

1

INTERACTION





Which of your five senses are you using at the moment?

LET'S BEGIN

- 1 Look at the photos. What are the people doing? What senses are they using?
- 2 Which senses do you use the most? Why are they important? Discuss with a partner.
- 3 What are the main functions of the brain?
- 4 Look at the parts of the body in the box below. Which are associated with the function of interaction? Make a list in your notebook.

brain • eyes • hair • kidneys • lungs
muscles • nose • skeleton • skin • stomach

- 5 In pairs, discuss these questions:
 - a Why do some people wear glasses?
 - b How can loud music hurt you?
 - c What smells don't you like very much?
 - d How can hot food be dangerous?
 - e What do you do when you are cold?
- What do you know? Let's find out!



Useful language

Some people wear glasses because ...

Loud music can hurt ...

I don't like the smell of ...

Hot food can ...

When I'm cold, I usually ...

Reflect

- 1 Look at the photos. What senses are the people using? What information are their sense organs receiving?



- 2 In your notebook, complete the sentences with the words in the box. There are some extra words.

organism • neuron • taste bud • tissue • spinal cord • organ

- a A is a cell that sends messages to and from your brain.
- b An is a living thing, such as a person, animal or plant.
- c Cells with similar structures and functions form
- d An is a part of your body that performs a specific function.

- 3 Do the quiz.

Your interactive body!

- 1 Human eyes detect light and different colours.
 - a three
 - b five
 - c seven
- 2 A typical human heart beats about times a day.
 - a 50,000
 - b 100,000
 - c 200,000
- 3 There are different bones in an adult human body.
 - a 106
 - b 156
 - c 206
- 4 The human body has about muscles.
 - a 400
 - b 600
 - c 800

- 4 Find out about hearing aids. Why do some people need them? What do they do? How do they work?





One or two?

Think first

You are going to do two different experiments with your eyes to test how they work. Think about the following questions individually before discussing them with your group. Make notes about your group's answers.

- a Is there a reason why people have two eyes instead of just one?
- b What can two eyes detect that only one eye cannot?



Materials: Two pencils, yoghurt pots, paper clips, tape measure.

Step by step

- 1 In groups, decide which two group members will do the first experiment and who will do the second: Pair 1 and Pair 2.
- 2 Pair 1, both hold a pencil in each hand and stretch your arm out, as in photo **a**. Close one eye. Now, try to touch the ends of your pencils together. Repeat with the other eye closed and then with both eyes open. Pair 2, record data about the experiment.
- 3 Pair 2, sit at your desks with an empty yoghurt pot a metre away from you. Cover one eye with a hand. A pupil from Pair 1 will move a paper clip slowly above the pot, as in photo **b**. Say 'drop' when you think the paper clip will fall into the pot and the person from Pair 1 will let it go. Repeat with the other eye covered and then with both eyes open. Pair 1, record data about the experiment.
- 4 At the end of the experiments, review your notes and discuss the following questions with your group:
 - a Does one of your eyes work better than the other?
 - b Do two eyes detect distance better than just one?
 - c Do you think two ears detect distance better than just one?
 - d Why would this ability be important for human evolution?



Wrap it up

Review your answers to the *Think first* questions after your discussion in step 4. Did your answers change after the experiments?

Evaluate your cooperative learning.



The senses

What sense organs do you use when you watch a film?

Our sense organs let us interact with the world around us. They detect information and send electrical signals to the brain. The brain interprets the signals and then decides how to react to the stimulus.

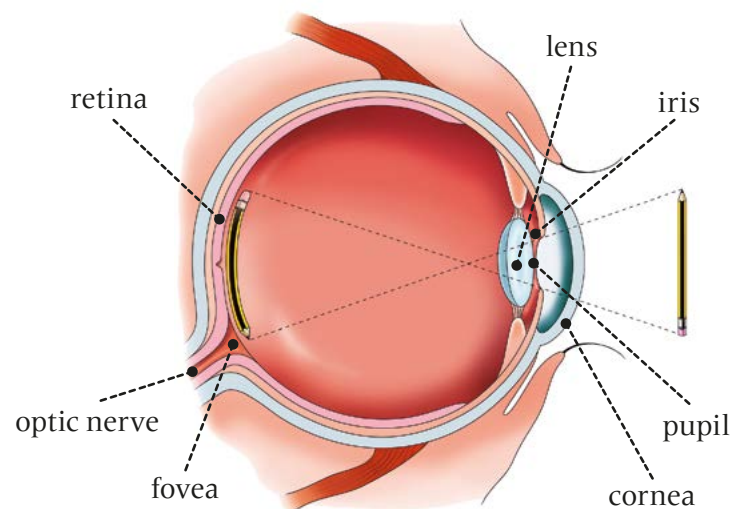
Sight

1 Light passes through the **cornea** and enters the eye through the **pupil**.

2 The coloured part of the eye is the **iris**. It controls the size of the pupil and the amount of light that enters the eye.

