

Interaction

Objectives

In this unit you will learn about...

- the parts of the nervous system.
- the senses of touch, hearing, sight, smell and taste.
- the locomotor system: the skeletal and the muscular system.



The nervous system helps us carry out the life process of interaction. There is a network of nerves in our body. They transmit messages in the form of electrical impulses almost instantly.



Interaction is a two-way process. For example, when we are cold or feel strong emotions, small bumps, called goosebumps, appear on the skin. Muscles in the skin contract and the hairs become erect.





Our senses give us vital information about our surroundings. When we listen to music, sound waves cause internal parts of our ears to vibrate, and this information is then sent to our brain.



The eye is a very important sense organ. Our eyes tell us what colour something is, how near or far it is and if it is moving or not. The pupil dilates (opens wider) and contracts to control how much light enters.



Your senses of smell and taste work together to let you enjoy food. Cells in your nose and mouth send messages to your brain about what food tastes like.



Our locomotor system and our nervous system work together to interact with the world. Sometimes the reaction happens so quickly that it's almost impossible to control.

(2) Listen and answer the questions.

1.

3.

- a) What are the three life processes that all living things perform?
- b) What parts of the body do people use to interact with their environment?

Think .• Look at photo 1 and complete the sentence with a classmate.

The nervous system is similar to a communications system because...

Look, read and complete the sentences in your notebook.

- a) Sound waves cause ... to ...
- **b)** The nervous system and the locomotor system work together to allow us to...
- c) The sense of smell and taste give us information about...
- d) Our pupils dilate in order to...
- (Think, pair, share!) Look at photo 6 and read the text. Then tell a classmate.
- a) How do we react to something surprising or frightening?
 We react to something surprising/frightening by ...
- **b)** Discuss how this reaction can help keep us safe from danger. Then tell the class.

Our nervous system



The nervous system is made up of the **brain**, the **spinal cord**, and a large network of **nerves**. Sensory nerves carry messages to the brain and motor nerves carry messages to the **muscles**.

The brain

The brain is the coordinating centre of the nervous system. It controls all of the body's activity.



The **cerebrum** is the largest and most complex part of the brain. It controls our intelligence, memory, personality, emotion, speech and the ability to feel and move.

The **cerebellum** is responsible for balance, movement, and coordination.

The **brainstem** connects the brain to the spinal cord. It also controls some involuntary actions like breathing and our heartbeat.

Nerve cells

Nerve tissue is made up of **nerve cells**. Nerve cells (neurons) have a shape that allows them to transmit electrochemical messages from one to another.

Nerve cells are star-shaped cells that consist of a **cell body**, a long extension called the **axon** and shorter, thin fibres called **dendrites**. To transmit messages, they create electrical signals called **nerve impulses**. These impulses pass messages from one cell to the next. The cell body controls the nerve cell and creates nerve impulses. The axon transmits these nerve impulses away from the cell body, to other nerve cells. Dendrites receive nerve impulses from other nerve cells.

The space between nerve cells is called a **synapse**. In order to travel across this space, the nerve impulse changes into a chemical. After the chemical crosses the synapse, it's transformed back into a nerve impulse. Then it's ready to be passed on to the next nerve cell.



Parts of the nervous system

The brain

When our brain receives information, it sends a message to a part of the body to tell it how to react. If our hand touches a hot object, nerves in our skin tell our brain. Then the brain tells the muscles in our hand to move.



The spinal cord

The spinal cord connects the brain to the rest of the body. This cord is made up of nerve tissue, forming a long, thick tube.

Nerves

Nerves connect the spinal cord to our muscles, organs and skin. **Sensory nerves** receive messages from the environment and send them to the brain. **Motor nerves** transmit messages our brain sends to the muscles or **glands**. This results in movement, or a physical response, such as sweating. Messages travel along the nerves very quickly.

Activities

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Correct the false statements in your notebook.

- a) The spinal cord connects the nerves to the muscles.
- **b)** The brain sends and receives messages to and from the nervous system.
- c) Messages from our nerves travel slowly to and from the brain.
- d) The cerebrum is part of the brain. It controls involuntary movements.
- 3. (3) Listen and say brain, spinal cord, sensory nerves or motor nerves.
- 4. Create The Draw and label a diagram of a nerve cell in your notebook. Write sentences to describe the function of each part.

The ... controls/transmits/receives...

QUIZ Check your learning.

Our senses: touch and hearing



We can **feel** pressure, temperature and textures with our **skin**. We can **hear** sound with our **ears**. It's important to look after our senses.

How we feel

Nerve endings in our skin detect information about the objects that we touch. They produce nerve impulses which the sensory nerves transmit to the brain.



