



6 Natural Science

Natural Science 6 Learning Lab is a collective work, conceived, designed and created by the Primary Education department at Santillana, under the supervision of **Teresa Grence**.

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Contents

Be a scientist! 6

1 Nutrition 8

2 The circulatory and excretory systems 24

Learning Lab game 38



3 Human reproduction 40

4 How the human body works 54

Learning Lab game 70

5 Matter and energy 72

6 Electricity and magnetism 88

Learning Lab game 102



Read about it! 106

Key vocabulary 112

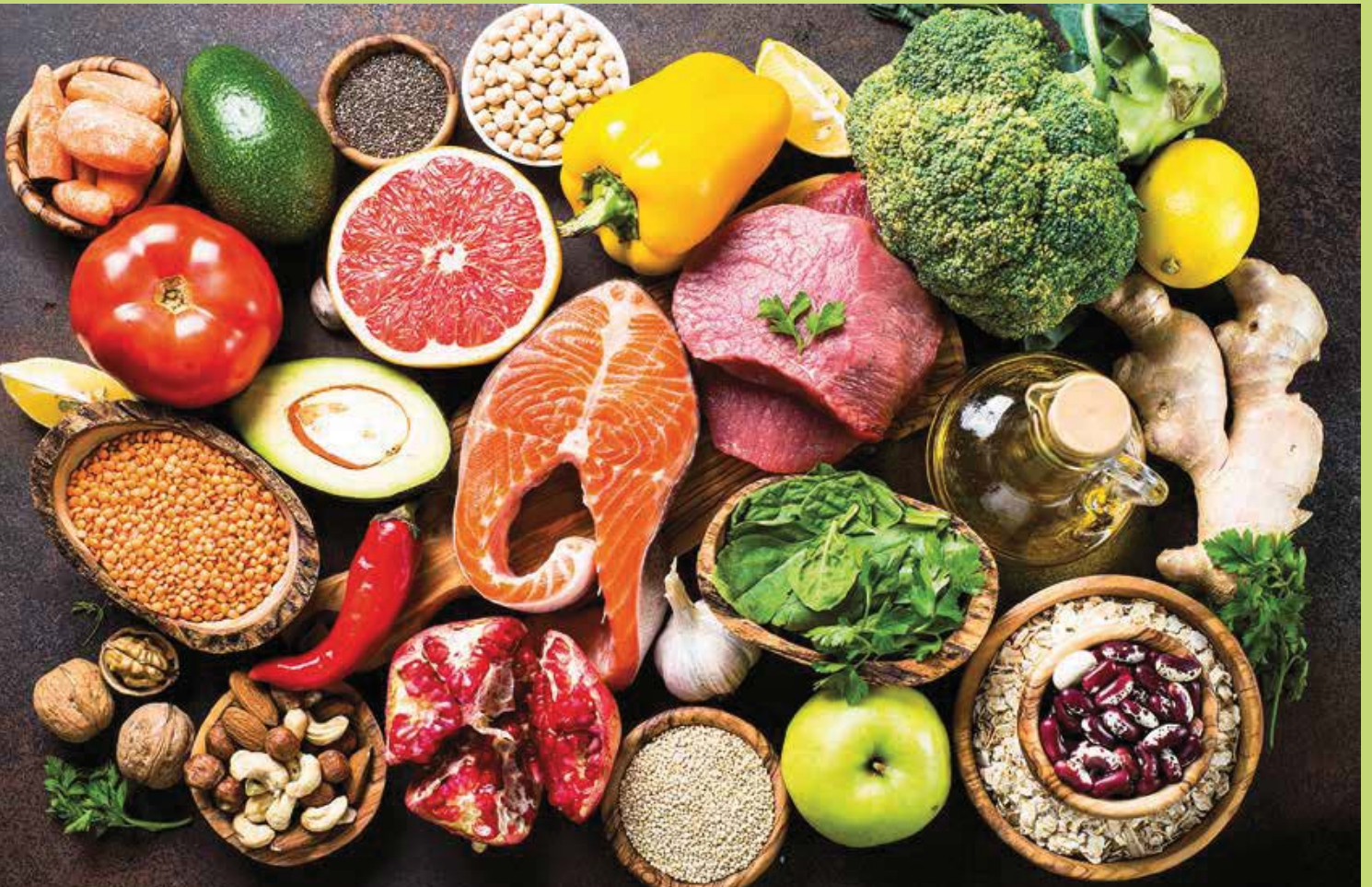
UNIT	CONTENTS
1 Nutrition	<ul style="list-style-type: none"> • What are the food groups? • What are healthy food choices? • How do our body systems work? • How can we look after our body systems? • How does the digestive system work? • The respiratory system • How does gas exchange work? • The circulatory system • The excretory system
2 The circulatory and excretory systems	<ul style="list-style-type: none"> • The circulatory system • The excretory system • The locomotor system • The health of our body systems
REVIEW	Learning Lab game
3 Human reproduction	<ul style="list-style-type: none"> • What are the main characteristics of human reproduction? • Male and female organs • Sex cells and fertilisation • Development of the embryo • Pregnancy and birth • Health issues
4 How the human body works	<ul style="list-style-type: none"> • Cells and living things • Viruses, bacteria and organisms • How can we stay healthy? • Advances in health • Vaccinations and penicillin • Techniques of first aid
REVIEW	Learning Lab game
5 Matter and energy	<ul style="list-style-type: none"> • What are mixtures? • Separation of mixtures: distillation, filtration and evaporation • Physical changes of state • Chemical reactions: combustion, oxidation and fermentation • Forms of energy
6 Electricity and magnetism	<ul style="list-style-type: none"> • Electrical changes • Electric circuits • What is magnetism? • The Earth's magnetism • Electromagnetism • The effect of magnetism on objects
REVIEW	Learning Lab game
READ ABOUT IT!	

