

UNIT 2

- 1 The difference between eating and nutrition
- 2 Food needs
- 3 Diet
- 4 How diet influences our health
- 5 Food-related disorders

REVISION ACTIVITIES

SCIENCE PRACTICAL **LS**

Identifying nutrients

WORK ON YOUR KEY COMPETENCES **LS**

How much sugar is there in my drink?

Do you know how much sugar you consume each time you have a soft drink?

In the last few decades, the amount of sugar in our diet has increased a lot, and the excessive consumption of sugar has led to health problems.

In this task, you'll carry out an experiment to make you more aware of the sugar you consume when you have soft drinks. The aim is to calculate the sugar and calorie content of some common soft drinks and compare it with the daily recommended intake.

OXFORD INVESTIGATION

Go to your GENIOX Desktop.



Food and nutrition



Think and discuss



- 1 Think about your diet. Analyse the food you eat through the course of one day and note which ones contain sugar or are processed foods.
- 2 Do you think you consume no more than 500 g of meat per week?
- 3 Compare your data with other groups. Is it similar?
- 4 Think about adverts for food on TV. What kinds of food are usually advertised? Discuss how advertising can influence our eating habits.
- 5 Look at the map and answer the questions.
 - a. What percentage of children are overweight in Spain?
 - b. Think of reasons to explain why there are high percentages of children who are overweight in some countries with low incomes.

A healthy diet: weighty reasons

Obesity: a childhood epidemic. ‘Children today will live fewer years than their parents.’

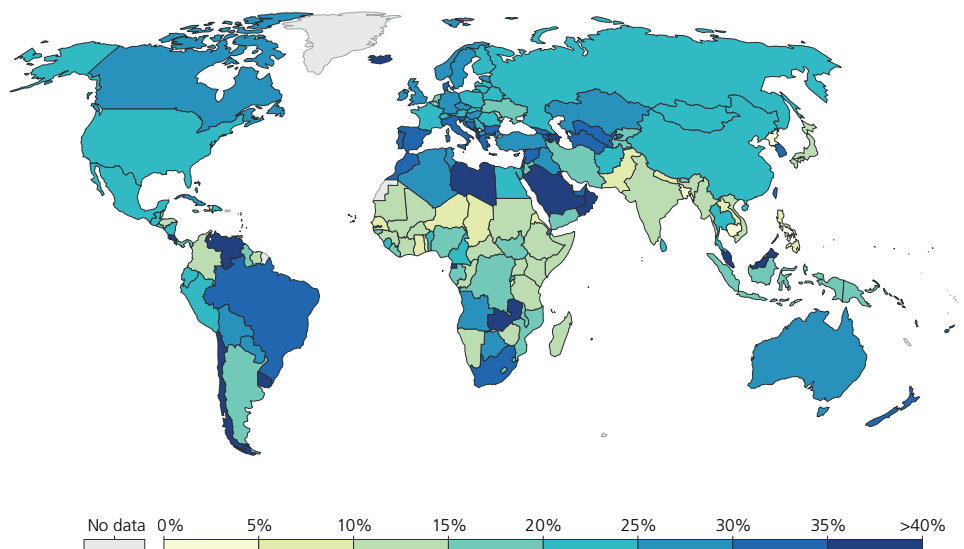
La Vanguardia, 28/06/2021

One of the aims of Sustainable Development Goal 3 (Good health and well-being) is to reduce premature deaths due to non-transmissible diseases through preventive measures and treatment, and to promote good mental health and well-being.

In the last few decades, diseases related to unhealthy eating habits have increased notably in developed countries. High calorie diets and the overconsumption of food have produced an excess of saturated fats and sugars in our bodies. These cause diseases such as obesity, cardiovascular diseases, high blood pressure, diabetes and cancer.

According to data from the WHO, obesity and excess weight problems have reached epidemic levels in the world. 2 000 million people in the world are obese or overweight. Obesity is thought to be responsible for almost 3 million deaths a year.

Percentage of overweight children by country



Percentage of overweight children aged 2–4 in the world. (Source: Our World in Data. Data from 2016).

These facts have alerted health authorities, who recommend reducing sugar intake, especially in children’s foods, and consuming no more than of 500 g of red or processed meat per week.

1 The difference between eating and nutrition

¹**crystalline**: made of or similar to crystals.

²**soluble**: can be dissolved.

When you eat an apple what are you doing? Is it eating or nutrition or both? Explain your answer.

- Eating is the voluntary process used to incorporate food into our body.
- The term **nutrition** refers to the group of involuntary processes that allow us to extract nutrients from food so our cells can use them.

1.1. Types of nutrients

Food labels indicate the quantity of different nutrients in food products, such as sugars, fats, proteins and vitamins. What are the main nutrients in the foods below?



CLIL activities

1 In small groups, discuss the difference between eating and nutrition. Why is understanding nutrition important?

Eating is... whereas nutrition refers to...

2 Look at the photos below. In your notebook, write down if you think our cells would find it easier to access the nutrients in the foods in A or in B and why.



Nutrients are the biomolecules that make up our bodies. **Carbohydrates**, **lipids** and **proteins** are organic nutrients, while **water** and **minerals** are inorganic nutrients. **Vitamins** are essential organic nutrients that need to be part of our diet too and they can be chemically very diverse.

Carbohydrates

Their main role is to give us **energy**. There are two main groups.

- **Simple carbohydrates**, or sugars, have a sweet flavour; they're small **crystalline**¹ molecules that are **soluble**² in water. There are two types:
 - **Monosaccharides**, such as **glucose** and **fructose**, are found in honey and fruit. Monosaccharides can be used directly by cells.
 - **Disaccharides**, such as lactose in milk and sucrose in sugar, are two monosaccharides joined together. Our body has to separate them before they can be used.
- **Complex carbohydrates** aren't sweet or crystalline. Many molecules found in simple carbohydrates join together to form complex carbohydrates. Our body needs to separate them before it can use them.

