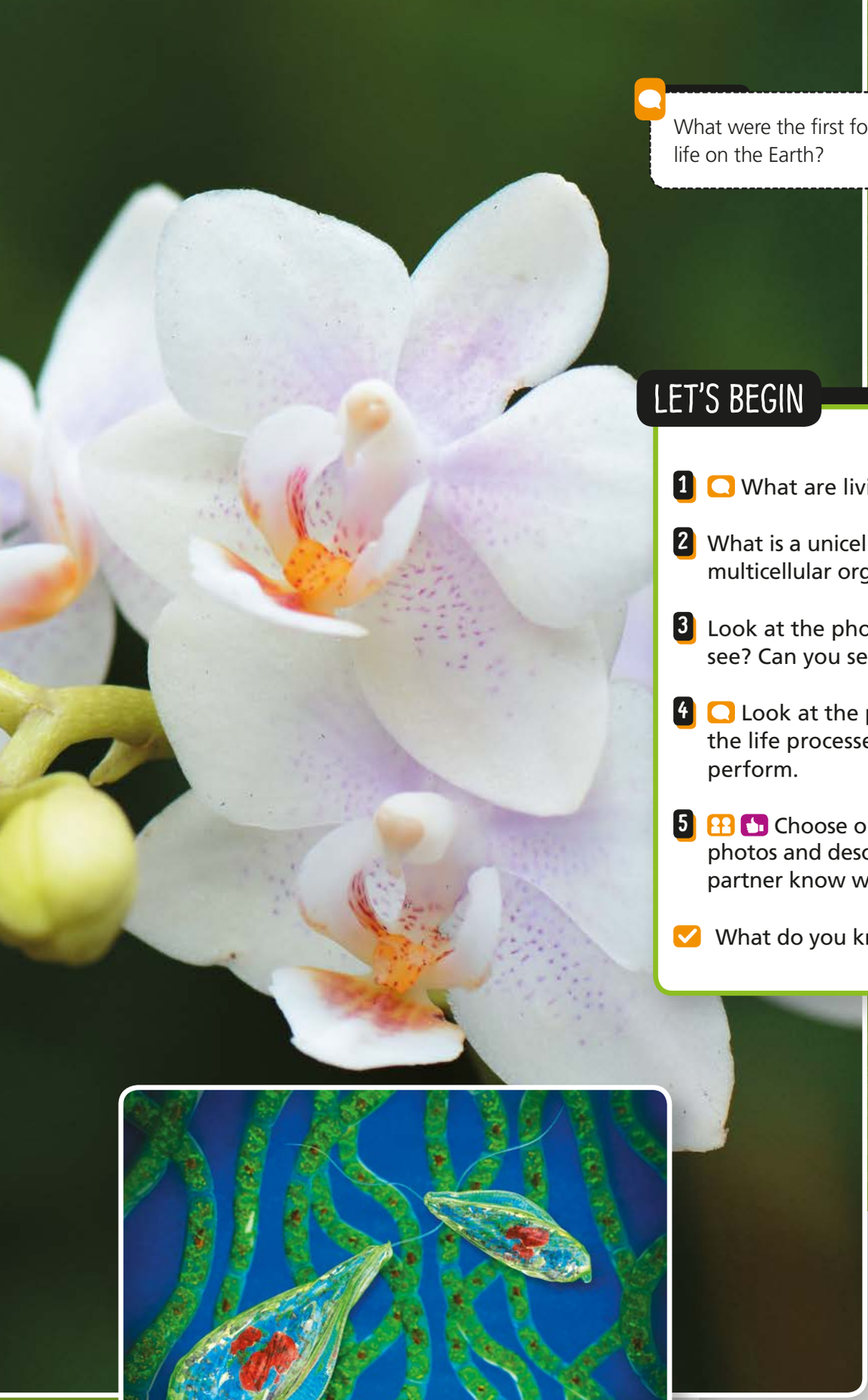
1 FORMS OF LIFE



What were the first forms of life on the Earth?

