THE INTERACTION FUNCTION

Activate What do you do when you hear a loud noise?

The interaction function

Living organisms receive information about their environment and adapt or react to something they detect. This vital function is called **interaction** and it is essential for survival.

The **receptors** in our body detect information from **stimuli**. Stimuli can be internal, such as pain when you have got a stomachache, or external, for example your skin reacts to cold temperatures.

Reception contains special cells and send signals to the **nervous system.** The **brain** then interprets the signals, decides how to react and generates a **response.** Nerve impulses transport the information to the right organs, or **effectors,** so that they know what to do.



1 In your notebook, write what stimulus these living organisms are responding to.



2 What happens if your reaction to stimuli is incorrect? Discuss it with a partner and list three examples.

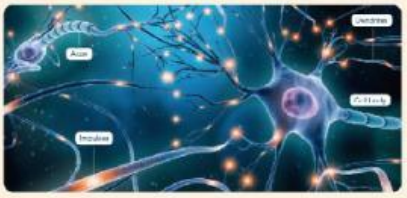
Neurons and nerve impulses

The **nervous system** is formed by cells called **neurons** and the **brain.** Neurons are specialised cells that transmit **nerve impulses,** also called signals.

Neurons contain a **cell body,** with the nucleus, an **axon** which is the long middle part of the neuron, and **dendrites,** which are short projections that connect neurons.

Neurons send signals along the axons and receive them at the dendrites. They transmit it to the next neuron until the information reaches its final destination.

A collection of axons connected to neurons forms a **nerve.**



3 Draw and label a neuron in your notebook.

4 Answer the questions in your notebook.
a) What is a neuron?
b) What is the nervous system formed of?
c) How does the nervous system work?

• What is a voluntary reaction? When might it happen?

Language Bank
Might, may and could
for predictions
You **may** raise your hand when you hear your name in class.

THE SENSE ORGANS AND HEALTH

Activate What do you sense about the world around you with your eyes closed?

The senses

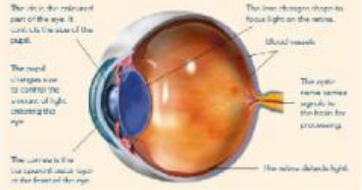
The human body has got **five senses** that collect information from stimuli and send it to the brain to be processed. Our sense organs help us to understand what is happening around us. The five senses are: **sight, touch, smell, taste** and **hearing.**

Sight and the eyes

The **eyes** are the sense organs of **sight.** They detect light around us and perceive objects, colours and perspective. We see things because the eyes reflect light into our eyes. The eyes collect that information and send it to the brain, which processes it and allows us to form images.

The eye has got **auxiliary structures** which protect it and allow it to move. These include the **eyebrows, eyelids, eye muscles** and **lacrimal glands.**

We must protect the eyes from bright sunlight, too much screen time and harmful substances.



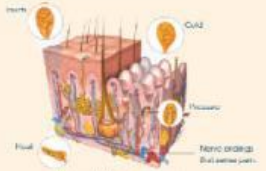
1 Draw your eye in your notebook. Label the parts of the eye in red and the auxiliary structures in blue.

• Check the size of your classmate's pupil. Then, check it again after your classmate has looked at a light for a few seconds. Has the pupil changed?

Touch and the skin

Our sense of **touch** gives us information related to temperature, texture, shape and humidity. The **skin** is our touch sense organ.

There are different types of **touch receptor cells** on the skin. Touch receptor cells send the information they detect to the brain through the nerves. There are some sensitive areas on the body that contain a higher number of touch receptors. Two examples are the fingertips and the lips.



2 Write the five types of stimuli that touch receptor cells detect and an example for each one.

3 Which of the following actions help to protect your skin?
a) Wash your hands with soap
b) Only wear tight clothes
c) Scratching it
d) Never use moisturising cream
e) Use sunscreen to protect it from the Sun
f) Protect it from extreme temperatures

4 Look at the pictures. How was the skin damaged?



Language Bank
Past Simple passive
The skin **was** damaged by...

LIVEWORKSHEETS

Smell and taste

The receptor cells in the **olfactory bulb** detect substances in the air and send that information to the brain via the **olfactory nerve**. This is our sense of **smell**.

The same thing happens on the **tongue**, which contains thousands of **taste buds** that are responsible for our sense of **taste**. The receptor cells in the taste buds send information via the **gustatory nerve** to the brain.

The senses of **smell** and **taste** are connected. We taste food using both senses. There are five different **flavours**: sweet, salty, sour, bitter and umami.



5 **Answer the questions in your notebook.**

a) What is the smell sense organ?
b) What are the taste sense organs?
c) What is the role of the olfactory nerve?
d) What is the role of the gustatory nerve?

6 **Complete and find out how to protect your senses of taste and smell.**

a) Brush your teeth and ... after every meal.
b) Don't eat very hot or very ... foods.
c) Visit the ... regularly to check your teeth.
d) Blow your ... gently.
e) Don't put any objects ... your nose.



• Write a list of as many foods and drinks that you can think of for each of the five flavours. Then, compare the food's flavours.

