping patterns
- Analyses and interprets the data related to various cropping methods.
- Differentiates between intercropping and mixed cropping, and crop rotation methods.
- Give different examples of various cropping methods.

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

The teacher tests the previous knowledge:

TLM Required: **Model of cropping patterns**

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher elicits the concept of cropping patterns through discussion and demonstration of models and charts.<br>• Mixed cropping is growing two or more crops simultaneously on the same piece of land, for example, wheat + gram, or wheat + mustard, or groundnut + sunflower.<br>• Inter-cropping is growing two or more crops simultaneously on the A few rows of one crop alternate with a few rows of a second crop, for example, soyabean + maize, or |  <br>  | Which of the f**o**llowing is not a characteristic of mixed cropping?<br>(a) Minimizes risk of crop failure<br>(b) Set patterns of rows<br>(c) Harvesting and threshing of crops separately is not possible<br>e) Individual marketing and consumption of |

`

| | | |
|---|---|---|
| finger millet (bajra) + cowpea (lobia). Same field in a definite pattern. This ensures maximum utilisation of the nutrients supplied, and also prevents pests and diseases from spreading to all the plants belonging to one crop in a field.<br>• Crop rotation: The growing of different crops on a piece of land in a pre-planned succession is known as crop rotation.<br>• Depending upon the duration, crop rotation is done for different crop combinations. The availability of moisture and irrigation facilities decides the choice of the crop to be cultivated after one harvest. | Propose suitable crop rotation cycles for different situations.<br><br>Discuss and analyse the advantages of crop rotation for soil health. | the crop is not possible<br>Ram has been cultivating a paddy crop year after year in the same field. Recently, he has observed a decline in the yield despite the best inputs, he suggested sowing pigeon gram for one or two years before again using the field for paddy crop. What is the rationale behind this suggestion? |

**Summary**:

- There are different cropping patterns to improve crop production. They are mixed cropping, intercropping and crop rotation.
- Mixed cropping: growing multiple crops simultaneously on the same land.
- Intercropping: Inter-cropping is growing two or more crops simultaneously the A few rows of one crop alternate with a few rows of a second crop.
- Crop rotation: The growing of different crops on a piece of land in a pre-planned succession is known as crop rotation.

**Factual Questions:**

- What are the benefits of intercropping?
- Suggest one reason why a farmer might choose to practice intercropping.
- What are the different types of cropping patterns?

**Open-ended questions:**

- What is meant by mixed farming? What are its advantages**?**
- Define inter-cropping with examples.
- Give an example of crops grown in a two- year rotation.
- Compare mixed cropping and intercropping.

**Evaluation/ Quiz/Assessment:**

- Growing different crops in a piece of land in a pre-planned succession is called……..
- Define crop rotation. Why should we adopt it?
- Which of the following is an example of mixed cropping mentioned in the text?

a) Soybean + maize b) Wheat + gram c) Cowpea (lobia) grown in a definite pattern d) Growing different crops in succession

**Homework:**

- Mixed cropping involves arranging crops in distinct rows. (True/False)
- Intercropping can help in preventing pests and diseases from spreading to all plants. (True/False)
- Crop rotation involves growing the same crop repeatedly on the same land. (True/False)
- The duration of crops does not influence the type of crop rotation. (True/False)

## PERIOD PLAN -9

Chapter name: Improvement in food resources Grade : 9

Subject: Biological science

**Concepts covered:** 3.1.3. Crop Protection Management- Activity 3.1

`

**Learning Objectives:**

- Relates weed control to crop yield
- Gives examples of weeds
- Applies knowledge to hypothetical situations
- Gives examples of plant diseases
- Applies the scientific concept of using natural insecticides to solve problems
- Explains the best practices of crop protection management

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

The teacher tests the previous knowledge:

TLM Required: Pictures of different types of pests and weed plants, Specimen/picture of pests