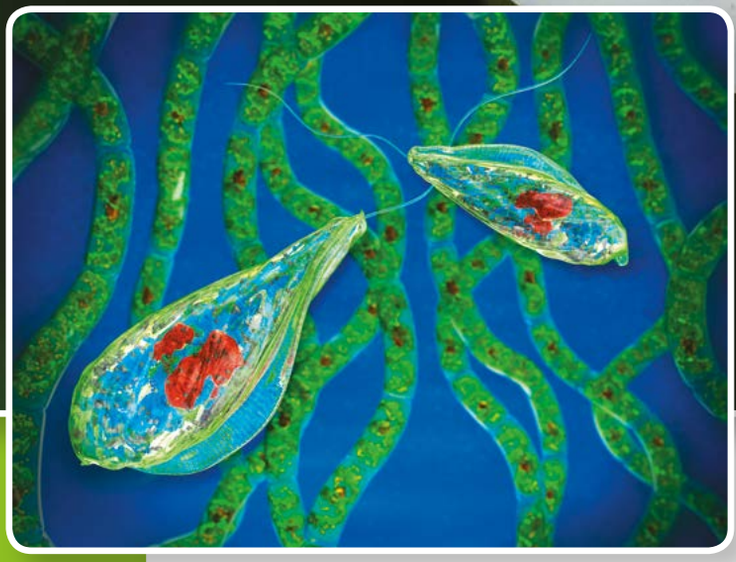
LET'S BEGIN

1. What are living organisms made up of?
2. What is a unicellular organism? What is a multicellular organism? Give an example of each.
3. Look at the photos. What living things can you see? Can you see any non-living things?
4. Look at the photos again. Name some of the life processes that the living organisms perform.
5. Choose one of the living things in the photos and describe it to your partner. Does your partner know what kingdom it belongs to?

What do you know? Let's find out!

Useful language

It lives in ...
It has ... legs.
It lives on (*plants*) and ...
It is an expert in ...



Reflect

1 In your notebook, make a list of six living things and six non-living things. Then choose one from each group and write about the main differences.

2 What do scientists use to observe tiny organisms?

3 What are the characteristics of living things? Unscramble the words and write the answers in your notebook.

a nbro
b rwog
c pdorreeuc
d ide

4 What is the process in which plants make their own food? Why is this process vital? Explain in your notebook.

5 Bacteria and viruses are microscopic organisms. Answer the questions below in your notebook.

a Do they have cells?
b What kingdom do they belong to?
c Are they hostile or friendly organisms?

6 Use the words from the box to copy and complete the text in your notebook. There are some extra words.

mammal • swim • amphibian • land • water • animal
algae • animals • eggs • rivers • sleep • night

The platypus is a small **(a)** ..... . It belongs to the **(b)** ..... kingdom. It is a very good swimmer. It spends most of the time in the **(c)** ..... . It lives in small streams and **(d)** ..... in eastern Australia. It feeds on other **(e)** ..... . It lays **(f)** ..... in a burrow near the water. It likes to **(g)** ..... during the day and move during the **(h)** ..... . The bigger platypus lives in Tasmania.

7 Think about the planet Mars. Can plants grow in Martian soil?

a Name the main things plants need to grow.
b What non-living things do you think exist on Mars?
c Do you know another name for Mars?

Useful language

Scientists use a ... to observe (*cells*).

A (*biologist*) uses a (*Petri dish*) to ...

They use a (*slide*) to examine ... under a ...

Platypus are a protected species.

Work together

Grow your own bacteria

Think first

You are going to do an experiment to see how bacteria grow.

Think about the following questions individually. Then agree on the answers with the rest of your group.

a Do all types of bacteria grow in a similar way?

b Why is it important to wash your hands?

Materials: Cotton buds, Petri dishes, permanent marker, digital camera, notebook, pen.

Step by step

1. In groups, make a list of objects and places where you can get bacteria samples. For example, your mobile phone, a door handle, your fingernails, the top of your desk. Discuss your ideas and vote for the best two.
2. Prepare your samples. Choose one object or place from your list. Swab it with a cotton bud. Open a Petri dish and rub the cotton bud on the agar. Close the Petri dish. Make sure it is completely closed. Write the name of the sample, the date and the time on the Petri dish. Choose a different object or place and repeat the process.
3. Answer this question individually: *Which sample do you think will grow more quickly?* Then share your answer with the rest of your group and agree on one answer together.
4. Put your Petri dishes in a warm place for three days. Each day, check the samples and draw or take a photo of what you see. Make notes about the changes. **Do not** open the Petri dishes!
5. At the end of the experiment, compare your notes and discuss these questions in your group:
   a Which sample grew more quickly?
   b Which samples did not grow very much?
   c Are the samples different? Why?
   d Which of the samples you tested had the most bacteria?
   e What do you now think about cleaning things or washing your hands?
6. After you finish the experiment, **do not** open the Petri dishes! Give them to your teacher.