3 The **lens** focuses the light on the **retina** at the back of the eye.

5 The **fovea** is where the optic nerve meets the retina. The fovea is a blind spot because it cannot detect light.

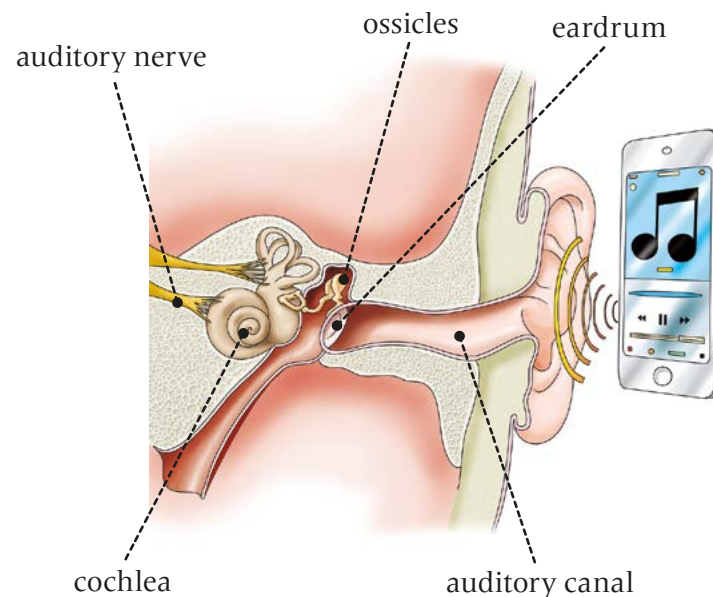


4 Nerve receptors in the retina detect light and send electrical signals to the **optic nerve**. From there, the signals are carried to the brain.

Hearing

1 Sound waves enter the **outer ear**. They go into the **auditory canal** and they make the **eardrum** vibrate.

4 The **auditory nerve** carries the electrical signals to the brain.



2 The **ossicles** are three small bones in the **middle ear**. They vibrate when the eardrum vibrates.

3 The **cochlea** is in the **inner ear**. It detects sound vibrations in the ossicles and it produces electrical signals.

Smell

Chemical particles in the air enter the nose through the **nostrils**.

The chemical particles are detected by **nerve receptors** inside the nose.

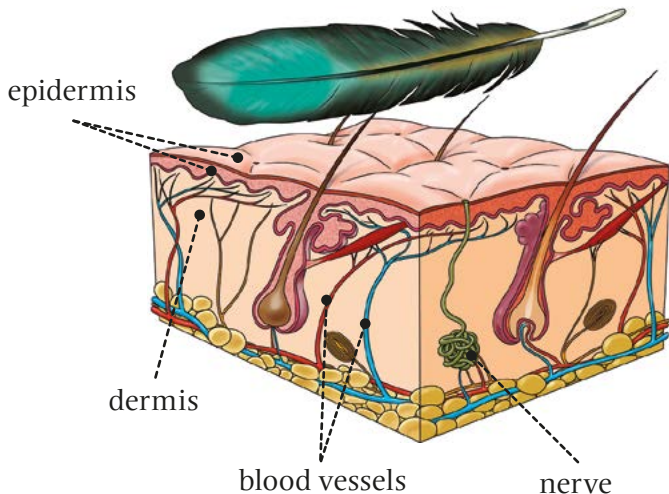
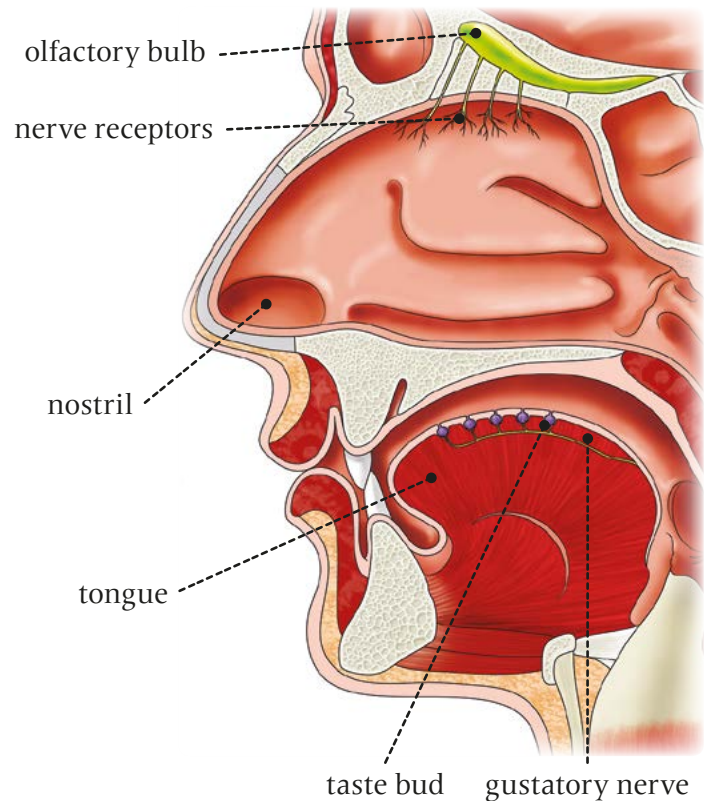
The nerve receptors send electrical signals to the **olfactory bulb** in the brain.

