THEME 3

THE WORLD OF THE LIVING

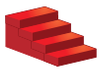
ACTIVITY 25

What we have to do?

Study that leaves release water vapour during the process of transpiration.

What do we need?

A healthy well-watered potted plant, dry polythene bags, thread/rubber bands.



How do we proceed?

1. Take a healthy, well-watered leafy plant, growing under the sun.
2. Select two branches each with 10-12 leaves.
3. Remove all the leaves from one branch and retain the leaves of the other branch.
4. Cover both branches with polythene bags and tie their mouths with thread/rubber bands (Fig. 25.1).
5. Tie up the mouth of an empty polythene bag and keep it under sunlight along side the plant.
6. Observe the inner surface of each polythene bag after a few hours.

What do we observe

We observe that the inner surface of polythene bag enclosing the leafy branch of plant has more number of water droplets. The leafless branch has negligible number of water droplets as compared to the leafy branch.

The inner surface of the empty polythene bag does not have any water droplets.

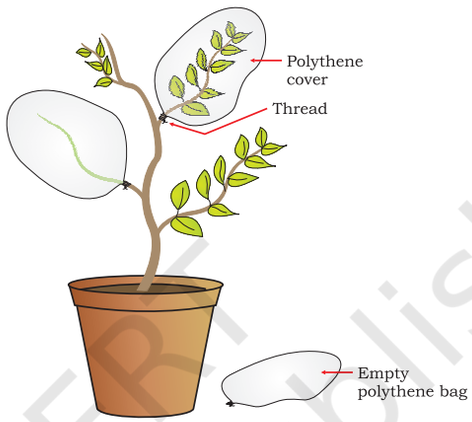


Figure 25.1
Branches covered with polythene bags

What do we conclude?

We conclude that plants release water vapours from their leaves which condense on the inner surface of polythene bags in the form of water droplets. Water vapours move out of the leaves through minute openings called stomata. This process is called transpiration.

Let us answer

1. Why do leaves release water vapour by the process of transpiration?
2. Name the pores in leaves through which plants transpire?
3. Why do desert plants lose less water as compared to leafy plants?
4. Why do water vapours released by the leaves appear as water droplets on the inner surface of the polythene bags?
5. Which of the plants will have more rate of transpiration — a plant growing under sun or a plant growing under shade? Give reasons for your answer.

What more can we do?

Select two leafy branches in a potted plant. Apply a layer of oil on the leaves of one of the branches. Tie polythene bags as in the above activity, on the selected branches. You will observe that the inner surface of the bag enclosing the oil-layered leaves do not have any water droplets. This is because of the reason that stomatal openings are clogged by the oil.

Note for the teacher

Before the activity, teacher may discuss the concept of transpiration in the class. The plants selected for the activity should be those which are growing under the sun. The indoor plants and those growing under shade should not be selected. The teacher can discuss the role of stomata in transpiration. Other roles of stomata should also be discussed.

Notes

ACTIVITY 26

What we have to do?

Identify the parts of a flower and distinguish between unisexual and bisexual flowers.

What do we need?

Flowers of *Petunia/Cassia/Datura/Hibiscus*/lady's finger and flowers of pumpkin/bitter gourd/snake gourd/papaya, blade, forceps, white sheet of paper.

How do we proceed?

1. With the help of a blade, vertically cut a flower (Flower A) of *Petunia/Cassia/Datura/Hibiscus*/lady's finger into 2 halves. Take care not to cut through the pistil of the flower (gynoecium).
2. Spread the 2 halves, side by side, on a white sheet.
3. Observe the various parts of the flowers carefully and compare them with the figure given below (Figs. 26.1, 26.2 & 26.3).
4. identify the parts you observe.

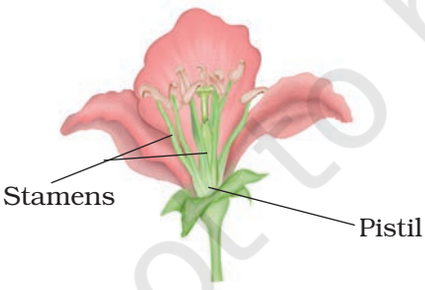


Figure 26.1 Parts of a flower

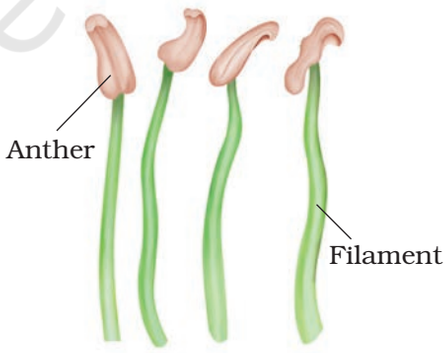


Figure 26.2 Parts of a stamen

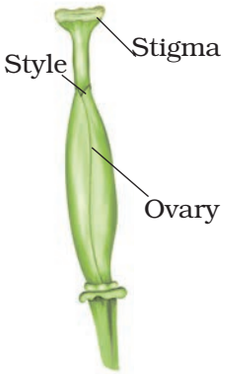


Figure 26.3 Parts of a pistil

5. Pull out the individual parts with the help of forceps, one after another, and group them separately based on their colour and appearance.
6. Take another flower (Flower B) of pumpkin/bitter gourd/snake gourd/papaya and repeat the above steps to observe and identify the parts.

What do we observe?

Flower A has four parts–

- prominent coloured parts
- green-coloured parts surrounding coloured parts at the base.
- a number of filaments in the middle with a yellow-creamish part.
- a centrally located structure with a swollen base.