Wrap it up

Compare your answers to the *Think first* questions with your discussion in step 5. Did your answers change after the experiment?

Evaluate your cooperative learning.

Living organisms

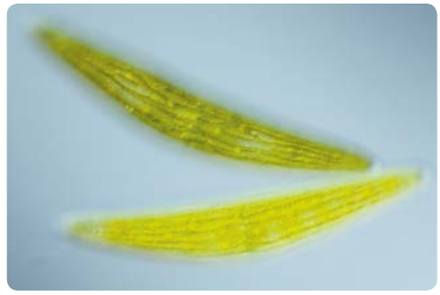
What living organisms are there on Earth?

The cell

Our planet is home to different types of living organisms, including plants, animals, fungi, algae and bacteria. All living organisms consist of tiny units called **cells**.

Living organisms can be **unicellular** or **multicellular**.

- In a unicellular organism, the **single cell** performs all of the life processes.
- In a multicellular organism, **many different cells** perform different functions.



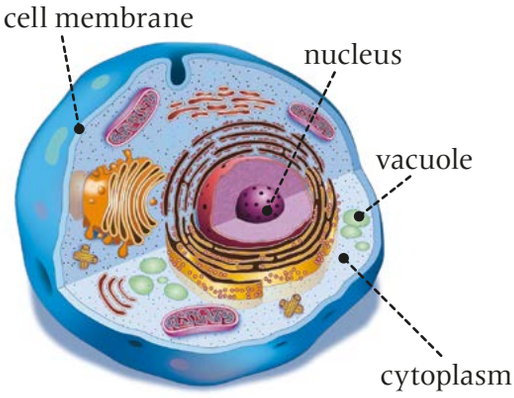
Closterium, a unicellular green alga

Animal and plant cells have some structures in common:

Animal cell structure

Animal cells have:

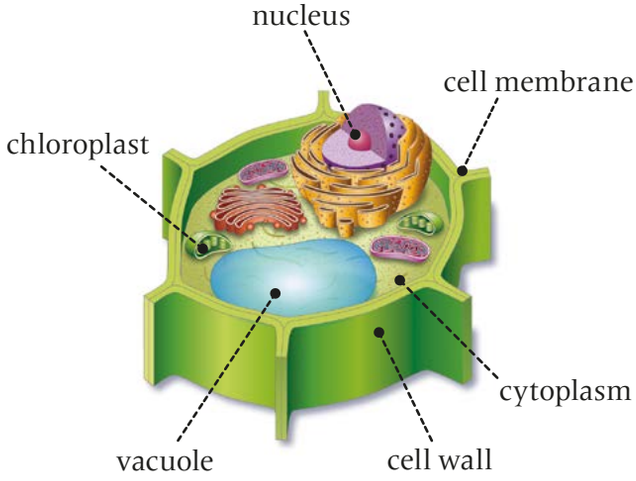
- a **nucleus**. It controls the functions of the cell, such as reproduction.
- a **cell membrane**. It controls the substances that enter and leave the cell.
- **cytoplasm**. It is a jelly-like substance between the cell membrane and the nucleus. It contains various chemicals and structures.
- **vacuoles**. They are storage bubbles. They contain water and minerals which the organism needs to grow. Not all animal cells have vacuoles.



Plant cell structure

Plant cells have a nucleus, a cell membrane, cytoplasm and vacuoles as well, but they also have:

- a **cell wall**. It gives the cell its shape and protects it.
- **chloroplasts**. They contain chlorophyll, so the plant can carry out the process of photosynthesis.



Life processes

Every living organism performs three main life processes: **nutrition**, **interaction** and **reproduction**. Depending on the organism, each of these three functions occur differently.

Nutrition

All living organisms take in **nutrients** from their environment to obtain **energy**. This energy allows them to grow and function properly.

Plants use sunlight to make their own food through photosynthesis.

Animals cannot make their own food, so they take in nutrients from other living organisms.

Decomposers feed on the remains of dead organisms. Fungi and bacteria are decomposers.

Interaction

All living organisms react to **stimuli**. A **stimulus** is a change in the environment. It produces a reaction in an organism. Any reaction to stimuli is a **response**. Animals respond quicker to stimuli, but plants respond slower.

