

Natural Science

Natural Science 5 is a collective work, conceived, designed and created by the Primary Education department at Santillana, under the supervision of **Antonio Brandi Fernández**.

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**Alademosca il·lustració
Digitalartis**

Do not write in this book.

Do all the activities in your notebook.

CONTENTS

| Unit | Natural Science syllabus | Topics |
|---|----------------------------------|--|
| 1 The human body 6 | People and health | <ul style="list-style-type: none"> ■ Cells in the human body ■ Tissues and organs |
| 2 Sensitivity 16 | People and health | <ul style="list-style-type: none"> ■ Sensitivity ■ The sense organs |
| 3 Health and health risks 26 | People and health | <ul style="list-style-type: none"> ■ Injuries to the nervous system ■ The effects of alcohol |
| TERM REVISION | | |
| 4 Plant growth and nutrition 36 | Living things | <ul style="list-style-type: none"> ■ What plants need ■ How plants obtain nutrients |
| 5 Ecosystems 44 | Living things | <ul style="list-style-type: none"> ■ The physical environment ■ Living things in ecosystems |
| 6 People and the environment 54 | Living things | <ul style="list-style-type: none"> ■ Terrestrial ecosystems ■ Aquatic ecosystems |
| TERM REVISION | | |
| 7 Matter 66 | Matter and energy | <ul style="list-style-type: none"> ■ Properties of matter ■ Mass and volume |
| 8 Energy 76 | Matter and energy | <ul style="list-style-type: none"> ■ Forms of energy ■ Properties of energy |
| 9 Forces and machines 86 | Technology, objects and machines | <ul style="list-style-type: none"> ■ Changes produced by force ■ Movement and friction |
| TERM REVISION | | |
| Cooperative project: Energy sources | | |

| Topics | | Know how to |
|--|--|--|
| <ul style="list-style-type: none"> ■ Systems and organisms ■ The skeletal system | <ul style="list-style-type: none"> ■ The muscular system ■ Movement | Perform basic first aid procedures |
| <ul style="list-style-type: none"> ■ Nerves ■ The central nervous system | <ul style="list-style-type: none"> ■ The peripheral nervous system | Use sign language to communicate |
| <ul style="list-style-type: none"> ■ Injuries to the locomotor system ■ Physical exercise | <ul style="list-style-type: none"> ■ A healthy diet ■ Rest and leisure activities | Make good decisions |
| | | |
| <ul style="list-style-type: none"> ■ How plants obtain carbon dioxide ■ Photosynthesis | <ul style="list-style-type: none"> ■ Xylem and phloem vessels ■ Plant respiration | Design an experiment on photosynthesis |
| <ul style="list-style-type: none"> ■ Nutrition in ecosystems ■ Food chains and food webs | <ul style="list-style-type: none"> ■ Mutualism and commensalism ■ Parasitism and competition | Build a food web |
| <ul style="list-style-type: none"> ■ The environment ■ Dangers to the environment | <ul style="list-style-type: none"> ■ Endangered species ■ Protecting the environment | Compare urban and rural ecosystems |
| | | |
| <ul style="list-style-type: none"> ■ Density ■ Floatability | <ul style="list-style-type: none"> ■ Solids, liquids and gases | Build a submarine and explain how it works |
| <ul style="list-style-type: none"> ■ Energy transformations ■ Renewable and non-renewable energy sources | <ul style="list-style-type: none"> ■ Power plants ■ Consequences of energy use | Draw an energy transformation diagram |
| <ul style="list-style-type: none"> ■ Speed and gravity ■ Inside a machine | <ul style="list-style-type: none"> ■ Operating parts ■ Technological advances | Build a model bridge |
| | | |

My project

Welcome to your Natural Science book!

This year you will do a Science project with your classmates. Here is what you need to know...

What is a project?

A project is a series of activities about one specific topic. These activities include finding information, organizing it, and making a presentation.



How do you do a project?

Follow these steps:

- **Find information about the topic.** Look in books and on the Internet, and ask different people for help.
- **Write about the topic.** This year, you and your classmates will present your project as a computer presentation. Include photographs and animations to make your presentation more interesting.
- **Present your project.** Give your presentation to the class.

Who do you work with?

A project is **cooperative group work**. This means you work with several classmates and each one is responsible for a different part of the project.

Your teacher will help you organize your group and the different tasks.

