

Living organisms: plants



CD
Track 1

The classification of living beings

All living beings have two characteristics in common: they are made of **cells** and they carry out three vital functions.

The cells

Cells are microscopic units of different shapes and sizes. All cells have three parts: the **cell membrane**, the **cytoplasm** and the **nucleus**.

Unicellular organisms are made up of only one cell.

Multicellular organisms are made up of a lot of different cells. These are organised into **tissues**, **organs** and **systems**.

The vital functions

All living beings carry out three vital functions:

- **The nutrition function** is the process in which living beings obtain oxygen and the nutrients they need, use substances in their bodies and eliminate waste.

Living beings obtain nutrients in two main ways:

- **Heterotrophic nutrition.** Living beings obtain nutrients by feeding on other living beings or their remains.
- **Autotrophic nutrition.** Living beings produce their nutrients from water and carbon dioxide.

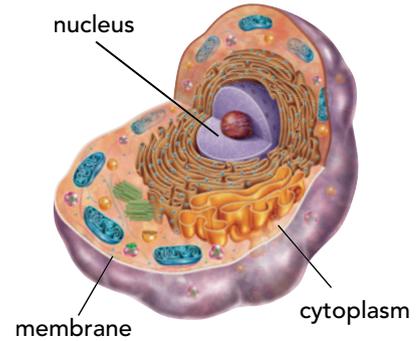
- **The interaction function** allows living beings to react to changes in their environment.

- **The reproduction function** allows living beings to produce offspring.

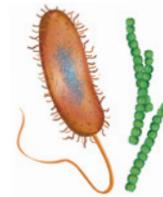
The five kingdoms

Scientists classify all living beings into five large groups called kingdoms based on their cell type and how the cells are organised: **monera**, **protocista**, **fungi**, **plantae** and **animalia**.

A cell



The five kingdoms



Monera



Protocista



Fungi



Plantae



Animalia

- 1 All cells have three parts? What are they?
- 2 What is the difference between heterotrophic and autotrophic nutrition?
- 3 Which function controls our reactions?

CD
Track 2

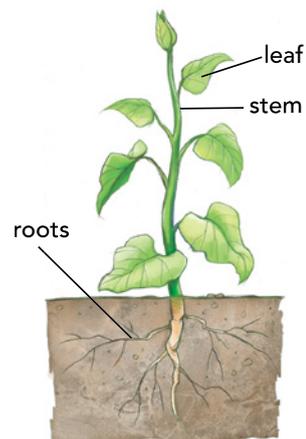
What are plants?

Plants are essential for producing oxygen and food for other living beings. All life on Earth depends on plants.

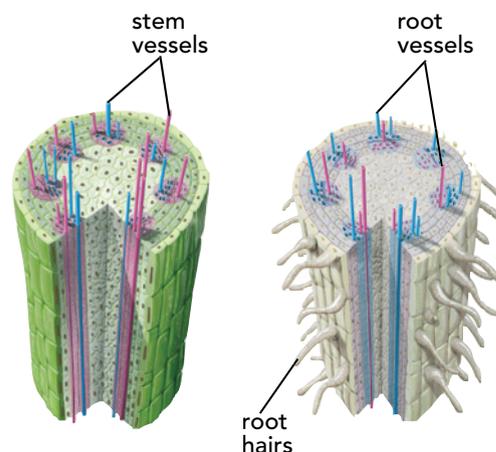
Plants are **multicellular** living organisms with autotrophic nutrition and tissues. Most plants have a basic body structure, with a **root, stem, leaves** and **vessels**.

- **The roots** fix the plant to the ground. Roots can be different shapes; they usually branch out and there are tiny hairs on the ends of these branches called root hairs. These **root hairs** allow water and minerals from the soil to enter the plant.
- **The stem** is usually above the surface of the soil and holds up the rest of the plant. A stem may have branches or it may not. Stems can be thin, green and flexible. When they are thick and woody, they are called **trunks**.
- **The leaves** are normally green, flat and have **veins** running through them. They join to the stem of the plant by the stalk, which is also known as the **petiole**. Leaves have two sides.
- **The upper side** of the leaf is bright green and shiny.
- **The lower side** of the leaf is lighter green and has small openings, called **stomata**. Stomata join the inside of the plant with the external environment and can open and close.
- **The vessels** are tube-shaped cells which run through the inside of the root, stem, branches and the veins of the leaves. Water and other substances flow through them.