Reproduction

Living organisms need to reproduce for their species to survive. Most plants grow from seeds. Most animals lay eggs or have babies.

Reproduction can be:

- **asexual**, which involves one organism. It is common in unicellular organisms, such as bacteria.
- **sexual**, which involves a male and a female of the same species.

A lioness with her cub.

1. How is a plant cell different from an animal cell?
2. How do living organisms obtain energy to grow and function? How do we obtain energy to grow?
3. Listen to the definitions and write the words in your notebook.
4. How do animals and plants react to stimuli? Give examples.

Organisation of living organisms

What is the study of living things called?

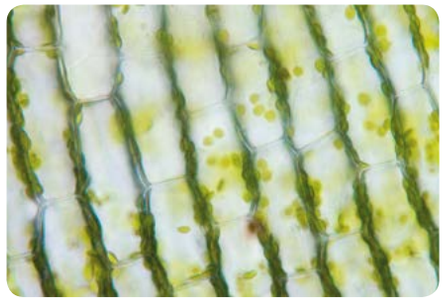
A **cell** is the smallest living unit in a living organism. Cells in most multicellular organisms, such as plants and animals, are **specialised**. This means different cells perform different functions. Specialised cells form a variety of tissues and organs.

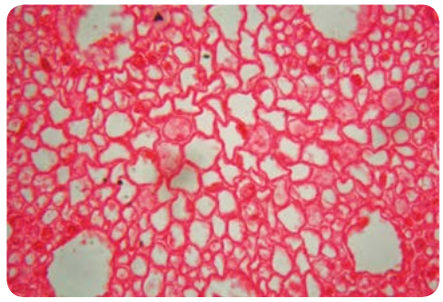
Specialised cells

Animals and plants have many specialised cells.

Examples of plant cells

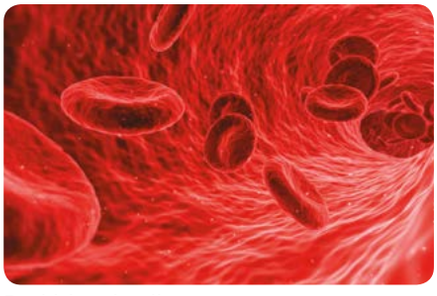
- **Leaf cells**. These cells absorb sunlight so the plants can perform photosynthesis.
- **Root hair cells**. They absorb water and minerals from the soil.

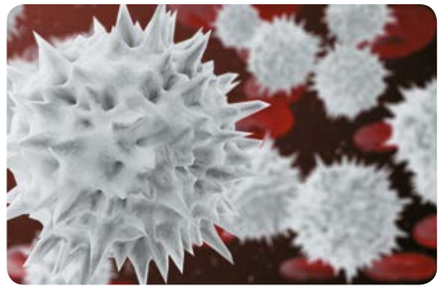

Leaf cells


Root hair cells of corn

Examples of animal cells

- **Red blood cells**. They are red because they carry haemoglobin. Haemoglobin is a bright, red protein that contains iron. The red blood cells carry oxygen around the body.
- **White blood cells**. They are the bodyguards of the organism. They protect the body from bacteria, viruses and other foreign intruders.
- **Nerve cells**. They carry information from the brain to the rest of the body. The sense organs also send information to the brain using nerve cells.


Red blood cells


White blood cells


Nerve cells

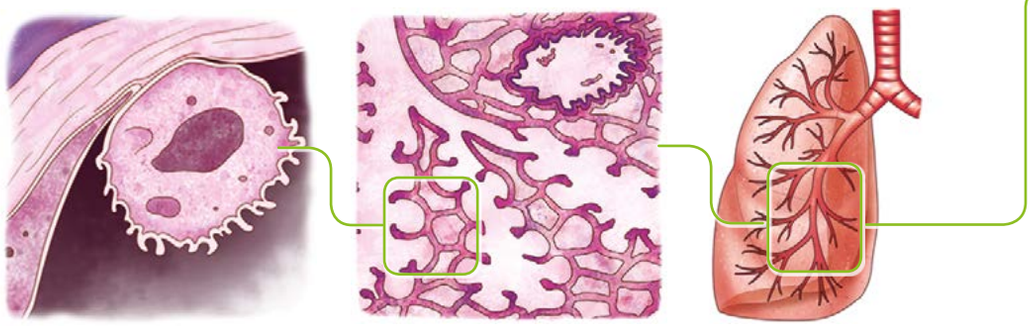
1 Choose a specialised cell and describe its main function.