The most important complex carbohydrate is **starch**. It's formed of thousands of glucose molecules and is found in food such as potatoes. Cellulose in plant fibres also belongs to this group and although it's important for our nutrition, our body can't use it as an energy source.

Lipids

These are a diverse group of substances that are insoluble in water and have an oil-like **appearance**¹. They can be divided into different types depending on their function.


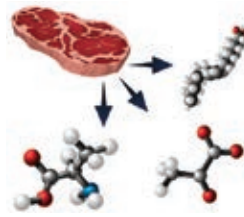

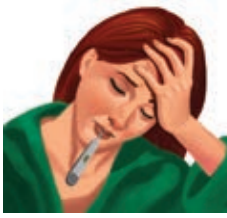


Fats	<p>Fats are molecules that store energy and also help insulate us from the cold. They can be saturated or unsaturated.</p> <ul style="list-style-type: none"> • Saturated fats are almost all of animal origin. • Unsaturated fats are almost always found in plants, although some fish have them too. They tend to be liquid, and in this state they are called oils.
Membrane lipids	These form part of the structure of cell membranes and cell organelles. There are many different types including cholesterol and phospholipids.
Lipids that perform regulatory functions	Some vitamins that play a role in the regulatory functions of the body, such as vitamins A and D, are lipids.

Proteins

They're formed when simpler molecules, **amino acids**, **bond**² together. There are 20 different amino acids which combine in many different ways to form all of the proteins that make up an organism.

Our body can make only 12 of these amino acids, so the remaining 8 (known as the **essential amino acids**) need to be obtained from food. Most animal proteins contain a balanced amount of all amino acids. However, plant proteins tend to be **deficient**³ in some.

Proteins perform many tasks, such as building and repairing structures and regulating the metabolism.

Structural function	Digestive function	Transport function
 Collagen	 Digestive enzymes	 Haemoglobin
Immunological function	Hormonal function	Movement function
 Antibodies	 Growth hormones	 Actin and myosin

¹**appearance:** the way something looks.

²**bond:** join.

³**deficient:** not having enough.



Foods such as butter, cheese and bacon are rich in saturated fats.



Some foods rich in unsaturated fats are oil, nuts and salmon.



Eggs, meat, milk and fish are protein-rich foods.

GLIL activities

3 🧠 Which foods contain a lot of cholesterol and why is it bad to consume too much of it?

4 📖 In your notebook, explain why vegetarians should combine a range of ingredients in all of their meals.

5 🎧 Listen and find out how regularly we should consume protein-rich foods and write examples of what they are.



¹**absence:** complete lack of something.

²**dairy:** products made from milk.



Vitamin-rich foods include fruits, vegetables and cereals.

Vitamins

The chemical composition of the different vitamins varies greatly. They're essential for the proper functioning of our body, although we only need them in small quantities. However, their **absence**¹ causes disorders and diseases.

Vitamins are easily destroyed by heat, so they're found in higher quantities in raw or lightly cooked foods. Light and oxygen can also damage vitamins.

There are two main types of vitamins.

- **Fat-soluble vitamins** are soluble in lipids, but insoluble in water. If they're consumed in excess, they accumulate as body fat and can cause harmful effects. The best-known are vitamins A and D.
- **Water-soluble vitamins** are soluble in water, but insoluble in lipids. They're not harmful to our bodies because they can be expelled in urine. Examples are vitamins B1, B2, B12 and C.

Some of the main functions of vitamins are shown in the table.

Vitamin	Recommended daily dose	Function	Foods they are found in
A (retinol)	750 µg	<ul style="list-style-type: none">• Antioxidant• Involved in sight function• Helps keep skin healthy	Milk and dairy ² products, carrots, egg yolks, liver
D (calciferol)	2.5 µg	<ul style="list-style-type: none">• Involved in the calcification of bones	Milk and dairy, cod liver oil
B ₁ (thiamine)	0.4 mg/1000 kcal of food	<ul style="list-style-type: none">• Involved in obtaining energy from nutrients	Cereals, vegetables, beer, yeast, wheat germ
B ₂ (riboflavin)	0.6 mg/1000 kcal of food	<ul style="list-style-type: none">• Involved in obtaining energy from nutrients• Keeps skin, mucous membranes and the cornea healthy	Milk and many foods; partly synthesised by intestinal bacteria
B ₃ (niacin)	6.6 mg/1000 kcal of food	<ul style="list-style-type: none">• Involved in obtaining energy from nutrients	Milk and eggs
B ₁₂ (cyanocobalamin)	1.2 µg	<ul style="list-style-type: none">• Involved in creating red blood cells	Eggs and meat; partly synthesised by intestinal bacteria
C (ascorbic acid)	60 mg	<ul style="list-style-type: none">• Antioxidant• Helps keep mucous membranes healthy	Citrus fruit, strawberries, vegetables

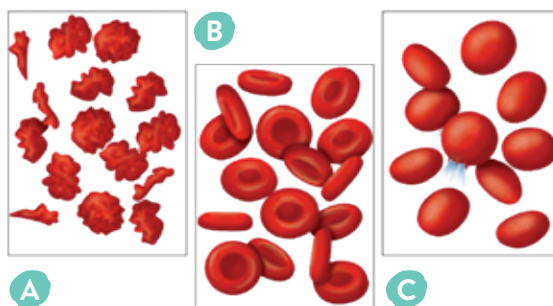
CLIL activities

- 6 With a classmate discuss why we should eat a variety of foods.
- 7 In small groups, discuss which foods you would eat to keep your skin healthy.
- 8 In your notebook, explain why it's important not to cook fresh foods for too long.

Minerals

The drawings show red blood cells from three different people. Review what you know about osmosis and answer the following questions.

- Which drawing shows blood plasma with an excess of minerals?
- Which one shows a deficit of minerals?
- Explain the relationship between how much salt we consume and the water we eliminate.



Effect of different concentrations of minerals dissolved in blood plasma on the shape of red blood cells

¹fulfil: complete, achieve or realise.

²solvent: able to dissolve other substances.

Minerals are inorganic substances that **fulfil** various functions.