Taste

Food touches the **tongue**, which is covered with **taste buds**.

The taste buds have **receptor cells** that detect tastes: sweet, sour, bitter, salty and umami.

Electrical signals are carried to the brain by **gustatory nerves**.



Touch

Your **skin** covers and protects your body. The top layer is the **epidermis** and the middle layer is the **dermis**.

The dermis contains many **blood vessels** and **nerves**. These nerves can detect sensations, such as heat, pressure and texture.

The nerves in your skin send electrical signals to the brain.

1 🗨️ Which sense organs detect these things?

air freshener • light • birds singing
soft skin • sweet food

2 🗣️ Listen to the information about the senses. Are the statements true or false? Answer in your notebook.

3 🧑🏫 What parts of our sense organs produce electrical signals? How do they get to the brain? Discuss with a partner.

4 🔍 Find out how these things protect our sense organs: safety goggles, earplugs, dust mask and oven gloves. Share your findings with the class.

The nervous system

Cells are the smallest living parts of living **organisms**. Cells that have the same function join together and form **tissues**. These tissues form **organs** that work together in **systems**.

The **nervous system** carries messages between the **brain** and other systems of the body, such as the digestive system, the respiratory system and the locomotor system. When our senses detect stimuli, the locomotor system lets us react and move.

The central nervous system

The **brain** and the **spinal cord** make up our **central nervous system**.

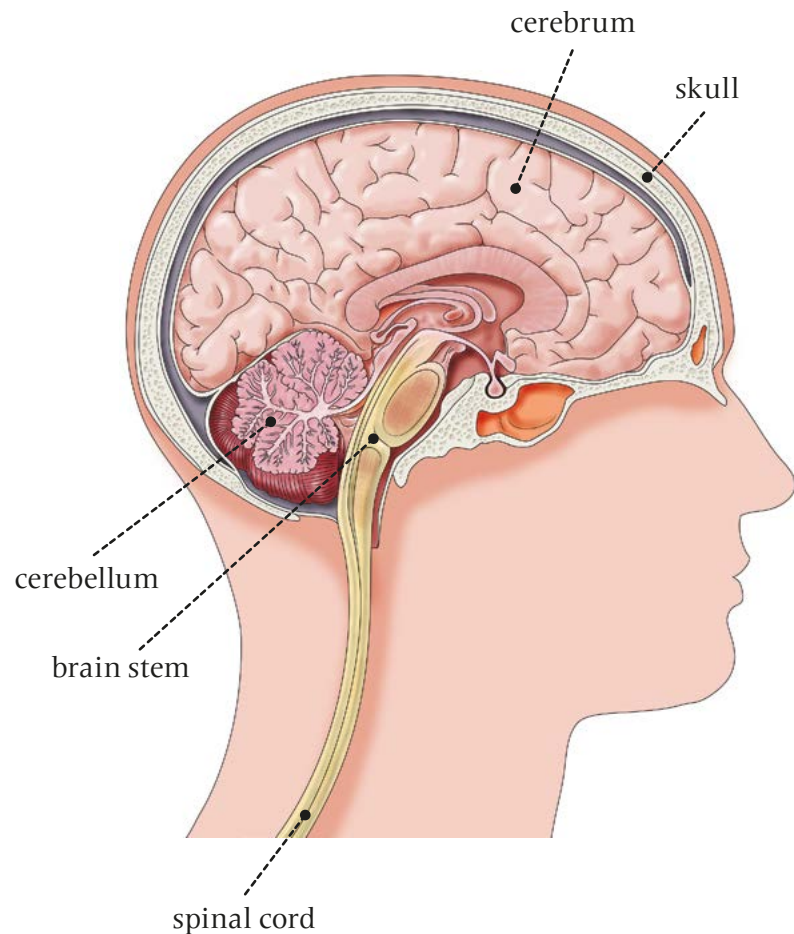
The brain

The brain controls the rest of the nervous system. It is protected by the **skull** and it has three main parts:

- The **cerebrum** is the biggest part of the brain. It processes information from the senses. Thinking, or cognition, also happens in the cerebrum, for example, when we study, take decisions or play games. These actions are **voluntary**.
- The **cerebellum** controls movement, balance and coordination.
- The **brain stem** connects the rest of the brain to the spinal cord. It controls **involuntary actions**, such as sleeping, breathing and our heartbeat.