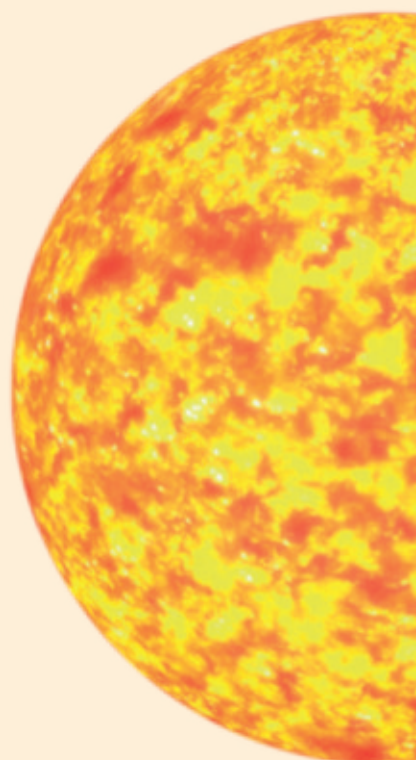


Energy sources: petroleum and the Sun

My project this year is about **energy sources**. You will find out about two very important energy sources on our planet: petroleum and the Sun.

→ HOW DO PEOPLE USE PETROLEUM AND SOLAR ENERGY?

What products come from petroleum? What do we do with solar energy?



→ WHERE DO PETROLEUM AND SOLAR ENERGY COME FROM?

How do we extract petroleum? How do we obtain solar energy?



→ HOW DOES USING PETROLEUM AND SOLAR ENERGY AFFECT US?

Are these energy sources renewable or non-renewable? How do they affect the environment?



1

The human body



First aid

The human body is like an amazing machine with many pieces that work together.

All the parts that make up our body work in a coordinated way thanks to the brain. Our brain acts like a powerful computer. It can process information from inside and outside our body and initiate appropriate responses.

When we eat and breathe, our body obtains the nutrients and energy it needs to grow and perform vital functions.

Our muscles and bones allow us to move in many ways. For example, we can walk, jump, run, dance, play an instrument, do arts and crafts or use tools.

However, sometimes our body can suffer a small accident like a cut, a burn, a bone fracture or heat exhaustion. In these cases, we should follow some guidelines known as first aid procedures so the problem does not become worse and the recovery is faster.



Read and understand

- Why is the human body sometimes called an amazing machine?
- Which organ works like a computer? How?
- What are first aid procedures?
- Write two possible situations in which first aid procedures may be needed.
- Look at the comic strip. Describe what is happening in the classroom. What is the teacher doing?
- **SPEAKING.** Discuss with your partner any emergency situation you have experienced. Describe the first aid procedures that were followed.

KNOW HOW TO



Talk about cells in the human body.

Identify the levels of organization in the human body.

Describe the locomotor system and how it works.

FINAL TASK

Perform basic first aid procedures.



WHAT DO YOU REMEMBER?



The human body

- Our body carries out three basic life processes: nutrition, sensitivity and reproduction.
- Everybody has the same body parts, but we are not exactly alike. There are differences based on age and sex.

1 What body parts carry out each of the three life processes?

2 What life processes do these photographs represent?



Cells in the human body



Human beings are living things. All living things share two characteristics:

- They are made up of cells. Living things can be **unicellular**, when they are made up of a single cell, or **multicellular**, when they are made up of many cells.
- They carry out three basic life processes: **nutrition**, **sensitivity** and **reproduction**.

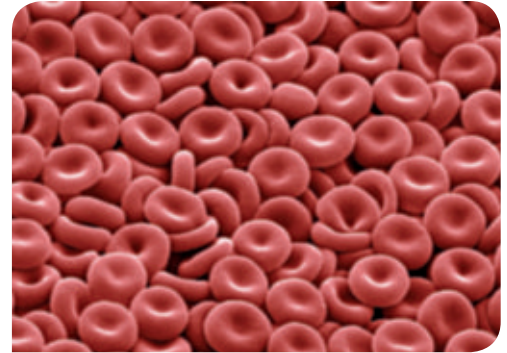
Cells

Cells are the basic units of life. Human beings are made up of millions of cells. That is why they are considered multicellular living things.

Most cells are very small and cannot be seen with the naked eye. They can only be seen through a **microscope**. ①

Cells are living units and they carry out the three basic life processes:

- **Nutrition.** Cells obtain nutrients and energy from food.
- **Sensitivity.** Cells react to what they perceive around them.
- **Reproduction.** Cells can divide and produce new cells that are identical to themselves.



① Red blood cells seen through a microscope.