- **Structural function:** maintaining bones and teeth.
- **Regulatory function:** controlling the correct functioning of our body through, for example, the nervous system and muscles, and taking part in cellular metabolic reactions.

Different foods contain different amounts of minerals, although they're most abundant in fruit and vegetables. Some minerals are also dissolved in the water we drink.

We need large amounts of magnesium, potassium, calcium and sodium, but only minimal amounts of iron, zinc, copper and iodine. However, all of them are essential for our metabolism.

Water

Water is the most abundant molecule in our body. It makes up around 63% of our body mass.

Water fulfils various functions.

- It acts as a **solvent**² for most other nutrients. This is essential to carry out our own metabolic reactions.
- It serves as a **transport system** for other substances.
- It **regulates our body temperature**.

There's a fine balance between the amount of water we obtain daily through food and drink, and the amount we eliminate through our urine, breath, sweat and faeces.

Daily balance	
Water intake (litres)	
Drink	1.5
Food	0.7
Internal synthesis	0.3
Total	2.5
Water loss (litres)	
Urine	1.5
Sweat	0.5
Exhaled air	0.3
Faeces	0.2
Total	2.5

Which factors do you think affect the daily balance of water?

CLIL activities

- 9 With a classmate look at the table above and discuss why we need to drink more water during the summer.

During summer it's important to drink more water because...

- 10 In your notebook, explain how you can ensure your body has the right amounts of different minerals.
- 11 Listen the students and say if the statements are true or false. Correct the false statements.

2 Food needs

¹**regulate:** control or maintain.

²**vital:** necessary or essential for something to succeed or exist.

³**expenditure:** use of energy or materials.

We need food to obtain nutrients that satisfy three types of needs: energy, structural and **regulatory**¹.

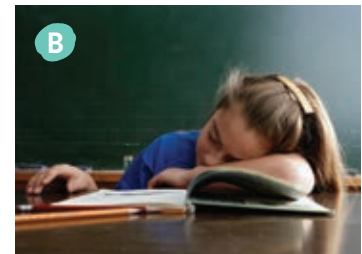
Our body is constantly creating new structures to renew tissues or to grow new ones. *Which nutrients do you think help in this process?*

	Energy needs	Structural needs	Functional and regulatory needs
Biomolecules	Carbohydrates, fats and, when their levels are low, proteins	Proteins, some lipids (fats, cholesterol) and minerals such as calcium	Vitamins and minerals
Functions	Give energy to cells so they can perform their functions	Responsible for the growth and maintenance of our body	Regulate chemical reactions inside cells

2.1. Calculating energy needs

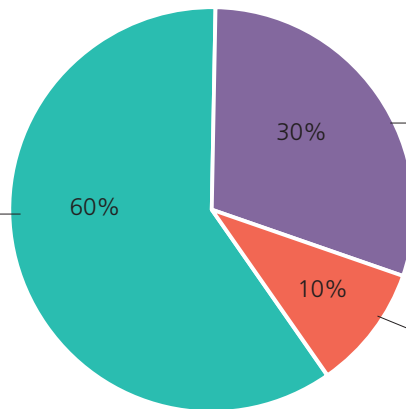
Just as a car needs energy to move, cells also need energy to perform vital functions and ensure the body keeps working.

- Which girl is using more energy?
- Are both girls consuming energy? Explain your answers.



Our energy needs can be divided into three categories:

Basal metabolism: this term refers to the quantity of energy that our body needs to carry out **vital**² functions. This energy consumption occurs even when we're resting or sleeping.



Energy expenditure³: this term refers to any additional energy needed when we perform physical activity, such as walking. This category is variable according to the lifestyle of the individual.

Digestion of food: when we ingest food, our organs perform certain actions and a range of chemical reactions take place.

Average distribution, as a percentage, of the body's energy expenditure

Nutrients have different **calorific values**, for example:

Kilocalories (kcal) are units used to measure the energy content of nutrients.

- A gram of fat provides 9 kcal.
- A gram of carbohydrate provides 3.75 kcal.
- A gram of protein provides 4 kcal.

Calculate your energy needs

We can use the following formulas to calculate, approximately, the daily basal metabolic rate of an individual:

Men: $66.5 + [13.7 \times \text{weight (kg)}] + [5 \times \text{height (cm)}] - [6.7 \times \text{age (years)}]$

Women: $55 + [9.5 \times \text{weight (kg)}] + [4.8 \times \text{height (cm)}] - [4.7 \times \text{age (years)}]$

In addition, we need to add the energy expenditure resulting from the physical activity carried out by the individual depending on their lifestyle. In the following table you can see values for the energy expenditure needed to perform various activities.

Energy expended doing different activities: men* (kcal/kg of body mass/min)					
Sleeping	0.018	Cycling	0.120	Walking	0.063
Eating	0.030	Playing football	0.137	Running (8/10 km/h)	0.151
Climbing stairs	0.254	Swimming	0.173	Sitting down	0.028

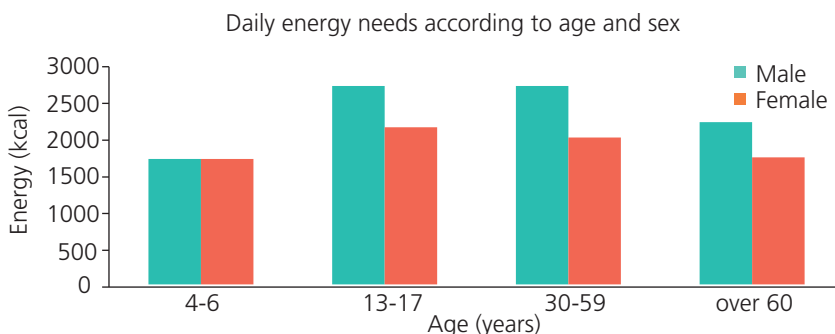
* 10% less for women.



Weight, height and age affect our basal metabolism and energy expenditure.