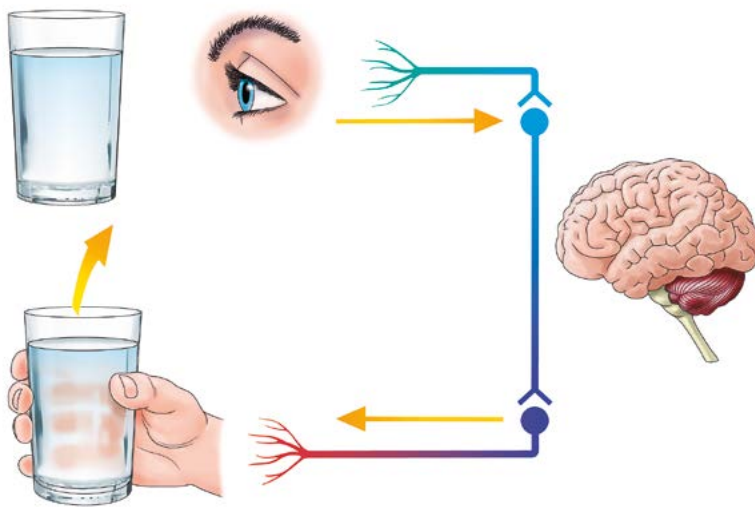
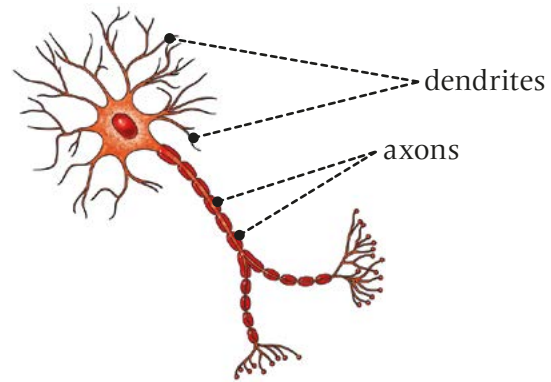
The spinal cord

The spinal cord is made up of nerve tissue. It runs down the spine and it is protected by bones, called vertebrae. The spinal cord controls our **reflex actions**, such as blinking when something is moving quickly towards our eyes.



The peripheral nervous system

The **peripheral nervous system** is made up of nerves. These nerves are made up of tiny cells called **neurons** that transmit electrical signals. Neurons have **dendrites** that receive signals and **axons** that transmit signals to other neurons.



Different neurons perform different tasks.

- 1 **Sensory neurons** carry signals from the sense organs to the brain. The eye sees the glass of water, and sends signals to the brain.
- 2 The **brain** interprets the information and responds by producing signals.
- 3 **Motor neurons** carry those signals to the locomotor system. The brain tells the hand to hold and move the glass of water.

1 🧑🧑 With a partner, decide which parts of the central nervous system these sentences refer to:

- | | |
|---------------------------------|---------------------------------|
| a It controls our heartbeat. | d It helps us think and study. |
| b It processes information. | e It goes down the spine. |
| c It is protected by vertebrae. | f It controls our coordination. |

2 🗣️ Listen to a neuroscientist explaining how your brain interprets a stimulus. Summarise the steps in your notebook.

3 🗣️ 🧑🧑 Why is the skull important? When should we wear a helmet? Why?

4 🔍 Search online about reflex actions. Are they voluntary? Why are they important?

👍 Useful language

The skull is important because it ...

Without the skull, ...

We should wear a helmet when ...

Wearing a helmet (*prevents / protects*) ...

Look at the skeleton on this page. Which bones are flat?

The locomotor system

Our body responds to signals that come from the brain. The signals travel through the nervous system to our muscles, which **contract** and **relax**. The muscles move our bones and joints, so we can do things like hold objects or play sports. All of these parts together form the **locomotor system**.

The skeleton

An adult human skeleton has 206 **bones** that are connected by **joints**.