2 There are different types of blood. With a partner, find out how many blood groups there are. Which is the most common group and the least common group?

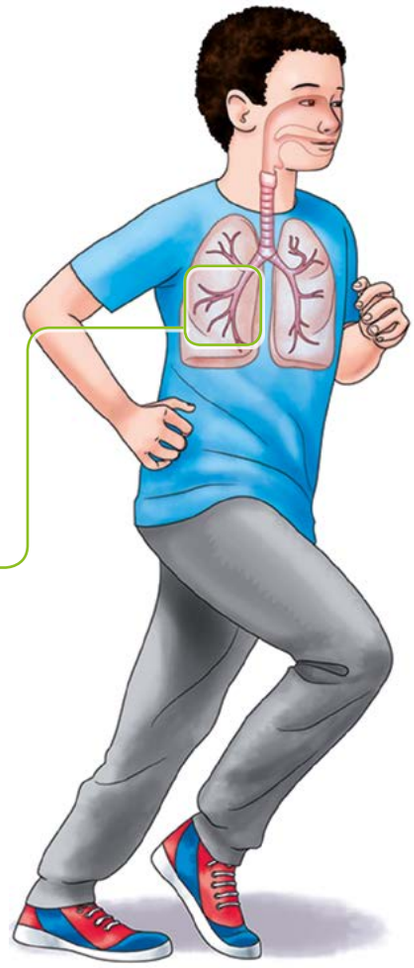
Cells, tissues, organs and systems

In all multicellular organisms, cells join together to form complex structures.

- **Tissues**. Cells with similar characteristics and functions work together to form tissues. An example of tissues in plants are xylems that transport water and minerals. People and animals have muscle tissue that helps them move.
- **Organs**. Tissues form organs. The cells in an organ work together to carry out a particular function. Examples of organs in people and animals are: the heart, the brain, the lungs and the stomach.
- **Systems**. Organs working together to perform the same function form systems. They are the most complex structures in a living organism. An example of a system which people and animals have is the nervous system.



cell tissue organ



organism

3 Listen to a neuroscientist talking about nerve cells. What are the two main types of nerves? How do signals help the brain?

4 How do cells form an organism?

5 In pairs, think of an animal system or a plant system. Name its parts and its main functions. Then draw the system, starting from the simplest structure.

6 Can all living organisms form tissues? Search online and share the information you find with the class.

Useful language

This is the ... system.

The ... and ... are the main parts of this system.

It moves ... around ...

The five kingdoms of living things

Are algae plants? How about mushrooms?

Scientists classify living things into five groups based on their distinctive characteristics and similarities. These five groups are called **kingdoms**.

Animal kingdom

This kingdom is the largest of the five kingdoms. Animals are multicellular organisms. They get the energy they need by feeding on other living organisms. Animals can move, respond to stimuli and reproduce.

Kangaroos feed on grasses and flowers.

Plant kingdom

Plants are multicellular organisms. They use photosynthesis to collect energy from the Sun to make their own food. Plants cannot move like animals, but they can reproduce and respond to stimuli.

Fungus kingdom

Most fungi live on trees or in the soil. They can be unicellular or multicellular. Fungi get their nutrients from the remains of dead plants and animals, or working with other living organisms. This kingdom includes various types of yeast and mushrooms.

Mushrooms. They consist of many cells. Some mushrooms are poisonous. Some are edible. They are almost 90% water.

Yeast. We can find yeast almost everywhere in nature. Yeast consists of a single cell. Some types of yeast can be harmful, but others can be beneficial. We use yeast to make bread and pizza.

Protist kingdom

Protists are usually unicellular, but some are multicellular. Most protists are aquatic. This kingdom includes algae and protozoa.

- **Algae**. They can consist of a single cell or many cells. Algae use sunlight to produce their own food.
- **Protozoa**. They are unicellular organisms. They get their nutrients through the cell membrane.

Euglena is a unicellular protist.

Monera kingdom

This kingdom consists of microscopic unicellular organisms. We can find them in the air, in water, on land, in animals and in people. All organisms in the monera kingdom are **bacteria**. Some bacteria can cause illnesses. Some decompose dead matter and some are beneficial for our health.