CLIL activities

- 12 **LS** White bread contains 51% carbohydrate, 36% water, 9% protein, 3% fat and 1% minerals. In your notebook, calculate how many kcal there are in 100 g and 375 g of bread.
- 13 Listen to the doctor and write down how much energy you need to consume every day.
- 14 Look at the graph and answer the questions.



- a. Which gender has lower energy needs? Why?
 - b. How do energy needs change for females as they age? Is it the same for males? If not, why do you think there are differences?
 - c. Might a man have lower energy needs than a woman of the same age? Why?/Why not?
- 15 **LS** Calculate your energy expenditure based on some of the activities you do each day. Compare it with the rest of the class and draw conclusions about how the type of activity, gender differences and other factors influence it?

You can consult an extended table of activities and energy expenditure online if you need more information.

3 Diet

You've probably heard someone say they're 'on a diet' if they're trying to lose weight. *What does it mean to be 'on a diet'? Can you be on a diet if you're not trying to lose weight?*

Forbidden foods?

There are no forbidden foods, only foods that need to be consumed less frequently than others. For example, we can eat pastries or drink a sugary soft drink every now and then without negatively affecting our health. The secret is to eat those foods less regularly.

The term **diet** refers to the quantity and type of food consumed daily by a person.

3.1. A balanced diet

For a diet to be **healthy** it needs to be balanced. Balanced means it provides the necessary energy and structural nutrients in the right proportions.

The food wheel is a tool to help design a healthy, balanced diet. The food wheel distributes the nutrients according to the function they fulfil in our bodies.

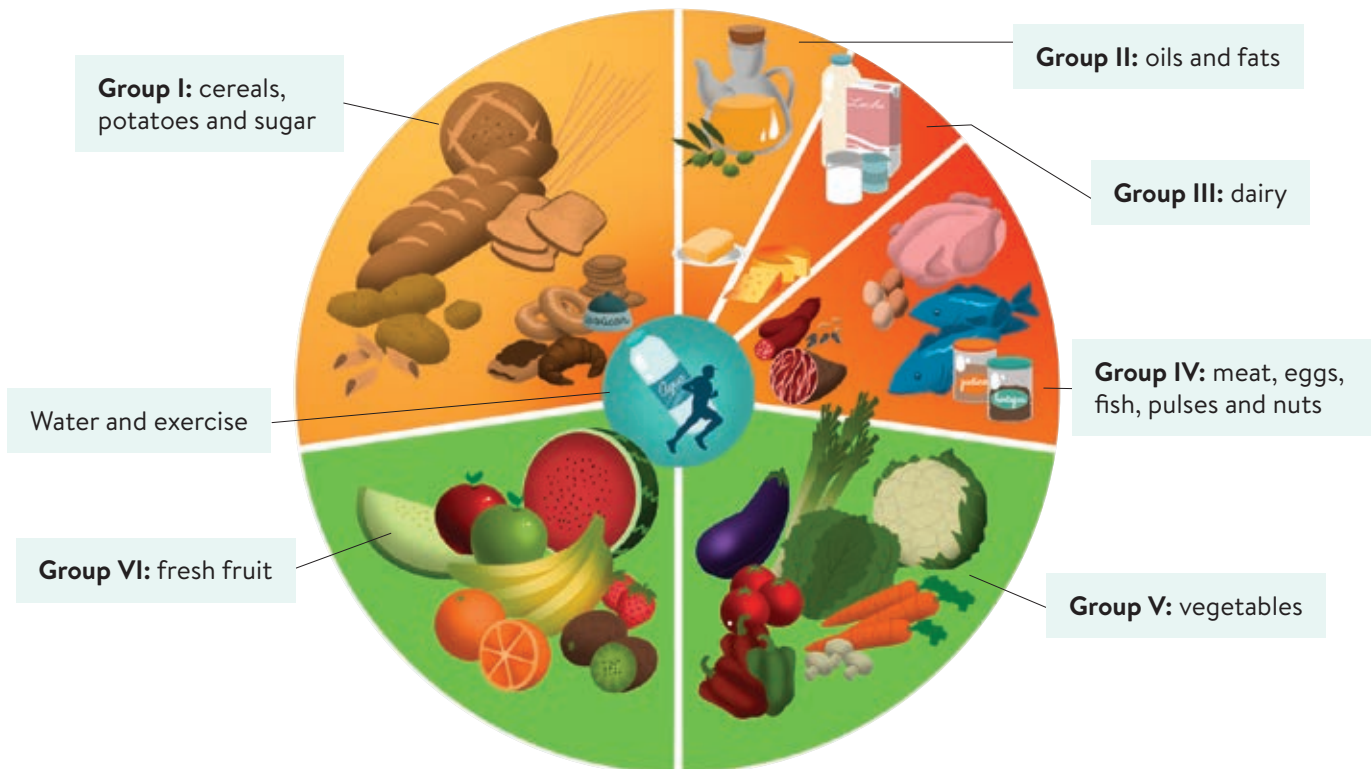
Interpreting the food wheel

- The colours indicate the different functions carried out by the nutrients in the foods.
- The six sections each represent a food group whose members have similar nutrients.
- The size of a section helps you understand how frequently you should consume those foods. The bigger the section, the more of those foods need to be consumed.

Energy function: carbohydrates, fats

Structural function: proteins, some carbohydrates

Regulatory function: vitamins, some minerals



Advice for a healthy diet

- To have a balanced diet it's important to eat a variety of foods in the following proportions:
 - Proteins, 10-15%
 - Carbohydrates, 55-60%
 - Fats, around 30%
- Make sure you eat several times a day.
- Eat fresh vegetables as they'll help make sure you have a range of vitamins and minerals.
- Avoid processed foods and saturated fats.
- Eat the right proportion of unsaturated fats and avoid foods rich in cholesterol and saturated fats. Any excess is stored as adipose tissues and accumulates in blood vessels, leading to very serious diseases.
- Eat fibre-rich foods daily, such as vegetables, fruit and pulses.

constipation: difficulty emptying the bowels.

Why do we need fibre in our diet?