Bones

There are three types of bones:

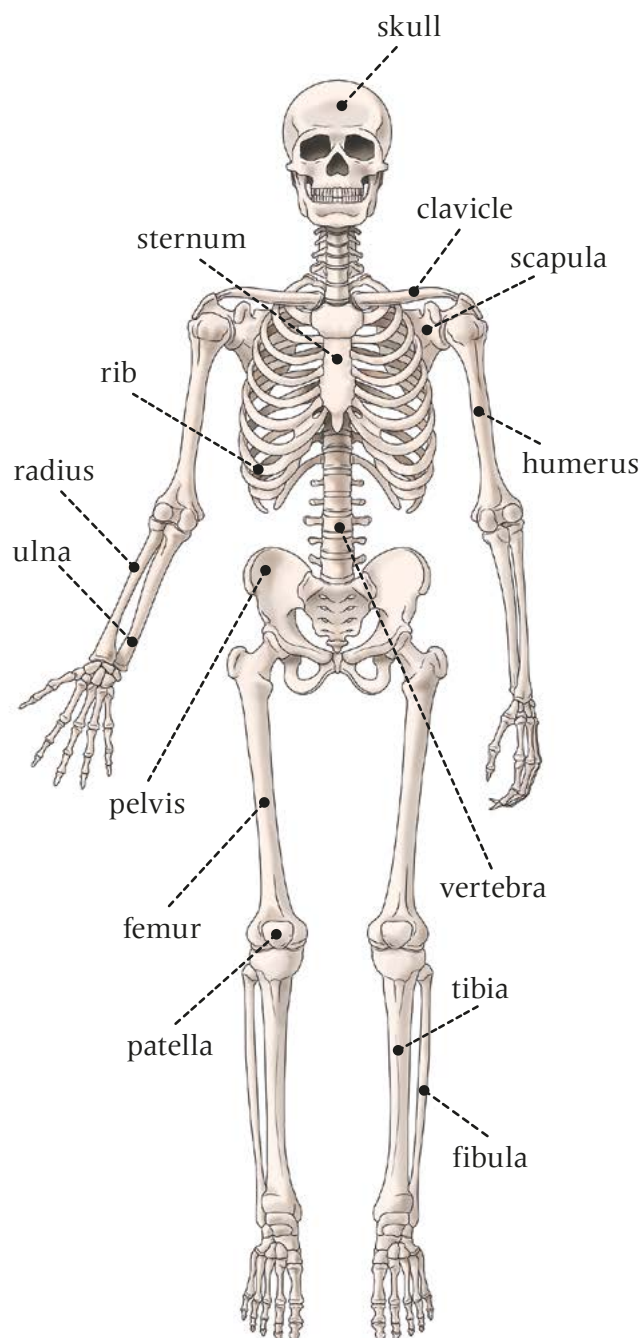
- **Short bones** provide stability and support. For example, vertebrae are short bones that also protect the spinal cord.
- **Flat bones**, such as the sternum and the ribs, protect our internal organs.
- **Long bones** are found in the arms and legs. The femur is the longest bone in the human body.

Joints

Our bones are connected by **joints**. Our joints are held together by strong elastic tissues called **ligaments**. The ends of our bones are protected by strong, flexible tissue called **cartilage**.

There are three types of joints:

- **Fixed joints** do not move. The skull has many bones that are connected by fixed joints.
- **Semi-flexible joints**, such as the vertebrae, allow some movement.
- **Flexible joints** allow much more movement. Our shoulders and knees are flexible joints.



1 Which bones protect the respiratory system? Which bones protect the brain?

2 What types of bones are these?

tibia • finger bones • pelvis • feet bones • scapula • radius

Useful language

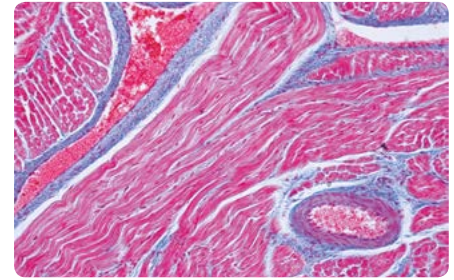
I think ... is / are ...

The ... (is / are) probably ...

