

UNIT 4

PLANTS

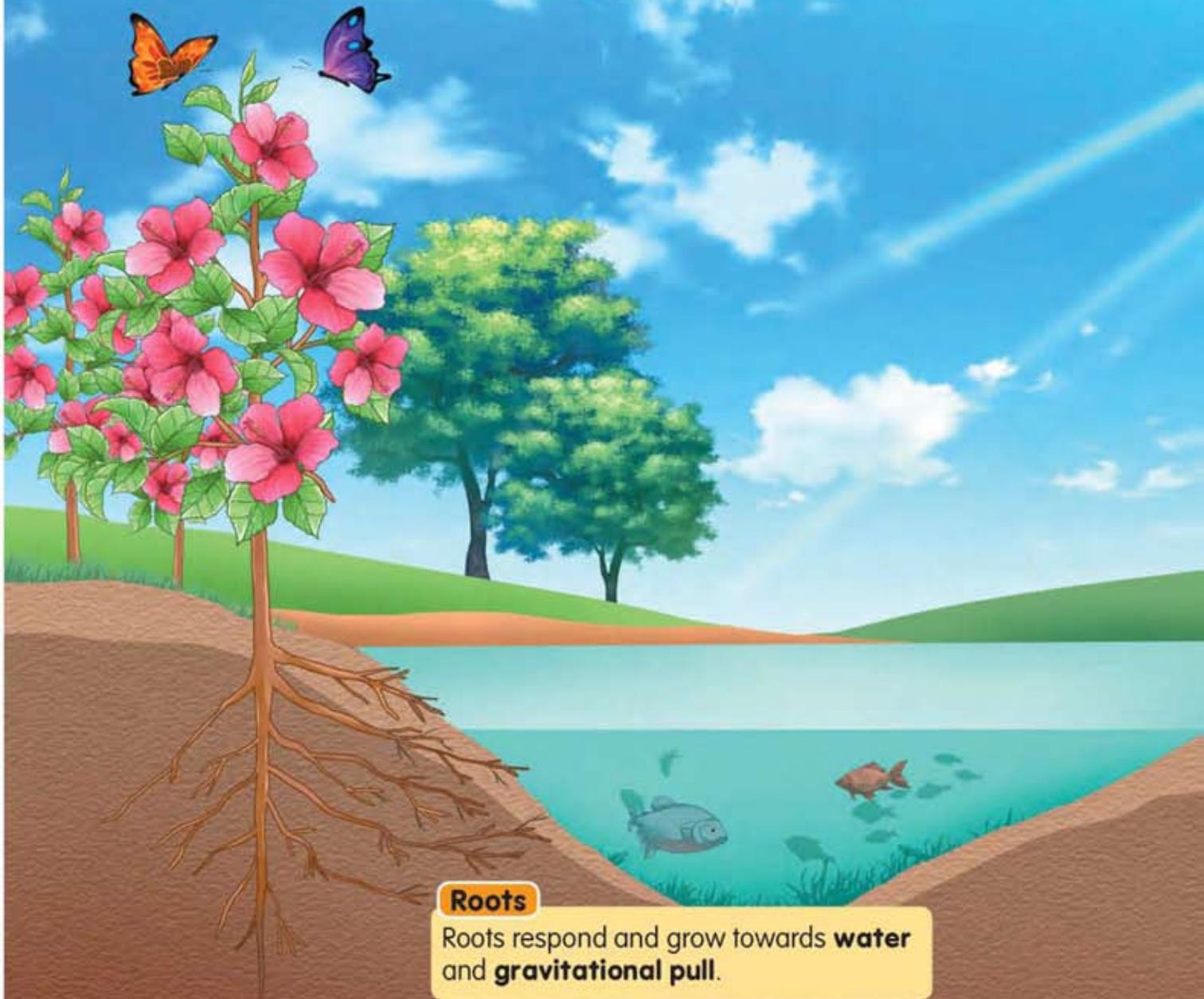
Teruni helps her grandfather at the vegetable farm.
What can you observe?