Fibre is an important complex carbohydrate that promotes digestion. It facilitates and accelerates the evacuation of faeces, preventing **constipation**¹. It also contributes to maintaining the intestinal microbiota (the millions of bacteria that live in our digestive tract), helps us digest certain foods, protects against pathogenic microorganisms and provides us with certain vitamins.

CLIL activities

- In small groups, discuss if a varied diet is always a balanced diet.
- Read the information on the right above about fibre. In your notebook, write three reasons why fibre-rich foods are so important.
- Listen to the conversation and identify the mistakes made by the students when they describe a healthy diet.
- Look at the food wheel and identify which foods we should consume the most of.
- With a classmate look at the charts below and discuss why the diets are unbalanced.

Diet A	
Meat	10 %
Fish	30 %
Fats and oils	50 %
Bread	5 %

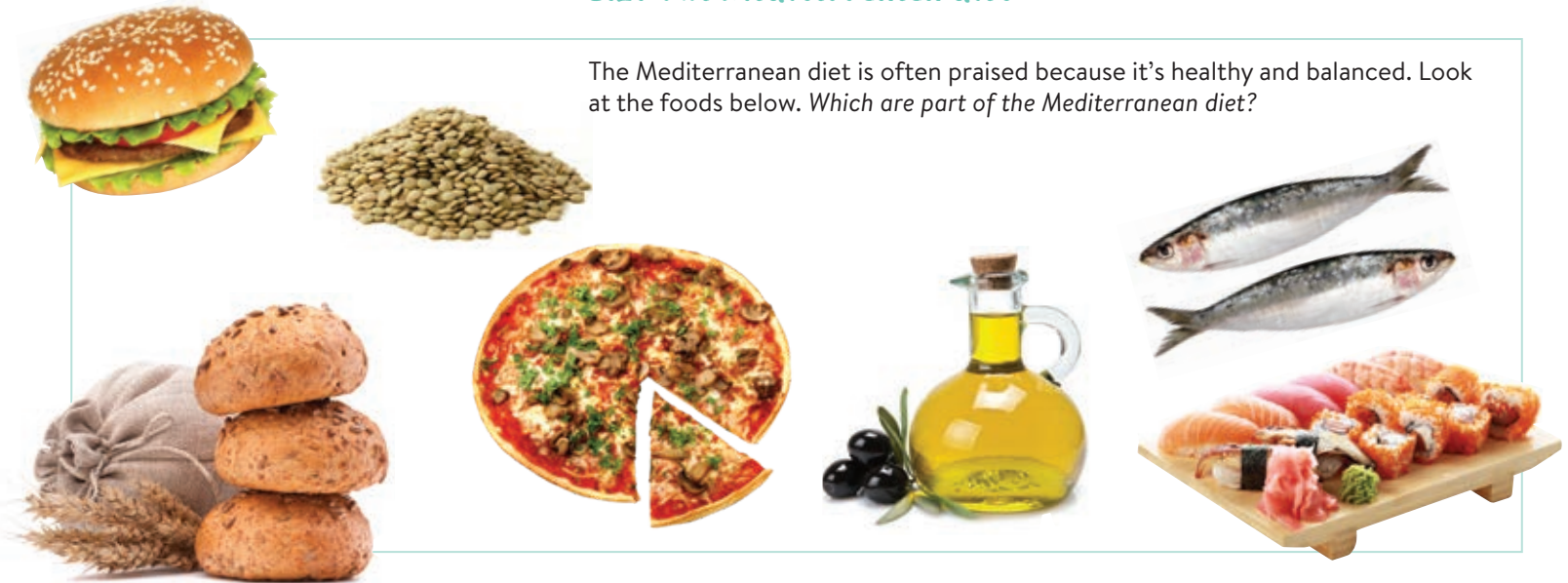
Diet B	
Meat	50 %
Fish	20 %
Eggs	20 %
Bread	5 %
Fruit	5 %

I think Diet A is... because... Diet B looks like it has...

- Prepare a healthy menu for one day for a person with a daily energy expenditure of 2 200 kcal. Take into account the major nutrients in each of the foods. Use the table on the right to help calculate what size portions the person should eat.

Energy value per 100 g portion (kcal)					
Biscuits	436	Boiled potatoes	86	Sausages	315
Cereal	368	French fries	253	Pate	518
Cocoa powder	357	Pasta	368	Soft cheese	174
Sugar	380	Legumes	350	Manchego cheese	376
Bread	255	Egg	162	Apple	52
Fruit yogurt	100	Tinned tuna	280	Pear	61
Butter	740	Sea bream	140	Banana	90
Whole milk	68	Hake	86	Orange	44
Pastries	469	Plaice	73	Strawberries	36
Jam	280	Salmon	172	Mandarin	40
Cauliflower	30	Sole	73	Grapes	81
Green beans	39	Chicken	121	Watermelon	30
Aubergine	29	Pork chop	208	Olive oil	900
Chard	33	Lamb chop	215	Vinegar	4
Asparagus	24	Beef steak	181	Mayonnaise	781
Spinach	32	Turkey	223	Bolognese sauce	73
Courgette	31	Bacon	665	Crisps	544
Onion	47	Ham	289	Crepe brulee	132
Tomato	22	Serrano ham	380	Ice cream	209
Lettuce	18	Chorizo	468	Chocolate	540

3.2. The Mediterranean diet



The Mediterranean diet is often praised because it's healthy and balanced. Look at the foods below. *Which are part of the Mediterranean diet?*

'beneficial': having a helpful or useful effect.

The **Mediterranean diet** is characteristic of the traditional diets followed in southern European countries. It includes consuming olive oil, cereals, legumes, fish, vegetables and fruit.

These foods have many **'beneficial'** qualities.

- **Olive oil** provides vegetable fats, which are healthier than animal ones.
- **Cereals** contain complex carbohydrates and fibre.
- **Fish** provides protein and less cholesterol than meat.
- **Legumes** have balanced amounts of nutrients and fibre.
- **Fresh fruit and vegetables** are rich in vitamins, minerals and fibre.