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher elicits the concept of crop protection management through discussion.<br>• Do you find any unwanted plants growing along with the cultivated crop in the field?<br>• What do we need to do if we find any unwanted plants? Why?<br>Field crops are infested by many weeds, insect pests and diseases.<br>**Weeds**: Unwanted plants cultivated in the field, they compete for food, space, and light with crop plants.<br>Ex. Xanthium, Parthenium, Cyprinus, Amaranth, Chenopodium, Convolvulus, Wild oat, Grass<br>Generally, insect pests attack the plants in three ways:<br>(i) they cut the root, stem and leaf,<br>(ii) they suck the cell sap from various parts of the plant, and<br>(iii) they bore into the stem and fruits.<br>Pathogens: Bacteria, viruses and fungi. - transmitted through soil, water and air.<br>Weeds, insects and diseases can be controlled by various methods.<br>Herbicides – to control weeds<br>Pesticides – To control pests<br>Fungicides – to control fungi<br>These chemicals are sprayed on crop plants or used for treating seeds and soil.<br>Impacts of excessive use of chemicals:<br>1. poisonous to many plants and animals.<br>2. Environmental pollution<br>Weed control methods:<br>• Mechanical removal<br>• proper seed bed preparation,<br>• timely sowing of crops,<br>• intercropping and crop rotation<br>Pest preventive measures:<br>• the use of resistant varieties,<br>summer ploughing | The teacher guides the students to conduct the activity and discusses the findings.<br><br>Visit a nearby garden/agricultural field and make a list of the weeds and the flowers/crops found in the area. Also, make a list of insect pests, if any, infesting the flowers/crops. | Which of the following conditions will give the most benefits? Why?<br>(a) Farmers use high-quality seeds, do not adopt irrigation or use fertilisers.<br>(b) Farmers use ordinary seeds, adopt irrigation and use fertiliser.<br>(c) Farmers use quality seeds, adopt irrigation, use fertiliser and use crop protection measures<br><br>- **……and……** **……**The **climate is more congenial for the manifestation of weeds, insect-pests and diseases**<br>Collect information about natural insecticides and prepare a sample of insecticide to solve the problem of pests |

`

| | | |
|---|---|---|
| | | in your local village, and prepare a project report |

**Summary**:

- Field crops are infested by weeds, insect pests, and diseases.
- Weeds are unwanted plants that compete with crops for food, space, and light.
- Pathogens like bacteria, viruses and fungi are transmitted through soil, water, and air.
- Weeds, insects, and diseases can be controlled by using chemicals.
- Excessive use of these chemicals is poisonous to plants and animals and pollutes the environment.
- The use of resistant varieties and summer ploughing is a weed and pest preventive measure.

**Factual Questions:**

- How can we get rid of weeds?
- Name on common type of unwanted plant that infests field crops.
- What are the chemicals used to control weeds called?
- What is the negative impact of the excessive use of pesticides?

**Open-ended questions:**

- Name the mechanical method of weed control.
- Give some examples of weeds.
- What are the preventive measures to avoid pests?
- How are the pathogens transmitted?

**Evaluation/ Quiz/Assessment:**

- What are microorganisms called?
- Where is pathogens present?
- Define herbicides, pesticides and fungicides and state their purpose.

**Homework:**

- ✓ Xanthium and Parthenium are commonly known as.
- ✓ Explain the importance of proper seedbed preparation in weed control.

## PERIOD PLAN -10

**Concepts covered:** Storage of Grains – Activity 3.2

**Learning Objectives:**

- Explain the need for the storage of grains
- Develop preventive and control measures to store the grains for future use.
- Collect the information about the seasons in which different grains are sown and harvested.

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

The teacher tests the previous knowledge:

TLM Required:

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • What do farmers do to the crop after the harvest? | | |

`

| | | |
|---|---|---|
| • What happens if the food grains are not stored properly?<br>Factors responsible for such losses are biotic— insects, rodents, fungi, mites and bacteria, and abiotic— inappropriate moisture, humidity, and temperatures in the place of storage.<br>Impacts of improper storage:<br>• Degradation in quality,<br>• loss in weight,<br>• poor germination capacity,<br>• infestation,<br>• discoloration and contamination<br>• poor marketability,<br>How do you think the farmer stores the grain or agricultural produce free from pests for a long time?<br>Preventive and Control measures:<br>• Strict cleaning before storage<br>• proper drying of the produce first in sunlight and then in shade, and fumigation using chemicals that can kill pests. | The teacher guides the students to conduct the activity and discusses the findings.<br>Collect grains/seeds of cereals, pulses and oil seeds and gather information about the seasons in which they are sown and harvested | **How do storage grain losses occur?**<br><br>**What are the impacts of improper storage of grains?**<br>Why should fumigation be preferred over spraying in godowns?<br><br>Fumigation is a control measure used to:<br>a) Improve grain quality<br>b) Kill pests in stored grains<br>c) Reduce moisture content<br>d) Prevent discoloration |

**Summary**:

- Food grains can be lost due to biotic factors and abiotic factors.
- Improper storage leads to degradation in quality, loss in weight, poor germination capacity, discoloration, and poor marketability.
- Strict cleaning of the storage area, proper drying of the produce under sunlight and then in shade are the preventive measures.
- Fumigation using chemicals kills pests.

**Factual Questions:**

- What are the biotic factors responsible for losses of stored food grains?
- What are the abiotic factors that spoil the stored grains?

**Open-ended questions:**

✓ What is the purpose of drying the produce before storage?

**Evaluation/ Quiz/Assessment:**

- The following question consists of two statements – Assertion (A) and Reason (R). Answer it by selecting the appropriate option given below:

Assertion (A): Humidity in the air promotes the growth of fungi.
Reason (R): Food grains are stored in silos on large scale.

a)Both A and R are true, and R is the correct explanation of A.
b) Both A and R are true, and R is not the correct explanation of A.
c) A is true but R is false.
**d)** A is false, but R is true.