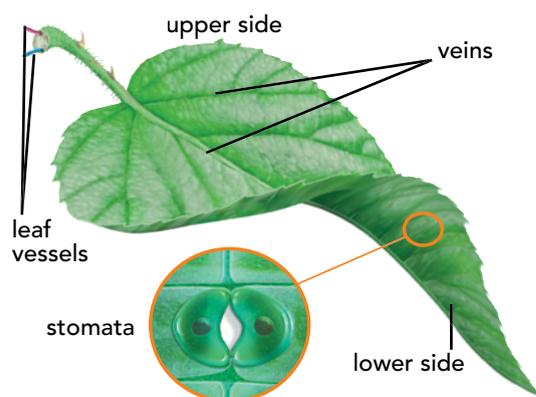
The parts of a plant



The stem



The leaf



- 1 Draw a table showing the four parts of a plant and their functions.
- 2 Draw a leaf and label its parts in your notebook.



Did you know...?

Leaf is singular,
leaves is plural.

Art and nature



The nutrition function in plants

Plants carry out autotrophic nutrition. This means that they produce the nutrients that they need from substances they obtain from the environment around them. They distribute the substances throughout their cells, respire and eliminate waste.

Absorbing substances **a**

Plants absorb water and minerals from the soil through their root hairs. This mixture is called **xylem sap**. It travels through the vessels of the plant and is distributed throughout the plant.

Plants also absorb **carbon dioxide** from the air through the stomata.

Photosynthesis **b**

Photosynthesis is when plants use energy from sunlight to make nutrients.

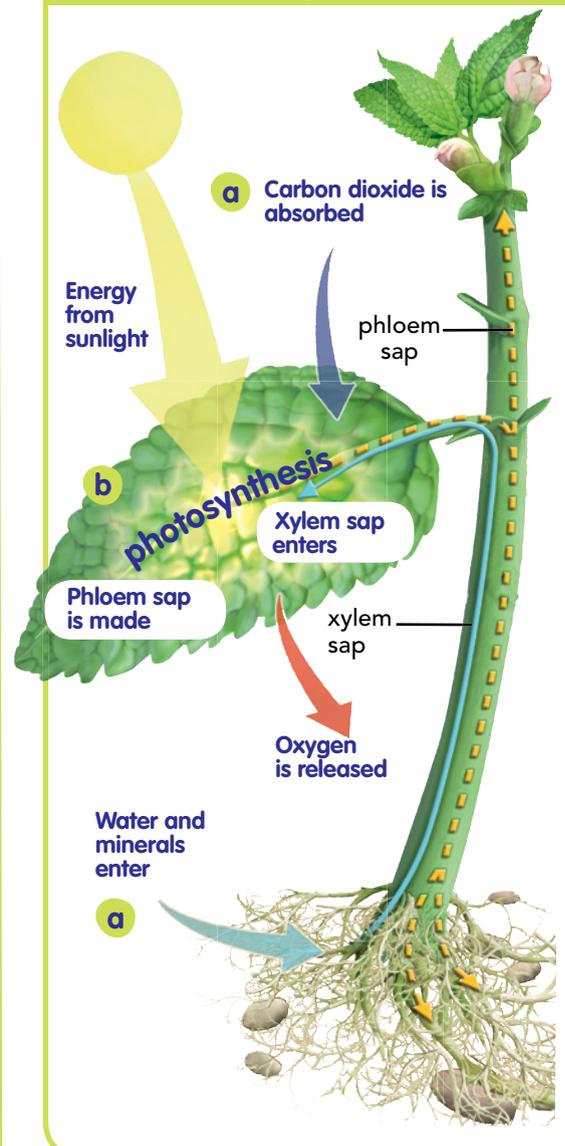
This process takes place inside the cells of the green parts of the plant, mostly in the leaves. These cells contain a green substance called **chlorophyll** which absorbs the Sun's energy.

The plant uses this energy to change xylem sap and carbon dioxide into carbohydrates, which, together with water, form **phloem sap**. The sap is distributed through the plant's vessels.

Luckily for us, photosynthesis produces **oxygen** as a waste gas!

- 1 Name three substances that plants absorb from the environment.
- 2 Describe the process of photosynthesis. Use these words: carbon dioxide, chlorophyll, oxygen, phloem sap, sunlight, energy, xylem sap.

Photosynthesis



Did you know...?

The *Monotropa uniflora* or ghost plant is white and does not contain chlorophyll. It lives on the energy of another plant!