Write your observations for the flower B as you did for flower A.

What do we conclude?

- The green part of flower is the sepal.
- The large, coloured part is the petal.
- The filamentous part (many in number) with a yellow-creamish part is the stamen.
- The central part (only one in number) with broad base is the pistil.
- Flower A has all the four parts.
- Flower B has only 3 parts—sepals, petals, stamens or pistil.
- As flower A has both stamen (male reproductive part) and pistil (female reproductive part), it is a bisexual flower (*bi* = two).
- Flower B has only one of the reproductive parts – either stamen or pistil. Hence, it is a unisexual flower (*uni* = one).

Let us answer

1. Name the green parts of a flower.
2. Which are the male reproductive parts of the flower? Draw their structure and label them.
3. Name the yellow-creamish part of stamens? What is formed inside them?
4. Write the significance of pistil in flower.
5. Can self-pollination occur in a unisexual flower? Give reasons for your answer.
6. Why do insects and butterflies visit the flowers?
7. Which part of the flower becomes the fruit?

What more can we do?

- Collect 10-12 different kinds of flowers. Divide students into four groups and each group may study the parts of 2-3 kinds of flowers. The Table 26.1 can be filled.

Table 26.1.

S. No	Name of the Flower	Petals		Sepals		No. of Stamens	No. of Pistils
		Number	Colour	Number	Colour		

- Categorise the flowers into unisexual and bisexual flowers. Study various methods of pollination in these flowers. This can clarify the concept of self and cross-fertilisation in flowers.

Note for the Teacher

- Teacher can take the students to the school garden or any nearby garden to show the variety of flowers. Various parts of the flowers can be studied there itself. Students should be told to collect only a few flowers. Plucking too many flowers should be discouraged.
- As the activity involves the use of blade for sectioning the flower, it must be done under supervision of the teacher.

Notes _____

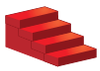
ACTIVITY 27

What we have to do?

Let us learn about joints in our body and how they move.

What do we need?

We need enthusiastic, cheerful children!!



How do we proceed?

The teacher will draw the Table 27.1 on the black board or the Table can be written on sheets of paper and distributed to students. The students may be called in groups and asked to move different body parts which will involve different joints in our body. Students will choose the appropriate type of movement/statement from the list and complete the Table.

What do we observe?

One of the group members will fill up the Table 27.1 on the basis of observations made by the group.

Table 27.1 : Body parts/joints and their movement. Choose from the following and write in column 2 moves sidewards, rotates, does not move, moves up and down, rotates partly, bends.

S. No.	Body part/joint	Type of Movement	Type of Joint
1	Head		
2.	Skull		
3.	Lower jaw		
4.	Neck		
5.	Arm (shoulder)		
6.	Elbow		
7.	Wrist		
8.	Finger		

9.	Backbone		
10.	Leg		
11.	Knee		
12.	Ankle		
13.	Toe		
14.	Ribs and Chest		

(Note that the last column (Type of joint) will be filled up later only after a discussion in the class on various types of joints in our body.)

What do we conclude?

After filling the columns in the Table 27.1, we can conclude that:

- Each part listed in the Table is made up of many bones.
- Bones are strong and cannot be bent.
- Our body parts bend only at those points where bones meet.
- The points where bones meet are called joints.
- Different joints exhibit different types of movement.
- Cartilage is present at the ends of bones. (It acts as a smooth surface between bones.)
- Certain muscles are attached to the bones. Bones cannot move by themselves. Bones and muscles function together and enable movement.
- A pair of muscles work together to bring about movements of bones. When one muscle contracts the other relaxes.

Let us answer

1. Which type of joint allows maximum movement in all directions?
2. Which parts of your arm have the following joints:
   a) Hinge joint b) Gliding joint c) Ball and socket joint
3. We can turn our head from left and right because of
   a) ball and socket joint b) hinge joint c) pivot joint

4. Match the following:

Column A	Column B
a) Gliding joint	Skull
b) Hinge joint	Ankle
c) Fixed joint	Between ribs and breast bone
d) Partially movable joint	Knee

5. Our skull is made up of several plate-like bones which are joined to each other. Like other joints, can these bones also show any kind of movement? Give reason for your answer.

WHAT MORE CAN WE DO?

- Find out from your family members or relatives if they have suffered from any kind of joint-related problem. Also find out the advise given to them by the doctors during such problems in the form of DOs & DON'Ts. Fill up the information in the Table 27.2.

Table 27.2

S. No.	Pain Related to which joint	DOs	DON'Ts

NOTE FOR THE TEACHER

- Before beginning the activity the teacher will assess the class by asking questions on types of movements in various animals.
- Students may refer the textbook for corelating the type of joint with the type of movement.
- During discussion on identifying the types of joints, teacher shall guide the students on the basis of examples as given below.

Type of joint	Type of Movement	Examples

- Ball and socket joint: End of one of the bones is round like a ball. It fits into the socket (hollow part) in the other bone and allows maximum movement in all directions. Joints at hip and shoulder.
- Pivot joint: This joint allows movement in all directions—left and right, up and down. Joint between head and neck.
- Hinge joint: This joint allows movement in one direction only— up and down, or backward and forward, like the hinges of a door. Elbow joint and knee joint.
- Fixed joint (or Immovable joint): The edges of two flat bone at this joint are tightly interlocked in a zipper fashion. Bones of the skull.
- Partially movable joint: This joint allows only partial movement. Joints between the bones of backbone; joints between ribs and breast bone
- Gliding joint: In this joint two bones can slide upon each other. It allows side to side as well as backward and forward movement. Joints between the wrist bones and between the bones of ankle.