- Which of the following is an abiotic factor that can lead to losses in stored food grains?

a) Rodents b) Fungi c) Inappropriate temperature d) Bacteria

- Which of the following should be done to produce before storing it?

a) Infestation b) Proper drying c) Discoloration d) Poor marketability

**Homework:**

`

- Why should preventive measures and biological control methods be preferred for protecting crops?
- What factors may be responsible for losses of grains during storage

## PERIOD PLAN -11

**Concepts covered:** Animal Husbandry, 3.2.1. Cattle farming

**Learning Objectives:**

- Identifies the need to improve animal husbandry practices
- Differentiates milch and draught animals
- Gives examples of local and exotic breeds of cattle
- Explains the methods of cattle breeding and the livestock farm management practices
- Communicates the findings and conclusions of the project on cattle effectiveness
- Applies learning of animal diseases to hypothetical situations
- Draws a concept map to depict the various livestock farm management practices

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

The teacher tests the previous knowledge:

- Apart from plants, where do we get food from?
- Why do we rear animals?
- What food do we get from animals?

TLM Required: Indian cattle pictures, foreign cattle pictures, a Chart showing farm management practices

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| • What needs to be done to get food from animals?<br>• What do you mean by white revolution?<br>• What should be improved to meet the growing need for milk and its products?<br>The teacher introduces the concept of animal husbandry.<br>• To bring improvement in crop variety, we manage crops scientifically. What do we need to do to improve animal livestock?<br>Along with the increasing demand for milk and meat, what is Cattle husbandry is done for two purposes— milk and draught labour for agricultural work such as tilling, irrigation and carting.<br>Indian cattle: Bos indicus-cows,<br>Bos bubalis-buffaloes.<br>Milk-producing females - milch animals (dairy animals)<br>The ones used for farm labour - draught animals.<br>Milk production depends on<br>• the duration of the lactation period,<br>Lactation period: the period of milk production after the birth of a calf.<br>• Exotic or foreign breeds -Jersey, Brown Swiss are - for long lactation periods, | The teacher guides the students to conduct the activity and discusses the findings.<br><br>Visit a livestock farm. Note the following:<br>(1) Number of cattle and number of different breeds.<br>(2) The amount of daily milk production from the different breeds. | Which aspects are to be scientifically managed?<br>What animals are reared on the farms?<br>Indian cattle belong to two different species. Name them<br>What does animal-based farming include?<br>Why should we improve animal husbandry practices?<br>What do you mean by Lactation period? |

`

- local breeds - Red Sindhi, Sahiwal - resistance to diseases. The two can be cross-bred to get animals with both the desired qualities.

The exotic and local breeds can be cross-bred to get animals with both the desired qualities.

- Proper cleaning and shelter facilities for cows and buffaloes are essential for humane farming, ensuring the health of the animals and the production of clean milk.
- Animals require regular brushing to remove dirt and loose hair.
- under well-ventilated roofed sheds that protect them from rain, heat and cold.
- The floor of the cattle shed needs to be sloping to stay dry and to facilitate cleaning.

The food requirements of dairy animals:
(a) maintenance requirement, the food required to support the animal to live a healthy life,
(b) milk-producing requirement, which is the type of food required during the lactation period.
Animal feed includes:
(a) roughage, which is largely fibre, and (b) concentrates, which are low in fibre and contain relatively high levels of proteins and other nutrients.
© Feed additives containing micronutrients promote the health and milk output of dairy animals.

- Cattle suffer from several diseases.

The parasites may be external or internal
External parasites – live on skin – skin diseases.
Internal parasites – worms – affect the stomach and intestine.
Flukes – damage the liver

- Infectious diseases – Bacteria, viruses

Vaccinations are given to farm animals

Table 12.2: Nutritional values of animal products

| Animal Products | Per cent (%) Nutrients | | | | | |
|---|---|---|---|---|---|---|
| | Fat | Protein | Sugar | Minerals | Water | Vitamins |
| Milk (Cow) | 3.60 | 4.00 | 4.50 | 0.70 | 87.20 | B1, B2, B12, D, E |
| Egg | 12.00 | 13.00 | * | 1.00 | 74.00 | B2, D |
| Meat | 3.60 | 21.10 | * | 1.10 | 74.20 | B2, B12 |
| Fish | 2.50 | 19.00 | * | 1.30 | 77.20 | Niacin, D, A |

The teacher guides the students to observe the table and discuss with their friends, and asks some questions related to this table.