CD
Track 4

Respiration **c**

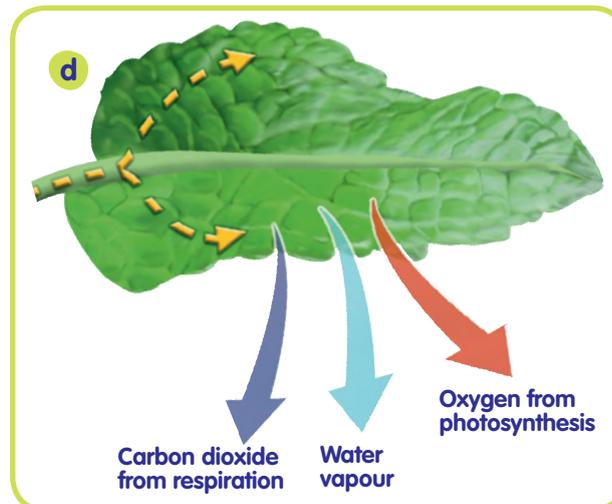
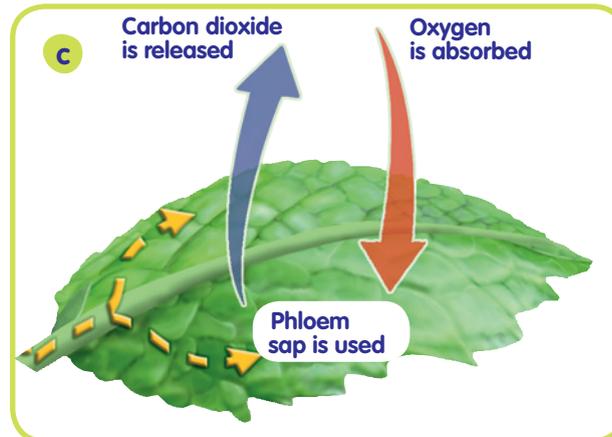
Plants are constantly respiring; when they respire, they absorb oxygen.

A plant's cells use oxygen to transform the carbohydrates contained in phloem sap. This is how plants obtain energy and other substances they need in order to grow. They also store some of these substances in their roots, leaves and fruit.

These processes generate carbon dioxide as a waste gas.

Expelling waste **d**

Plants expel the oxygen produced during photosynthesis through their stomata. They also expel the carbon dioxide, which they produce when they use their nutrients, and excess water in the form of vapour.



3 Describe the process of respiration. Use these words: carbon dioxide, oxygen, phloem sap, energy, carbohydrates.

4 a) What is the waste product produced by photosynthesis?

b) Why is it so important for human beings?

5 Correct these false statements in your notebook.

1 Plants do not consume oxygen.

2 Plants only respire at night.

3 Plants produce oxygen at night.

4 Plants expel oxygen through their leaves.



When plants carry out photosynthesis, they also absorb some carbon dioxide from the atmosphere.

1 Find out how carbon dioxide can damage the environment.

2 Find out how much carbon dioxide an average-sized tree can absorb.

3 Are there any other ways to absorb the carbon dioxide in the atmosphere?



The interaction function in plants

Even though plants do not have sense organs and cannot move from one place to another, they carry out the interaction function; they are able to react to changes in their environment.

- a Plants adjust some of their vital functions to the different seasons of the year. They produce flowers in spring and many lose their leaves in autumn.
- b Some plants respond to light by growing towards it.
- c Some plants respond to contact. Climbing plants, for example, wrap themselves around supporting objects.
- d Other plants can move quickly when they come into contact with other living organisms. For example, some plants, like Venus Flytraps, close as soon as an insect touches them.



Many leaves turn yellow and fall when autumn arrives.



Plants grow towards the light.



Climbing plants wrap themselves around supporting objects.



Venus Flytraps close as soon as an insect touches them.

1 Name four ways that plants react to their environment.



2 Work with a partner. Think of ways of conducting experiments to prove the interaction functions of a plant. Write your ideas in your notebook and use drawings to help explain them. Share your ideas with your classmates.



The reproduction function in plants

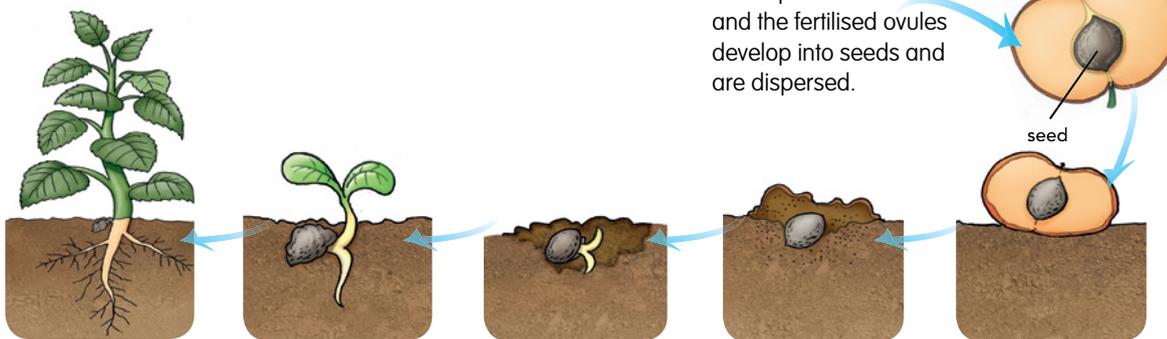
All plants can reproduce to produce descendants. Plants carry out **sexual** and **asexual reproduction**.