MINI LAB	FINAL TASK
<p>How balanced is your diet?</p> <p>How do gastric juices dissolve food in the stomach?</p> <p>How much air can your lungs hold?</p>	<p>Values education Healthy habits</p> <p>Task Make a brochure about a healthy lifestyle</p>
<p>Build a model</p>	<p>Values education Health in sport</p> <p>Task Blood transfusions</p>
<p>Health tips</p> <p>Reproduction in human relationships</p>	<p>Values education Reproduction and health</p> <p>Task Investigate twins</p>
<p>Observation of bacteria</p> <p>Does washing our hands remove bacteria?</p> <p>Fight against infections</p>	<p>Values education Healthy lifestyles</p> <p>Task Emergency situations</p>
<p>Interpret changes of state</p> <p>Make bread</p>	<p>Values education Energy conservation</p> <p>Task Separate a mixture</p>
<p>Make a simple circuit</p> <p>How do we use a compass?</p>	<p>Values education Saving electricity</p> <p>Task Build an electromagnet</p>

1


Nutrition

What do you know about nutrients?



We need nutrients to stay alive. We obtain them by eating food. The main groups of nutrients are carbohydrates, fats, proteins, vitamins and minerals.

1 Observe Name as many of these foods as possible.

 Then, say the main nutrients in each one. Tell your partner.

Broccoli contains vitamins and minerals.

You already know!

- Carbohydrates and fats provide us with energy.
- Proteins are essential to build and repair our body.
- Vitamins and minerals help us to keep healthy.

What are the food groups?

We can classify foods into several different food groups according to the nutrients they contain.



- 2 Look at the photos and listen. Then, describe the food groups.

Bread, pasta and rice belong to the grains and cereals group.

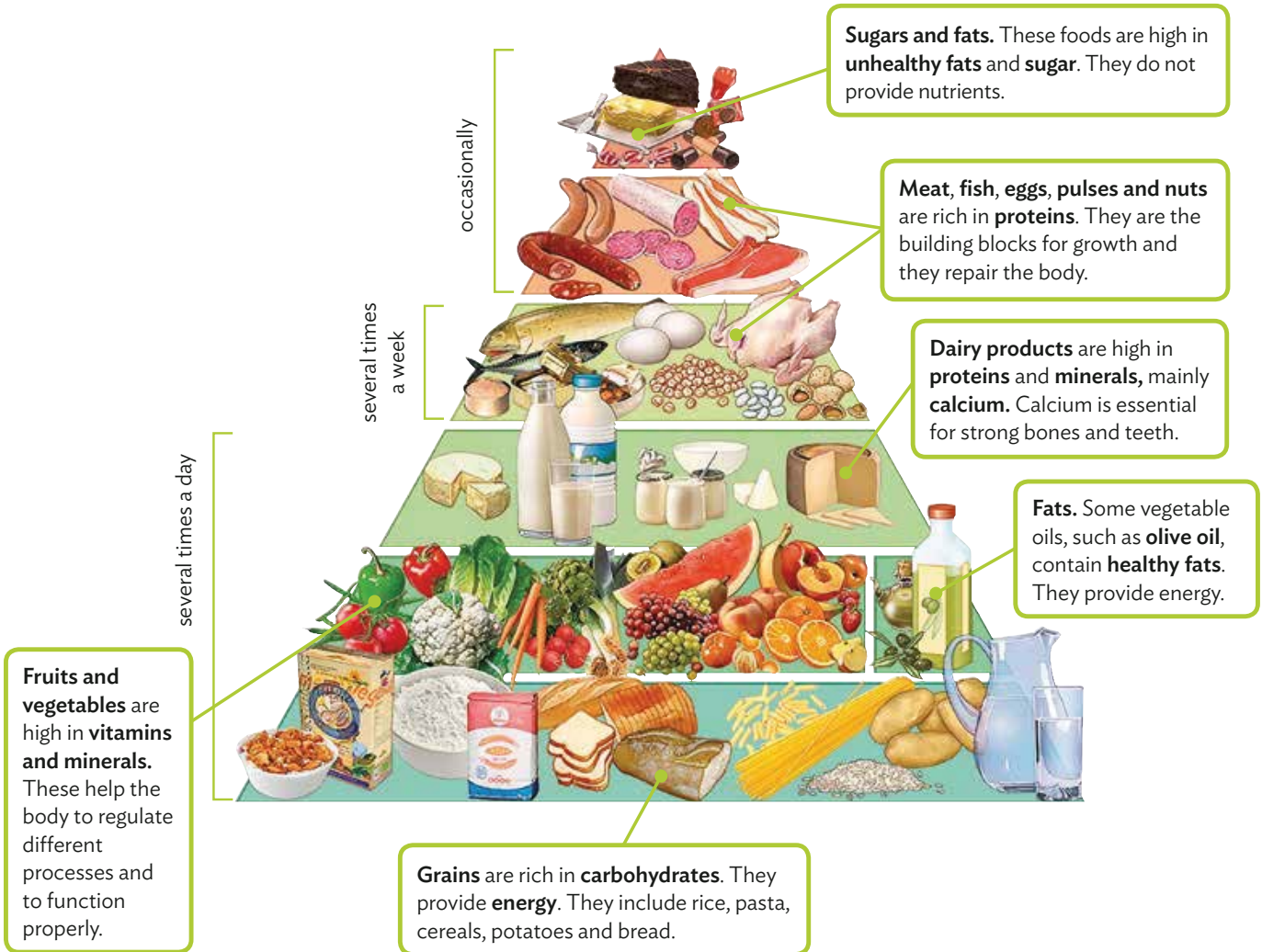
They provide energy.