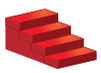
ACTIVITY 28

What we have to do?

Find out what the exhaled air contains.

What do we need?

Two test tubes, two thin glass tubes/plastic tubes/straws (6-8 inch long), lime water, water.



How do we proceed?

1. Take two clean test tubes and label them 'A' and 'B'.
2. Half-fill the test tube 'A' with tap water and take the same quantity of freshly prepared lime water in test tube 'B'.
3. Place the glass tube/plastic tube/straw in each test tube, taking care that one end dips properly in the solution.
4. Blow air (exhale) into test tube 'A' for 2-3 minutes. Shake the tube vigorously. Repeat the process 2-3 times and keep it in a test tube stand [Fig. 28.1 (a)].
5. Now, blow air into test tube 'B' for 2-3 minutes. Shake the tube vigorously. Repeat the process 2-3 times and keep it by the side of test tube 'A' [Fig. 28.1 (b)].
6. Observe both the test tubes and compare the colour of solutions in them.

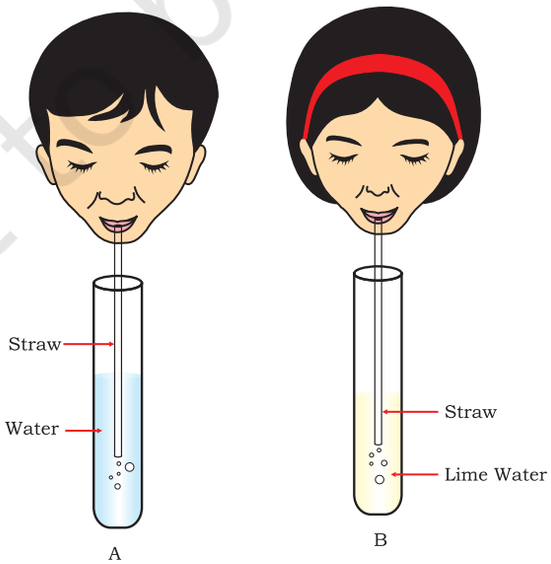


Figure 28.1
(a) Air being exhaled into water
(b) Air being exhaled into lime water

What do we observe?

The colour of water in test tube 'A' remains unchanged whereas the colour of lime water in test tube 'B' turns milky.

What do we conclude?

Exhaled air contains carbon dioxide which turns lime water milky.

Let us answer

1. What is lime water? Write the significance of taking lime water in the experiment.
2. Why does lime water turn milky in test tube 'B'?
3. What is the difference in the inhaled air and exhaled air?
4. Does the exhaled air contain only carbon dioxide?
5. Which gas in the inhaled air is necessary for respiration in human beings?
6. Are there organisms that can respire in the absence of oxygen? Name a few of them.
7. How are photosynthesis and respiration linked to each other?

What more can we do?

- A sensitive indicator called Phenol red can be used in place of lime water. Take a small quantity of water in a test tube (1-2 mL), add 2 drops of Phenol red and shake well. The solution appears pink. If we exhale into the solution, CO_2 present in the exhaled air dissolves in it and the pink solution turns pale yellow.
- Blow air on a mirror. You will find some water droplets on the mirror. This is because exhaled air contains water vapours which condense on the cool surface of the mirror in the form of water droplets.

NOTE FOR THE TEACHER

- Before the start of activity, teacher should explain the concept of breathing and respiration. The students must be familiar with the terms 'inhalation' and 'exhalation'.
- Lime water can be prepared by dissolving lime (calcium hydroxide) in water. Filter the solution and you get lime water.
- Do not blow air in quick short bursts as this may splash the solution out of the test tube.
- Cover the mouth of the test tube with the thumb while shaking.

NOTES

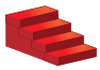
ACTIVITY 29

What we have to do?

Understand the mechanism of breathing.

What do we need?

A wide-mouthed plastic bottle, Y-shaped glass/plastic tube, one-holed cork, balloons, rubber/plastic sheet, rubber band.



How do we proceed?

1. Take a wide-mouthed plastic bottle and remove its bottom.
2. Fix a one-holed cork to the mouth of the bottle.
3. Take a Y-shaped glass/plastic tube and fix a deflated balloon to both the forked ends, as shown in the Fig. 29.1.
4. Insert the stem of the tube into the cork in such a way that the forked end is present in the bottle.
5. With the help of a rubber band tie a rubber or plastic sheet onto the open base of the bottle.
6. Pull the rubber sheet from the base downwards and observe the balloons.
7. Now push the rubber sheet upwards into the bottle and observe the changes in balloons.
8. Repeat the above two steps 3-4 times and observe.

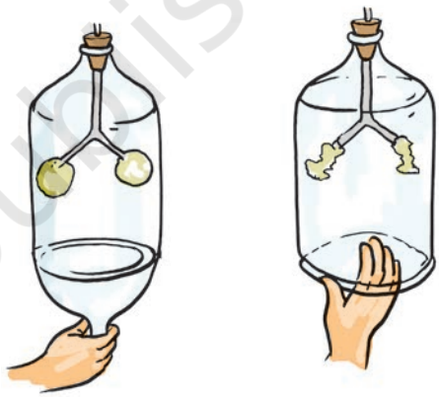


Figure 29.1
Model to show mechanism of breathing

What do we observe?

When we pull the rubber sheet downwards the balloons inflate and become larger in size. However, when we push the sheet upwards, the balloons deflate and shrink in size.

What do we conclude?