Give examples of exotic breeds of cattle.
Mention two essential requirements for humane farming practices for cattle.
Which of the following breeds is known for its long lactation period?
a) Red Sindhi
b) Sahiwal
c) Jersey
d) Bos bubslis
Which type of food is required during the lactation period of dairy animals?
Prepare a questionnaire to ask the dairy farm owner about dairy farm management.
What are the external and internal parasites? What are its effects?

**Summary**:

- ✓ The scientific management of raising and caring for livestock animals is called animal husbandry.
- ✓ Animal-based farming includes cattle, goat, sheep, poultry and fish farming.
- ✓ Cattle husbandry is done for two purposes— milk and draught labour for agricultural work such as tilling, irrigation and carting.
- ✓ Indian cattle belong to the species Bos indicus, Bos bubalis.
- ✓ Milk-producing females are called milch animals, and animals used for labour are called draught animals.
- ✓ Milk production depends on the duration of the lactation period.
- ✓ Exotic breeds like Jersey and brown Swiss are known for their long lactation periods.
- ✓ Local breeds like red Sindhi and Sahiwal exhibit resistance to diseases.
- ✓ Exotic and local breeds can be cross-bred to get animals with the desired qualities.
- ✓ Proper cleaning and shelter facilities for cattle are necessary for their health and good milk production.
- ✓ Cattle can suffer from various diseases.
- ✓ Parasites can be external or internal, affecting the skin, stomach, liver, and intestine.

`

**Factual Questions:**

- What is Animal Husbandry?
- What are draught animals? Give examples.
- What happens if the shed is crowded with more cattle?

**Open-ended questions:**

- What are Milch animals? Give examples.
- Why should we clean the cattle and their shelter regularly?
- Why do cattle require regular brushing?
- Why might cross-breeding local and exotic breeds be advantageous for a farmer?

**Evaluation/ Quiz/Assessment:**

✓ Mention a few measures for the prevention of diseases in cattle.

✓ Flukes primarily damage the:

a) Stomach b) Intestine c) Liver d) Skin

✓ Vaccination is given to farm animals to protect them from:

a) External parasites b) internal parasites c) infectious diseases d) nutritional deficiencies

✓ The food required to support the animal to live a healthy life is known as:

a) Milk producing requirement b) Maintenance requirement c) Lactation diet d) Concentrates

✓ Name two types of infectious agents that can cause diseases in farm animals.

**Homework:**

- Differentiate between milch and draught animals? Give examples.
- How can we increase the milk production?
- What are the benefits of cattle farming?
- Explain the common management practices in dairy.

## PERIOD PLAN -12

**Concepts covered:** 3.2.2. Poultry farming

**Learning Objectives:**

- Distinguishes between indigenous and exotic species.
- Gives examples of indigenous and exotic poultry breeds
- Relates crossbreeding to obtaining improvement in fowl variety
- Explains the desirable traits to be focused on in developing new varieties

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

The teacher tests the previous knowledge:

- Apart from plants, where do we get food from?
- Why do we rear birds?
- What food do we get from birds?
- What should be improved to meet the growing need for chicken and eggs?

TLM Required: Chart or poultry birds, Pictures of Indigenous Poultry breeds, Chart showing desirable traits in chicken.

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher introduces the concept of poultry farming with the help of a picture. | Aseel x Leghorn improved variety | Discuss the implications of the following |

`

| | | |
|---|---|---|
|  <br>• Poultry means Chicken. What is the rearing of domestic fowl called?<br>• What do we get from domestic fowls?<br>• Where are chickens reared in your village?<br>• What qualities do local breeds of chicken have?<br>• Which chicken do you prefer to eat, local or farm?<br>• Which chicken lays more eggs, local or farm?<br>Which chicken possesses natural immunity?<br>• Improved poultry breeds are developed and farmed to produce layers for eggs and broilers for meat.<br>Indian/indigenous breeds - Aseel<br>Foreign/Exotic breeds – Leg horn<br>desirable traits—<br>(i) number and quality of chicks<br>(ii) dwarf broiler parent for commercial chick production;<br>(iii) summer adaptation capacity/ tolerance to high temperature;<br>(iv) low maintenance requirements;<br>(v) reduction in the size of the egg-laying bird with the ability to utilise more fibrous, cheaper diets formulated using agricultural by-products.<br>Broiler chickens:<br>• fed with vitamin-rich supplementary feed for good growth rate and better feed efficiency.<br>• Care is taken to avoid mortality and to maintain feathering and carcass quality.<br>• The daily food requirement is protein-rich with adequate fat.<br>• The level of vitamins A and K is kept high in the poultry feeds.<br>For the good production of poultry birds:<br>• maintenance of temperature<br>• hygienic conditions in housing and poultry feed,<br>• prevention and control of diseases and pests.<br>Infestation of poultry birds: virus, bacteria, fungi, parasites, as well as from nutritional deficiencies.<br>Preventive measures for diseases:<br>• proper cleaning,<br>• sanitation,<br>• spraying of disinfectants at regular intervals.<br>• vaccination | Discuss the improved variety of characters based on the above flow chart.<br><br>The teacher guides the students to conduct an activity and discuss the findings<br>What types of breeds did you observe?<br>What ration is given to them?<br>How were the lighting and housing facilities given to them?<br><br>Visit a local poultry farm. Observe types of breeds and note the type of ration, housing and lighting facilities given to them.<br>Identify the growers, layers and broilers. | statement.<br>“It is interesting to note that poultry is India’s most efficient converter of low fibre foodstuffs (which are unfit for human consumption) into highly nutritious animal protein food.”<br><br>What do we get when we crossbreed indigenous and foreign breeds of chicken?<br><br>The following are varieties of poultry birds: A and B are Aseel and Bursa, C and D are White Leghorn and Rhode Island Red. Which are indigenous and which are exotic?<br><br>What would you obtain if indigenous species were bred with exotic species?<br><br>What would be the advantages of this process?<br>What are the preventive measures for diseases in poultry? |