The correct combination of the foods characteristic of the Mediterranean diet has several health benefits. It is known to protect against cardiovascular diseases caused by an excess of cholesterol in the blood. It also prevents constipation, colon cancer and obesity due to its high fibre content and low amounts of saturated fats.

World heritage

The Mediterranean diet was declared Intangible Cultural Heritage by UNESCO in 2010 in response to a joint application submitted by Spain, Italy, Greece and Morocco.

CLIL activities

- 22** In small groups, take turns to describe a dish. The other students have to say if it's part of the Mediterranean diet or not.

This dish includes...

One of the ingredients of this dish is ...

This dish is rich in ...

- 23** In your notebook, create a mind map explaining why the Mediterranean diet is considered to be balanced.
- 24** Explain how the Mediterranean diet helps prevent constipation, colon cancer, obesity and cardiovascular disease.

3.3. Other diets

Some people change their diets following recommendations from unqualified people or without medical supervision. This is often because they want to lose a lot of weight in a short time for some reason.

Miracle diets are defined as diets that have no scientific basis but claim to have certain, unproven, benefits. Following these diets can cause problems of various kinds, including metabolic, gastrointestinal, circulatory, dermatological and neuropsychiatric disorders.

Do you know anyone who has followed a diet like this? What was their experience? Have you heard about any unbalanced diets that are recommended in certain circumstances?



Sometimes, however, **specific diets** are needed to prevent or control disease or to change certain lifestyles. These special diets need to be followed under medical supervision and should be closely monitored.

These are some examples of special diets.

- **Low calorie diets:** they include a smaller percentage of high-energy foods (carbohydrates and fats) so the person loses weight.
- **High calorie diets:** they include a lot of energy-rich foods. They're suitable for people who are **under-nourished**¹.
- **Low cholesterol diets:** they're recommended for individuals who are at risk of suffering from circulatory diseases.
- **High fibre diets:** these diets feature many foods that are rich in fibre. They're appropriate for people who suffer from constipation.
- **Low protein diet:** suitable for people who suffer from kidney problems that lead to an excess of uric acid in the blood.
- **Soft diets:** they're used when people have gastrointestinal illnesses, for example diarrhoea, or after certain **surgical**³ operations. Red meat, most vegetables, legumes and citrus are avoided. Foods such as rice, chicken and fish are served, preferably boiled.



¹**under-nourished:** a person who doesn't get enough nutrients.

²**nutritionist:** an expert in nutrition.

³**surgical:** related to medical operations.





Vegan diet

This diet doesn't include meat, fish or animal products such as milk, cheese, eggs or honey. Some people follow a vegan diet because of their religious beliefs or ethical concerns about sustainability or animal rights. Although some people argue it's healthier, **nutritionists**² warn of the risk of not eating enough protein, vitamins and other important nutrients.

Which diet, vegan or omnivorous, is more recommendable from the point of view of sustainability? What about health? Split the class into two groups and debate the pros and cons of each.



CLIL activities

- 25  In your notebook, explain which diets would be recommended for someone who's underweight or for a professional athlete.
- 26  With a classmate, take turns to describe each type of diet on this page and see if the other can identify which it is.
This diet has more...
People on this type of diet eat foods such as ...
This type of diet is useful for people who have ...
- 27 Research the Dukan diet. What does it involve? Why has it been criticised?

4 How diet influences our health

¹advertise: promoting a product so more people buy it.

²imbalance: too much or too little of something.

³tend: something likely to happen.

Numerous studies indicate there is a close relationship between obesity and poverty. *Can you think of reasons why the obesity levels are increasing alarmingly in populations with low incomes in developed countries?*

4.1. Consumption habits

Due to historical, cultural, social and religious reasons, eating habits around the world are very different. **Advertising**¹ also influences the way we eat by encouraging us to buy certain foods.

Nutritional **imbalances**² and illnesses linked to inadequate diets are common in **developed countries**. These diets **tend**³ to have:

- a high calorie content.
- an excess of sugar and sugary products.
- an abundance of foods high in cholesterol and saturated fats and many processed foods. This means that obesity, diabetes and disorders of the circulatory system are common.
- an abundance of protein-rich foods that can lead to excessive amounts of amino acids in the body which have to be eliminated by the kidneys and liver.

In **developing countries**, nutrition can also be unbalanced due to a lack of:

- calories, which leads to low energy levels.
- variety, which leads to nutritional imbalances.
- protein-rich foods.





Poor sanitary conditions while handling food can also lead to infectious illnesses and food poisoning.

The food supply chain



The processes that food undergoes from the moment it's produced until it reaches the consumer is called the **supply chain**. To avoid micro-organisms contaminating and reproducing in food, all stages in the supply chain must be clean and sanitary. *Can you describe the hygiene and conservation measures that are taken from when a fish is caught to when it reaches your home?*

CLIL activities

- 28** In your notebook, explain why the amount of calories consumed in developed and developing countries might be different.
- 29**   With a classmate, make a list of television adverts related to food, and divide them into those that promote healthy foods and those that promote unhealthy foods. What do you notice?
- 30**  In small groups, discuss what fast food is and give some examples.
- 31**  Design an advert to sell a healthy food product that promotes a balanced diet in children and young people.
- 32** Research the following methods used during the supply chain to ensure food is safe: vacuum packing, sterilisation and pasteurisation.

4.2. Nutritional information

If you look at the nutritional information on a food label, you'll see that among the list of ingredients there are usually some that start with the letter E followed by a number. *Do you know what function these substances have? Are they nutrients? Why?/Why not?*

Additives are natural substances or artificial chemical products that are added to some foods for different purposes.

Additive	Function
Preservatives	Extends the shelf life of a product
Dyes	Gives food attractive colours
Food enhancers	Increases the flavour of a product
Stabilisers	Maintains the texture and appearance of food
Antioxidants	Avoids oxidation changing the characteristics of the food
Sweeteners	Gives food a sweet flavour; can be sugars or artificial sweeteners; artificial sweeteners are commonly used in diet foods and drinks

The additives allowed in the European Union (EU) are clearly displayed on food labels using a code composed of the letter E followed by a number.

perishable: likely to decay.