When we pull the rubber sheet downwards, it increases the space in the bottle. As a result air rushes through the opening of the Y-tube into the balloons, thereby, inflating them. When we push the rubber sheet upwards, the space in the bottle decreases and puts pressure on the balloons, because of which, the balloons push air through the Y-tube and are deflated.

The model used in the above experiment simulates the respiratory system of human beings.

- The plastic bottle represents the chest cavity.
- The stem of the Y-tube represents the wind-pipe which divides into two branches (Bronchi) with forked ends.
- The balloons represent the lungs and the rubber sheet, the diaphragm.

As described in the above activity,

During inhalation

- Diaphragm moves downwards.
- Chest cavity increases in size and air enters the lungs.
- Lungs get filled with air and expand in size.

During exhalation

- Diaphragm moves upwards.
- Chest cavity decreases in size and air is forced out of the lungs.
- Lungs release the air and reduce in size.

Let us answer

1. Differentiate between inhalation and exhalation.
2. What is the role of diaphragm in breathing?
3. What would happen if the diaphragm stops moving?
4. What does the plastic bottle represent in the above activity?
5. Why does the size of the chest cavity changes during inhalation and exhalation?
6. Why should the stem of the tube open outside the bottle?
7. Name the structural unit of diaphragm which helps in its movement.

What more can we do?

- The activity can be performed with a glass tube without any bifurcation.
- Place your hand on the abdomen. Take a deep breath and release it slowly. Note the change in the movement of your abdomen. Now perform the same activity but place your hand on the chest. You can feel the movement of your rib cage.
- Feel the movement of your abdomen and rib cage during breathing in different states such as physical

  a) During relaxation

  b) After exercising

  c) After running

  Record the frequency of movement in a minute and give reasons.

Note for the teacher

Before the start of this activity, the students must be familiar with the terms 'inhalation' and 'exhalation'. A brief discussion about the structure of the respiratory system may be done in the class. Students must be told about the muscular and involuntary nature of diaphragm to understand its movement.

Notes

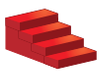
ACTIVITY 30

What we have to do?

Observe how water moves between cells in plants.

What do we need?

A medium-sized potato, potato peeler, knife, sugar solution, pins, Petri plate and water.



How do we proceed?

1. Take a potato and peel off its skin.
2. Make both ends flat by cutting off thin slices with a knife.
3. From one end carefully scoop out a cavity in the potato, leaving a thin layer of potato tissue all around the cavity.
4. Fill half of the potato cavity with sugar solution.
5. Mark the level of sugar solution inside the cavity by inserting a pin into the potato wall.
6. Now place the potato cup in a Petri plate containing water, such that most of the potato cup is dipped in water, but the level of water is lower than that of sugar solution (Fig. 30.1).
7. Keep the set-up for a few hours and observe the level of sugar solution in the cavity.

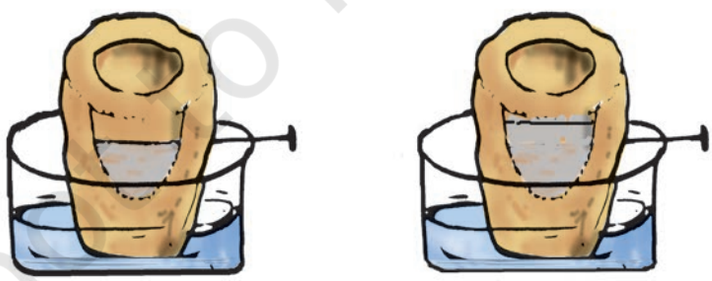


Figure 30.1
Water moves through different cells of potato through osmosis

Precautions

- The wall of the potato cavity should not be more than 4-5 mm thick.

- Take care that the wall remains intact while scooping the potato or while inserting the pin in the wall.
- For marking the level of sugar solution inside the potato cup insert the pin at an angle with its tip coinciding with the level of sugar solution.
- Do not fill the potato cavity with sugar solution up to its brim as it may overflow.
- Take care that the level of water in Petri-plate is lower than the level of sugar solution in the potato cavity.

What do we observe?

After a few hours we will observe that water from the Petri plate enters the potato cavity and the level of solution in the cavity rises.

What do we conclude?

- The Petri plate has higher concentration of water molecules than the potato cavity.
- Water moves from the Petri plate into the potato cup across the cell walls and cell membranes.
- Potato membrane behaves as a semi-permeable membrane through which water moves from its higher concentration to lower concentration. Such movement of water is called osmosis.

Let us answer

1. What is the direction of movement of water in the above experiment? Give reasons.
2. How does water move from soil to the xylem of root?
3. How does water reach from the roots of a plant to the leaves?
4. What would happen in the above experiment if –
   a) the level of water is higher than that of sugar solution?
   b) wall of potato is quite thick?
   c) skin of the potato is not peeled off?

What more can we do?

- Taking all other precautions, set up another experiment but with a hole in the potato cup made with a pin.
- Set up another experiment by reversing the water and sugar solution in the experiment. Observe the level of water in the potato cup after a few hours. What do you conclude?

Note for the teacher

- Before beginning the activity ask a few recapitulation questions like the examples given below:
  a. How do plants absorb water and minerals from the soil?
  b. How do water and nutrients move from roots to the leaves?
  c. Which tissue is responsible for transport of materials in plants?
  d. Name the vascular tissue for transport of water and nutrients in plants.
  e. Name the vascular tissue for transport of food prepared in leaves to all parts of the plant.
- The term osmosis may not be introduced at this stage because the students are not familiar with the concept of molecules, concentration of solutions and selectively permeable cell membrane.
- The teacher may emphasise upon the direction of movement of water and rise in the level of sugar solution bearing in mind the concept of osmosis.