**Summary**:

`

- Improved Poultry Breeds Developed and farmed to produce layers for eggs and broilers for meat. Include Indian/Indigenous breeds (e.g., Aseel) and Foreign/Exotic breeds (e.g., Leg horn).
- For Good Growth Rate and Better Feed Efficiency (likely referring to broilers):
- Care is taken to avoid mortality and to maintain feathering and carcass quality.
- The daily food requirement is protein-rich with adequate fat.
- The level of vitamins A and K is kept high in the poultry feeds. For the Good Production of Poultry Birds:
- Maintenance of temperature.

Hygienic conditions in housing and poultry feed.
Prevention and control of diseases and pests.

**Factual Questions:**

- What is Poultry?
- What are the two main products obtained from raising domestic fowl?
- What are layers and broilers?

**Open-ended questions:**

- Name two external factors that have a favourable effect on egg laying of hens.
- Give examples of Exotic Poultry breeds.
- How do you distinguish **i**ndigenous and exotic species of chicken?

**Evaluation/ Quiz/Assessment:**

- □.....---------- are hens that have a high rate of egg production.
- Name two vitamins that should be included in high amounts in poultry feed.
- Give examples of Indigenous Poultry breeds.
- Which of the following can cause infestation in poultry birds?

a) Proper cleaning b) Vaccination c) Bacteria d) spraying of disinfectants.

- Identify whether the given statement is true or false.

Infestation in poultry can arise from nutritional deficiencies.

**Homework:**

✓ What management practices are common in dairy and poultry farming?
✓ What are the differences between broilers and layers, and in their management?
✓ Explains the desirable traits to be focused on in developing new varieties of fowl.

## PERIOD PLAN -13

Chapter name: Improvement in food resources Grade : 9
Subject: Biological science

**Concepts covered:** 3.2.3(i) Marine fisheries

**Learning Objectives:**

- Locates the marine fishery area in our country.
- Explains about marine capture fisheries
- Gives examples of popular marine capture fishes.
- Classifies fishes based on the structure

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

The teacher tests the previous knowledge:

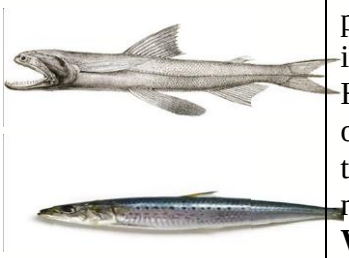
- What food do we get from animals?
- Name the nutrients we get from animal foods.
- Name an important aquatic food rich in protein?
- What do you mean by blue revolution?
- Where do fish live?

`

- What should be improved to meet the growing need for fish?

TLM Required: Chart showing types of fish, fishery and sources, Pictures/specimens of marine culture fish varieties

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher introduces the concept of fish production through simple questioning.<br>• Why is fish called an aquatic food?<br>• What is the main nutrient we get from fish?<br>Fish is a cheap source of animal protein for our food.<br>Fish production- the finned true fish, shellfish such as prawns and molluscs.<br>There are two ways of obtaining fish:<br>• from natural resources, which is called capture fishing.<br>• fish farming, which is called culture fishery.<br>The water source of the fish can be either seawater or freshwater, such as in rivers and ponds.<br>Fishing can thus be done both by capture and culture of fish in marine and freshwater ecosystems.<br>• India's marine fishery resources include 7500 km of coastline and the deep seas.<br>Marine fish varieties - pomphret, mackerel, tuna, sardines, and Bombay duck.<br>• Marine fish are caught using many kinds of fishing nets from fishing boats.<br>• Yields are increased by locating large schools of fish in the open sea using satellites and echo-sounders.<br>The teacher introduces that marine fish of high economic value can be farmed and displays the pictures. **Finned fishes**<br>• Some marine fish of high economic value: Mullets, bhetki, and pearl spots, shellfish such as prawns, mussels and oysters (for pearls), as well as seaweed.<br>• As marine fish stocks get further depleted, the demand for more fish can only be met by such culture fisheries, a practice called mariculture. |  <br>Where do these fish live?<br>Can we get the desired type of fish through capture fisheries? | What does fish production include?<br>How many types of fisheries are there based on the mode of obtaining?<br>**What are the main sources to obtain fish?**<br>**Based on the water source, how can we classify fish**<br>**India's marine fishery resources include _____km of coastline**<br>How are marine capture fishes obtained?<br>The yield of marine fish is increased by locating large schools of fish in the open sea using.<br>What is the use of satellites and Eco-sounders in marine capture fisheries? |