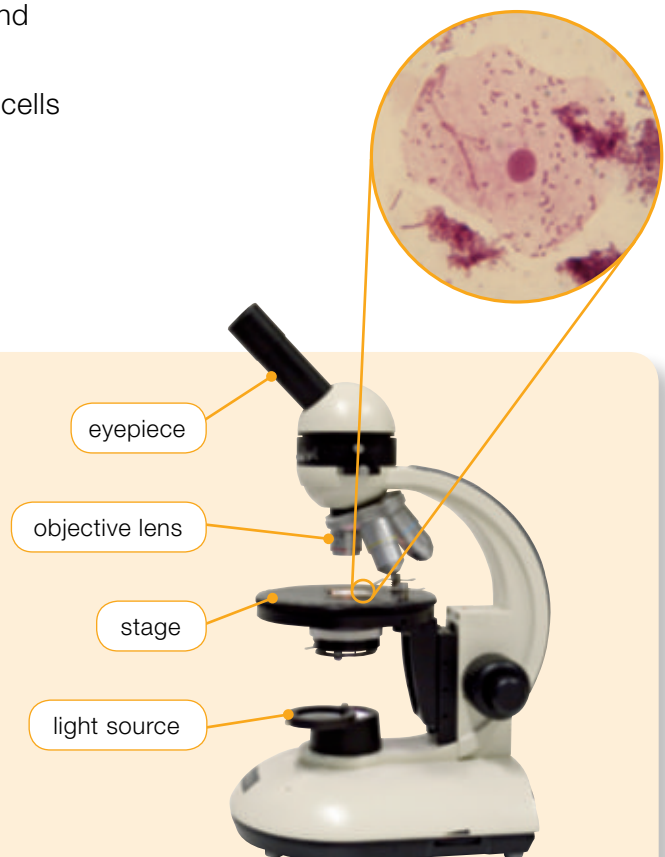
LEARN MORE

The microscope

The microscope is an instrument that makes very small living things or objects appear much larger than they really are.

A microscope has a lens in the eyepiece and a set of objective lenses. Each one provides different magnification. Some modern microscopes can enlarge objects 1,000 to 1,500 times.

To observe a sample through a microscope, you put a glass slide with the sample on the stage. The sample has to be thinly sliced so the light from the light source can travel through it.





Types of cells

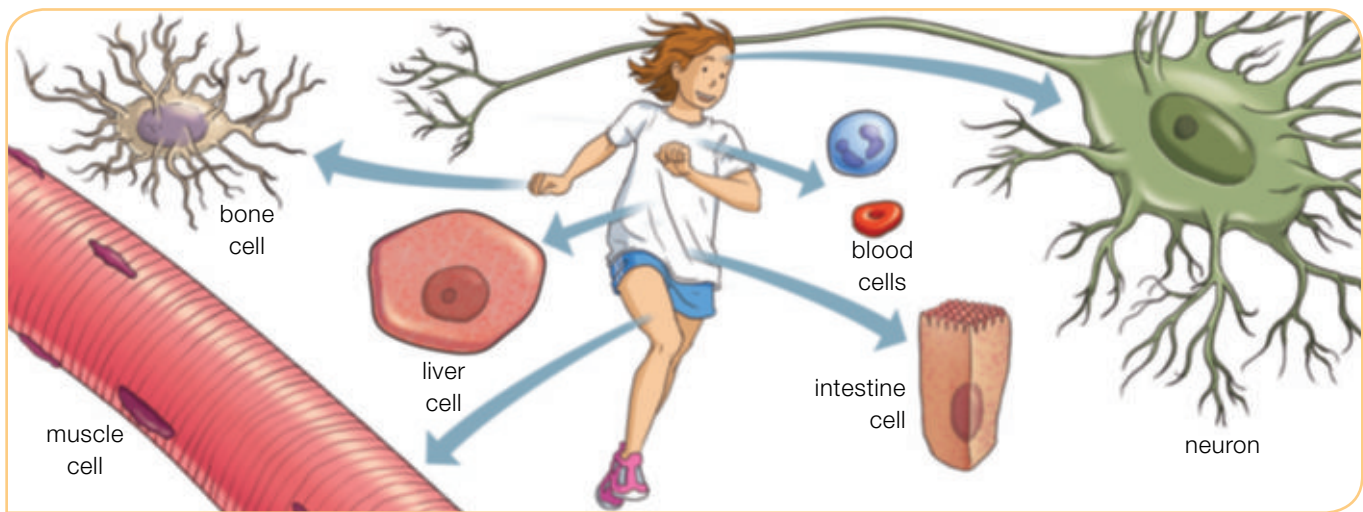
All cells are very small, but they can differ in size. For example, brain cells, known as neurons, are much bigger than blood cells.