Wow, there are so many pumpkins!

Why is this part of the plant coiled around this pole?

Plant Responses to Stimuli

Like humans and animals, plants also respond to stimuli, such as water, gravity, light, and touch. Let us look at the picture below.



Roots

Roots respond and grow towards **water** and **gravitational pull**.



Shoots

Shoots respond and grow towards **light**.

Leaves

Leaves of **some** plants respond to **touch**.



SCIENCE INFO

Some plants, such as *Mimosa pudica* and Venus flytrap will droop and fold their leaves inward when touched.



Mimosa pudica

Venus flytrap

Based on the picture above, what can you say about plant responses towards stimuli?



Activity 1

Aim To investigate whether roots respond to water.

Hypothesis Roots respond to water.

Apparatus and Materials

3 newly germinated green bean seedlings, cotton, straw, double-sided tape, water, marker pen, petri dish

Steps



1. Place the green bean seedlings on a double-sided tape in the middle of the petri dish.



2. Put cotton on the left and right sides of the petri dish. Then, mark their positions as A and B using the marker pen.



3. Add a few drops of water on cotton A using a straw until it is damp.
4. Observe the growth of roots of the green bean seedlings every day for a week.
5. Record your observations in the form of sketches.

Questions

1. In which direction do the roots of the green bean seedlings grow?
2. Is your hypothesis accepted?
3. What is your conclusion based on this activity?

Activity 2

Aim To investigate whether roots respond to gravity.

Hypothesis Roots respond to gravity.

Apparatus and Materials

8 newly germinated green bean seedlings, cotton, straw, water, tile, petri dish, double-sided tape, modelling clay, plastic food wrapper, skewer

Steps



1. Line the petri dish with cotton. Then, arrange the seedlings on a double-sided tape in different positions.



2. Add a few drops of water on the cotton using a straw until it is completely moist.



3. Wrap the petri dish with the plastic food wrapper. Then, make a few holes on its surface using a skewer.



4. Hold the petri dish upright on the tile using the modelling clay.

5. Observe the growth of the roots of the green bean seedlings every day for a week.
6. Record your observations in the form of sketches.

Questions

1. In which direction do the roots of the green bean seedlings grow?
2. Is your hypothesis accepted?
3. What is your conclusion based on this activity?

Activity 3

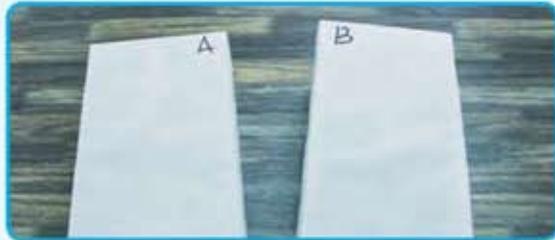
Aim To investigate whether shoots respond to light.

Hypothesis Shoots respond to light.

Apparatus and Materials

2 beakers filled with damp soil that are planted with chilli plants,
2 shoe boxes, knife

Steps



1. Label both shoe boxes, A and B.



2. Make one hole on the left side of box A and the right side of box B using a knife.



3. Place the beaker with the chilli plant in each box. Then, close the boxes.



4. Place both boxes in the sunlight.

5. Observe the growth of the shoots of the chilli plants after a week.

6. Record your observations in the form of sketches.

Questions

1. What are the conditions of the chilli plants in boxes A and B after a week?
2. In which directions do the chilli shoots in boxes A and B grow?
3. Is your hypothesis accepted?
4. What is your conclusion based on this activity?

Activity 4

Aim To investigate parts of a plant that can respond to touch.

Hypothesis Leaves of *Mimosa pudica* respond to touch.