Language hint
[noun] as ... as
Strawberries are **not as sweet as** peaches.

Hearing

We detect **sound** with **hearing**. Our **ears** are our hearing sense organs.

Thanks to this sense, we detect sound vibrations that travel through air and water. Those vibrations reach the ears and are sent to the brain via the **auditory nerve**. The brain turns the vibrations into something we can understand.

The ears also help us to keep our **balance** because they detect our position and send signals through the **vestibular nerve** so the brain can control movement.

We divide the ear into three different parts that are connected: the **outer ear, the middle ear** and **the inner ear**.

We can protect the ears by avoiding very loud noises, not putting any objects inside the ears and visiting the doctor for regular check-ups.

1 Sound vibrations enter the ear canal and reach the **eardrum**.

2 The eardrum transmits the vibrations to the **cochlea**, where receptor cells are located.



3 Receptor cells in the cochlea send signals through the **auditory nerve** to the brain.

4 The bones called **ossicles** amplify the sound vibrations and send them to the cochlea.

7 **Describe the path a sound takes for us to perceive and understand it. Use the words in the box to help you.**

Ear drum | Outer ear | Brain | Inner ear | Ossicles | Auditory nerve

8 **Think and choose: why have we got two ears?**

a) To hear different sound frequencies.
b) To determine the direction of sound.
c) To protect the inner hearing organs.

A HEALTHY NERVOUS SYSTEM



Refresh What bones protect your brain and your spinal cord?

The nervous system

The **nervous system** reacts to the environment and controls every action in the body. If a snake (spot it here in the red vein) bites you, the peripheral nervous system detects the danger and sends messages to the brain. The brain processes the information and sends messages through the spinal cord to the peripheral nervous system. The nervous system coordinates a response and tells the body how to react.



The nervous system can be divided into central nervous system and peripheral nervous system. The **central nervous system** is formed by the **spinal cord** and the **encephalon**, with the brain, the cerebellum and the brainstem.

- The **brain** coordinates emotions and decides how to respond.
- The **cerebellum** controls voluntary movements.
- The **brainstem** controls involuntary movements.
- The **spinal cord** transmits information from the peripheral nervous system to the brain.

The **peripheral nervous system** is formed of two types of nerves that carry all the information.

- **Sensory nerves** take information from the receptors to the central nervous system.
- **Motor nerves** take information from the central nervous system to the effectors.

1 **Copy and complete the sentences in your notebook.**

a) The spinal cord...
b) The brain...
c) Sensory nerves...
d) The cerebellum...
e) Motor nerves...
f) The brainstem...

2 **Which of the following sentences best describes the functions of the nervous system?**

a) The main organ is the brain, which receives stimuli directly through receptors.
b) The spinal cord transforms external stimuli.
c) The brain coordinates the body's response to stimuli using information it receives from the different senses.

Health and the nervous system

There are **injuries** and **diseases** that can damage the nervous system. **Injuries** include accidents, falls and being hit with a hard object. These can result in fainting, loss of vision and sometimes even brain damage. After an accident in which the spinal nerve was damaged, the transmission of nerve impulses can be interrupted. This can cause paralysis.

Diseases and illnesses, such as infections, epilepsy and diabetes can damage certain areas of the nervous system. Some other causes of damage are degenerative diseases like Alzheimer's disease and multiple sclerosis.



Injuries can damage the nervous system.

3 **Write an example of an injury and a disease that can damage the nervous system.**

4 **Which of the following activities can be dangerous for our nervous system?**



5 **Complete the sentences about the best ways to keep our nervous system healthy and active. Use the terms in the box to help you.**

Drugs and alcohol | New things | Helmet | Relaxed | Language

a) Learn a ... to keep your brain active.
b) Stay ... because stress is harmful.
c) Explore and discover ... to make new connections between neurons.
d) Avoid ... because they contain toxic substances.
e) Wear a ... to prevent injuries to your head.

LIVEWORKSHEETS

A HEALTHY LOCOMOTOR SYSTEM

Activity What parts of your body move when you lift an arm?

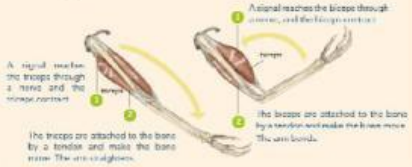


The locomotor system

The **locomotor system** provides support and allows body movement. It is the combination of two body systems, the **muscular system** and the **skeletal system**.

The **muscular system** permits movement. **Muscles** are formed by cells that receive signals from the brain. They contract or relax and this causes movement. Some muscles produce involuntary movements, like the cardiac muscle in the heart.

The **skeletal system** has got three main roles: to support the muscles and hold the body into shape, to move the body and to protect soft organs inside the body. It is formed of bones of different shapes and sizes. They are connected to the muscles by **tendons**, and support them when they move. Bones are connected to other bones by **joints**, like the elbow. In the joints, bones are linked together by strong tissues called **ligaments**.