Sexual reproduction

Plants that carry out sexual reproduction have female and male reproductive cells, which join together to form a new plant. In most plants, the reproductive cells are produced in organs called **flowers** and sexual reproduction is carried out through **seeds**.

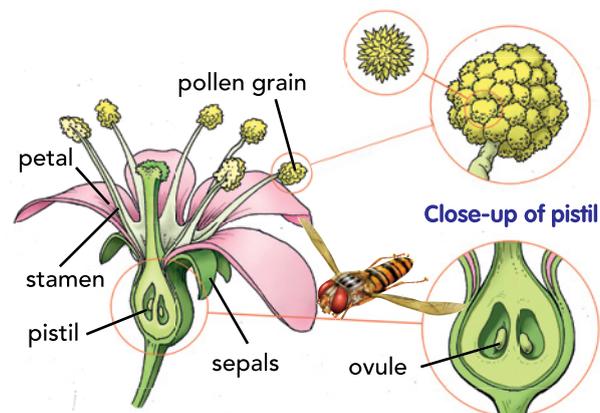
A typical flower has got a **pistil**, which is the female part of the flower. It produces reproductive cells called **ovules**. It has also got a number of **stamens**, which is the male part of the flower. They produce **pollen** grains, which contain male reproductive cells.

Sexual reproduction in seed plants consists of four stages: **pollination**, **fertilisation**, **seed and fruit formation** and **germination**.

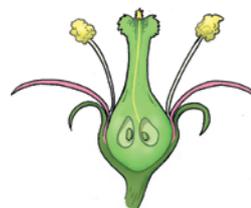


Asexual reproduction

In asexual reproduction, a part of the plant develops into new smaller plants. For example, certain plants produce descendants from their branches or roots, while mosses and ferns produce spores.



Pollination: a grain of pollen is transported to the pistil of another flower by the wind or an insect.

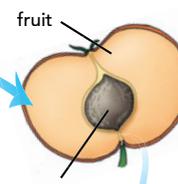


Fertilisation: the grain of pollen joins together with the ovules inside the pistil.



Seed and fruit formation

the pistil develops into a fruit and the fertilised ovules develop into seeds and are dispersed.



seed

Germination: seeds that reach the soil germinate and grow into a new plant.

- 1 Explain the difference between sexual and asexual reproduction in plants.
- 2 Draw a flower and label its parts.





Apply
your skills!

Project Studying photosynthesis

Observing the nutrition processes in animals is simple, because we can see clearly how they feed, breathe, etc.

In plants, these processes are not so evident. However, we can do a simple experiment which will enable us to observe photosynthesis in plants.

Materials

Fragments of an aquatic plant, such as elodea.

A transparent jug full of water

A funnel (also transparent).

A test tube completely full of water.

Procedure

- Step 1** Take the fragments of elodea and put them in the funnel, pushing them gently against the neck of the funnel to ensure they stay in place.
- Step 2** Put the funnel containing the elodea into the jug upside-down, ensuring that the funnel is completely submerged. Your jug should look like the one in picture a.
- Step 3** Place the plant in the Sun and, at an adequate temperature, you will soon see how small bubbles form, which rise up through the neck of the funnel. The gas which is released is oxygen produced in photosynthesis (picture b).
- Step 4** Document your results and write your conclusion.



Check what you know!

Work in your notebook



1 Copy and complete the sentences.

- 1 Plants carry out ... nutrition.
- 2 A plant's basic structure is made up of
- 3 The transformation of sunlight into energy is called

2 What is the name of the green substance that absorbs energy from sunlight during photosynthesis?

3 True or False? All life on earth depends on plants.

4 Give two examples of plants carrying out the interaction function.

5 Put the four phases of seed plant reproduction in the correct order in your notebook.

germination
seed and fruit formation

pollination
fertilisation

6 Which of the four phases of seed reproduction is taking place in the photograph?



7 Name three fruits that you can eat. Describe them and say where the seed(s) of each fruit is/are.

8 Name five ways we use plants in everyday life.

My Word list

animalia
cells
carbon dioxide
chlorophyll
flower
fungi
interaction
function
leaves
monera
multicellular
nutrition function:
• autotrophic nutrition
• heterotrophic nutrition
ovule
oxygen
petiole
phloem sap
photosynthesis
pistil
plantae
protocista
reproduction function:
• asexual
• sexual:
- pollination
- fertilisation
- seed and fruit formation
- germination
root
seeds
stamen
stem
stomata
vessels
xylem sap