Apparatus and Materials *Mimosa pudica*

Steps



1. Touch the leaves of *Mimosa pudica* with your fingers. Observe.
2. Record your observation in the form of sketches.



3. Repeat steps 1 and 2 by touching the flower and stem of *Mimosa pudica*.

Questions

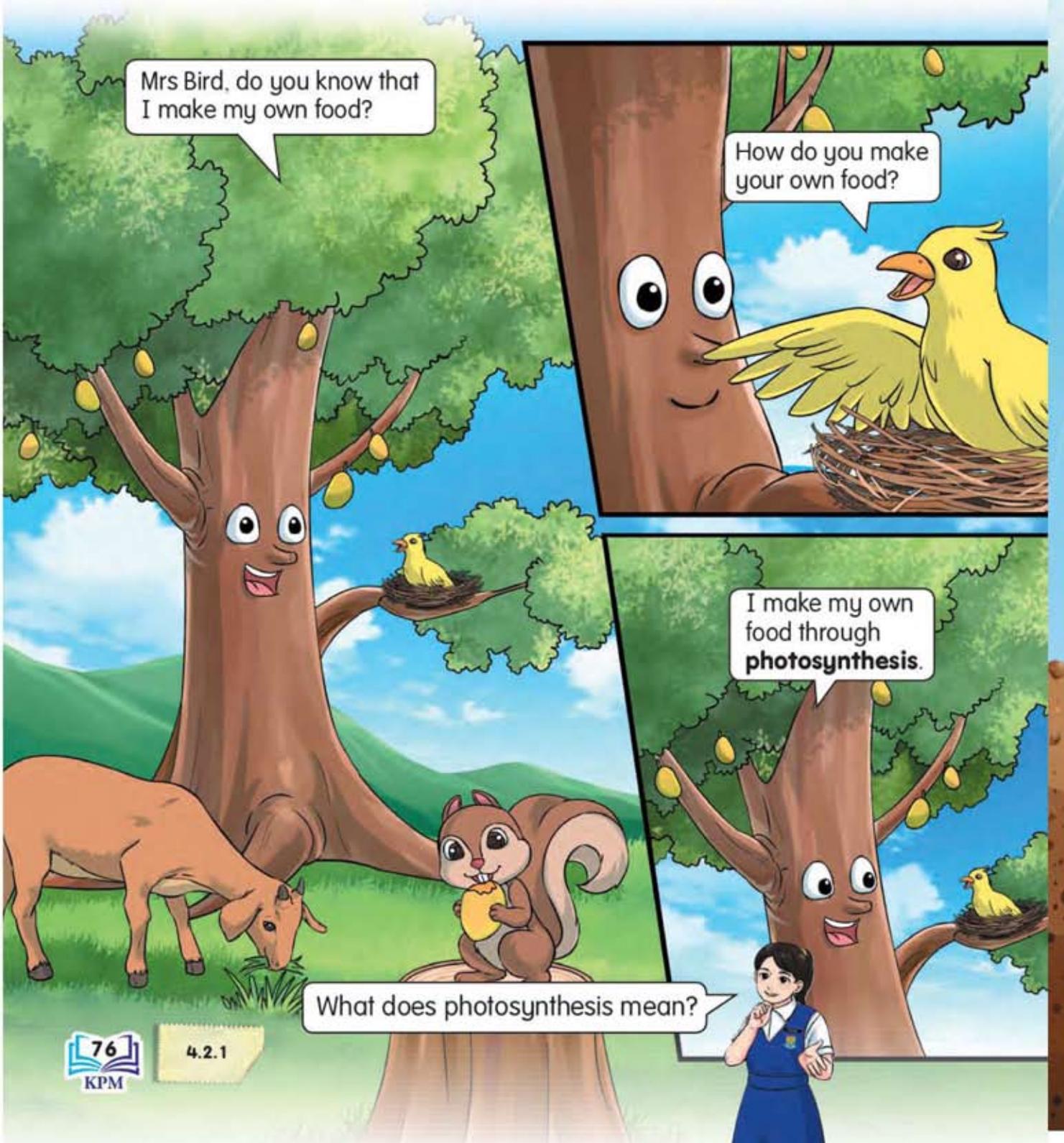
1. Based on this activity, what can you observe about the leaves, flower, and stem of *Mimosa pudica* when touched?
2. Is your hypothesis accepted?
3. What is your conclusion based on this activity?
4. Give examples of other plants that respond to touch. How do these plants respond?