Cells can also differ in shape. For example:

- Blood cells are round.
- Muscle cells are elongated.
- Intestine cells are block-shaped.
- Neurons are star-shaped. **2**

WORK WITH THE PICTURE

- Describe the different types of human cells to your partner.
- ▶ *Neurons are large and irregular-shaped. They have one very long branch coming out of them...*

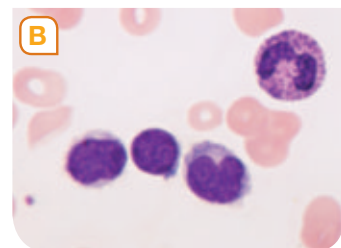


- 2** Some types of human cells. Each type of cell has its own size and shape.

ACTIVITIES

- 1** What are the characteristics of living things?
- 2** What are cells? Are cells alive? Explain.
- 3** Identify the three basic life processes of cells.

| | |
|----------------|------------------|
| a. sensitivity | d. reproduction |
| b. production | e. magnification |
| c. nutrition | |
- 4** Why do we need a microscope to see cells?
- 5** Look at the photographs. Compare them to the diagram above and identify the two types of cells.
- 6** **ICT.** Search the Internet to find out how big a brain cell can be.



Levels of organization



Human beings are multicellular living things with many different types of cells. Our cells work together at different levels, called **levels of organization**. ①

Tissues

In multicellular living things, groups of the same type of **cells** join together to form **tissues**. ②

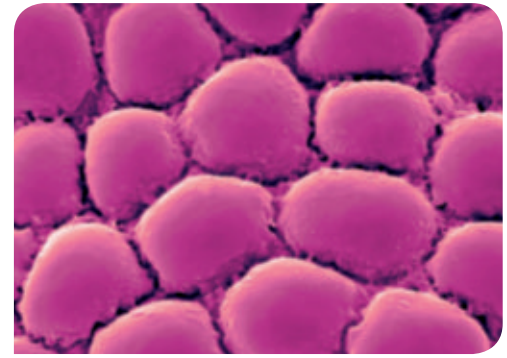
Our body has several types of tissues. For example, muscle tissue is made up of muscle cells, and bone tissue is made up of bone cells. All the cells which form a tissue perform a common function. For example, cells in muscle tissue produce movement.

Organs

Tissues join together to form **organs**. All the tissues in an organ work together to perform a common function.

The stomach, the heart and the kidneys are human organs. Each organ carries out a specific function.

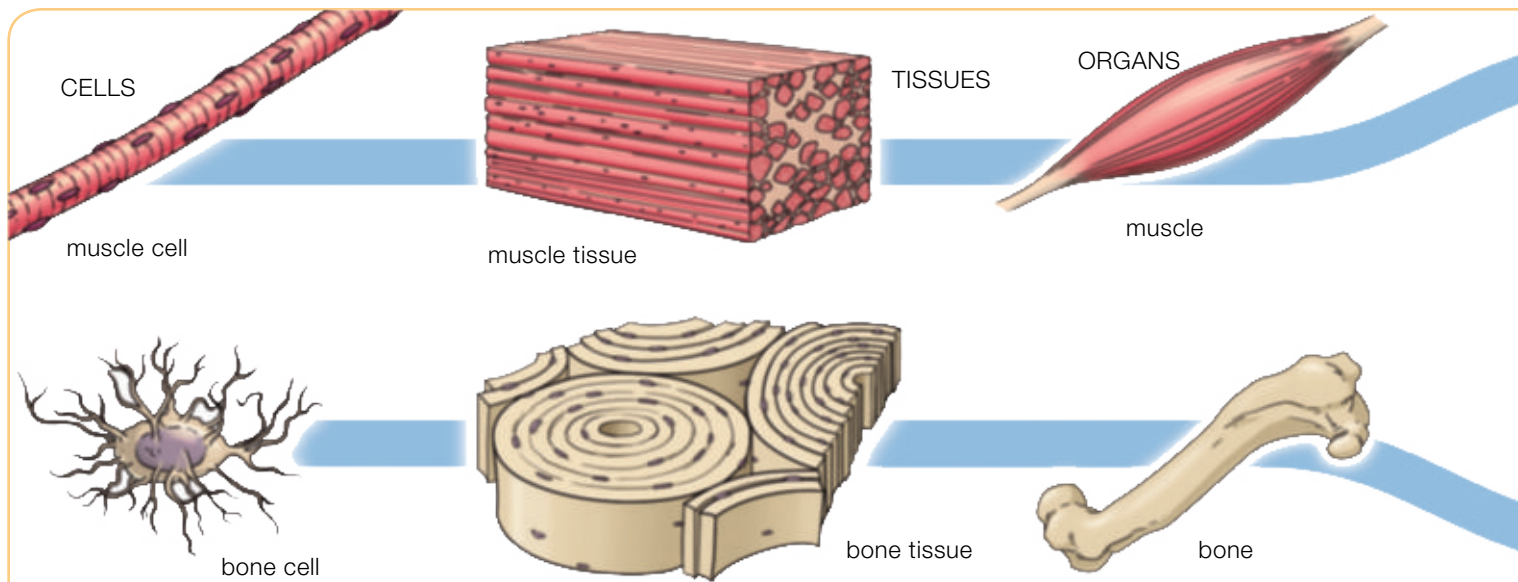
For example, our tongue is an organ which consists of several tissues: muscle tissue, which allows the tongue to move; epithelial tissue, which covers the tongue; and nervous tissue, which is made up of nerve cells. These tissues work together so that the tongue functions properly.