Final task

Design a healthy lifestyle.

What are healthy food choices?

The **food pyramid** helps us to decide **which foods** to eat. It also tells us **how much of each food** we should eat to have a healthy and balanced diet.



- 1 Observe** Look at the food pyramid. How often do you need to eat foods from each level? Explain

*We need to eat **grains** several times a day to **get enough energy**.*

- 2 Think about it** Why is water included at the bottom of the pyramid?



Science facts

How much of our body is water?

About 60% of the human body consists of water.

Two thirds of this water is found inside our cells and between the cells. The rest is found in our blood plasma.

A healthy and balanced diet includes foods rich in **fibre**. Fibre is found in whole grains, and in many vegetables and fruits. Fibre helps the process of digestion.

Lifestyle

Water is the best drink

You should drink at least six glasses of water every day. You need even more water when you do exercise.



Mini Lab

How balanced is your diet?

Classify the foods you eat

- 1 Make a list of all the foods you eat in a typical day.
- 2 Then, copy the table in your notebook.

	grains	fruit	vegetables	dairy	meat, etc.	fats	sweets	water
breakfast	✓	✓						✓
snack								✓
lunch								
snack								
dinner								

- 3 Put a tick in the corresponding column for each food on your list.
 - Include drinks. For example, if you have orange juice and toast for breakfast, put a tick in the grains column and the fruit column.
 - Include one tick for every glass of water you drink.

Analyse your results

- 4 Refer to your table and answer the questions.
 - From which food group do you eat the most often? And the least?
 - Do you eat a large variety of foods?
 - Do you eat the recommended amount from each food group?
 - Do you drink enough water?

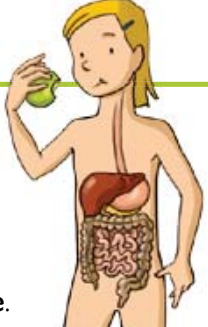


Write your conclusions

- On a typical day, my diet **is** / **isn't** healthy and balanced.
- I should eat more ... I should eat less ...

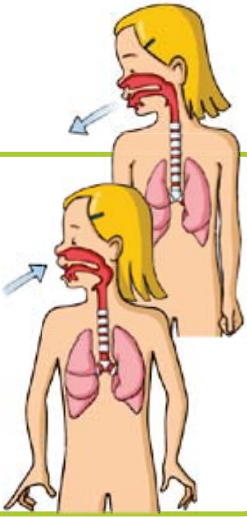
How do our body systems work?

During nutrition our body systems carry out **food processing**, **gas exchange**, **transporting materials** and **waste disposal**.



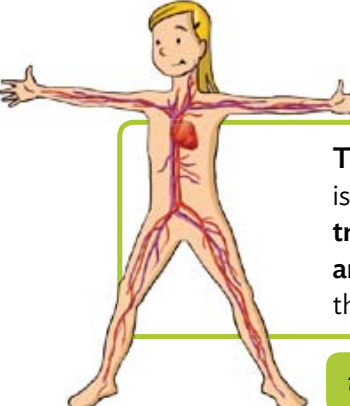
The digestive system is responsible for **digesting** the food we eat, and **obtaining nutrients** from the foods we eat. It **disposes of solid waste**.

food processing



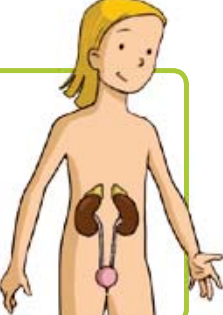
The respiratory system is responsible for **carrying out gas exchange**. This process involves taking in oxygen from the air and eliminating carbon dioxide from the body.

gas exchange



The circulatory system is responsible for **transporting nutrients and gases** throughout the body.

transporting materials



The excretory system is responsible for **disposing of liquid waste** from the body.

waste disposal

- 1 Classify** Look at the pictures. Copy and complete the table. Then, tell your partner.

body system	main organs	process

The digestive system is responsible for digesting...

- 2 Think about it** Read the questions. Discuss with your partner.
- Which systems are involved in obtaining the substances we need?
 - Which systems remove waste from our body?
 - Why is it important to remove waste from our body?

How can we look after our body systems?

To keep our body healthy and look after our body systems we need to practise **healthy eating habits**, **good hygiene habits** and **healthy routines**.

A healthy digestive system



- Try to eat all the types of nutrients in each meal.
- Eat the recommended amount of foods from each food group.
- Eat foods rich in fibre.
- Wash fruits and vegetables before you eat them.
- Chew your food many times.
- Wash your hands before and after each meal.
- Brush your teeth three times a day.

A healthy respiratory system

- Avoid cigarette smoke.
- Spend time in areas with clean air, such as natural parks and forests.
- Air your room every day and keep it clean and dust-free.