Notes

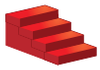
ACTIVITY 31

What we have to do?

Study the different types of reproduction in fungi/plants.

What do we need?

A slice of bread, water, filter paper, Petri plate, micro-slide, cover glass, forceps, Compound microscope.



How do we proceed?

1. Take a piece of bread and sprinkle some water on it.
2. Place it on a moist filter paper kept in a Petri plate.
3. Leave it undisturbed in a warm but shaded place for two-three days.
4. Observe the surface of the bread slice.
5. You may find some thread-like structures on it (Figs. 31.1 & 31.2). If they are not seen, sprinkle some more water and leave the bread slice for one or two more days.
6. With a forceps, pull out a few threads from the bread slice and place them on a micro-slide.
7. Add three to four drops of water and place a cover glass. Observe under the low power of microscope (Figs. 31.3 & 31.4).

Figure 31.1
Fungus growing on moistened bread

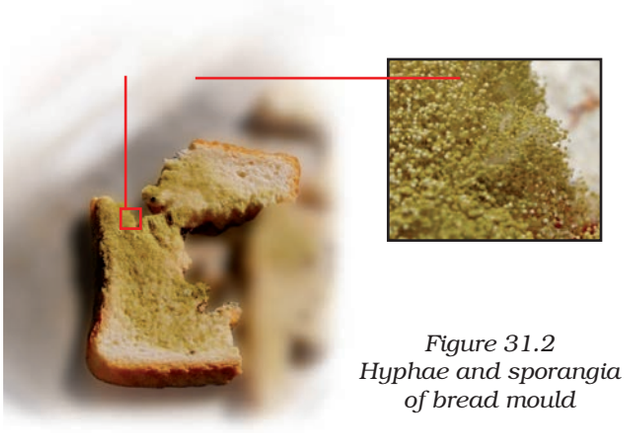


Figure 31.2
Hyphae and sporangia of bread mould

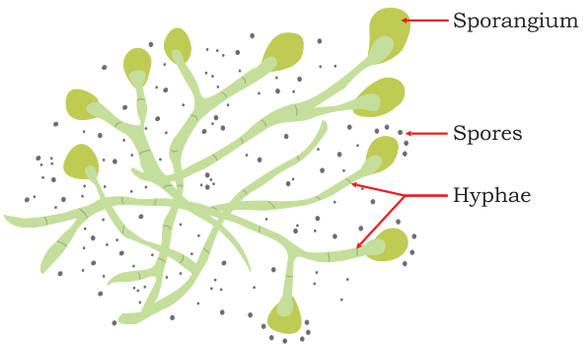


Figure 31.3 Hyphae seen under microscope

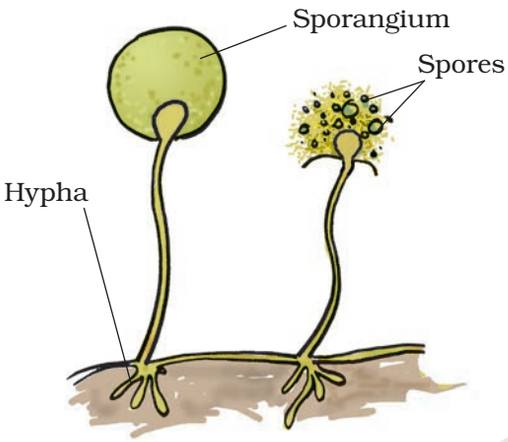


Figure 31.4 Asexual reproductive structures of bread mould

WHAT DO WE OBSERVE?

- The thread – like structures seen on the surface of bread may be green/white/brown/grey–coloured.
- When observed under the microscope, these structures comprise of long thin filaments with spherical/club-shaped bodies at their tips.
- Several small rounded spores will be seen floating in water.

WHAT DO WE CONCLUDE?

- The thread-like structures on the surface of moist bread are the hyphae of a fungus, bread mould a kind of fungus.
- Some hyphae develop a spherical/club-shaped body at the tips called sporangium.
- The sporangium produces several hundreds of minute rounded spores.
- The spores are asexual reproductive bodies which are released into the atmosphere.
- Under certain conditions, spores germinate into new hypae.

Some of the most common fungi are *Penicillium*, *Aspergillus*, *Mucor* and *Rhizopus*.

LET US ANSWER

1. Name the organism that can grow on a moist bread slice.
2. What does bread contain that encourages growth of mould?
3. State whether the following statements are *true* or *false*. If false, correct the statement.
   a) Fungi are heterotrophs and derive their nutrition from other sources.
   b) *Rhizobium* is a bread mould which reproduces by spore formation.
   c) Spores of bread mould are light-weight and can be dispersed easily.
4. Where are spores formed in a fungus and how are they dispersed?

WHAT MORE CAN WE DO?

Plants reproduce in various ways. The following activities can be performed to understand this.

- Take a fresh potato. With the help of a magnifying glass, observe the 'eyes' on its surface. Cut a few pieces of potato with 'eyes'. Sow them in soil and water them regularly for about a week. You will observe the growth of small plants from the pieces of potato tuber (Fig. 31.5). Tuber is a vegetative part. This method of producing new plants from the vegetative parts of plants is called vegetative propagation.