**Summary**:

- Fish can be sourced from both freshwater (rivers, ponds) and marine ecosystems.
- Fishing can be done through capture and culture in both marine and freshwater environments.
- Examples of marine fish varieties include pomphret, mackerel, tuna, sardines, and Bombay duck.
- Marine fish are commonly caught using various types of fishing nets from fishing boats.
- Examples of some marine fish of high economic value are mullets, bhetki, and pearl spots.
- Shellfish such as prawns, mussels, and oysters (for pearls) are also of high economic value.
- Seaweed is another valuable marine resource.

`

- As marine fish stocks become depleted, the demand for more fish can be met by culture fisheries, a practice called mariculture.

**Factual Questions:**

- What is meant by marine fisheries?
- What are culture fisheries?
- How can fish be classified?

**Open-ended questions:**

- Gives examples of popular marine capture fishes.
- Do marine capture fisheries help to obtain fish of the same economic value?
- What can be done to get fish of high economic value?
- Can marine fish be cultivated in the sea?
- What do you mean by mariculture?

**Evaluation/ Quiz/Assessment:**

✓ Shellfish include prawn and___

✓ Mullets, prawns and mussels are examples of

o marine fishes
o freshwater fishes

(C) finned fishes
(d) shelled fishes

✓ State if the statement is true or false.

Mullets are marine fish farmed in seawater

**Homework:**

- How is seaweed useful to us?
- As we cannot get our desired fish through capture fisheries, what can we do to meet that demand?
- As culturing fish in water is called aquaculture, what can we call such culture in marine water?
- How do you differentiate between Capture Fishery and Culture Fishery?

## PERIOD PLAN -14

Chapter name: Improvement in food resources Grade : 9
Subject: Biological science

**Concepts covered:** 3.2.3 (iii) Inland fisheries

**Learning Objectives:**

- Identifies the major resources for fish production
- Differentiates between the freshwater Capture and Culture fisheries.
- Analyses and interprets the data related to Composite Fish Culture
- Relates hypothecation in fishes to ensure the supply of pure seeds in desired quantities

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

The teacher tests the previous knowledge:

- Name an important aquatic food rich in protein?
- Why is fish called an aquatic food?
- What do you mean by blue revolution?
- Name the resources of fish?
- How can fish be classified?

`

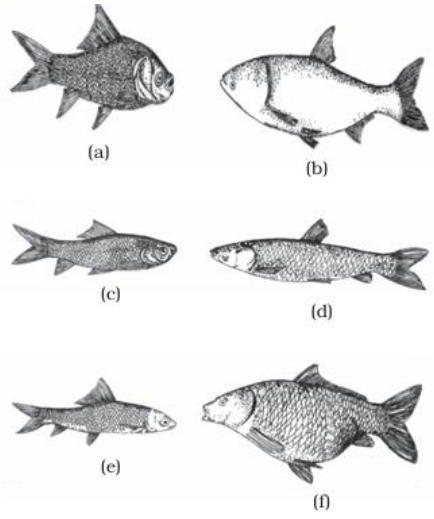
- What do you call the fish that grow in the sea?