A healthy circulatory system

- Eat foods rich in healthy fats such as salmon, olives, avocados, nuts and olive oil.
- Do exercise or play sports every day.
- Walk and ride your bicycle instead of travelling by car.



A healthy excretory system

- Drink at least six glasses of water a day.
- Go to the toilet as soon as you feel the need.
- Take a shower and use soap every day.

3 Listen to the nutritionist. Then, make a recommendation.



Your partner says which system it benefits.

You should **air your room every day**.

It benefits **the respiratory system**.

How does the digestive system work?

Food processing takes place in the **digestive system**. Digestion consists of four stages: **ingestion**, **digestion**, **absorption** and **elimination**.

Ingestion begins in the **mouth**. The **teeth** break down food. The pieces mix with **saliva** from the **salivary glands**. This mixture is called a **bolus**. When we swallow, the bolus is pushed into the **pharynx** and down the **oesophagus** to the **stomach**.

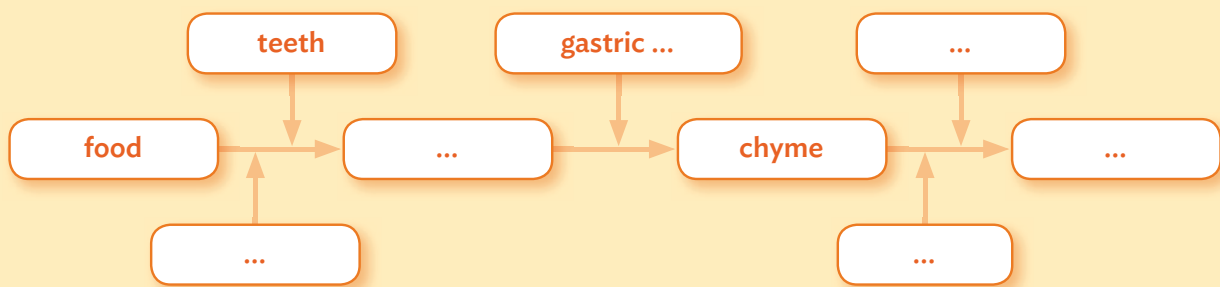
Absorption takes place in the **small intestine**. Tiny hairs called **villi** on the walls of the small intestine help absorb nutrients into the **blood**.

Digestion begins in the **stomach**. Here, **gastric juices** dissolve the bolus into a thick liquid called **chyme**. The chyme passes into the **small intestine**. Intestinal juices, and other juices, turn the chyme into a milky liquid called **chyle**.

Elimination takes place in the **large intestine**. The mixture left after the nutrients have been absorbed turns into solid waste, called **faeces**. Faeces leave the body through the **anus**.

1 Observe Imagine you are eating an apple. Describe the stages of digestion to your partner.

2 Listen, then complete the flow diagram about ingestion and digestion.



Mini Lab

How do gastric juices dissolve food in the stomach?

You need

- 5 glasses
- 500 ml white vinegar
- small portions of brown bread, cooked meat, an apple, cooked rice and a sweet

Do your experiment

- 1 Predict.** First, predict how long it will take for each food to dissolve in gastric juices. Write your predictions in the table.
- 2** Fill each glass with 100 ml white vinegar. The vinegar represents the gastric juices.
- 3** Put each portion of food in a different glass.
- 4** Observe the glasses after one, then two days. Copy and record in the table how long it takes for the food portions to dissolve.

Analyse your results

- Which food dissolved the fastest?
- Which food dissolved the slowest?
- Why do you think some foods dissolve faster than others?



food	prediction time (days) for portions to dissolve	real time for portions to dissolve
brown bread		
cooked meat		
apple		
cooked rice		
a sweet		

3 Think about it What do we use kitchen items for?

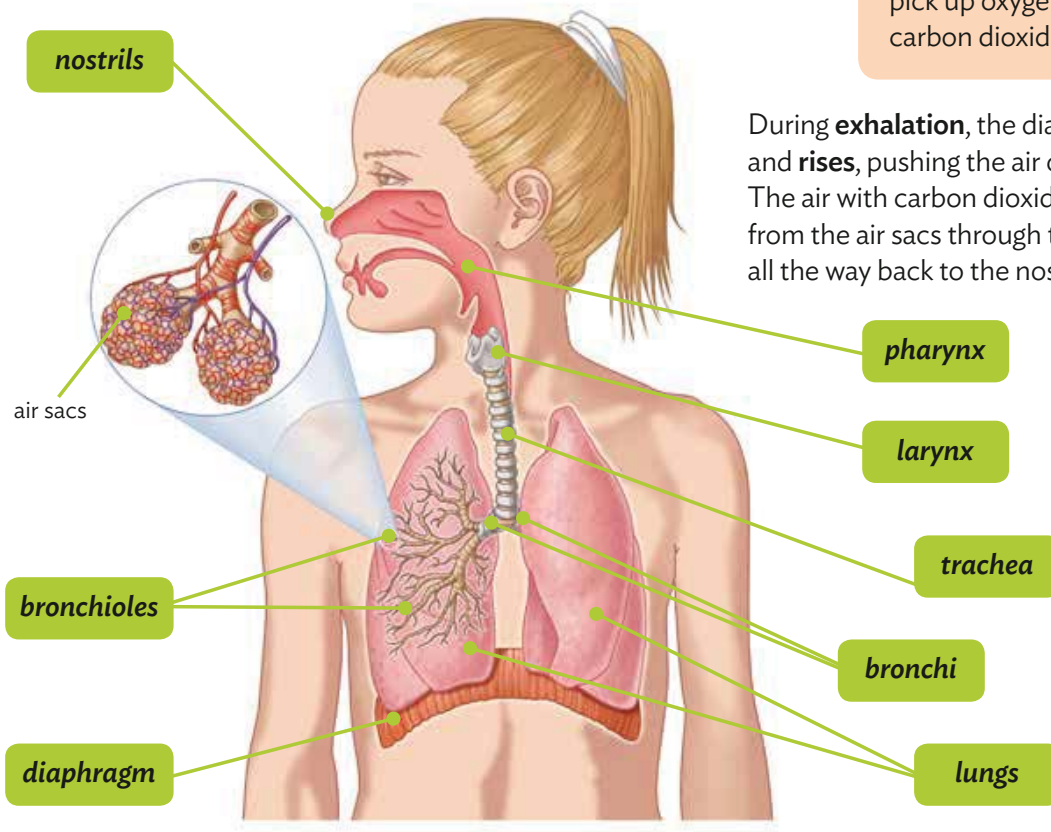
Match them and write the corresponding organ and a stage of the digestive system.