Figure 31.5 Young potato plants emerging from 'eyes' (buds) of potato

Figure 31.6 Young ginger plants growing from the stem of ginger

Figure 31.7 Young plants growing from the leaf of Bryophyllum

- Cut a few pieces of fresh ginger and sow them in the soil. Water them daily and observe after a week. Do you observe any kind of growth (Fig. 31.6)?
- Observe a 'leaf' of the sprouted leaf plant (*Bryophyllum).* You will see small buds in the margins of leaves. Remove a few buds and sow them in the soil. Water them daily for 8-10 days. You will observe young plants growing from these buds (Fig. 31.7).

NOTE FOR THE TEACHER

- Teacher should introduce the concept of asexual and sexual reproduction in plants. The term 'vegetative propagation' may also be explained before performing the activity.
- Students must be strictly cautioned not to eat the bread infected with fungus or inhale the spores. Students may be asked to collect different plants that may reproduce by their vegetative parts.
- Teacher may also give the following project to the students. The students of the class may be divided into four groups. Each group may perform the experiment on bread slice by keeping it in different conditions (see the table below) and record their observations. Students may also plan innovations and perform the experiment.

S.No.	Conditions	Observation
1.	Moist and warm	
2.	Moist and cold	
3.	Dry and warm	
4.	Dry and cold	

Observation : Hyphae seen on day 3/hyphae seen on day 6/hyphae not seen at all.

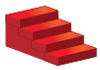
ACTIVITY 32

What we have to do?

Study the mode of reproduction in yeasts.

What do we need?

A beaker, warm water, sugar, dehydrated yeast powder, micro-slide, dropper, glass cover (cover slip), Compound microscope.



How do we proceed?

1. Take some warm water in a beaker.
2. Dissolve a spoonful of sugar in it.
3. Now add about 1g of dehydrated yeast powder into the solution and stir it.
4. Keep the beaker in a warm place for about an hour.
5. With the help of a dropper, place a drop of the solution on a clean micro-slide.
6. Place a cover glass on it taking care that air bubbles do not enter beneath the cover glass. Observe the slide under the microscope.

What do we observe?

- A number of minute, rounded unicellular yeast cells can be observed (Fig. 32.1).
- A few yeast cells have a bulb–like projection on their body.
- Some yeast cells appear like chains of 3-4 cells.

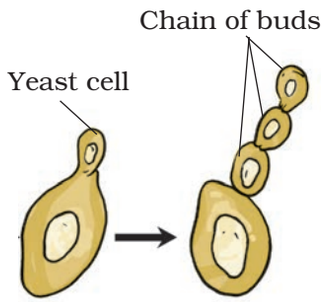


Figure 32.1
Reproduction in yeast by budding

What do we conclude?

- Yeasts grow well in a solution containing sugar kept in warm conditions.
- A bulb–like projection develops on the adult yeast cell called the bud.

- The bud grows in size, detaches from the adult cell and forms a new yeast cell.
- Sometimes, buds may remain attached on the yeast cell and another bud may arise from it appearing like a chain of buds.
- This method of asexual reproduction by formation of buds is called budding.

Another organism which reproduces by budding is *Hydra*.

Let us answer

1. What would happen if we conduct the above activity in cold water?
2. Is yeast an autotroph or a heterotroph?
3. State whether the following statements are *true* or *false*. If false, correct the statement.
   a) Yeast is a fungus that has heterotrophic mode of nutrition.
   b) Yeast can reproduce by budding and binary fission.
   c) The buds remain attached to the parent yeast cell and appear like a chain of cells.

What more can we do?

- Observe the permanent slide showing budding in *Hydra* and compare it with the slide of yeast cells.
- Observe the permanent slides of reproduction in other organisms, such as *Spirogyra*, *Amoeba*, *Paramoecium*, etc. Note down the type of reproduction you observe in them. Fill the Table 32.1.

Table 32.1

S.No.	Organism	Type of reproduction observed	What you observed?
1.	*Amoeba*		
2.	*Paramoecium*		
3.	*Hydra*		
4.	*Spirogyra*		

Note for the teacher

- The teacher should introduce the concept of asexual reproduction in plants and animals. Different methods of reproduction in organisms may be explained to understand the observations.
- It should be noted that the activity must be performed with the dehydrated yeast powder and in warm conditions.
- Yeast cells are very minute and cannot be seen under low magnification. Teachers can focus yeast slide under high magnification (10 × 40 or 10 × 100) and show it to students.

Notes

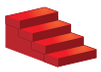
ACTIVITY 33

What we have to do?

Prepare a temporary slide to observe plant cells.

What do we need?

Onion bulb, forceps, blade/scalpel, water, methylene blue, micro-slide, cover glass, microscope.



How do we proceed?

1. Take an onion bulb and remove its outer dry pink covering.
2. Cut the onion bulb into two halves and take out a fleshy leaf, carefully pull out the thin white peel from its inner surface with a forceps (Fig. 33.1).
3. Cut a small piece of the thin onion peel with a blade/scalpel and place on a clean micro-slide.
4. Add 2-3 drops of water onto the slide and spread the onion peel.
5. Add a drop of methylene blue solution.
6. Carefully place a cover glass on it ensuring that there are no air bubbles under the cover glass.
7. Observe the slide under the microscope.

Figure 33.1
Method of removing onion peel

What do we observe?

We will observe a number of compactly arranged rectangular cells separated from each other by cell walls. A thin membrane can be observed beneath the cell wall. The cell has a jelly – like substance containing a dense dark-coloured round body (Fig. 33.2).