② Fat tissue is made up of fat cells, which store energy.

WORK WITH THE PICTURE

- How are the cells in the muscle tissue organized?
▶ *The cells in the muscle tissue are elongated and they join together...*
- What organs can you see in the picture?



① Levels of organization of the human body.



Systems

Organs join together to form **systems**. Organs within systems work together to perform a common function.

For example, the muscular system is made up of all the muscles in the body, and the skeletal system is made up of all the bones. The muscular system and the skeletal system form the locomotor system.

Organisms

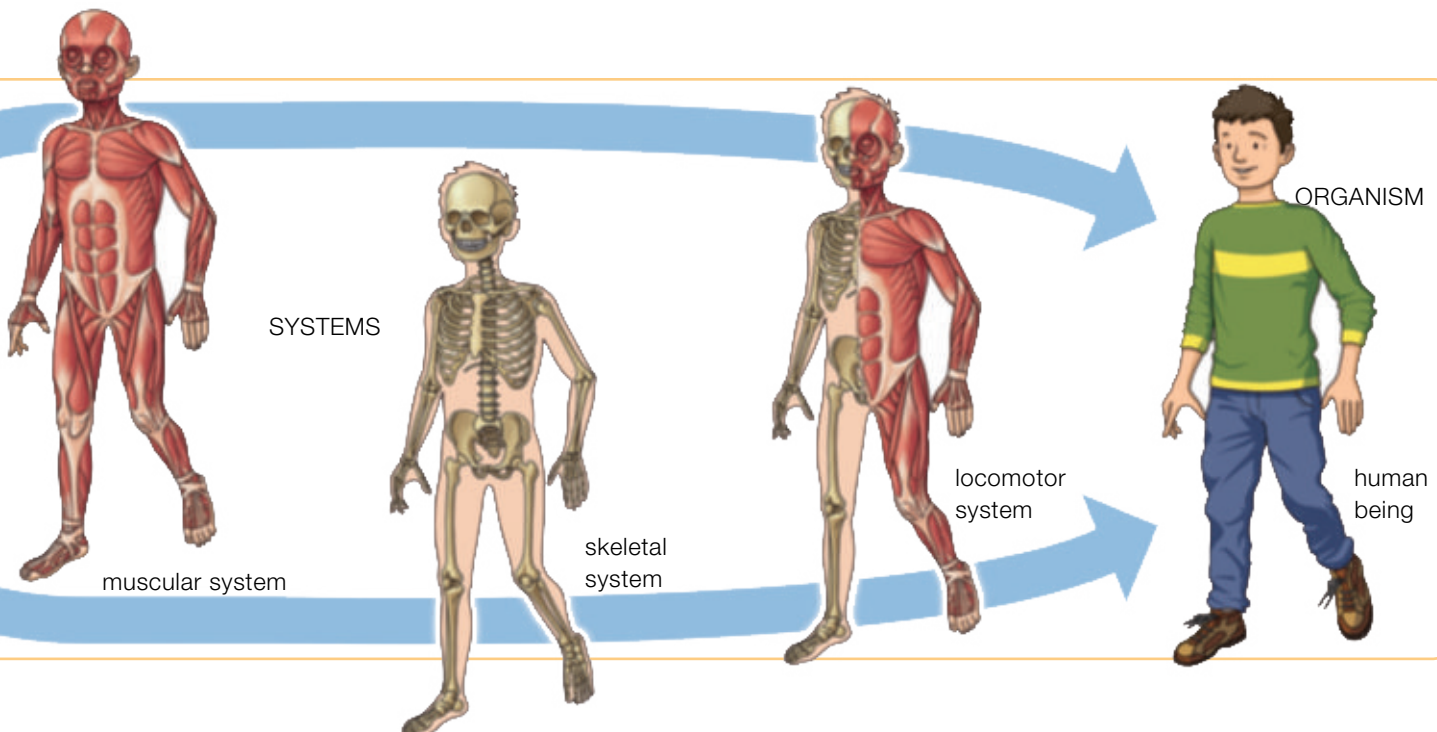
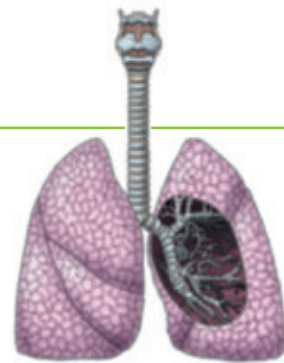
Finally, all the different types of systems in our body work together to form a human being.