The respiratory system

Respiration takes place in the **respiratory system**. It involves two stages: **inhalation** (breathing in) and **exhalation** (breathing out).

During **inhalation**, the diaphragm **contracts** and **descends**, creating space for the lungs to expand. This movement draws air with oxygen into your **nostrils** and **mouth**. Then, the air continues to the **pharynx**, and down the **larynx** and the **trachea** to the **lungs**. At the lungs, the air enters the **bronchi**, then the **bronchioles** and finally it reaches the **air sacs**.



During **exhalation**, the diaphragm **relaxes** and **rises**, pushing the air out of the lungs. The air with carbon dioxide leaves the body from the air sacs through the air passageways all the way back to the nose and mouth.



Science facts

Do we need to tell our body to breathe?

No! Breathing happens automatically about 15 times per minute. That is over 20,000 times a day! When we do exercise, our breath rate increases. This is because our heart pumps more blood to pick up oxygen and eliminate carbon dioxide.



1 **Observe** Look at the diagram. Take turns to tell your partner what happens when you breathe in and out.

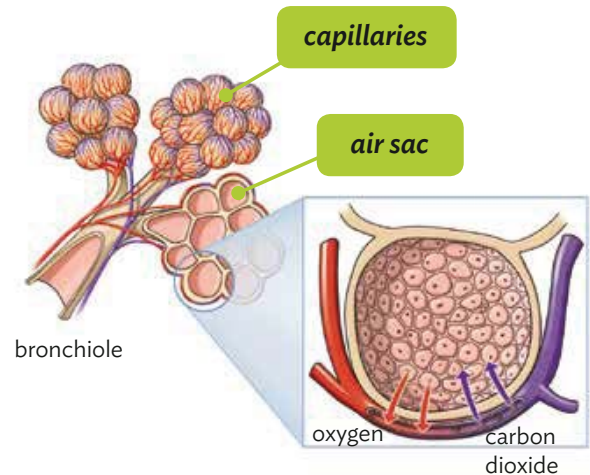
2 **Think about it** Which part of the body is common to both the respiratory and the digestive system?

When we breathe in, the diaphragm contracts and descends.

How does gas exchange work?

Gas exchange takes place at the air sacs. Air sacs are surrounded by **capillaries**.

- The **oxygen** in the air we inhale passes from the air sacs into the blood inside the capillaries. The oxygen is then transported in the blood to all the cells in the body.
- Our **body cells** produce **carbon dioxide**. This **waste gas** is transported in the blood to the air sacs. The air sacs expel carbon dioxide when we exhale.



Mini Lab

How much air can your lungs hold?

You need

- 2 balloons
- a tape measure

Do your experiment

- 1 Stretch and pull the balloon before you blow it up.
- 2 Take a deep breath, then exhale all the air into your balloon.
- 3 When your balloon is a sphere, close the end.
- 4 Hold the balloon, while your partner measures the circumference.
- 5 Repeat the experiment twice more for each of you.
- 6 Record your results in a table like this:

	name:	name:
	circumference in cm	
experiment 1		
experiment 2		
experiment 3		



Analyse your results

- 7 Was the circumference of your balloons always the same each time?
- 8 Compare your measurements to your partner's.

Write your conclusion

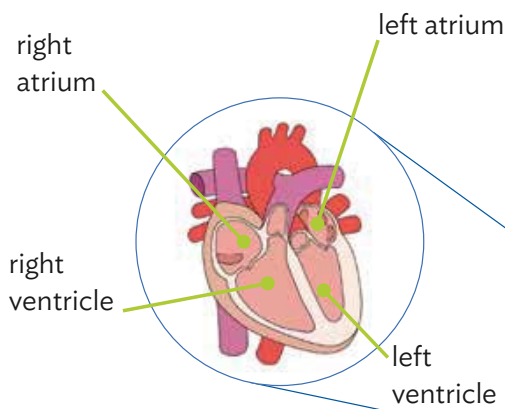
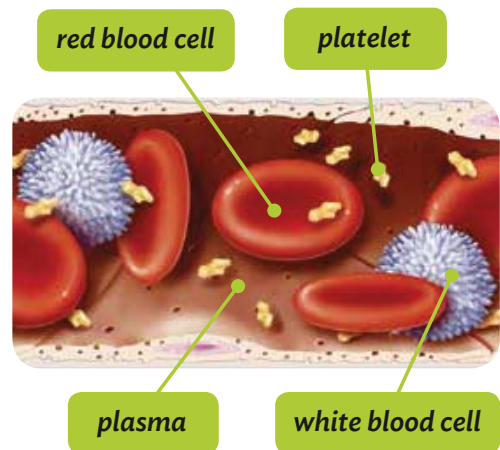
- Do we all have the same lung capacity? Write a few sentences in your notebook.

