

Plants



Engage!

+ Find out about fruit!

Fruit can be sweet, juicy, colorful, big or small. But how does fruit grow?

As a class, discuss how bananas, oranges and melons grow. Write your ideas on the board. Try to answer these questions:

- 1 Where does each fruit come from?
- 2 On which part of the plant does the fruit grow?
- 3 How are these fruits similar and different?

Next, in groups, choose a fruit and use the internet or books to find out how it grows. Tell the class what you found out about your fruit. Work as a class to make a poster that explains how fruit grows.

Explore!

+ How can I change the color of a flower?

Objective: Change the color of a flower without touching the plant.



Method

-  In groups, fill a cup halfway with water.
- Add 10–15 drops of food coloring into the water and stir.
- Cut the end of the flower stem at an angle and put it in the cup.
- Describe the flowers in the first column of the table below.
- Observe the flowers the next day. Describe them in the second column of the table.

You will need

- ☐ two white flowers
- ☐ a tall cup
- ☐ water
- ☐ food coloring
- ☐ a spoon
- ☐ scissors



Observations

- Complete the table with your observations.

The flowers on day 1	The flowers on day 2



Conclusions

- What color was your flower at the beginning of the experiment?

- What color did you add to the water?

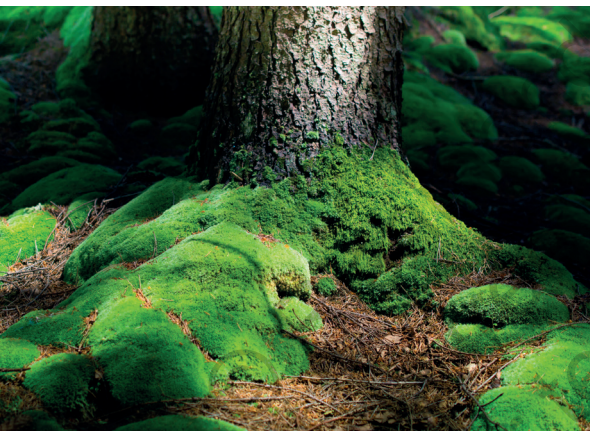
- Did the flower change color overnight?

-  Imagine you are going to repeat the experiment. How can you get a darker color?





Ferns are vascular plants without seeds.



Mosses are nonvascular plants.



a flowering tree

+ What are vascular and nonvascular plants?

There are many different kinds of plants. But scientists can classify all plants into two groups: **vascular** and **nonvascular**.

Vascular plants have roots, a stem and leaves. They use a system of tubes to transport water and food. Some tubes transport water and **minerals** from the roots to the stems and leaves. Other tubes transport food from the leaves to the rest of the plant. Vascular plants are stronger and grow taller than nonvascular plants.

We can put vascular plants into two main categories: **flowering** and **nonflowering**.

Most plants that produce seeds are flowering plants, although sometimes the flowers can be small and hard to see, such as the flowers of grasses. Nonflowering plants that produce seeds include conifers. Other nonflowering plants, like ferns, reproduce by spores.

Nonvascular plants do not have roots, stems or real leaves. They also do not have a system of tubes to transport water and food. They **absorb** water and minerals through their surface.

Most nonvascular plants are small, and they live near or in water, in forests or in the mountains. Nonvascular plants are nonflowering. Moss is an example of a nonvascular plant.

Practice

- 1 Choose the true sentences.

- a. ☐ There is a small variety of plants in the world.
- b. ☐ Vascular plants transport food and water through a system of tubes.
- c. ☐ Some plants have no roots, no stem and no real leaves.
- d. ☐ Most nonvascular plants are big.

- 2 Complete the Venn diagram.

have roots live in or near water moss need water
produce own food trees use a system of tubes



- 3 Look at the photos and write *vascular* or *nonvascular*.





+ What are the parts of a flower?

Vascular plants can be flowering or nonflowering. There are many types of flowering plants. Some are colorful, and some are plain. Some are big, and some are small. Some have a strong smell, and others have flowers with no smell at all.

Flowers have many parts, and each part has a function. The petals are the colorful leaves of the flower. Petals can be different shapes and sizes. Some smell nice. Colorful or strong-smelling petals attract insects and birds, which help the plant reproduce.