TLM Required: charts showing the population and the current food production

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

TLM Required: Types of Culture fishery

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher introduces the concept of Inland fisheries with the help of a chart and simple questioning:<br>• What are the major sources of water?<br>• What do we call the fish obtained from the sea?<br>• Apart from the sea, where do we obtain fish from?<br>• What is the water from lakes and rivers called as?<br>• What is brackish water?<br>Fresh water resources include canals, ponds, reservoirs and rivers.<br>Brackish water resources, where seawater and freshwater mix together, such as estuaries and lagoons, are also important fish reservoirs.<br>Fish culture is sometimes done in combination with a rice crop, so that fish are grown in the water in the paddy field.<br>Composite fish culture system:<br>• Both local and imported fish species are used in such systems.<br>• A combination of five or six fish species is used in a single fishpond.<br>• These species are selected so that they do not compete for food among themselves, having different types of food habits.<br>The food available in all the parts of the pond is used<br>• Catlas - surface feeders,<br>• Rohus - middle zone of the pond,<br>Mrigals and Common Carps - bottom feeders, and<br>• Grass carp feed on the weeds, | Visit a fish farm in the fish breeding season and note the following:<br>(1) Varieties of fish in a fish farm<br>(2) Types of ponds<br>(3) Feed ingredients used<br>(4) Production capacity of the farm.<br>If there are no fish farms close to your locality, gather the above information from the Internet, by referring to books or talking to people who are engaged in the fishery.<br>  <br>(a) (b) (c) (d) (e) (f)<br>• Identify the above given fishes and find where they feed in the pond. | Where are t he fish captured from?<br><br>What are the resources for capture fisheries?<br>How are fish captured?<br>What are capture fisheries?<br>What is production from inland water bodies called?<br><br>Estuaries and lagoons are water, inland water resources. |

**Summary**:

- Freshwater resources for fish culture include canals, ponds, tanks, and rivers.
- Brackish water resources, where saltwater and freshwater mix (such as estuaries and lagoons), are also important fish reservoirs.
- Fish culture is sometimes done in combination with a rice crop, so that fish are grown in the water in the paddy field. This is known as a composite fish culture system.

**Factual Questions:**

`

- What are the two ways of obtaining fish?
- Differentiate between Capture and Culture fisheries
- If more than one species of fish is cultured, what is it called **a**s?

**Open-ended questions:**

- Where does Rohu fish feed?
- Which species are used in the culture?
- Do fish compete for food and space in composite culture?
- Do all the fish have the same feeding habits in composite culture?
- A combination of how many species is used here?

**Evaluation/ Quiz/Assessment:**

- State if the statement is true or false:

Mullets are freshwater fish farmed in river water.

- Rohu and Catla are types of fish.

- Match the following

Surface feeder - Rohu
Middle zone feeder - Common carp
Bottom feeder - Mrigal

**Homework:**

- Where are t he fish captured from?
- What are the advantages of Composite fish culture?
- How is a culture o**f** Pomhret and Mackeral different from that of Catla and Rohu?

## PERIOD PLAN -15

**Concepts covered:** 3.2.4 Bee keeping

**Learning Objectives:**

- Explains why honey is widely used as medicine.
- Gives examples of Bee varieties
- Gives reasons why the Italian bee is considered the best in honey production
- Explains the measures to be taken to promote responsible bee production
- Relates pasturage to honey production

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

The teacher tests the previous knowledge:

✓ Do you like sweets?
✓ What are sweets made up of?
✓ Can we use a substitute for sugar and jaggery?
✓ Where do we get honey from?
✓ What is rearing honey bees for honey called?

TLM Required: Chart showing honey, its products and uses, different types of honey bees pictures.

Teacher Resources: SCERT textbook, Digital content of Diksha, Byju's and YouTube videos

| I do (Direct Instruction) | We do (Guided Practice) | You do (Independent Practice) |
|---|---|---|
| The teacher introduces the topic - bee keeping and elicits the wide usage of honey and bee keeping as an agricultural | | Why is honey widely used? |

`

| | | |
|---|---|---|
| enterprise.<br>• Honey is widely used and, therefore, bee beekeeping for making honey has become an agricultural enterprise.<br>• The beehives are a source of wax, which is used in various medicinal preparations.<br>The local varieties of bees used for commercial honey production are Apis cerana indica - Indian bee,<br>A. dorsata - the rock bee<br>A. florae - the little bee.<br>• An Italian bee variety - A. mellifera<br>• The Italian bees have a high honey collection capacity.<br>• They sting somewhat less.<br>• They stay in a given beehive for long periods, and breed very well.<br>For commercial honey production, bee farms or apiaries are established.<br>The value or quality of honey depends upon:<br>• the pasturage, or<br>• the flowers available to the bees for nectar and pollen collection.<br>• The kind of flowers available will determine the taste of the honey | | How are the products of honey useful in our daily life?<br><br>As it needs low investments, how do farmers use it to improve their income?<br>Where do we get honey from?<br><br>What does the Value and quality of honey depend upon? |

**Summary**:

- Honey is widely used, making beekeeping a significant agricultural enterprise.
- Beeswax is used in various medicinal preparations.
- Apis cerana indica, A. dorsata, and A. florae are local varieties for honey production.
- Apis mellifera is an Italian bee variety.
- The value or quality of honey depends upon:
  The pasturage, or the flowers available to the bees for nectar and pollen collection.

**Factual Questions:**

- What are the advantages of beekeeping?
- **What is pasturage?**
- **What is apiculture?**
- What happens if the bees get extinct?

**Open-ended questions:**

- How is the honey flow period related to honey production?
- What factors determine the yield of honey?
- What is the common name of Apis dorsata?