The circulatory system

Blood is pumped by the heart through the **blood vessels** around the body. **Nutrients, gases** and **waste products** are transported in the blood through the **circulatory system**.

We have about five litres of blood in our body. Blood consists of different types of cells in a clear liquid called **plasma**. Each type of blood cell has a different function.

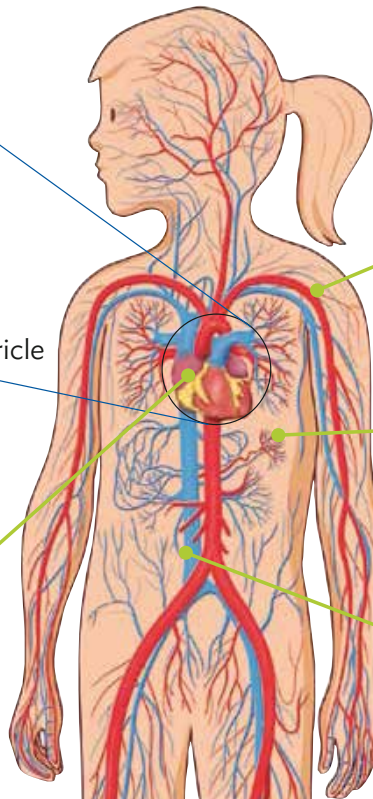
- **Red blood cells** carry oxygen from the lungs to all the body cells.
- **White blood cells** protect us from germs.
- **Platelets** are fragments of old cells. They help to stop bleeding from wounds.
- **Plasma** transports nutrients and waste products around the body.



The **heart** is made up of muscle. As it contracts and relaxes, it makes blood move through the blood vessels.

The heart has **four chambers**:

- The **right** and **left atria**, where blood **enters** the heart.
- The right and left **ventricles**, where blood **leaves** the heart.



Arteries are blood vessels that carry blood **away from the heart** towards all body tissues.

Capillaries are blood vessels with **very thin walls**. These walls allow **nutrients** and **oxygen** to pass into the body cells, and for **carbon dioxide** and other **waste products** to leave the cells.

Veins are **blood vessels** that carry **blood back to the heart** from all body tissues.

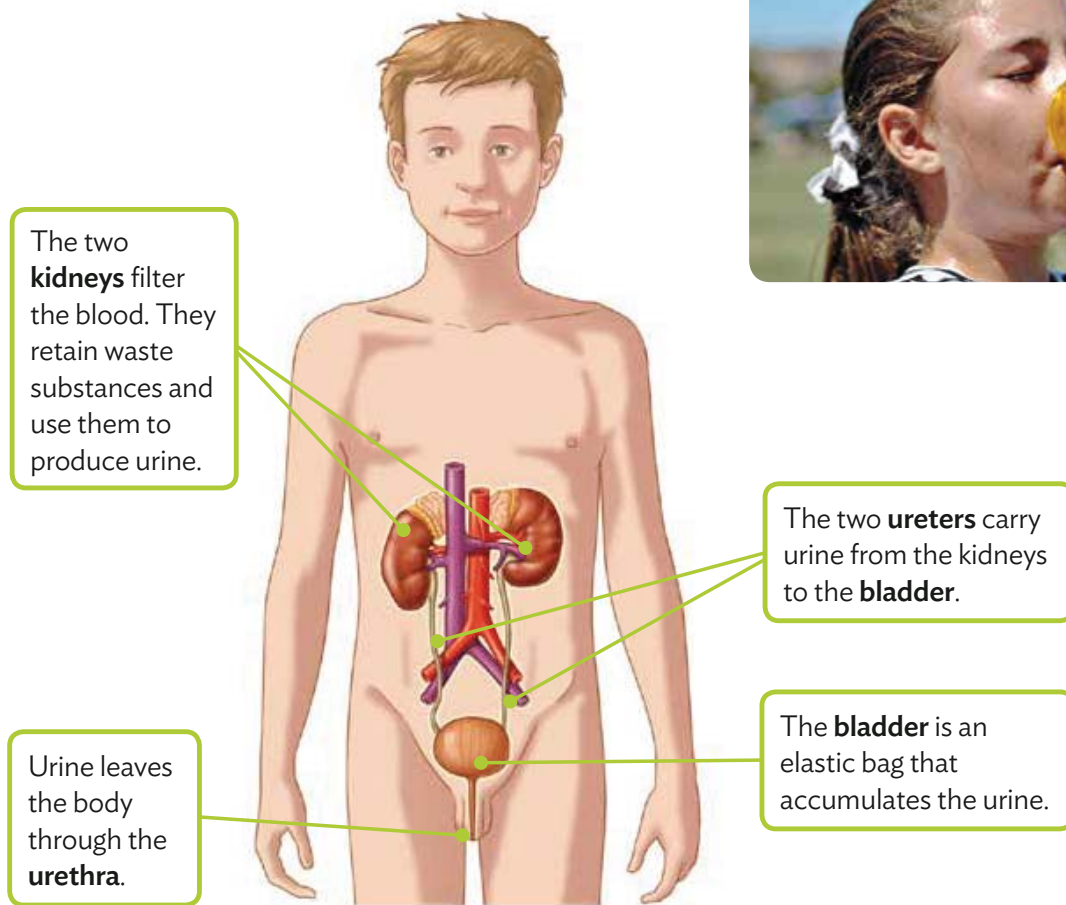
1 Observe Look at the diagram of the heart. Identify the arteries and veins. Explain how the blood moves in and out.