Helicobacter pylori bacterium

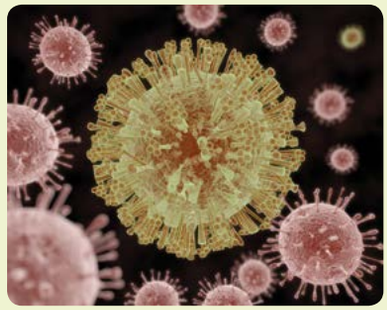
True or false

Read the text and decide if the statements below are true or false. Correct the false ones in your notebook.

R.H. Whittaker was an ecologist who developed the five-kingdom classification in 1969. Each group is based on the characteristics of an organism's cells and on how the organism obtains its nutrients.

Some organisms, like viruses, are not included in this system of classification.

Most scientists believe viruses are non-living things because they have no cells. Viruses do not take in nutrients and do not produce waste products. They do not grow or respond to stimuli. They must always be inside another living organism to survive and reproduce.



Zika virus

a. R.H. Whittaker was a famous biochemist.
b. Scientists use five sizes to classify living things.
c. Viruses do not belong to any of the five kingdoms.
d. A virus has no cells and cannot make its own food.
e. Viruses can grow with the help of another living organism.

1 Which kingdom(s) do these sentences refer to?

a. They can never be unicellular.
b. These organisms feed on dead plants and animals.
c. They cannot move but they can reproduce.
d. Most of these organisms are aquatic.

2 How are fungi different from plants?

3 With a partner, search online for beneficial bacteria.

a. What are the names of the two most common friendly bacteria?
b. Where can we find them? How do these beneficial bacteria help us stay healthy?

Our world

Life-changing inventions

Science helps us make people's lives better. People live longer and are healthier than in the past because medical equipment, vaccines and medicines have improved.

1 **Get into pairs. Person A reads text A below. Person B reads text B on page 116. Together, decide if the sentences below refer to text A, B or both.**

Unit 1, text A

Nowadays, we use many modern inventions to look after our health. Examples are X-ray images and digital thermometers. Scientists built the first microscopes in the 16th and 17th centuries. The invention of the microscope was a very important development and led to the discovery of new things about living organisms.

In the past, medical procedures were often dangerous. Nowadays, they are safer and less invasive. Doctors use X-ray imaging to see inside the human body and decide what is wrong. Clean water and sanitation have also saved many lives.

Advances in healthcare and medicine help people live longer and enjoy a better quality of life. People today can be healthier, more productive and more independent.

Doctors use a CT scan or an MRI scan to see inside a person's body.

a. This instrument helped scientists make new discoveries.
b. Thanks to this discovery, doctors can treat infections.
c. Nowadays, medical procedures are safer.
d. People have a better quality of life because of medical discoveries.
e. It was the world's first antibiotic.

2 **Think of some countries that do not have many resources. Describe how improvements in healthcare could help people to have a better quality of life. Think about the following:**

- medical equipment
- medicines
- clean water in schools and homes
- nutrition
- vaccines
- healthy eyesight

Useful language

Today, it is much (*easier*) to diagnose an illness with ...