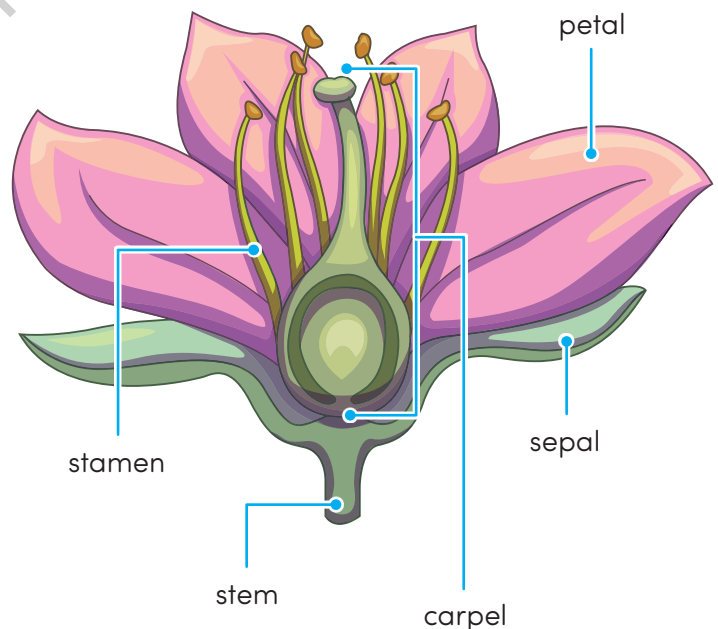
The **sepals** are under the petals, and they protect the flower. The stem joins the flower to the rest of the plant.

The main function of a flower is **reproduction**. This happens in two stages: **pollination** and **fertilization**. Most flowers have male and female parts that help them reproduce.

The **carpel** is usually in the middle of the flower. It is the female part of the plant. The **stamen** is the male part of a flower. They are between the carpel and the petals.



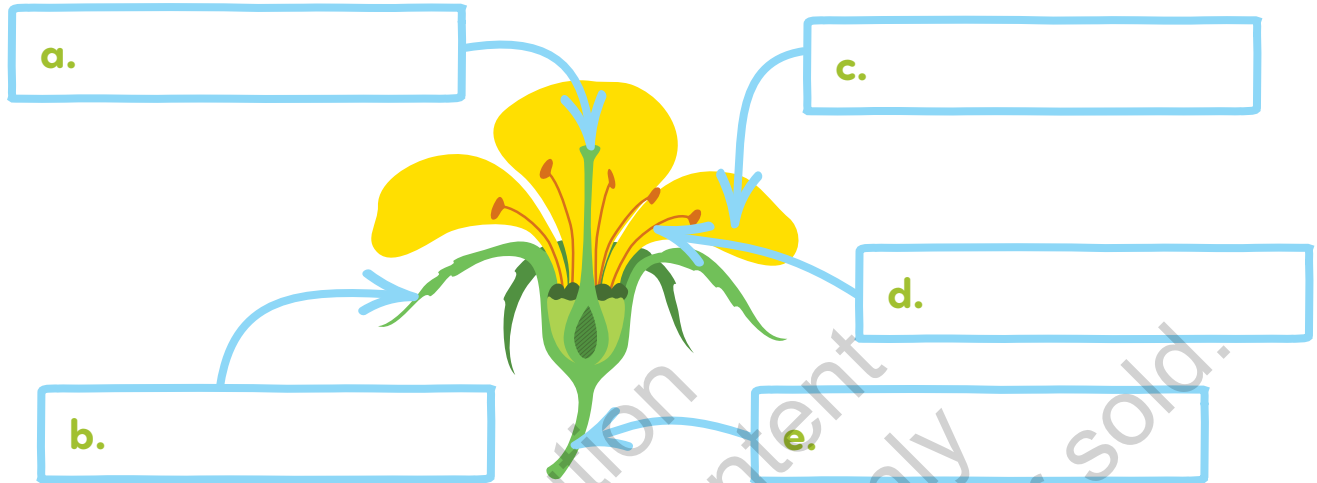
Colorful flowers attract pollinators like insects and birds.



Practice

1 Label the picture.

carpel petal sepal stamen stem



2 Work with a partner. Describe each flower. What similarities and differences are there?

A lily flower		Jasmine flowers	
			

3 What is your favorite flower or plant? Why do you like it, and how does it make you feel?



+ How do plants reproduce?