2 Compare How are arteries, veins and capillaries similar? How are they different? Write, then listen and check.

The excretory system

Our body produces three types of waste: **liquid**, **solid** and **gas waste**.

Liquid waste, known as **urine**, is eliminated through the excretory system. This system is responsible for eliminating waste substances from the blood. In this way, clean blood always circulates around the body.



Science facts

Why do we sweat?

When we sweat, we eliminate liquid waste through our skin. Sweat is mainly water, but contains waste substances as well. When we exercise, sweating increases to help to keep our body cool.



- 3 Look at the diagram. Which organ produces the urine? Which organ stores it? Why is it important to have an organ that stores urine?
- 4 Copy the diagram and label the excretory system.
- 5 **Think about it** Why do you think doctors take urine samples to test if a person is healthy?



Check your progress.....

Vocabulary

1 Write two examples of foods that are rich in these nutrients in your notebook. Include two other foods that are rich in fibre.

- carbohydrates
- proteins
- fats
- vitamins and minerals

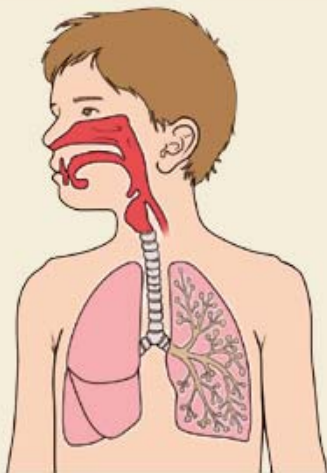
2 Listen and say *digestive system, respiratory system, circulatory system* or *excretory system*.

Concepts

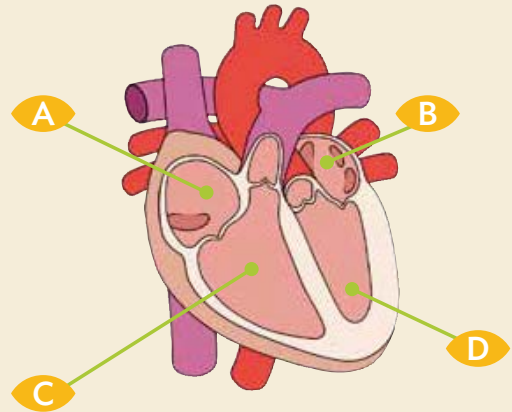
3 Write the organ of the digestive system where each of the following stages takes place.

- ingestion of food
- digestion of food
- absorption of nutrients
- elimination of solid waste

4 Look at the diagram. What system is it? Copy it and label the parts.



5 Copy the diagram of the heart and label its parts. Then, use arrows of different colours to show where blood enters and leaves the heart.



6 Complete the sentences about the excretory system and write them in order.

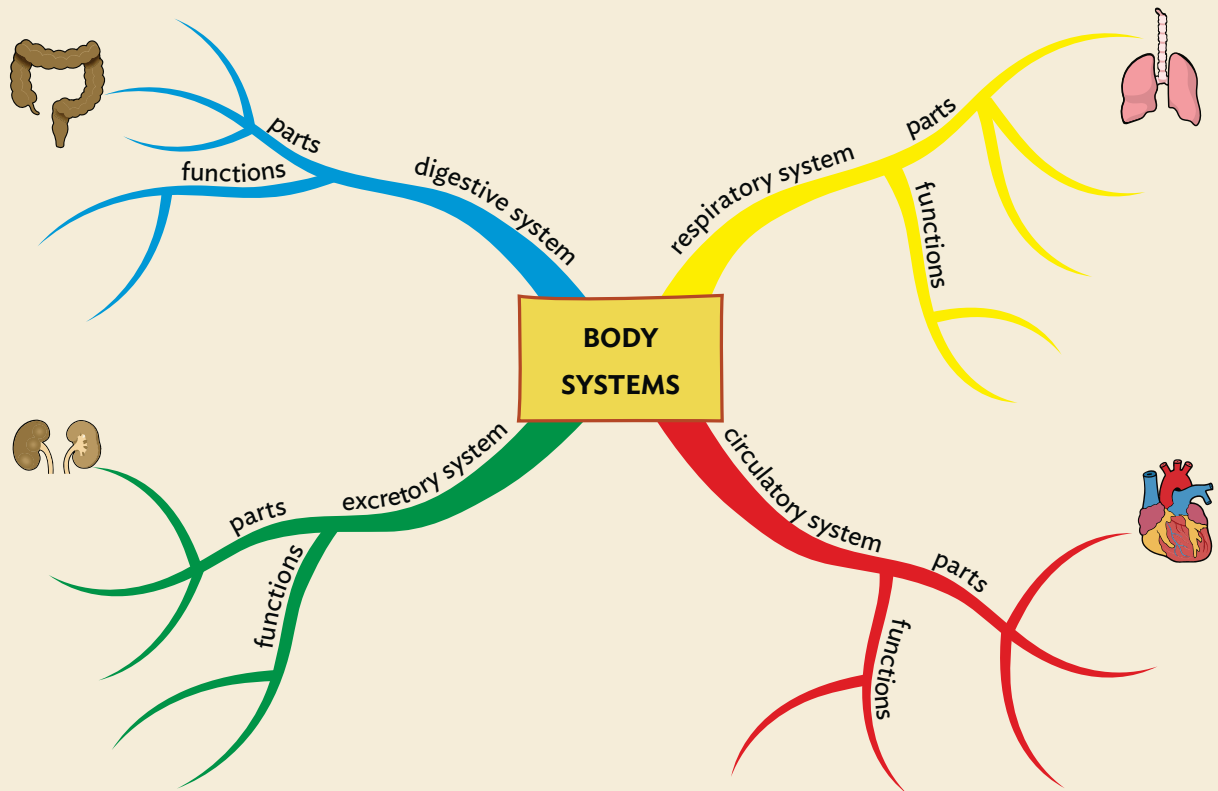
- The ... transport urine from the kidneys to the bladder.
- The ... produce urine and return nutrients and water to the blood.
- Urine leaves the body through the ...
- The ... stores urine until it leaves the body.