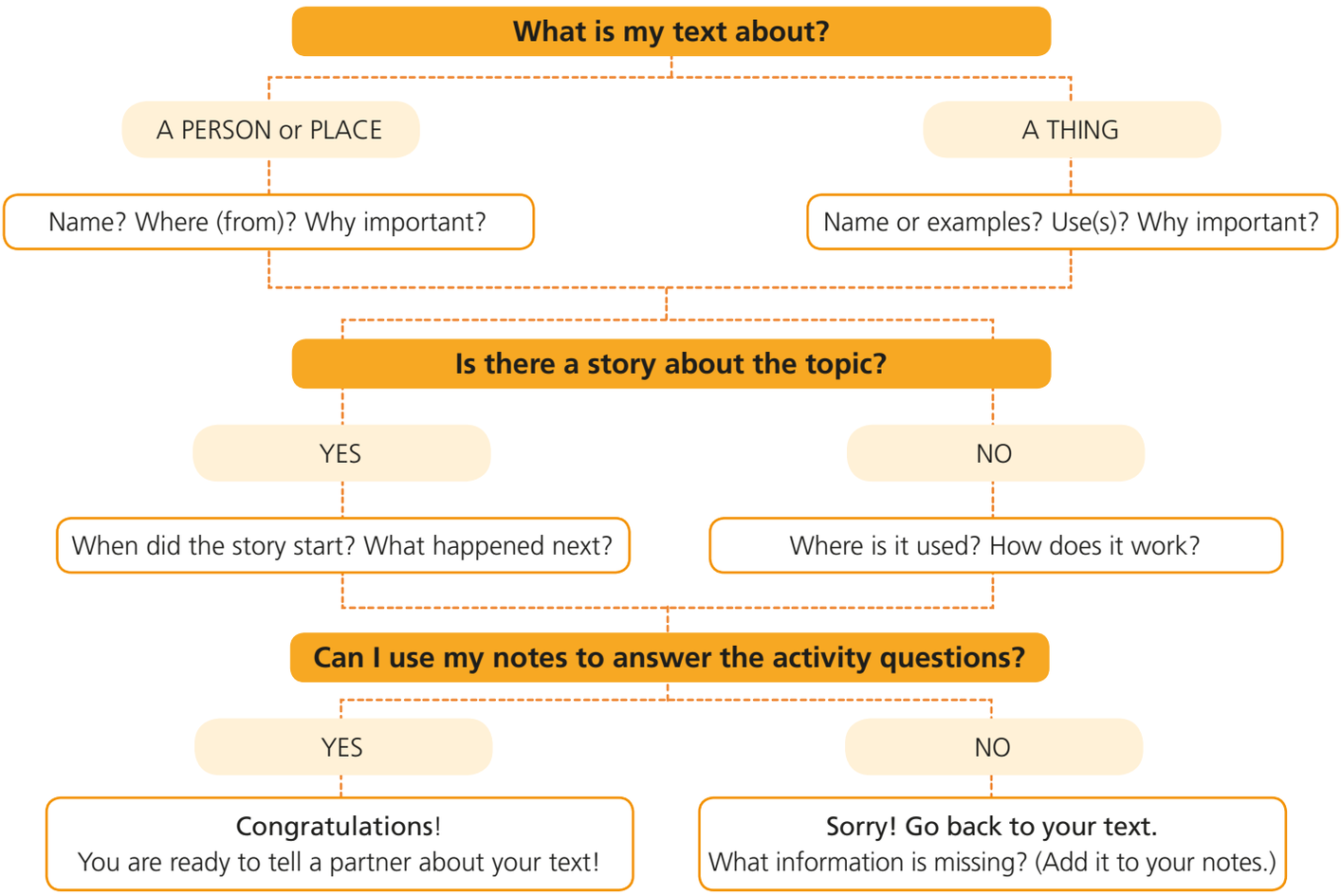
Medicines like ... can help people ...

Study skills

How to do a jigsaw reading

A **jigsaw reading** is when you have two different texts that share the same topic or theme. You read these texts with a partner.

Jigsaw readings are a fun way for you to work with a partner and get a better understanding of a topic without the help of your teacher. Because you cannot use the original text, HOW you make notes is important if you want to explain your text well. To make notes about your text, use a diagram like this below:

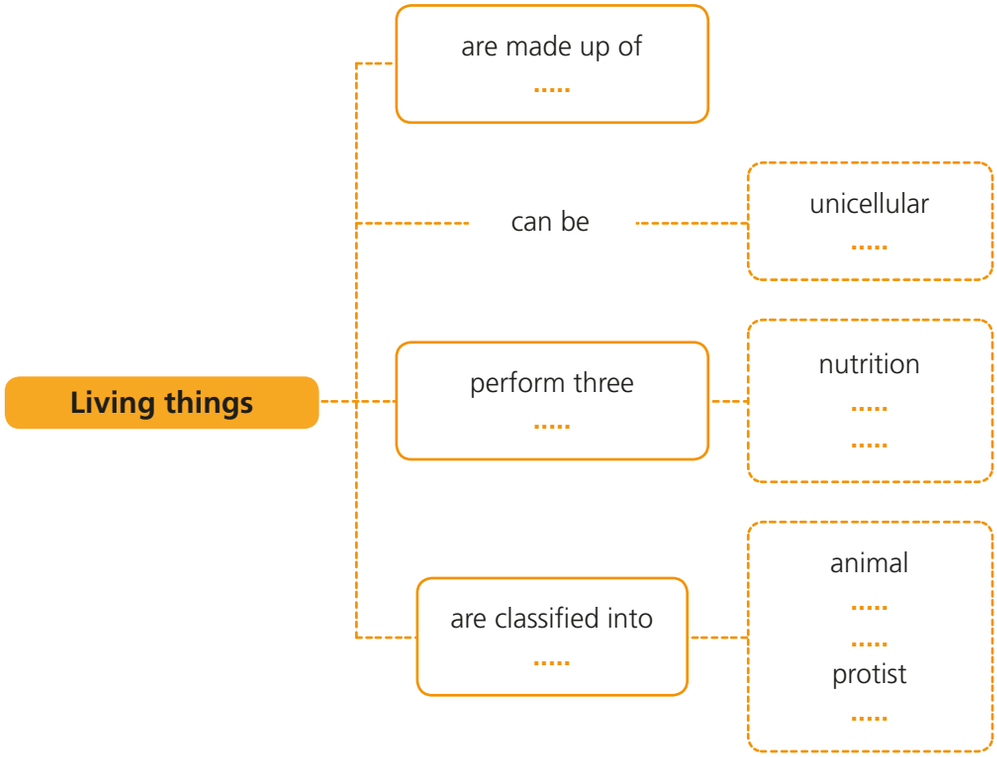


1. Read the text your teacher gives you (text A or text B). Next, copy the diagram in your notebook. Answer the questions about your text and write your answers on the diagram.
2. Now, use your notes to explain your text to your partner.
3. Did your partner understand your text? Did you understand your partner's text? Complete the questions and diagram together.

REVIEW

1 In your notebook, copy and complete the graphic organiser about living things. Use the words from the box. There are some extra words.

- multicellular
- plant
- monera
- interaction
- life processes
- respiration
- cells
- reproduction
- fungus
- insects
- kingdoms



2 Sometimes cells are called the *building blocks of life*. Write your own definition of a cell and share it with the class.

3 Guess which parts of a cell the following descriptions refer to:

a. the cell gate
b. storage tanks
c. control centre
d. food producers
e. protector
f. jelly filling

4 Look at the insect in the photo. In your notebook, write a description answering the following questions:

a. What characteristics does it have?
b. What kingdom does it belong to?
c. Where do you think it lives?
d. Where does it get its energy from?
e. Does it share any characteristics with organisms from other kingdoms?
f. What do you want to name it?

5 Listen and complete the sentences in your notebook.

a The small units that make up living organisms are called ..... .
b Organisms made up of many cells are called ..... organisms.
c The ..... controls the functions of a cell.
d Cells in most animals and plants are ..... .
e All organisms in the ..... kingdom are bacteria.
f All living organisms react to ..... .

6 In your notebook, define the following words and give an example of each.

a a tissue
b an organ
c a system
d an organism

7 Correct the statements in your notebook.

a Fungi take in nutrients through photosynthesis.
b Algae belong to the monera kingdom.
c Some animals can make their own food.
d Yeast is a multicellular protist.
e A virus is a unicellular organism.
f All bacteria are harmful.

8 Read the sentences below. Which part of a cell do they refer to?

a They contain chlorophyll and only plant cells have them.
b It controls what enters and leaves the cell.
c It controls all the functions of the cell.
d It contains various chemicals.
e It gives plant cells their shape.
f These storage bubbles contain water and minerals.

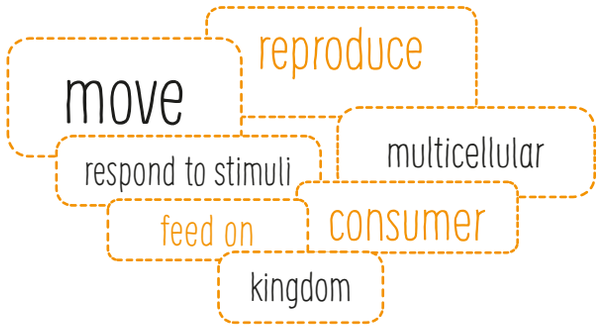
9 Look at the photo.

a Describe in your own words what you can see.
b Which kingdom does it belong to?
c Which life process do you think it is related to? Give two reasons why this process is important.

10 Why do you think a tree is a living thing and a rock is not? Give at least two reasons.

11 Both bacteria and animals consist of cells. What is the main difference between bacteria and animals? Do they have anything in common?

12 Talk about the animal kingdom. Then describe your favourite animal. Use the word cloud below to help you.



What do you know now? Check your progress!