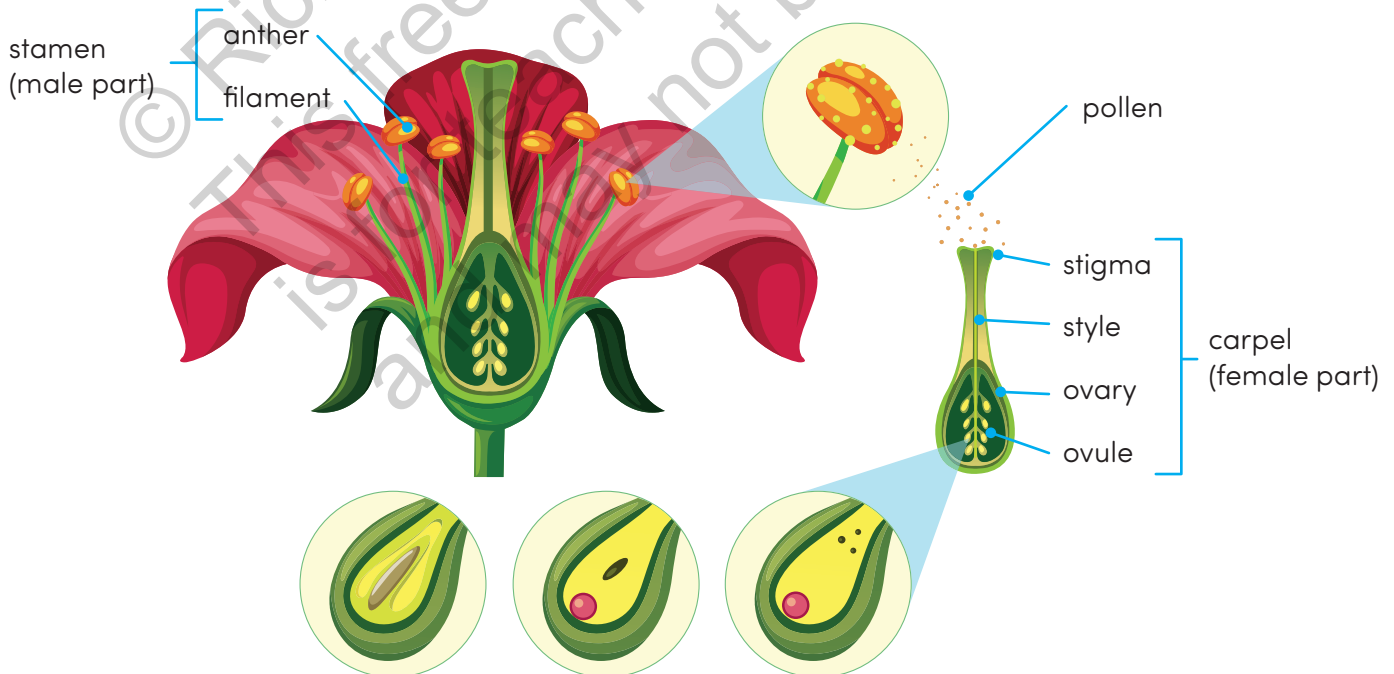
Plants need male and female parts to reproduce. Together, the male and female parts make seeds that will become new plants. Some flowers have both male and female parts. Other flowers have either male or female parts.

The stamen is the male part of the flower. The stamen consists of the **anther** and the **filament**. The anther makes **pollen**.

The carpel is the female part of the flower. The carpel consists of the **stigma**, the **style** and the **ovary**.

Pollination is when the pollen moves from the male part of a flower to the female part. In **self-pollination**, a flower pollinates itself. **Cross-pollination** is when one flower pollinates another. **Pollinators**, such as the wind, birds and insects, transport pollen from one flower to another.

Fertilization is the next step in the process of reproduction. A pollen grain lands on the stigma. The pollen grain grows a pollen tube down through the style to the ovary. Part of the male cell in the pollen grain passes down the tube to fuse with a female cell, or **ovule**, in the ovary. Fertilized ovules develop into seeds. The rest of the ovary develops into a fruit that contains one or more seeds. The seeds can then grow into new plants.