The skin is made up of three layers: the **epidermis**, the **dermis** and a layer of **fatty tissue**. The epidermis is the outermost layer. It provides us with protection and gives our skin its colour. The dermis is the middle layer. It supports the epidermis and contains many nerve endings. The fatty layer helps us keep warm and provides nutrients to the other two layers.

First aid for burns

To treat minor burns, first cool the burned area under cold water for about 10 minutes. Then, cover the burn with burn cream. Finally, cover it with plastic food wrap. If there are blisters, be careful not to break them. To treat serious burns, ask an adult, or phone the emergency services.





Looking after our hearing

The wax in our ears protect our inner ear from bacteria, dirt and water. It's important not to remove this wax because it helps keep our ears healthy.

Very loud noises can cause permanent damage to our eardrums. Turn the volume down when you use headphones. Stay away from very noisy places, or use ear protection to prevent hearing damage.

Activities



Our senses: sight



We can see the colour, movement and the distance of objects with our eyes. We should protect our eyes when necessary.

Parts of the eye

The **iris** is the coloured part of the eye. It surrounds the pupil. It's made of very small muscles that open and close the pupil.

The **pupil** is a small hole that lets light into the eye.

The **cornea** covers and protects the iris and the pupil.

The **lens** is a transparent, oval-shaped structure that focuses light on to the retina. It's located behind the pupil and the iris.

How we see

The **retina** is made up of nervous tissue arranged in thin layers of cells that detect light and colours. They send information to the optic nerve.

> The **optic nerve** is connected to the brain. It transmits information from the retina.

 Light goes into the eye through the pupil. Then it passes through the lens.

2. The lens projects an upside-down image onto the retina. This information is sent to the optic nerve.

3. The optic nerve transmits the information to the brain.

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Looking after our sight

Eyelids are thin folds of skin that cover our eyes. Eyelids have a row of small hairs called **eyelashes**. The eyelids and eyelashes protect our eyes by keeping dirt and dust out of them. Our eyes produce **tears** which keep our eyes moist. Tears contain water, oils and minerals, such as sodium. When our eyes are dry or dirty, we **blink** more quickly to cover the eye in tears and to wipe the eye clean again.

Protect your eyes from sunlight by wearing sunglasses with **UV light** protection on sunny days. Don't spend long periods of time looking at bright screens, especially



Ski goggles protect the eyes from snow, wind and bright sunlight.

in dark places. If you get something in your eye, such as an insect or sand, don't rub your eyes with your hands. Keep your hands clean to avoid spreading dirt or viruses from your hands to your eyes.

Activities



Our senses: smell and taste



We can detect **flavour** with our tongue. We can detect **smell** with our nose. The mouth and the nose are connected.

How we smell

Smells are made up of gases in the air. When air goes into your nose, the gases go into your **nasal passages**. The **olfactory cells** detect the gases and send nerve impulses to the **olfactory nerve**. The olfactory nerve transmits the impulses to the brain and the brain interprets the information.





How we taste

The tiny, pink bumps on your tongue are called **taste buds**. They can detect special chemicals in the things that you eat and drink. The chemicals mix with **saliva** and then the taste buds detect them. The taste buds produce nerve impulses and transmit them to the **gustatory nerves**. These nerves are inside the tongue, connected to the taste buds. These nerves then transmit the impulses to the brain. Finally, the brain interprets the information.

How taste and smell are connected

Have you ever noticed that food doesn't taste good when you have a cold? This is because your senses of smell and taste work together. Your taste buds detect different tastes, such as **sweet**, **salty**, **sour** and **bitter** tastes. While your nose detects thousands of different smells. These messages combine in the brain to give a perception of flavour.



Looking after our nose and tongue

Inside the **nostrils**, there are small hairs that help to **filter** dirt and dust from the air we inhale before it goes into our lungs. Filtered particles are covered in sticky mucus and are expelled when we **sneeze** or blow our nose.

Saliva is mostly water, but also contains other substances to keep our mouth clean and to help us to start digesting the food we eat too. To make sure our mouth is as clean and healthy as possible, we should brush our teeth carefully twice a day.



Smoking can damage the taste buds. Eating food with too much salt and sugar can also make it difficult to taste properly.

Burning your tongue with very hot food or drink can cause pain and swelling. This should only last for a short time and sucking an ice cube may help.

Activities



Experiment time!

DO RESEARCH

We use our senses to perceive the world around us. We use our sight to see what objects look like, their colours and shapes. We use our sense of touch to feel the texture and temperature of objects. Our senses of smell and taste sense the chemicals in food. We can use adjectives to describe what we are seeing, hearing, touching, smelling and tasting.

1. Use a dictionary to help you classify the adjectives below according to which sense you think they are connected to. Complete the table on template 1.1.