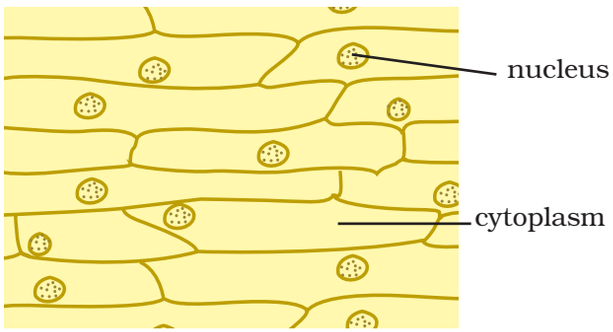


Figure 33 .2
A piece of onion peel showing cells

What do we conclude?

- The plant cells are surrounded by the cell wall.
- A thin cell membrane is present beneath the cell wall.
- The cell membrane encloses the jelly–like cytoplasm.
- The cytoplasm has a dense round nucleus which may be located in the centre or slightly on the periphery.

Let us answer

1. Why do onion cells have cell wall? Write the functions of cell wall.
2. Do animal cells have cell wall? Give reasons for your answer.
3. Why do onion peels have a number of cells which are closely packed together?
4. Why is it easier to see onion cells after they are stained with methylene blue?
5. Write the functions of cell membrane and nucleus of a cell.
6. Give reasons for the following:
   a) Red blood cells are spherical in shape.
   b) Nerve cells are the longest cells found in human body.
   c) Muscle cells are elongated and spindle-shaped.
7. Following are the steps for preparation of slide of onion peel.
   (i) Placing a small piece of onion peel on a micro-slide.
   (ii) Removing the epidermal peel from an onion bulb.
   (iii) Adding methylene blue stain to the peel.
   (iv) Placing the cover glass over the material.

   Which of the following represents a correct sequance?

   (a) i, ii, iii, iv; (b) ii, i, iv, iii; (c) iv, ii, iii, i; (d) ii, i, iii, iv.

What more can we do?

- Pluck a fresh and healthy leaf from *Tradescantia/Elodea/Rhoeo* plant. Using a forceps, carefully remove the epidermal peel from them. Perform the experiment as described in the above activity. Observe the leaf peels with or without staining. You will observe similar structure of plant cells as observed in the onion peel along with some new structures, such as stomata.

- Students can make slides using spring onions and record their observations.
- Take a toothpick and gently scrape the inner lining of the cheek with its blunt end. Take care not to hurt your cheek lining. Place the material on a clean micro-slide and spread it. Add a drop of water followed by 2-3 drops of methylene blue solution/iodine solution. Place the cover glass carefully and blot the extra solution if any. Observe the slide under the microscope and draw the observed structures. Note down the differences and similarities between onion peel cells and cheek cells.

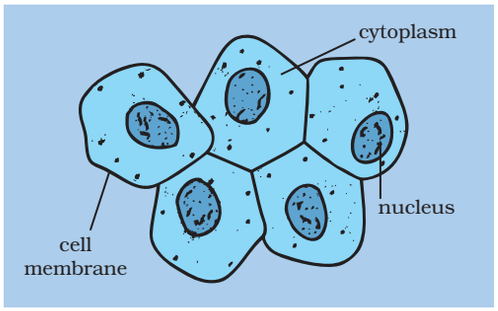


Figure 33.3 Human cheek cells

- Observe the permanent slides of different animal cells, such as muscle cells, nerve cells, blood cells, etc. Observe the diversity in shape and size of the cells. Relate their shape and size with the functions carried out by them.

NOTE FOR THE TEACHER

- Before performing the activity, teacher may explain the concept of a cell as the basic unit of life. Students can be asked to perform the activity in the class individually or in groups and make their observations.
- Since the activity involves use of scalpel/blade, it must be done under the supervision of a teacher. In case the students are performing the activity on cheek cells, they must be told to use blunt ends of the toothpicks and not to hurt their cheeks.

NOTES

ACTIVITY 34

What we have to do?

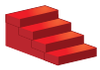
Create awareness among students about sex-based/gender-based discrimination that exists in our society.

Some terms related to the topic:

- The **biological sex** of a person is whether a person is a male or female.
- **Gender** refers to the state of being male or female with reference to social or cultural differences.
- **Gender roles** are perceptions or expectations of how men and women should behave. The views vary from person to person and culture to culture. Since gender roles are created by society, the perceptions of gender role also change with socio-cultural changes.
- **Gender stereotyping** refers to stereotyped images that are associated with males and females. A stereotype is a fixed idea or an image that people may have, but which is often far from reality/truth.
- **Gender-discrimination** is an understanding of the norms and customs of a society which are in favour of one gender over the other and which are practiced in our society since they are passed down from many generations. Understanding the socio-cultural factors responsible for this attitude is essential. This is not meant to defy the societal norms but to critically evaluate such practices.

What do we need?

Chart papers, bold marker pens, drawing pins.



How do we proceed?

We shall proceed to understand the issue through a series of activities. The activities may involve 'fill-up-the-slip', group-guided discussions, group games, brainstorming – sessions, role plays, skits, poster-making, slogan-writing, using flash cards, under taking case studies, citing anecdotes, setting up a Question box and other such activities.

What we have to do?

34A I am Good.

The activity will increase self-awareness of girls and boys by assessing themselves.

What do we need?

Slips of paper with the following Table 34.1 for each student.

Table 34.1

S. No.	I am a good student because	I am a good sister/ brother because	I am a good daughter/son because	I am a good human being because	I look good because
1					
2					

How do we proceed?

1. Fill-up the Table 34.1.
2. Although this is a self-awareness activity, you may share your personal qualities with the rest of the class.