Skeletal and muscular systems



1 Copy and complete these sentences in your notebook.

Bones with bones | Joint | Bones and muscles

a) The area where two or more bones connect is called a ....
b) Ligaments are tissues that connect ....
c) Tendons are tissues that connect ....

2 Take turns explaining to a classmate how the locomotor system produces arm movement. Then try to explain how the same happens with leg movement.

3 Write names of the bones and muscles that participate in the following movements.

a) Kicking a ball with your right foot.
b) Raising your arm to answer a question in class.
c) Turning your head around to look behind you.
d) Jumping in Physical Education Class.
e) Colouring a drawing.
f) Dancing to a song with your arms.

• Sometimes the locomotor system can be damaged. For example, we can break a bone, sprain a ligament, strain a muscle or dislocate a joint. Find photographs of various injuries, with x-rays or ultrasound scans. Check with a classmate what the injury is.



Language Bank

Question tags
It's a broken arm, isn't it?

A HEALTHY REPRODUCTIVE SYSTEM

Activity What is sexual reproduction?



Reproduction

Reproduction is a vital function that allows us to have children. Human reproduction is sexual, it needs a male and a female reproductive system to join two cells that are specialised in reproduction: **gametes.** Female reproductive cells are called **ova** (singular: **ovum**) or **eggs.** Male cells are called **spermatozoa** (singular: **spermatozoon**). When these two gametes meet, the biological process to generate a new living organism starts.



Spermatozoa swim to fertilise the ovum.



A fertilised ovum begins a process of cell division.

Human beings pass their characteristics to the next generation thanks to the genetic information contained in their reproductive cells.

In the case of human reproduction, spermatozoa fertilise the ovum inside the female body. The fertilised ovum travels to the **uterus,** where it will grow and develop until it is ready to **be born.**



1 Copy the following pictures in your notebook. Label the ovum with the words nucleus and membrane. Then, label the spermatozoon the words head, nucleus and tail.



The male and female reproductive systems

The human **male** and **female reproductive systems** are different. They have got different organs with different functions.





Male reproductive system:

1. Spermatozoa are produced in the **testes** and travel through the **vas deferens.**
2. The accessory glands produce fluids that mix with sperm and form **semen.**
3. Semen is ejaculated through the **urethra,** located in the **penis.**

Female reproductive system:

1. The **ovaries** produce **ova.** Every month one ovum travels through **the Fallopian tubes** to the **uterus.**
2. If the ovum is **fertilised,** it implants in the uterus and grows into a baby. If the ovum is not fertilised, it is expelled from the body during **menstruation.**
3. The baby is born through the **vagina.**

2 Complete the table with the names of the organs in the male and female reproductive systems.

MALE REPRODUCTIVE SYSTEM	FEMALE REPRODUCTIVE SYSTEM
?	?

3 Read the information and ask a classmate.

a) Where are spermatozoa produced.
b) Where are ova produced.
c) What happens to the ovum when it is fertilised.
d) What happens to the ovum when it is not fertilised.



Language Bank

Embedded questions
Do you know where are spermatozoa produced?

LIVEWORKSHEETS

Fetal development

The **process of reproduction** starts with the fertilisation of the egg and ends with the birth of the baby. Human's process of reproduction takes about 40 weeks to be completed.



Menstrual cycle

The **menstrual cycle** is the process through which an ovum is released. The uterus prepares for pregnancy and the uterine lining is shed along with blood and the ovum if it is not fertilised. The menstrual cycle takes about 28 days to be completed.



- **A1** Find out in which week of a pregnancy the following processes usually happen:
  a) The heart starts beating.
  b) The sense of hearing starts functioning.
  c) Hands and feet develop fingers and toes.
  d) All body organs are formed.

A healthy reproductive system

Human beings are born with a reproductive system, but it does not function until **puberty**. Puberty is a process that occurs between the ages of 11 and 17. It involves many **physical and hormonal changes** and the activation of the reproductive system. Hormones instruct the male body to produce spermatozoa and the female body to start releasing ova.



Condoms protect us from STIs and unwanted pregnancy.

Having the right information about our reproductive system will allow us to keep it **healthy** and **avoid unwanted pregnancy**. **Sexually transmitted Diseases (STDs)** are illnesses and diseases that are transmitted sexually. Some of them, such as HIV and syphilis, can be very serious. It is very important to use protection during sexual intercourse.

Another important aspect to remember is that **nobody can touch your body without your permission**. Having a sexual relationship with another person is absolutely voluntary. Nobody can force another person to do anything if they do not want to. Everybody has the right to choose who they want to be with.



No one can touch your body without your permission.

4 **C2** Answer the questions in your notebook.
a) What is puberty?
b) What does having the right information about our reproductive system help us to avoid?
c) What are STDs?

- **A1** **C2** Look at some of the changes that occur during puberty. Decide whether they happen to boys, girls or both.
  a) The voice deepens.
  b) Breasts develop.
  c) More body hair grows.
  d) Ejaculation starts.
  e) Facial hair grows.
  f) The hips widen.
  g) Menstruation starts.

LIVEWORKSHEETS