2. Add at least one more word to each row. You can use the dictionary again to help you.

ASK A QUESTION



MAKE HYPOTHESES

Look at the materials, but don't touch them yet. Answer the questions with a classmate.

- a) Which item do you think will be the easiest to describe? Why?
- b) Which item will be the most difficult to describe? Why?
- c) Record your hypotheses on template 1.1.

TEST YOUR HYPOTHESES

MATERIALS

- template 1.1
- a lemon
- a lettuce leaf
- a pencil

- a piece of paper
- a slice of ham
- an apple

PROCEDURE

Use your senses. Write a sentence to describe each item on template 1.1. Choose an item.

- **1.** Use your sense of sight. What does the item look like? Look at the table you made on template 1.1. Which words can you use to describe it? Write a sentence on the template.
- **2.** Use your sense of touch. What does it feel like? Which words from your table can you use to describe it? Write a sentence on the template.
- **3.** Use your sense of smell. What does it smell like? Choose some words from your table and write a sentence on the template.
- **4.** Use your sense of taste. What does it taste like? It might help to close your eyes as you taste. Choose some words from the table and write a sentence on the template. Repeat the procedure with the rest of the items. Write sentences for each.





ANALYSE YOUR DATA AND MAKE CONCLUSIONS

Compare your sentences and answer the questions. Discuss your conclusions with a classmate. Then record your conclusions on template 1.1.

- What similarities can you see? What differences were there?
 The ... and the ... both/all... Only the ... was...
- Which object was the most difficult to describe? Why?
 The ... was the most difficult to describe because...
- **3.** Which is your favourite taste? Why? *My favourite taste is ... because...*



...............

Our locomotor system



The **locomotor system** is made up of two systems: the **skeletal system** and the **muscular system**. It works in combination with our senses and our nervous system to help us interact with the world around us.

The skeletal system



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The muscular system

The muscular system allows us to move and perform **voluntary** actions such as waving our hand, and **involuntary actions** such as breathing. It's made up of **muscles** and **tendons**.

Muscle tissue is soft and flexible. There are three types:

- Skeletal muscles are voluntary muscles. We choose to contract them to move around. They are attached to bones and often work in pairs. The biceps are skeletal muscles.
- **Smooth muscles** are involuntary muscles. They can contract without us thinking about it. For example, there are smooth muscles in the small intestine that push food through the intestine.
- **Cardiac muscles** are also involuntary muscles. They are found only in the heart. They contract automatically so that the heart can pump blood around the body.

Tendons attach muscles to bones. When we want to move, muscles **contract** and tendons pull on bones. For example, to lift your forearm up, the biceps pulls the tendon, and the tendon pulls on the bones in the forearm, lifting it up.





Search and discover!



NATIONAL HEALTH

Colour blindness (or colour vision deficiency)

Colour-blind people can't distinguish between specific colours. The most common colours they confuse are different tones of red and green or blue and yellow. If you have trouble seeing the difference between these colours, you might have colour blindness. Most people who are considered colour-blind can see different colours, but will confuse some specific colours with others, depending on the type of colour blindness they have.

Most cases of colour blindness are inherited and are caused because the light-sensitive cells in the retina can't recognise some wavelengths of light. There are two types of cells in the retina: rods and cones. Rods are more sensitive to light but cones can detect different colours. People with colour blindness are either missing cones or they don't work properly.



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HUMAN BIOLOGY MUSEUM

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BODY FUN FACTS

Bones and muscles

Did you know that...

- Your bones stop growing when you are about 20 years old.
- Skeletal muscles are the only *voluntary* muscles; the only muscle that you can *choose* to move.
- The spinal column is made up of 33 bones.
- Muscle cells contract together to make the muscle get shorter.
- There are 42 muscles in the human face.
- Babies are born with almost 300 bones.
- Muscle cells are filled with proteins, which make the muscle contract.





The good news is Leo's femur and tibia bones are undamaged. The bad news is the ligaments that join the quadriceps in the thigh to the tibia are torn. And the knee cap, a bone which covers and protects the joint is bruised. The knee has been bandaged and the patient must rest the injured area for a week. Apply ice to reduce the swelling. Oh and no football until it's completely healed!



RAINBOW VISION: UNLOCK THE RAINBOW TODAY!

Can you see the number on the image in the image? About 1 in 12 men and 1 in 200 women have colour vision deficiency. But your problems may soon be over!

Rainbow Vision Glasses ® have been shown to improve the ability to distinguish between colours in 4 out of 5 people with colour blindness.

Drop by our testing centres today and try our Rainbow Vision Glasses for yourself. Call 555 055 155 to make an appointment now. There are many different tests to test colour blindness and our experts are happy to help!

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Let's revise!

2.