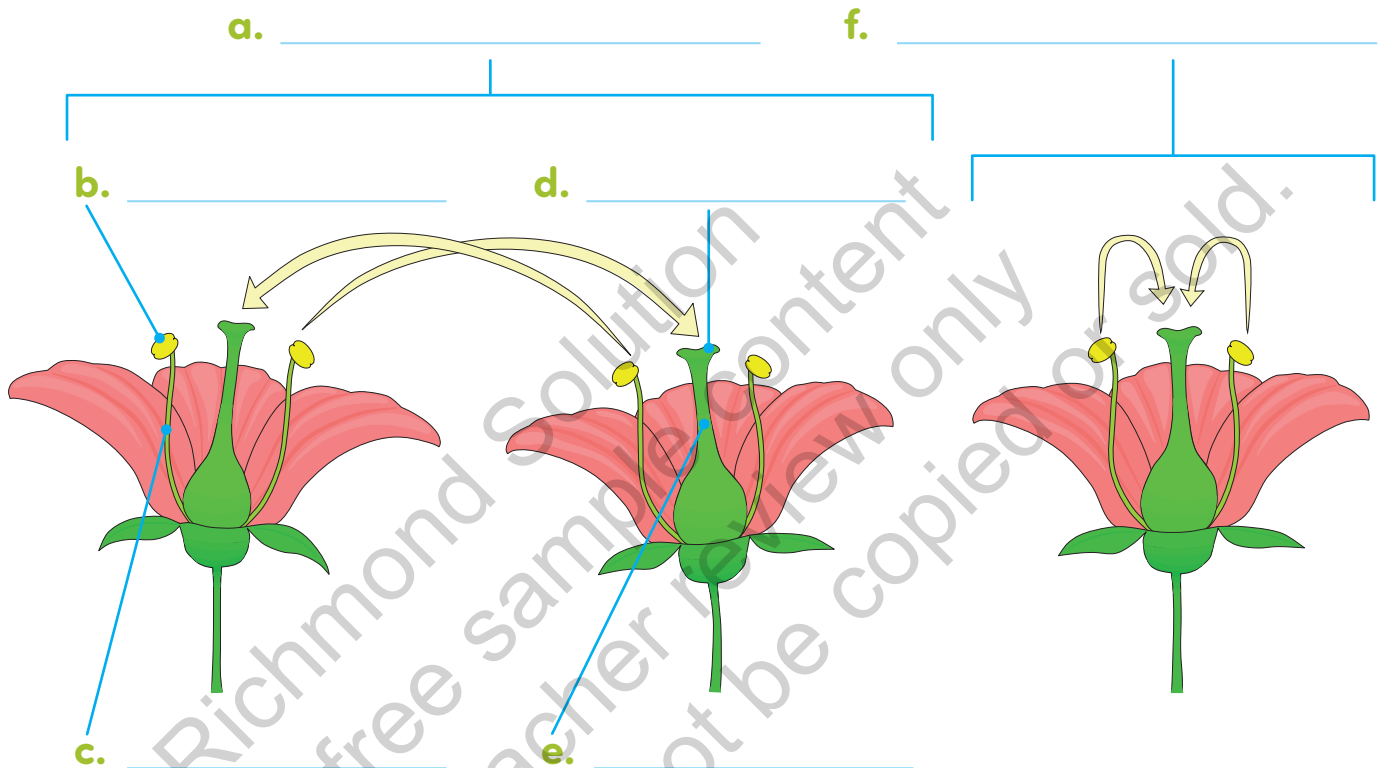


Practice

- 1 List three pollinators.

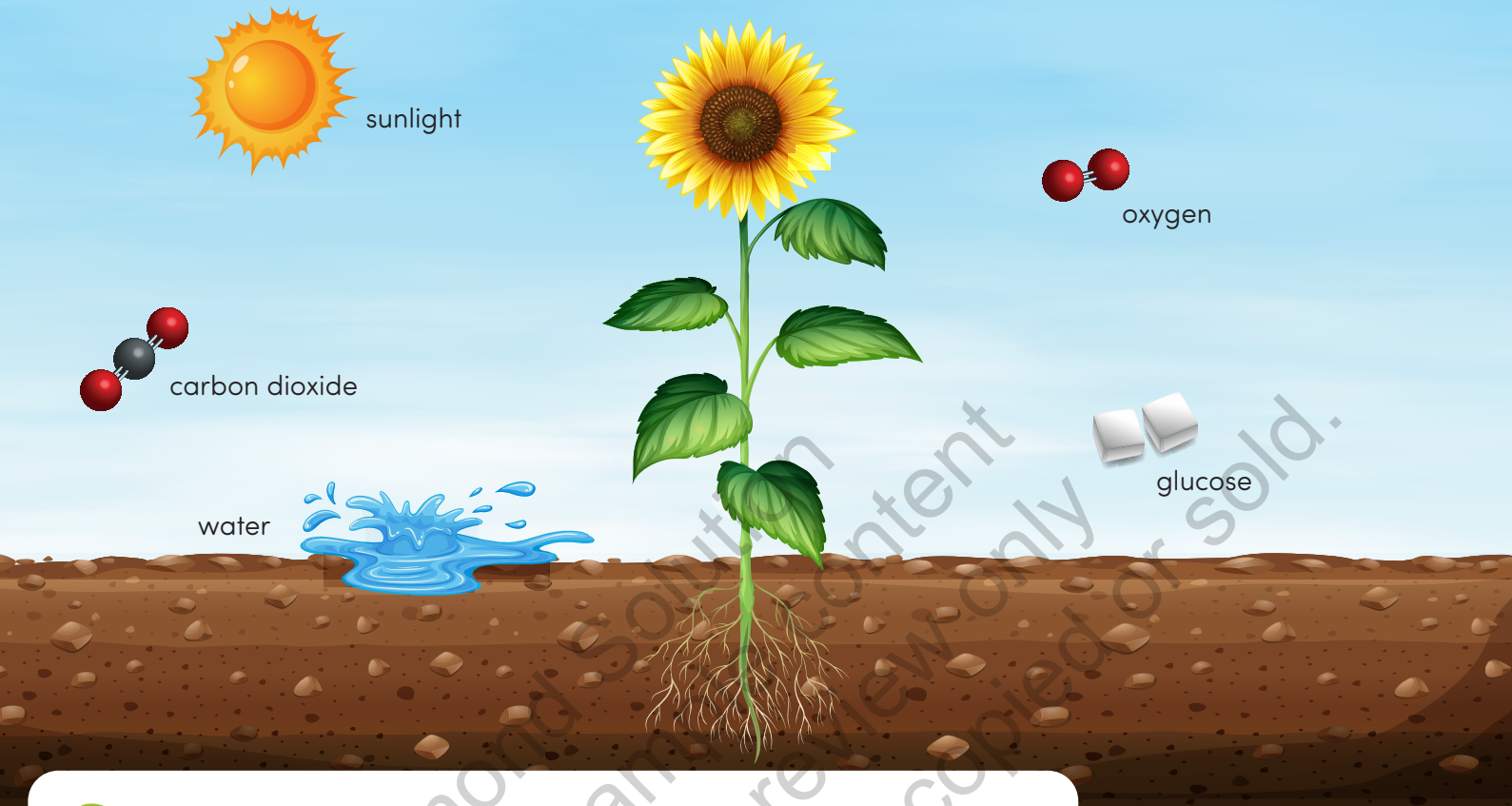
- 2 Label the pictures.