Based on the investigation above, what can you conclude about the relationship between each part of the plant and its stimuli?

Photosynthesis

Plants, humans, and animals need food to survive and grow. Humans and animals can move to find food but plants are not able to move. How do plants make their own food? Let us follow the conversation between the tree and the bird.



Mrs Bird, do you know that I make my own food?

How do you make your own food?

I make my own food through **photosynthesis**.

What does photosynthesis mean?

The Needs of Photosynthesis

Plants need **sunlight**, **chlorophyll**, **carbon dioxide**, and **water** for photosynthesis.

Sunlight

Main source of energy.

Carbon dioxide

Gas in the air which enters the leaves.

Water

Absorbed through the roots.

Chlorophyll

Green coloured substance in plants.

SCIENCE INFO

Non-green plants can also carry out photosynthesis if they have chlorophyll.

What do plants need for photosynthesis?

Products of Photosynthesis

During photosynthesis, chlorophyll absorbs sunlight and converts water and carbon dioxide into **glucose** and **oxygen**. The glucose produced is then combined to form starch which is stored in parts of plants such as leaves, stems, roots, seeds, flowers, and fruits.

Glucose stored in the form of starch

Substance produced as food.

Oxygen

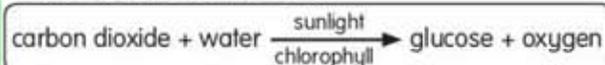
Gas released into the air through the leaves.



Based on the information above, what are the products of photosynthesis?

SCIENCE-INFO

Photosynthesis involves:



**Apparatus and Materials**

Flip chart paper, A4 paper, marker pens of different colours

Steps

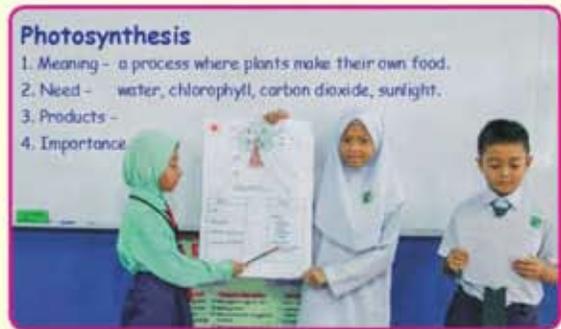
1. Form a group of three. Take turns to write the idea of photosynthesis on A4 paper in the clockwise direction.



2. The next member may add or correct what is written by his/her previous friend.



3. Discuss the written ideas in the group. Then, make a mind map on the flip chart paper based on the group's creativity.



4. Present the group work in front of the class.

Question

What can you explain about photosynthesis?