CLIL activities

33 In your notebook, explain if spices are the same as additives. Give reasons for your answer.



Reading the information on a food label

As consumers, we have the right to know certain information about the foods we eat. There are laws to ensure that companies inform people by displaying a label with all the relevant information. This label is a guarantee and must include, at least, the following information:

- Name of the product
- Product amount (weight or volume)
- List of ingredients (weight or volume in descending order)
- Instructions for use or cooking, if necessary
- Nutritional value
- Special storage conditions
- A 'best before' date, after which the food may not be of good quality.
- A 'use by' date (if it's a **perishable** food), after which the consumption of this food may be dangerous
- Name and address of manufacturer, packager or seller

Quantity in g or ml

NUTRITIONAL FACTS				
Portion size	Serving: 1 glass (200ml)	Number of portions in package		
	Servings per container: 5			
	(100ml) 1 serving			
Amount of nutrients per 100 ml	Energy (kcal)	36	72	Amount of nutrients per portion
	Protein (g)	3.5	7.0	
	Total fat (g)	0.1	0.2	
	Carbohydrate (g)	5.2	10.4	
	Lactose (g)	5.2	10.4	
	Sodium (mg)	48	96	
	Potassium (mg)	165	330	
Amount of vitamins and minerals per 100 g or 100 ml	Vitamin B12 (mg)	0.2	24%	Percentage of daily recommended intake
	Vitamin B6 (µg)	0.3	50%	
	Calcium (mg)	128	32%	
	Phosphorus (mg)	103	26%	
	Magnesium (mg)	12	8%	
	Iodine (µg)	9	13%	
	Zinc (mg)	0.4	5%	

(* % based on the recommended daily intake)

What type of drink could this label be for?

CLIL activities

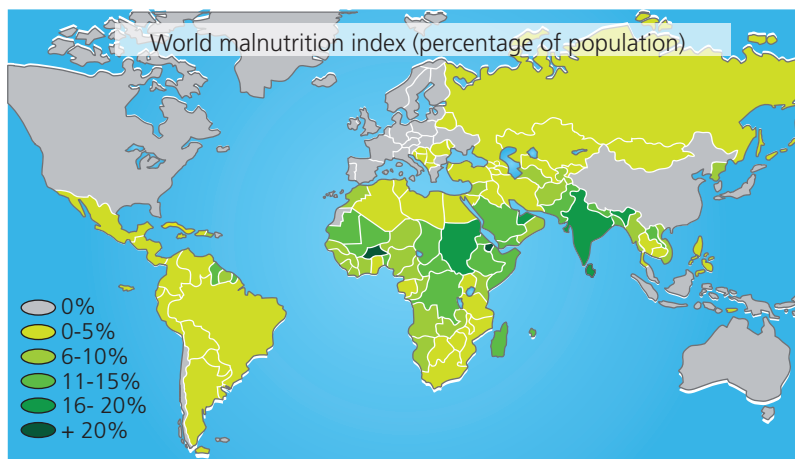
34 Bring a food label to class and discuss what's in the food product with a classmate.

This food contains a lot of...

35 Listen to the nutritionist and answer the questions.

5 Food-related disorders

5.1. Malnutrition: too many or too few nutrients



This map shows the percentage of people in the world who are undernourished.

- Which continents have the highest levels of undernutrition?
- How does undernutrition affect the body?
- What do you think a map showing obesity levels would look like?
- What do you think are the causes of the distribution of undernutrition and obesity?

Undernutrition	Deficiency diseases	Obesity
<p>This happens when not enough nutrients are ingested, particularly proteins. It's commonly associated with poverty and mostly affects children, whose physical development is then limited.</p> <p>It causes serious diseases, such as marasmus, caused by the total lack of food, and kwashiorkor, which is due to a diet very low in protein.</p>	<p>Some people don't consume enough of all the essential nutrients. This may be their choice, or it may be that they don't have access to certain foods.</p> <p>The lack of an essential nutrient can result in disease. For example, lack of iron produces anaemia, lack of calcium causes rickets and vitamin C deficiency produces scurvy.</p>	<p>This occurs when too many calories are ingested, and they accumulate in the form of fat. The main cause of obesity is overeating, although there are other factors such as genetics that may also influence it.</p> <p>It can lead to serious vascular disease and metabolic and psychological problems.</p>



persist: continue to do something.



CLIL activities >>>>>>>>>>

36 In your notebook, explain the difference between being undernourished and having an inadequate diet.

37 Have a class debate to discuss the possible causes of malnutrition and what solutions there are to the problem.

38 Identify similarities and differences between food intolerances and food allergies.

39 **LS** Research type 2 diabetes and how it is related to sugar. Make a summary.

5.2. Food allergies and intolerances

Some people are lactose intolerant. This means that eating milk or dairy products produces symptoms such as diarrhoea or gas. Other people are allergic to milk, which can sometimes even lead to death.

Do you understand the difference between an intolerance and an allergy? Can you think of any other examples?

- Food intolerances** are generally related with an inability to digest a particular nutrient. For example, people who are lactose intolerant are unable to digest lactose, which is a sugar found in dairy products. People who are gluten intolerant are unable to digest gluten, a protein found in certain cereals. Gluten intolerance may develop into **coeliac disease**, which causes various intestinal disorders.
- Food allergies** cause a reaction of the immune system that, if it **persists**¹ over time, can lead to death. People can have allergies to eggs, shellfish, milk, nuts and some food additives. It's very important to detect food allergies early to ensure certain products are removed from the diet.

5.3. Food poisoning

When people make homemade jam, the jars are put in a bain-marie (a large pan full of boiling water that covers the jars) to extract all the air.

Why do you think this process is followed? What could happen if this process didn't take place?