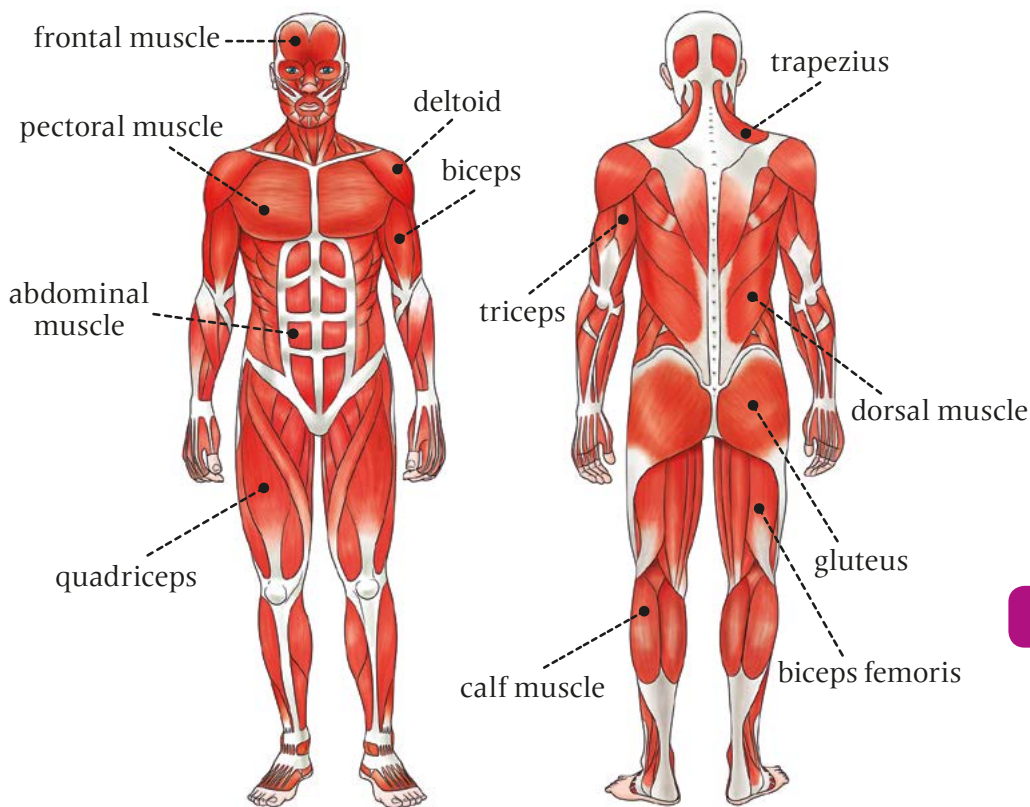
Muscles

The human body has more than 600 muscles. The nervous system controls these muscles by making them **contract** and **relax**. There are three types of muscles:

- **Skeletal muscles** are joined to bones by **tendons**. They are **voluntary muscles**, so we can control and move them when we want.
- **Smooth muscles** are found in organs like the stomach and the intestines. Smooth muscles are **involuntary muscles** because they work automatically. We cannot control them.
- **Cardiac muscle** makes the heart move and beat. It is an involuntary muscle.




Heart muscle under a microscope




Project tips

What is the difference between a broken ankle and a sprained ankle?

3  Listen to the clues and answer in your notebook. What are they describing?

4 Which muscles do we use to pick up a book? Which ones do we use to kick a ball?

5  Search online about joints. Which joints are the most flexible? How can you prevent injuries to your joints? Tell the class.

Drug addiction

Regular drug use can permanently affect our brain development and behaviour.

- 1** 🗨️ Get into pairs. Person A reads text A below. Person B reads text B on page 100. Together, decide if the sentences below refer to text A, B or both.

Unit 1, text A

The brain is made up of billions of nerve cells. These cells control all of our body systems by sending signals out to nerves and muscles. The signals are carried from nerve to nerve by chemicals called neurotransmitters.

Drugs are chemicals, too. When you take drugs, they interfere with the functioning of neurotransmitters, especially of dopamine. This neurotransmitter creates feelings of pleasure and satisfaction. If you take drugs, your body can produce too much dopamine. As a result, your brain will reduce the signals of pleasure. Lower dopamine levels can then make it difficult to feel satisfaction. You can easily feel sad and depressed. To feel the same level of pleasure again, your body will need more and more drugs. This is called addiction.



Dopamine makes us feel good.

- a The teenage years are an important time for the development of the brain.
- b Signals from our brain are carried around our bodies by chemicals.
- c Drugs can interfere with our ability to feel pleasure.
- d The need for increasing amounts of a drug is what we call addiction.
- e Drugs can do more damage to the brain of a younger person than an older one.

- 2** 🗨️ 🗨️ Here is a short list of positive activities that can make you feel better if you are feeling sad, bored or angry. With your partner, talk about these ideas and other things you do when you want to feel happier.

- Go for a walk
- Do sport or go dancing
- Play with a pet (to help release energy)
- Help someone
- Talk to someone about how you feel

👍 Useful language

I feel great when I ...
When I want to feel good, I ...
If I feel (angry), I ...