What do we observe?

Each one of us is worthy in one way or the other. We share a good relationship with people we interact with in our daily lives.

What do we conclude?

It is a 'feel good' activity. It sets us in a positive frame of mind, to take up the other activities.

What we have to do?

34B Self-realisation of one's 'strengths and weaknesses'

It will help students to improve their self-awareness and self-esteem which are essential for personality development.

What do we need?

Slips of paper filled by each student in the previous activity.

How do we proceed?

Exchange the slips filled up in the previous activity with a friend. Discuss whether you have assessed yourself correctly and how can you improve yourself.

What do we observe?

- According to your friend you may have assessed your strengths and weakness correctly/partly correct/absolutely incorrect.
- Similarly, you may feel that your friend is aware/partly aware/not aware about his/her strengths and weaknesses.
- After discussion, you and your friend appreciate each others views, and realise that you may not be completely aware about yourself.
- The activity may increase your self-esteem.

What do we conclude?

Each of us have certain strengths and weakness whether we are boys or girls. Let us appreciate other's strengths and try to correct our weaknesses. Here is an opportunity to enhance our strengths and overcome our weaknesses. It is important to know ourselves better through self-realisation in order to prepare for a normal and meaningful adulthood.

What we have to do?

34C Understanding gender stereotypes.

This will help students understand about the gender-stereotyping by analysing the expected attitude and behaviour of boys and girls in our society.

What do we need?

Chalk, participatory approach of students.

How do we proceed?

1. Have a brain-storming session on the expectation of our society about the behaviour of boys and girls.
2. It can be a group discussion, guided and moderated by the teacher.
3. Teacher can write down the responses of students on the black board.

Expected attitude and behaviour of boys	Expected attitude and behaviour of girls

What do we observe?

Most people have a certain image about the behaviour of boys and girls. For example, the results may reveal that according to our society boys are not expected to cry, always act brave and do outdoor jobs. On the other hand, girls are expected to be weak, emotional, tend to cry easily and are expected to remain indoors.

What do we conclude?

The society have stereotyped the attitude and behaviours of boys and girls. In reality, both, boys and girls experience the full range of

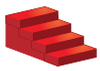
emotions, including happiness and sadness, love and anger, both are mentally strong and enduring in times of crises. Thus, stereotyping a particular attitude and behaviour just on the basis of gender is wrong and unacceptable.

What we have to do?

34D Learning about gender roles.

What do we need?

Slips of papers.



How do we proceed?

1. Take a slip of paper.
2. Write the sources on the slips from where you have learned about the gender roles discussed in the previous activity.
3. Share it with your classmates and discuss.

What do we observe?

We learn gender roles from sources such as parents, relatives, school, the community, magazines, movies, media, TV advertisements and others.

What do we conclude?

Boys and girls are not born with gender, stereotyped attitudes and behaviours. These are learned in the process of growing up in a society, who influences us in building up gender-fixed roles in our minds. These beliefs are so deeply ingrained in our consciousness that many of us think that gender roles are natural, therefore, we do not question them.

What we have to do?

34E Understand the issue of gender sensitivity.

How do we proceed?

Following activities may be carried out to develop gender sensitivity:

1. Enumerating the occupations which are traditionally considered for each gender.
2. Listing down occupations that can be taken up by both genders.
3. Giving examples of famous boys/men or girls/women who have broken stereotype of occupations.
4. Brainstorming session on reasons of gender stereotyping for occupations.
5. A skit on how cans these gender stereotypes lead to emotional burden in children.

What do we conclude?

- Different people and cultures have different beliefs about gender roles and responsibilities.
- Both genders can perform complementary roles and are equal to each other in worth.
- We should develop our own critical intelligence about culturally inherited stereotypes. If we see them as attainable goals only then we can bring a change in our society towards gender sensitisation.

Let us answer

1. Why are gender stereotypes destructive for a society?
2. How can gender stereotyping lead to emotional disturbance?
3. How does gender stereotyping limit our potential?
4. Give one example from your own life in which you had/have been affected by these stereotypes?
5. Shouldn't girls play outdoor sports and games?
6. Is it wrong for boys to help their mother in kitchen work?

What more can we do?

- **Activity:** Situation analysis, case studies or anecdotes from newspapers or electronic media which has some examples of gender stereotyping.
- **A question box** can be kept in the class and students can be encouraged to leave slips with queries, confessions, doubts, etc.

Note for the teacher

- There are several activities that can be performed over the entire year. All the actitivity are of the participatory type and are required to be performed in groups.
- The activities are so designed that they are expected to dispel myths and misconceptions prevalent in our society, particularly with regard to the girl child. Emancipation from the clutches of such myths is essential for the development of society and the nation at large.
- Teacher should be careful not to single out any individual or group or community, while dealing with such a sensitive issue.
- Teachers should also bear in mind the socio-cultural background of the students involved in performing these activities.
- The teacher should take care that the activities do not create a further divide among students leading to polarisation of views about the gender. The goals should be to dismantle gender stereotyping mind-set and create greater gender sensitivity. The ultimate goal is to establish gender equity.
- The teacher must avoid personal opinions on the issues but should encurage students to express their views open and freely, which means that he/she must not express being judgemental.
- The brainstorming and discussion sessions are meant to encourage students to ask gender-specific questions and use the interactions as a self-reflective tool for image makeover and a mind-set transforming process.
- Students should be encouraged to obtain frank and authentic information from parents, teachers, doctors, counsellor or peers.
- The final discussion session should involve active participation of all the groups finally leading to consensus-building on the debated issue.