**Evaluation/ Quiz/Assessment:**

- ……..is a less swarming bee species.
- Apis cerana is commonly known as.
- _____ …… An exotic variety of bees is domesticated in India **t**o increase the yield of honey.
- What are the desirable characteristics of bee varieties suitable for honey production?
- What is pasturage, and how is it related to honey production?

**Homework:**

- ✓ **What are the applications of honey in modern and traditional medicine?**

`

- ✓ Name two local and exotic breeds of bees used for commercial production of honey. List any three qualities for which foreign breeds are adopted.
- ✓ What are apiaries, and why are they established

**Teachers Diary:**

| Period No | Name of the Concept to be taught | Date | Activities Conducted during the teaching | TLM Used | Student Response 1/2/3/4/5 | Topics intended to reteach | Additional resources used to reteach |
|---|---|---|---|---|---|---|---|
| **1** | Introduction, 3.1 Improvement in Crop Yields | | | | | | |
| **2** | 3.1.1 Crop Variety Improvement | | | | | | |
| **3** | 3.1.2 Crop Production Management ,3.1.2.1 Nutrient Management | | | | | | |
| **4** | 3.1.2 Crop Production Management ,3.1.2.1 Nutrient Management | | | | | | |
| **5** | 3.1.2 Crop Production Management ,3.1.2.1 Nutrient Management | | | | | | |
| **6** | 3.1.2.2 Irrigation | | | | | | |
| **7** | 3.1.2.3 Cropping Patterns | | | | | | |
| **8** | 3.1.3 Crop Protection Management | | | | | | |
| **9** | 3.1.3 Crop Protection Management | | | | | | |
| **10** | Storage Of Grains | | | | | | |
| **11** | 3.2 Animal Husbandry, 3.2.1 Cattle Farming | | | | | | |
| **12** | 3.2 Animal Husbandry, 3.2.1 Cattle Farming | | | | | | |
| **13** | 3.2.2 Poultry Farming | | | | | | |
| **14** | 3.2.3 Fish Production | | | | | | |

`

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **15** | 3.2.3.1 Marine Fisheries | | | | | | |
| **16** | 3.2.3.2 Inland Fisheries | | | | | | |
| **17** | 3.2.3.2 Inland Fisheries | | | | | | |
| **18** | 3.2.4 Bee keeping | | | | | | |

**Signature of the HM** **Signature of the teacher**

| Teacher reflections | Action plan |
|---|---|
| What were some of the specific strategies that I used to encourage participation? How effective were they? What will I do differently next time? | |
| 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? | |
| What additional resources or modifications could improve the effectiveness of this lesson in future implementations? | |
| How well did I adjust my teaching based on student reactions or unforeseen challenges? | |

**Any other specific information:**

……

……

……

……

……

……

……

## LIST OF MATERILS REQUIRED TO PERFORM ACTIVITIES

**CLASS: IX**

| ACTIVITY NO: | ACTIVITY NAME | RESOURCES REQUIRED |
|---|---|---|
| | **CHAPTER - 5: THE FUNDAMENTAL UNIT OF LIFE** | |
| 5.1. | Observation of cells of onion peel | Onion, watch glass, slides, coverslips, water, safranine, glycerine microsope |
| 5.2. | Observation of cells of different plant parts like leaf, root tips, onion peel | Onion, leaf, roots, watch glass, slides, coverslips, water, safranine, glycerine, microscope |
| 5.3. | Osmosis with an egg | Eggs, dilute HCl, beakers, water, salt solution |
| 5.4. | Osmosis with dried raisins or apricots | Dried raisins or apricots, beakers, water, salt or sugar solution |
| 5.5. | Electron microscopy | Internet |
| 5.6. | Observation of cells of leaf of Rhoeo. | Rhoeo leaf, watch glass, slide, water, salt or sugar solution, microscope |
| 5.7. | Observation of cheek cells | Ice cream spoon, slide, methylene blue, microscope, water |
| | **CHAPTER - 6 : TISSUES** | |
| 6.1. | Observation of growing region of roots | Two beakers, onions, blade, scale, slides, watch glass, coverslips, safranine, glycerine and microscope |
| 6.2. | Observation of cross section of stem | Tender twig, watchglass, slides, coverslips, safranine, glycerine and microscope |
| 6.3. | Observation of epidermis in Rhoeo leaf | Rhoeo leaf, slides, cover slips, petridish, water, safranine, microscope |
| 6.4. | Observation of blood cells | Slides, cover slips, microscope, sterile syringe needle, surgical spirit, cotton |
| 6.5. | Compare the structures of different types of muscular tissues | Charts |
| | **CHAPTER - 12 : IMPROVEMENT IN FOOD RESOURCES** | |
| | All the activities in this chapter involve field visits or data collection and can be used as projects. Before conducting field visits or projects, prepare questionnaires or formats. | |