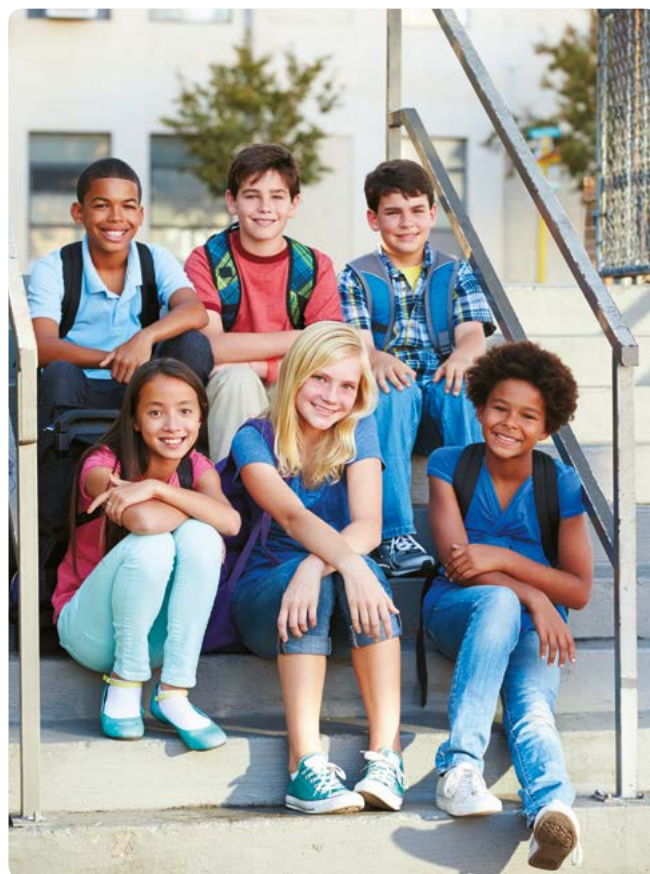



Being healthy can make you a better pupil

If you are healthy and rested, your mind and body work better together, making it easier for you to study.



The three keys to keeping yourself healthy are:

- a) **Eating a balanced diet.** Eat foods from all the food groups so your brain and body get the nutrients and energy they need to work and grow. To help your concentration, eat less sugar and junk food and drink plenty of water! Water cleans your body on the inside and helps it work efficiently.
- b) **Exercising.** Exercise keeps your body strong and your blood flowing. This means that more nutrients from the foods you eat can reach your muscles and brain. Also, exercise helps you relax and gives you a positive attitude that makes you happier and more productive in your studies.
- c) **Getting lots of rest.** Rest helps rebuild the energy your body needs and improves your concentration. Children between the ages of 6 and 14 need to sleep between 9 to 12 hours every day. Also, to help you concentrate better when studying, take 10-minute breaks for every half hour of study.



- 1  Look at Elena's diary for Monday. Tell your partner in which areas she does well and in which areas she could improve.

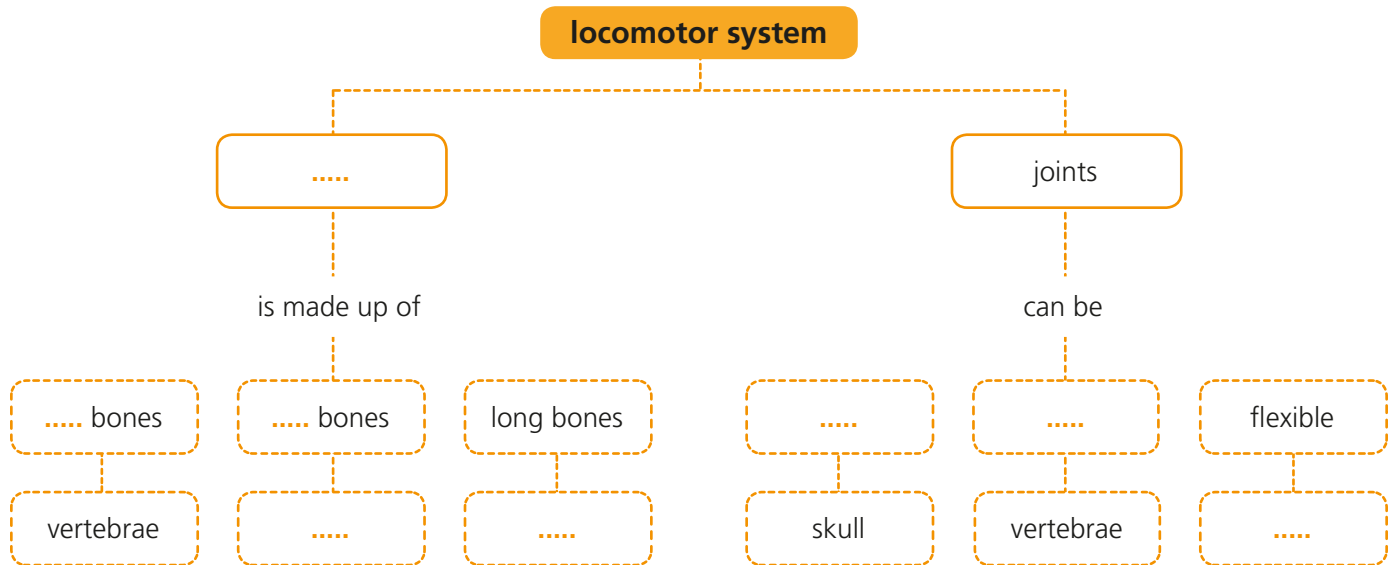
Name	Elena		
Day	Monday		
Nutrition (servings)	cereals and pulses (5), fruit and vegetables (0), meat and fish (2), dairy (4), water (2), milk (2), fizzy drinks (4)	Rest	9:30 – 7:00
Exercise	None		

- 2 In your notebook, copy and complete the table for yourself for each day of the week.
- 3  After a week, compare your table with a partner. How are they the same or different? In which areas could you or your partner improve?
- 4  Discuss in class the changes you want to make. How do you think they will help you improve in your studies?