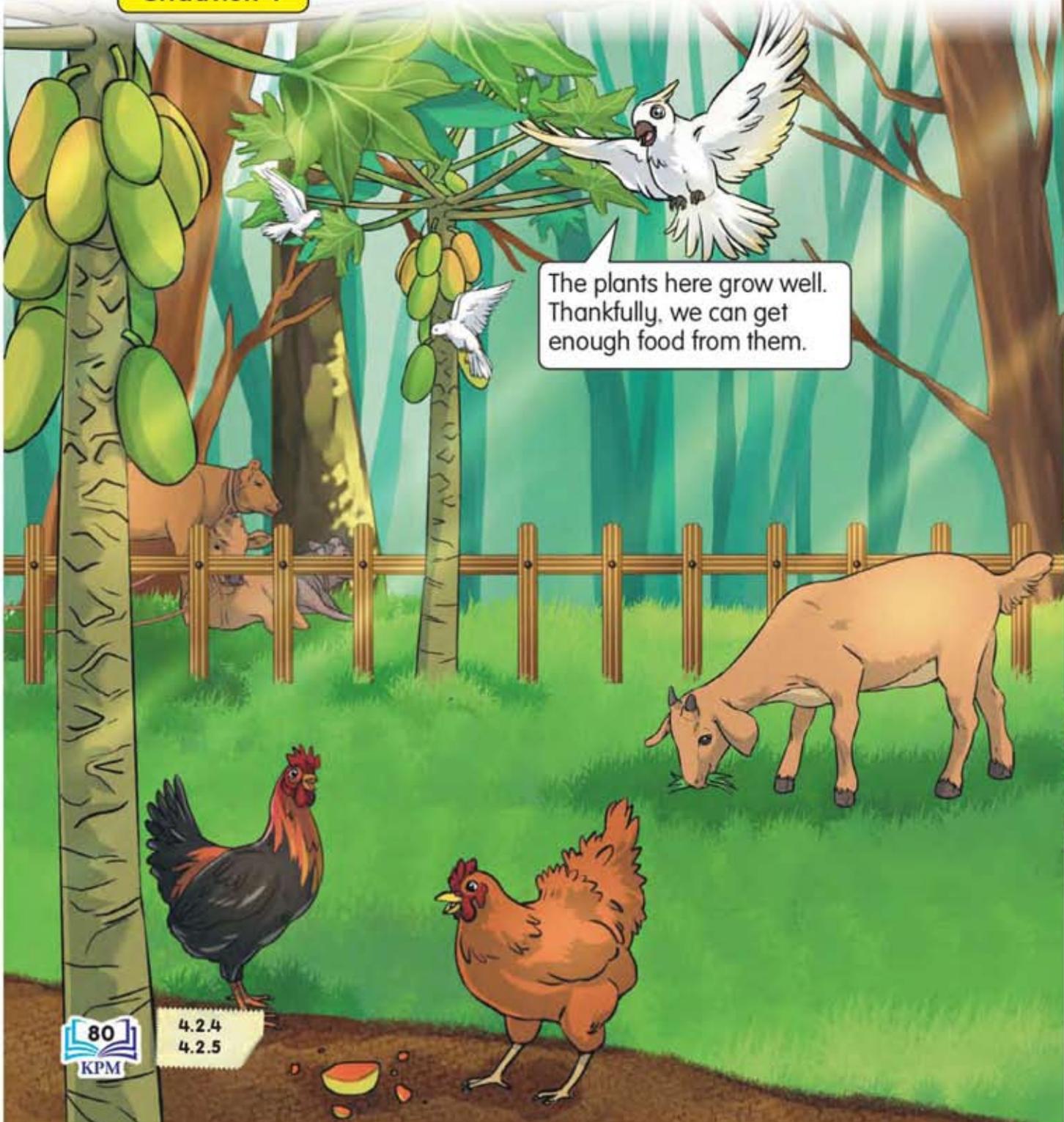


How do responses in plants assist the process of photosynthesis? Explain.

Importance of Photosynthesis to Living Things

Plants constantly carry out photosynthesis to enable them to produce their own food. The products of photosynthesis also provide benefits to other animals and the surrounding environment. Observe the situations.

Situation 1



The plants here grow well. Thankfully, we can get enough food from them.

Situation 2

We can supply oxygen for humans and animals to breathe.

We also absorb carbon dioxide for photosynthesis. This helps to maintain the balance of gas composition in the air.

oxygen

carbon dioxide

carbon dioxide

oxygen

oxygen

carbon dioxide

carbon dioxide

Why is photosynthesis important to living things?