In the human body, cells, tissues, organs and systems all work together so the organism functions correctly.

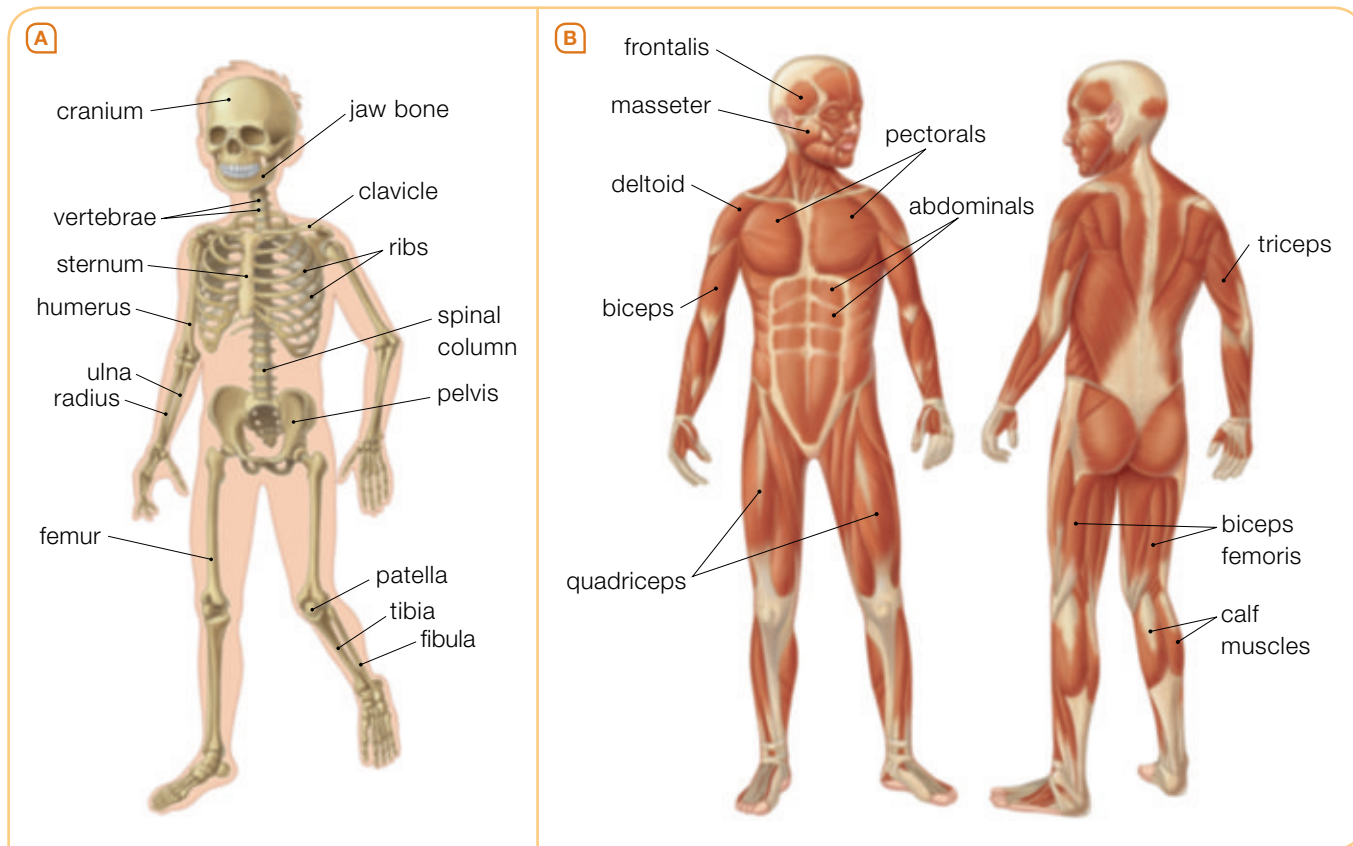
ACTIVITIES



- 1 Compare the different levels of organization of the muscular and skeletal systems in the diagram.
- 2 Look at the picture. What level of organization does it show? What system does it belong to?



The locomotor system



1 The locomotor system. A. The skeletal system. B. The muscular system.



The **locomotor system** consists of the **skeletal system** and the **muscular system**. Both systems work together to produce movement. 1

The skeletal system

The skeletal system gives our body its shape and protects delicate organs, like the brain, lungs and heart. There are over 200 bones in our body. All bones are hard and rigid and can have different shapes: flat, long and short.

The ends of bones are covered by a soft, elastic tissue called **cartilage**. Bones meet at **joints**, where they are held together by **ligaments**, made of flexible tissue.

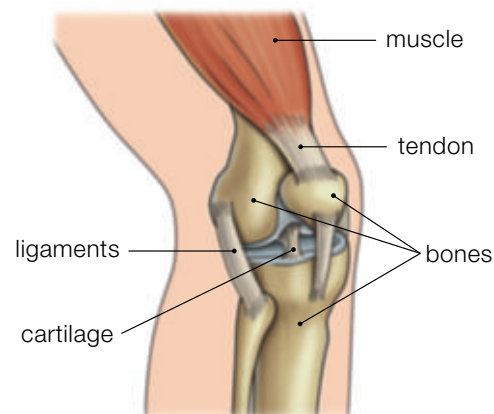
The muscular system

The muscular system consists of all the muscles in the body. Muscles are organs which can change in length and shape. When a muscle is relaxed, it is long and thin. When a muscle is contracted, it is shorter and thicker.