anther cross-pollination filament self-pollination stigma style



- 3 Order the stages of self-pollination 1–5.

- a. ☐ The fertilized ovule develops into a seed, and the ovary becomes a fruit.
- b. ☐ Pollen goes from the anther to the stigma.
- c. ☐ The pollen grain fertilizes an ovule.
- d. ☐ Seeds in the fruit germinate and make new plants.
- e. ☐ The pollen grain grows a tube down the stigma to the ovary.

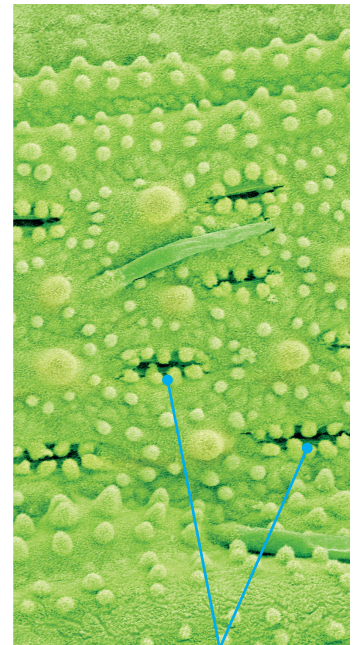


+ How do plants make food?

All living things need energy to live. Animals feed off other living things to get energy. But plants make their own food. They use sunlight, water and **carbon dioxide**. This process is called **photosynthesis**. Photosynthesis happens in a green plant's cells. **Chlorophyll** is a chemical found in leaves that makes plants green. It captures light energy from the Sun. Leaves and stems have tiny holes called **stomata** that take in carbon dioxide from the air and release **oxygen** during the day when photosynthesis is taking place. The plant's roots absorb water.

Green plants use light energy from the Sun to change water and carbon dioxide into oxygen and **glucose**. Glucose is a sugar and a source of food for plants. Green plants release the oxygen they produce during photosynthesis into the air. Other living things, like humans, use this oxygen to breathe.

Photosynthesis is important because most living things depend on plants for food and need oxygen to breathe.



stomata on the leaf of a rice plant

Practice

1 Choose the true sentences.

- a. ☐ Plants need energy to live.
- b. ☐ Chlorophyll absorbs water from the ground.
- c. ☐ Stomata are part of a flower.
- d. ☐ Plants use photosynthesis to make glucose.
- e. ☐ Plants release oxygen as part of photosynthesis.