Photosynthesis is important to living things because it enables plants to provide food, to produce oxygen for breathing, and also to maintain the balance of gas composition in the air.



FUN ACTIVITY

Photosynthesis Game

GROUP
ACTIVITY

Apparatus and Materials

A4 paper, scissors, envelope, stationery

Steps



1. Gather information on the importance of photosynthesis and plant responses through various sources.



2. Fold an A4 paper into six parts and cut it using a pair of scissors to make question cards. Each group has to produce 12 question cards.



3. Write down questions related to the importance of photosynthesis and plant responses on each card.



4. Put the question cards into an envelope and give it to another group.

5.



Each group needs to answer the questions from the envelope received from another group. The group that answers quickly and correctly wins the game.

Question

What are the importance of photosynthesis and responses in plants?



Steps

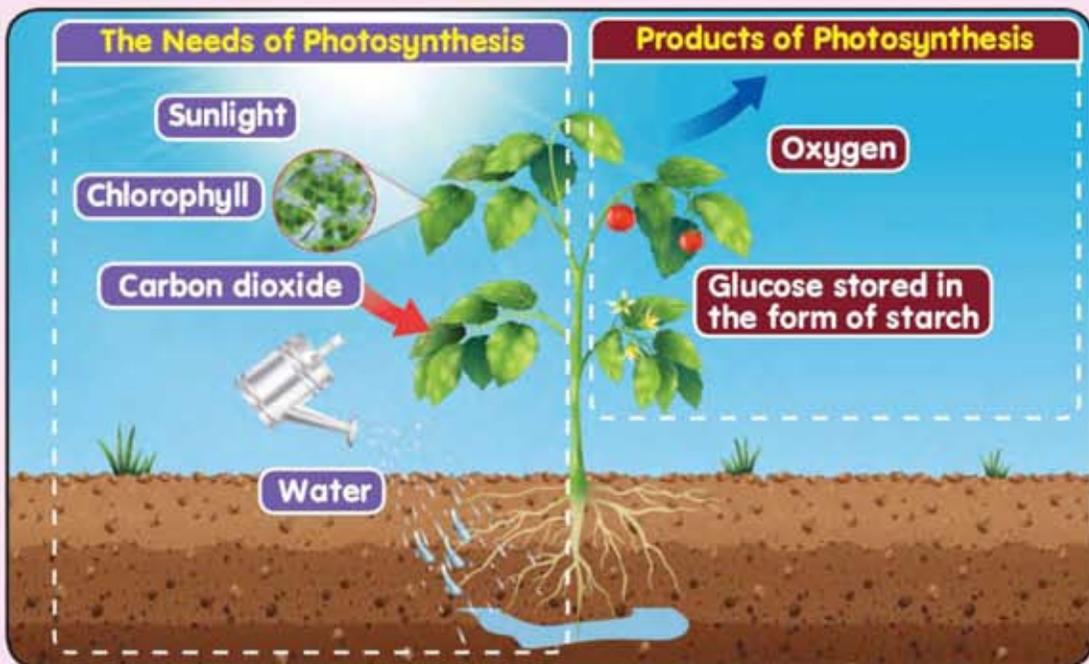
Produce an Emoticon Garden based on your creativity using used plastic containers, scissors, knife, marker pens, plastic ribbons, garden soil, A4 papers, vegetable seeds, and water sprayers.





MIND REFLECTION

1. Plants respond to stimuli such as water, gravity, sunlight, and touch.
2. Parts of plants that respond to stimuli are as below:
 - (a) roots respond to water
 - (b) roots respond to gravity
 - (c) shoots respond to light
 - (d) leaves of some plants respond to touch
3. Photosynthesis is a process where plants produce their own food.
4. The needs and products of photosynthesis are as below:



5. Importance of photosynthesis to living things are:
 - (a) to supply food.
 - (b) to supply oxygen.
 - (c) to maintain balance of gas composition of air.
6. Responses in plants help them to obtain their needs for photosynthesis.