There are about 640 muscles in our body. Muscles are joined to bones by **tendons**. 2

WORK WITH THE PICTURE

- What bones do you think protect the lungs and the heart? And the brain?
- *The bones that protect the lungs and the heart are...*
- Which muscles move your arms and legs?



2 The knee is a joint.



How the locomotor system works

The skeletal system and the muscular system make up the **locomotor system**. The muscles in this system receive orders from the brain, and work with the bones to make the body move.

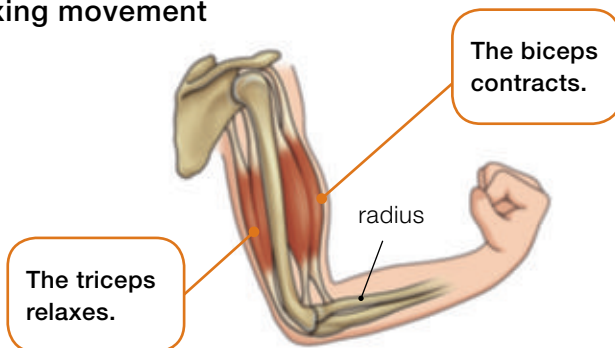
When a muscle receives an order, it **contracts** and pulls the bones attached to it. **3** Once the order is performed, the muscle **relaxes** and the bones return to their original position.

Most muscles work in pairs. One muscle contracts while the other one relaxes. These muscles are called **antagonists**, for example, the biceps and triceps in the arm. When the arm bends or straightens at the elbow, there is an antagonistic pair of muscles at work.

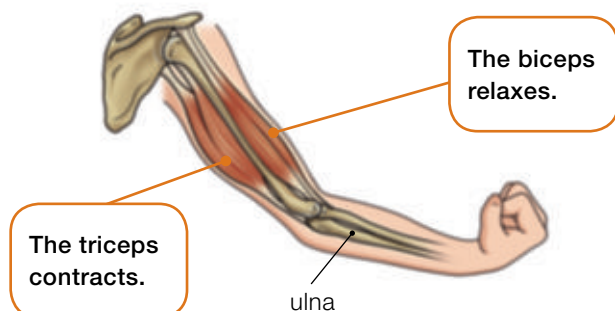
There are two movements.