Apply what you know

- When we do exercise our heart beats faster. Explain why in your notebook.
- Why is drinking water important for our digestive and excretory systems?
- Use these words to describe two functions of the small intestine.
 - chyme
 - chyle
 - villi
 - nutrients

Apply what you know

- 10 Which parts of the digestive, the respiratory and the excretory systems interact with the blood in the circulatory system? Explain in your notebook.
- 11 Copy and complete the graphic organiser. Write three parts and two functions for each system.



My progress

Think about your work in this unit. Copy and complete.

- I can make healthy food choices.
- I can identify the parts of the body systems.
- I can describe the functions of the body systems.

YES	NO	NOT SURE
...
...
...

Final task


Design a healthy lifestyle

In order to stay healthy, we need to have a balanced diet, be physically active and make healthy lifestyle choices.


Learn about the NAOS pyramid

The NAOS pyramid is used to recommend foods and physical activities in line with the Mediterranean diet.

- This pyramid divides the food groups into three levels of consumption.
- It divides different physical activities into three levels of frequency.

-  Study the pyramid. Then, complete a table with some recommendations for a healthy lifestyle.

frequency	foods and drinks	physical activity
several times a day	<i>drink water</i>	<i>go for a walk</i>
several times a week		
occasionally		

-  Look at the pyramid again. Tell your partner recommendations for a healthy lifestyle.

Drink water several times a day.

Go for a walk three times a week.



-  Do you agree with all the recommendations of the NAOS pyramid?



Be a scientist!

Make a brochure about a healthy lifestyle

You need





- a sheet of A4 paper
- scissors
- magazines
- coloured marker pens
- glue

Prepare your brochure

- 1 Study these recommendations for a healthy lifestyle.



Ways to lead a healthy lifestyle

	Brush your teeth regularly and visit the dentist.		Sleep at least 10 hours each night. Lack of sleep can affect your growth and your immune system.
	Use sunscreen all year round when outdoors whether it is sunny or cloudy.		Use a helmet for protection when riding a bike or a skateboard, and when skating or skiing.

Make your brochure

- 2 Follow these instructions.
 - Fold the sheet of paper in half and write a title on the front page.
 - On the next two pages, draw your own NAOS pyramid. Draw healthy foods and physical activities you enjoy.
 - On the fourth page, make a healthy lifestyle table like the model.
- 3 Present your brochure to the class and share your ideas.

KEY VOCABULARY

1 Nutrition

balanced diet consumption of the right amounts and types of food.

bladder an elastic bag that accumulates urine in the body.

bolus a mixture of food and saliva in the mouth after food is ingested.

calcium a mineral found in dairy products that is essential for strong bones and teeth.

chyme a thick liquid in the stomach after gastric juices dissolve the bolus.

chyle a milky liquid in the small intestine after intestinal juices dissolve the chyme.

circulatory system the body system responsible for transporting nutrients and gases through the body.



digestion the process by which food is broken up and absorbed in the body.

digestive system the body system responsible for digesting food, obtaining nutrients from food, and eliminating solid waste from the body.

excretory system the body system responsible for expelling liquid waste from the body.

faeces the solid waste that is produced when nutrients are absorbed in the body.

fibre a substance found in whole grains and many vegetables and fruits that helps the process of digestion.



food pyramid a diagram in the shape of a pyramid that provides advice on healthy food consumption.

gas exchange the process of taking in oxygen from the air and eliminating carbon dioxide from the body.

ingestion the process of taking food into the body.

nutritionist a person whose job is to give advice on healthy eating.

plasma the clear liquid in which the blood cells are found.

saliva a liquid that enters the mouth from the salivary glands and helps us to chew and swallow food.

urethra the tube beginning in the bladder through which urine leaves the body.

urine liquid waste that is expelled from the body through the excretory system.

ventricle one of the two main chambers in the heart.

villi tiny hairs on the walls of the small intestine that help to absorb nutrients into the blood.