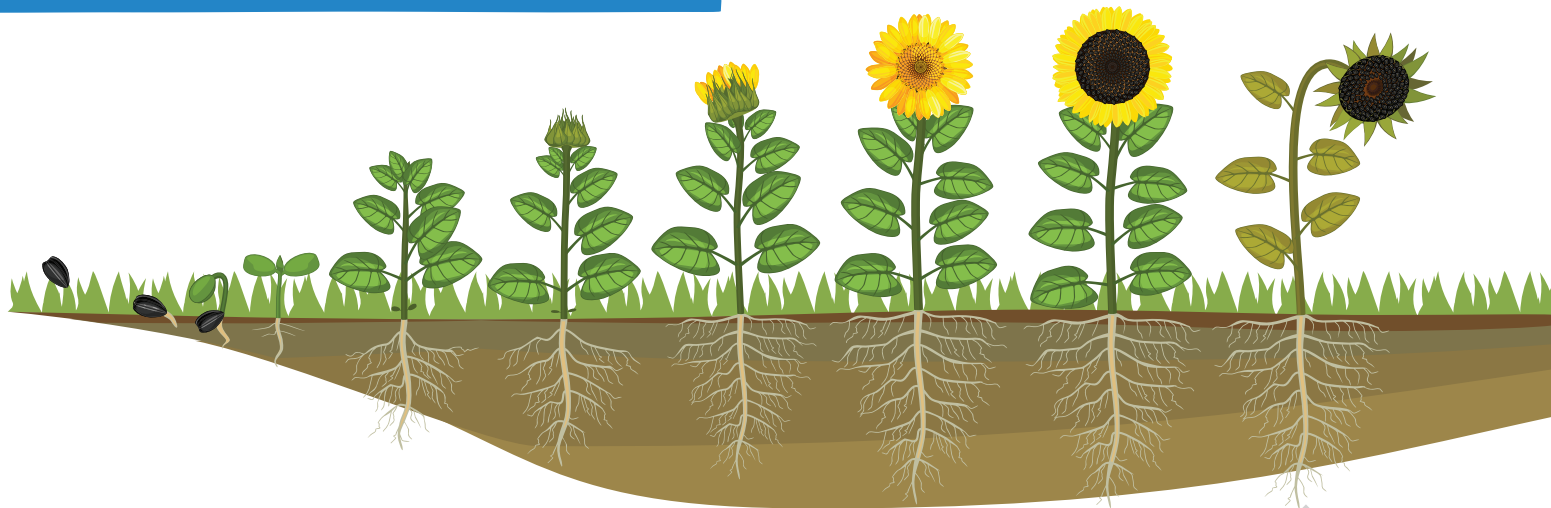
2 Complete the sentences.

carbon dioxide chlorophyll glucose photosynthesis stomata

- a. _____ is a gas that plants need for photosynthesis.
- b. The process plants use to make their own food is called _____.
- c. _____ is a green substance that captures energy from the Sun.
- d. _____ are small holes in leaves.
- e. _____ is a sugar and a source of food for plants. It is made by photosynthesis.

3 Work with a partner. Explain why photosynthesis does not happen at night.

4 Investigate. Use the internet to research an ocean organism that makes its own food.



+ What is the life cycle of a flowering plant?

There are four basic stages in a plant's **life cycle**. The first stage is **germination**. Germination is when a seed begins to grow. Seeds do not need sunlight, but they do need warmth, oxygen and water to germinate. The roots grow first. The germinated seed uses the roots to absorb water. Next, the stem and leaves grow. Finally, it is a tiny plant called a **seedling**.

The second stage is growth. The seedling grows into an adult plant. It uses photosynthesis to get energy to grow. Plants keep growing for their whole lives.

The third stage is reproduction. The adult plant produces flowers. It can now make new plants. Some plant **species** take weeks to be ready to reproduce, and others take years. After pollination and fertilization, the plant produces seeds.

Death is the fourth and final stage in the life cycle of a plant. Each species has its own life span. When it dies, the plant dries up or **decomposes**. The remains become minerals, which other plants absorb from the soil and use for growth.

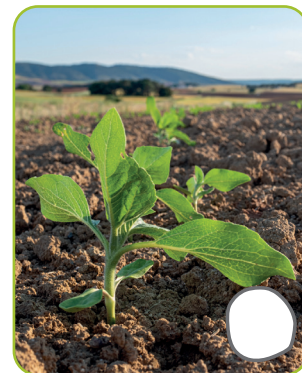


a palm tree seedling

Practice

- 1 Order the life cycle of a flowering plant 1–4. Label the stages.

death germination growth reproduction



- 2 Choose the seed that will germinate.