1. Complete the sentences in your notebook.

- a) The nervous system is made up of...
- b) The sensory nerves send ... to the...
- c) The brain sends ... to the ... so we can react.
- d) Nerve cells send information in the form of ... called...
- e) We use our senses to ... the world around us.

Think . Think about your senses. Answer the questions.

- a) Which sense would be the most difficult to live without? Why?
- b) Which sense would be the easiest to live without? Why?



I think the sense of ... would be the most difficult/easiest to live without because...

3. Do! 🖓 What objects can you identify using your sense of touch? Do an experiment with a classmate.

- a) Collect six different objects from around the house or classroom.
- **b)** Blindfold your classmate. Give him or her the objects, one by one. How many objects can your classmate identify?
- c) Then change roles. How many of your classmate's objects can you identify?
- d) Which objects were easy to identify? Why?

The ... was easy to identify because...

4. Create A Make a diagram of the nervous system.

- a) On a large piece of paper, draw around your classmate to create an outline.
- **b)** Draw a brain and spinal cord on pieces of paper. Cut them out and stick them on to your outline.
- c) Use red wool to represent sensory nerves, and blue wool to represent motor nerves. Stick the wool on to your outline.





5. (12) Classify these actions: voluntary or involuntary. Make a table. Then listen and check your answers.

sweating jumping cycling digesting food writing breathing clapping



Collaborate 🔏 Represent the nervous system. 6.

- a) In a large area, such as the playground, make a line with your classmates.
- b) Hold hands with the people next to you.
- c) The first person in the line should gently squeeze the next person's hand.
- d) Pass the movement down the line. When you feel your hand being squeezed, squeeze the hand of the next person in the line.

7. Think . Think about your representation of the nervous system in activity 6. Answer the questions with a classmate.

- a) What does the line represent?
- b) What does the action of squeezing represent?



Match the problems to the advice.

- a) You've burned your tongue.
- b) You've burned your hand.
- c) It's a sunny day.

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- d) Your eyes always feel tired and you have headaches.
- e) You're listening to music on your headphones.
- 1. Make sure the volume is not too high.
- 2. Suck on an ice cube.
- **3.** Get your eyes tested.
- 4. Wear sunglasses and put sun cream on.
- 5. Put it in cold water.

9. Which is the odd one out? Explain why.

a) sight	hearing	smell	nerves
b) ankle	skull	elbow	wrist
c) bone marrow	smooth	cardiac	skeletal



My work in this unit

Write a sentence to describe the part of the unit you found most difficult to understand and explain what you did to help you to understand it.

Study skills!

1.

Copy and complete the concept map to summarise the unit.



2. Collaborate & Write a quiz.

With a classmate, write three quiz questions about the nervous system, the senses and the locomotor system. Ask the class your questions. Give one point for each correct answer. The group with the most points wins.

3. Think, pair, share! Think about your work in this unit.

- a) What part of the unit did you enjoy learning about the most? Write a sentence.
- **b)** Compare your sentence with a classmate. Explain why.
- c) Share your sentence with the class. How many people agree with you?

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GLOSSARY

brainstem: part of the brain that connects the spinal cord to the rest of the brain.

- **bone marrow:** soft fatty substance in the cavities of bones, in which blood cells are produced.
- **bones:** structures made of minerals that are hard on the outside and sponge-like on the inside. They make up the skeleton and are where blood cells are produced.
- **cardiac muscle:** involuntary muscle found in the heart.
- **eardrum:** a thin membrane that vibrates when soundwaves hit it.
- **gland:** an organ that produces a substance for the body to use. There are many different glands in the body.
- **involuntary movements:** movements that are made unconsciously. For example, breathing or the heart beating.

joints: part of the body where two bones meet.



ligaments: tough fibres of flexible tissue that join two bones together. They are found in the joints.

- **locomotor system:** system made up of the skeletal and muscular system that works with the nervous system to produce movement.
- **motor nerves:** nerves that carry messages from the brain to the muscles.

muscles: elastic tissue that can contract and relax producing movement.

nerves: fibres in the body that transmits impulses of sensation to the brain or spinal cord, and impulses from these to the muscles and organs.

nerve cells: cells that transmit nerve impulses.

nerve impulses: electrical or chemical messages that travel from one nerve cell to another.

nervous system: system of tissues and organs that work together to transmit information to and from the brain.



sensory nerves: nerves that carry messages from sense receptors, such as those found in our sense organs, to the brain.

skeletal muscle: muscle attached to bone.

- **smooth muscle:** all involuntary muscles, except those found in the heart.
- **spinal cord:** long tube made up of nerves and tissue, located in the spinal column. It connects the motor and sensory nerves to the brainstem.

synapse: the space between two nerve cells.

tendons: pieces of flexible tissue that attach the end of a skeletal muscle to a bone.

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