REVIEW

- 1 Copy and complete the graphic organiser in your notebook and classify the words in the box.

flat • fixed • skeleton • ribs • knee • femur • short • semi-flexible




- 2 Complete the sentences in your notebook.

- a The focuses light on the retina inside the eye.
- b The vibrate when the eardrum vibrates.
- c The are two holes in the nose that let air in.
- d have receptor cells that detect tastes.
- e The is the layer of skin that has blood vessels.
- f are elastic tissues that hold joints together.
- g The system includes all our bones and muscles.
- h muscle makes our heartbeat.

- 3 Are the following sentences true or false? Correct the false ones in your notebook.


- a The pupil is the place in your eye where the optic nerve meets the retina.
- b The cochlea is a part of the inner ear and produces electrical signals.
- c The olfactory bulb is located inside the nose.
- d If you have a cold, it can be difficult to detect all the flavours in food.
- e The dermis is the top layer of your skin.

- 4  How do pupils who are blind or visually impaired read and write? Find out about the Braille system. Who invented it? How do you read Braille? Share your findings with the class.



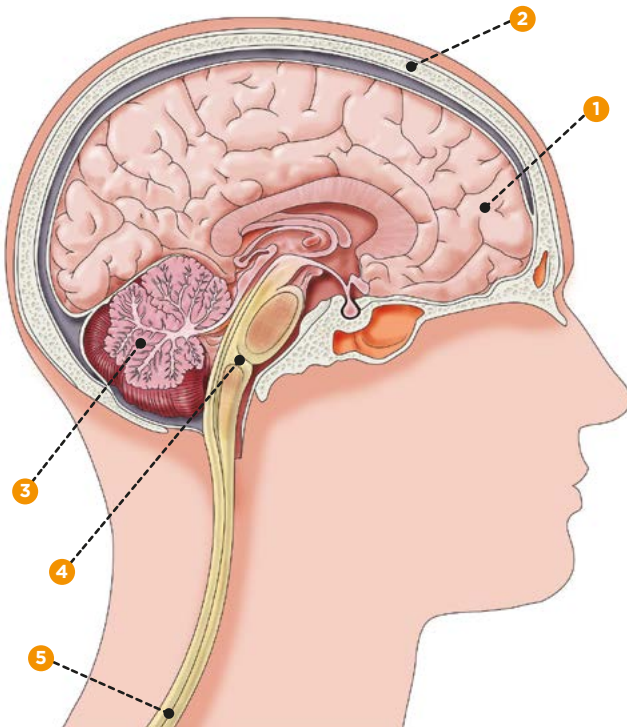
5 In your notebook, write advice for your classmates by answering these questions:

- a How can you look after your five sense organs?
- b What can you do to protect your brain and spinal cord?

6  How do our ears change sound vibrations into electrical signals? Listen and answer in your notebook.

7 Match the words in the box to the parts of the brain. There are some extra words.

axon • brain stem • cerebellum • skull
cerebrum • dendrites • neuron • spinal cord



8 What part of the brain are these sentences describing? Answer in your notebook.

- a It controls our reflex actions.
- b It is where we think and take decisions.
- c It controls sleep, breathing and our heartbeat.
- d It protects the brain from damage.
- e It controls movement, balance and coordination.

9 What cells are nerves made up of? How do these cells receive and transmit information?




10 Copy the chart in your notebook and put the words into the correct column.

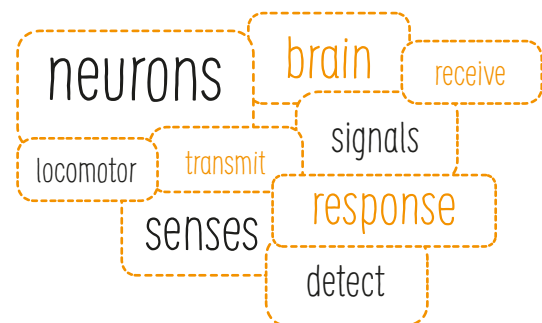
ossicles • lens • retina • cochlea
eardrum • auditory nerve • optic nerve
cornea • iris • auditory canal • fovea

sight	hearing
.....

11 Identify the odd word out. Explain why.

- a cerebrum, spinal cord, cerebellum
- b cornea, pupil, cochlea
- c radius, tibia, fibula
- d biceps, triceps, gluteus
- e vertebra, rib, sternum
- f humerus, scapula, femur

12  Talk about how your body reacts to different stimuli. Use the word cloud below to help you.



What do you know now?
Check your progress!