Seed A



warm

in a sealed pot

no water

Seed B



cold

in a sealed pot

water

Seed C



warm

in an open pot

water

Seed D

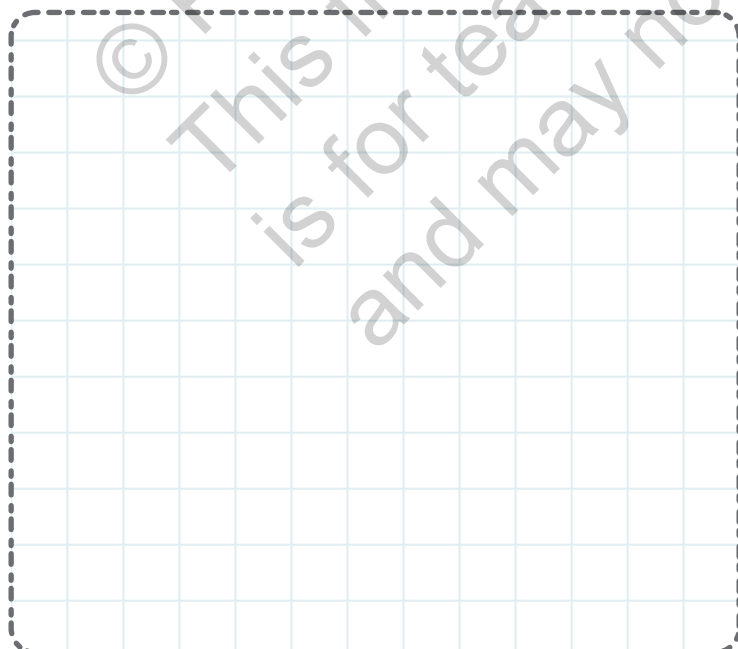


cold

in an open pot

no water

- 3 Use the internet to research the tomato plant. Draw and write about its life cycle.





+ What do plants need to grow?

All plants need four basic things to grow: energy from the Sun, water, minerals and the correct **temperature**. Most plants grow in loose, fine soil with lots of air. But some plants grow in rocky, rough soil. These four things affect the growth of a plant:



Sunlight

Plants need sunlight for the process of photosynthesis. Some plant species need more sunlight than others.

Water

Plants need **fresh water** to grow. They cannot grow in salt water. Some plant species need more water than others.



Minerals

Plants need minerals to grow. Mainly, they need **nitrogen**, potassium and phosphorus, but they also need a little of other minerals like zinc, iron and copper. They use their roots to get these minerals from the soil. Most plants need to grow in soil that has a lot of minerals because when a plant does not get the minerals it needs, it cannot grow well. Only some plants can grow in soil that does not have many minerals.



Temperature

Different species of plants can survive and grow in different temperatures. Only some plants can grow in places where the temperature is very high or very low.



Practice

- 1 Why is this a good place for plants to grow? Name three things.



- 2 Look at the photos. Why is it difficult for plants to grow in these places?

a.



b.



c.



- 3 Where does this plant get minerals from? Write your prediction, and then investigate. Use the internet or books to research the Venus flytrap.



prediction:

answer:

Venus flytrap

Check my progress ✓

- 1 Choose the words that relate to vascular plants.



no roots



stem



nonflowering



leaves



moss



fern



spores



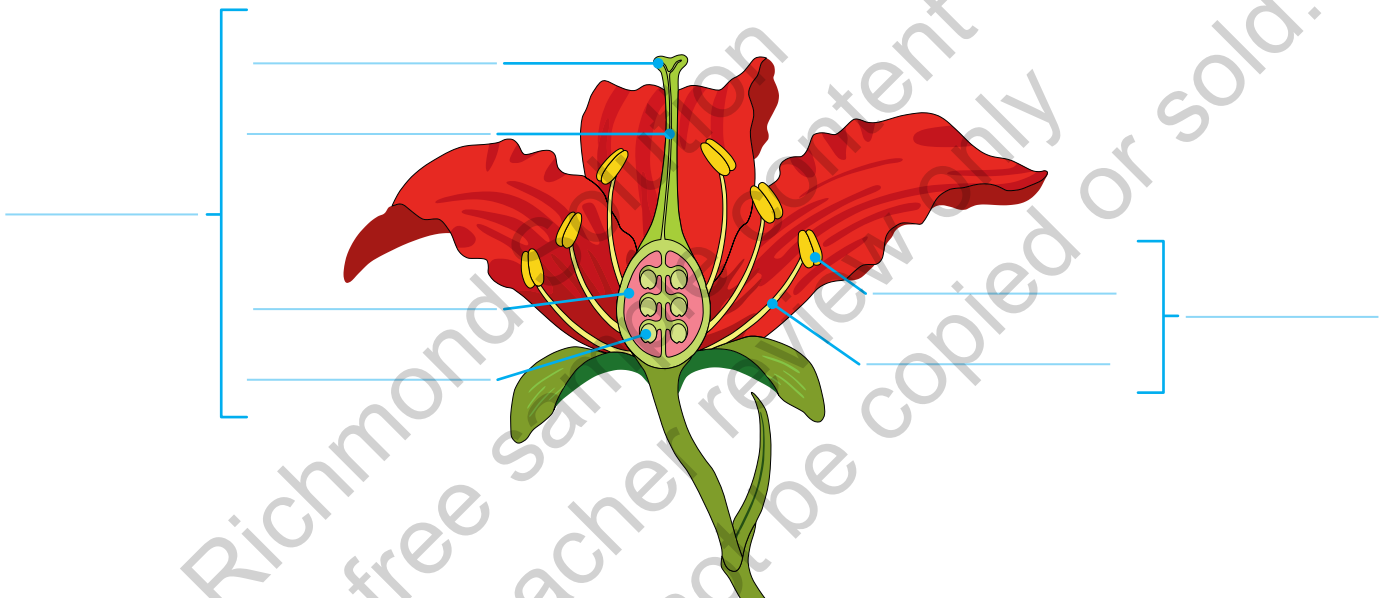
seeds



flowers

- 2 Label the flower. Write the labels for the female parts in red and the male parts in blue.