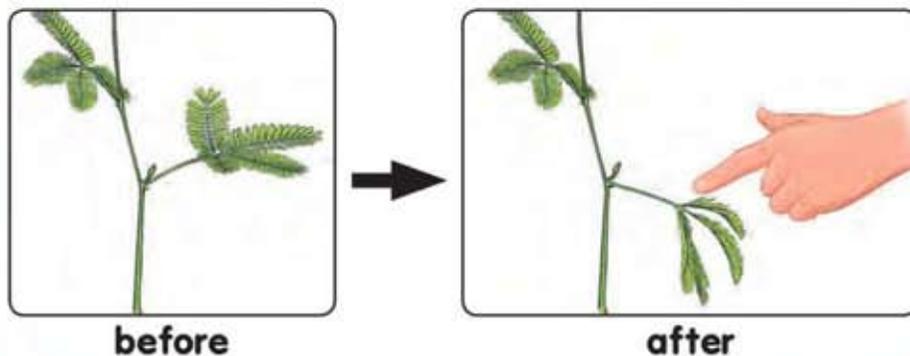
MIND TEST

Answer all questions in the Science exercise book.

- (a) Plants respond to .
(b) Parts of plants that can respond to stimuli are ,  and .
(c) Plants respond to stimuli such as , , , and .
- Identify the types of stimuli that cause the following responses in the plants below.

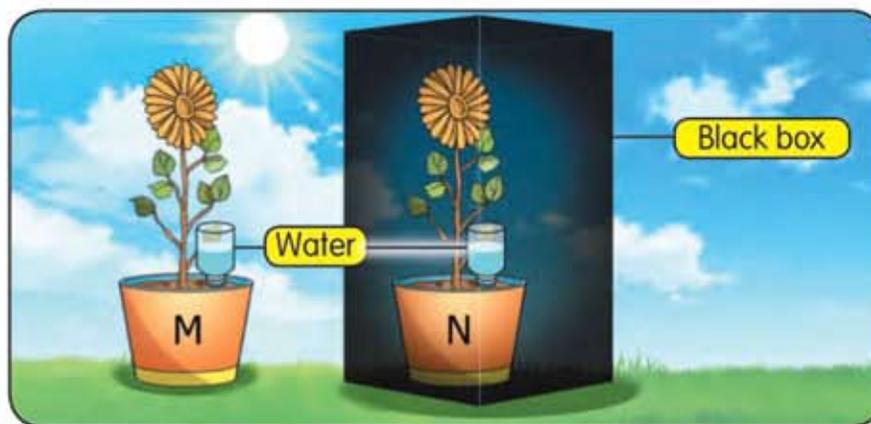


- The figure below shows the response of a plant towards a stimulus.



- State the type of stimulus that causes the response by the plant above.
- Which part of the plant responds to the stimulus?
- Give another example of a plant and its part that responds to the same type of stimulus.

4. Tick (✓) the correct meaning of photosynthesis.
- (a) A process where plants make their own food. 
- (b) A process where plants respond to water. 
5. Underline the correct answers.
- (a) (Water/Starch) is a need for plants to carry out photosynthesis.
- (b) (Chlorophyll/Light) is the green coloured substance found in leaves.
- (c) (Oxygen/Carbon dioxide) is the product of photosynthesis.
6. Tick (✓) the correct answers.
- (a) Photosynthesis supplies food to living things. 
- (b) Oxygen and glucose are products of photosynthesis. 
- (c) Starch is stored in the seed only. 
7. The figure below shows an investigation on the process of photosynthesis. Plants M and N are supplied with the same amount of water and placed under the sunlight.



- (a) What are the needs for photosynthesis in this investigation?
- (b) Predict the condition of plants M and N after three days.
Give your reasons.
- (c) In another investigation, plant M was not supplied with water.
Predict the condition of plant M after five days. Give your inference.