- **Flexing movement.** The biceps contracts and the triceps relaxes. The biceps pulls the radius, so the arm bends at the elbow.
- **Extending movement.** The biceps relaxes and the triceps contracts. The triceps pulls the ulna, so the arm straightens.

Flexing movement



Extending movement



- 3** The muscles in the girl's leg contract and pull the bones attached to them, making her leg go up.

ACTIVITIES

- 1** Where are these bones found?



femur - sternum -
cranium - fibula - humerus -
jaw bone - pelvis

- 2** How are ligaments and tendons similar? How are they different?

- 3** Name two muscles in each part of the body.

■ trunk ■ arms ■ legs

- 4** With a partner, make a list of simple movements you make every day. Which muscles and bones do you think work to produce them?



Perform basic first aid procedures

We use first aid procedures to give immediate help to a sick or injured person. Later, the person can receive professional medical treatment if necessary.

➔ Read about some basic first aid procedures.

Cuts

Using sterile gauze, press on the wound to stop the bleeding. When it stops bleeding, clean the wound with water and soap. Then, apply a disinfectant. When possible, wear sterile gloves. Next, go to hospital, as stitches or the tetanus vaccine may be needed.



Burns

Cool the burn under cold running water for a few minutes. Do not apply mud, oil, ointment, toothpaste, alcohol or any other substances to the burn. If the burn looks serious, cover it with wet gauze until you can get medical attention.

Nosebleeds

Bend your head slightly forward to avoid swallowing blood. Pinch your nose firmly for a few minutes, until the bleeding stops. Do not block your nostrils with cotton. If bleeding persists, repeat the procedure.



TRY TO STAY CALM.

➔ Understand the information.

- 1 Look up the meaning of *sterile*, *gauze*, *disinfectant*, *stitches* and *tetanus vaccine*.

➔ Show that you can do it.

- 2 Find out what to do in these situations and prepare a first aid poster:
 - a wasp sting ■ choking ■ heat exhaustion
- 3 **GROUP WORK.** Create a first aid guide in case of accidents at your school. Make some drawings to illustrate your guide.



- 1 SUMMARY.** Copy and complete the text in your notebook, using these words.



tissues - skeletal - pairs - cells -
ligaments - tendons - multicellular -
antagonists - microscope - organs -
organism - cartilage - joints - relaxes

All living things are made up of _____.
Human beings are _____ living things
because they have many cells. Cells are
only visible through a _____.

Cells of the same type join together to form
_____. Different tissues are organized
to form organs. _____ join together to form
systems, which in turn form a human being,
an _____.

The locomotor system consists of the
_____ and the muscular systems. The ends
of bones are covered by _____. Bones meet
at _____ and are held together by _____.
Muscles are attached to bones by _____.
Most muscles work in _____: one muscle
contracts while the other one _____. These
muscles are called _____.

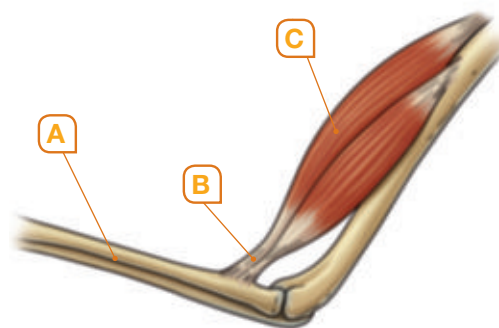
- 2** Look at the summary in your notebook.
Underline the sentences that answer
these questions.

- How can we see human cells?
- What is the level of organization after organs?
- What holds bones together?
- What do tendons do?
- What are antagonist muscles?

- 3** Use these words to write two sentences about the skeletal system.

- a. organs bones protect
b. bones joints ligaments

- 4** Copy and label the diagram and answer the questions. Then, circle the joints.



- a. What kind of movement is this?
b. Which muscles are involved?
c. How do they work?

- 5 CRITICAL THINKING.** Observe the pictures and answer the questions:



- What do you see in these pictures?
- Which level of organization does each belong to?
- Do they belong to the same system? Explain.

Show your skills



Choose one of the following activities.

- A. Prepare a computer presentation about levels of organization in the human body.
- B. Prepare your own microscope slide of a sample of your hair. Make an index card to describe what you see under the microscope.
- C. Search the Internet for an animation about how a joint works and present it to the class.