anther carpel filament ovary ovule stamen stigma style

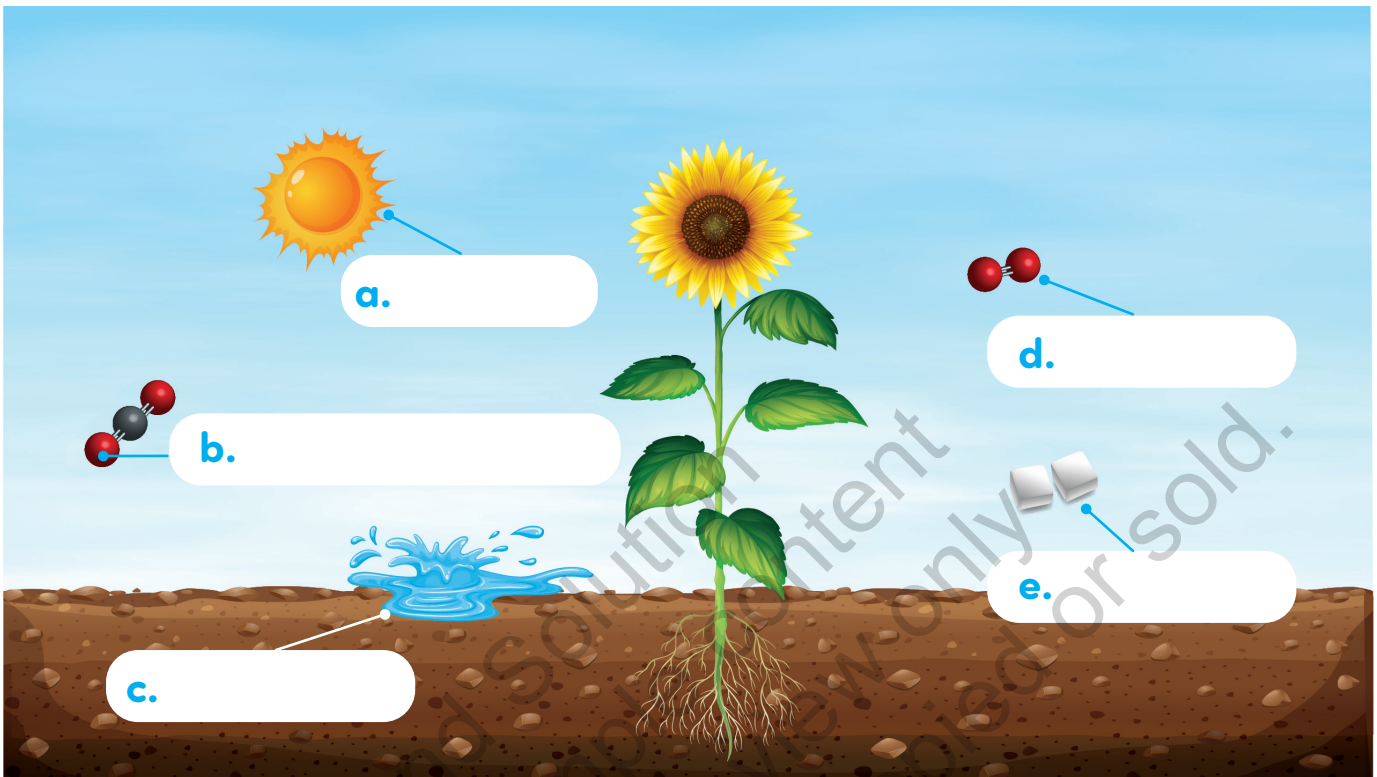


- 3 Circle the correct words to complete the sentences.

Cross-pollination / **self-pollination** is when pollinators transport **nectar** / **pollen** between flowers. Pollinators carry pollen from the **anther** / **sepal** to the **petal** / **stigma**. Then the pollen grows a tube down the **anther** / **style** to the **ovary** / **filament**. It **fertilizes** / **germinates** an ovule. This makes a **stem** / **seed**. The ovary becomes a **fruit** / **flower**.



- 4 Label the picture.



- 5 Complete the summary.

carbon dioxide energy glucose photosynthesis roots water

_____ is the process plants use to make food. Chlorophyll captures light
 _____ from the Sun. Stomata take in _____ from the air.
 _____ absorb water. Photosynthesis uses the sunlight, carbon dioxide and
 _____ to make _____.

- 6 Describe briefly the four stages in the life cycle of a flowering plant.

- a. germination: _____
 b. growth: _____
 c. reproduction: _____
 d. death: _____