If food is handled incorrectly or if it's contaminated, then certain toxins may be introduced that can be extremely dangerous if consumed. It can cause illnesses and in some cases death.

- **Salmonellosis**, which is caused by a bacteria, is mostly associated with the consumption of foods containing raw eggs, such as mayonnaise or raw and under-cooked chicken.
- **Botulism** is also caused by a bacteria and can occur after ingestion of poorly preserved foods, such as tinned foods, but it's rare thanks to improved food safety standards.

5.4. Eating disorders



Some people aren't happy with the way their bodies look, which can lead to psychological problems called eating disorders.

Can you name any eating disorders? In groups, discuss the reasons why you think some people develop them.

Two of the main eating disorders are anorexia and bulimia.

- **Anorexia**: an illness where a person rejects food because they have a fear of gaining weight. The resulting lack of nutrients leads to the **malfunctioning**¹ of the body. This nutritional deficit may, in extreme cases, cause permanent organ damage.
- **Bulimia**: people who suffer from this disorder ingest extreme amounts of foods in a compulsive way, then feel ashamed or regretful and vomit the food back up or take **laxatives**² to remove the food from their body.

CLIL activities

- 40  Listen to the scientist and note down the tips for healthy eating habits.
- 41  In small groups, discuss the possible consequences of following weight-loss diets without medical supervision.

Going on a diet without speaking to your doctor first can be...

- 42 During pregnancy, women should be very careful what they eat because infections that come from food can be transferred to the fetus. Find out which foods pregnant women should avoid and why.

¹**malfunction**: stops working properly.

²**laxatives**: medicine, food or drink that helps somebody empty their bowels easily.

Raw foods aren't always safe

Listeriosis is a rare but very serious infection caused by the bacteria *Listeria monocytogenes*. It can be caused by consuming unpasteurised milk or dairy products (like cheese and yogurt) and raw or undercooked meat, sausages or pates. Symptoms include fever, aching muscle and gastrointestinal problems. The symptoms can appear up to two months after consuming the contaminated food.



People who suffer from anorexia see a distorted version of themselves when they look in the mirror.

Revision activities

Food and nutrients

- 43 Complete the following sentences, in your notebook.
- Nutrition is an ... process through which ... use the ... found in
 - Nutrients provide us with the ... necessary for our survival.
 - Eating is a ... process in which we ingest ... found in the environment.
- 44 Copy the following table and identify the function performed by each type of nutrient.

Nutrient	Function
Carbohydrates	...
Lipids	...
Proteins	...
Vitamins	...
Minerals	...

- 45 **LS** What's a disaccharide? Which one is found in milk?
- 46 Copy the table and put the following terms in the correct column: *collagen, potassium, niacin, cholesterol, starch, oleic acid, calcium, fructose, haemoglobin, thiamin.*

Carbs	Lipids	Proteins	Minerals	Vitamins
...

- 47 Name three foods that provide:
- protein
 - vitamins
 - carbohydrates
 - minerals

Nutritional needs

- 48 Explain the difference between basal metabolism and energy expenditure.
- 49 A 40-year-old woman and a 14-year-old boy have different basal metabolisms. What does this mean? If we consider that both are the same height and weight (170 cm and 65 kg), whose basal metabolism is higher? If 1 kcal = 4.184 J (joules), express their metabolic rates in kJ/day.

- 50 Why should the temperature be around 20 °C to measure a person's basal metabolism? What would happen if the temperature was 5 °C or 35 °C?
- 51 **LS** Paul is going to take part in a 10 km race tomorrow and can choose between menu A and menu B for his dinner. Which do you think he should choose to make sure he has the maximum amount of energy for the race? Which would be better if he had to eat something during the race and why?



- 52 Match the foods with the nutrients they contain and explain your answers:
- Food:** jam, fish, oil, butter
 - Nutrients:** saturated fats, unsaturated fats, proteins, carbohydrates
- 53 Design a diet of 2 400 kcal/day for a girl who does regular sport. The distribution of nutrients in each meal is indicated in the table.
- Copy and complete the table with the missing data.
 - What would happen if the girl didn't do sport regularly?

	Carbs	Lipids	Proteins	kcal
Breakfast	...	6	16	300
Lunch	130	45	...	950
Snack	18	8	20	...
Dinner	60	...	25	...

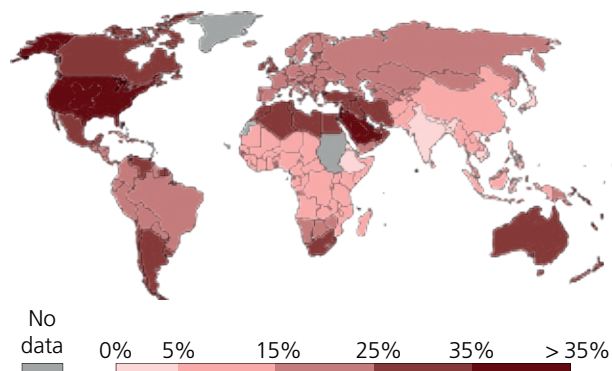
Diet

- 54 Which food in the following pairs should we consume in lower quantities: red meat / poultry; milk / flavoured yogurt; bread / cookies; oil / butter? Give reasons for your answers.

- 55 Explain what the nutritional value of food is. What do we mean when we say milk has a high nutritional value?
- 56 One way to calculate a person's healthy weight range is using body mass index (BMI), which has the following formula:
- $$\text{BMI} = \frac{\text{weight (kg)}}{\text{height}^2 \text{ (m)}}$$
- According to the WHO, a healthy BMI is between 20.5 and 25.5. Calculate your own BMI.
- Looking at your BMI, do you think you should change your diet?
- 57 What kind of foods contain nutrients which help with regulatory functions?

Eating habits

- 58 **LS** The map below shows the percentages of obese people in different countries.



- a. Which countries have the highest levels of obesity?
- b. Why do you think this is the case?
- c. What are the causes and consequences of obesity?
- 59 **LS** Do you think eating habits change over time? Do you and your parents like the same types of food? Explain your answers?
- 60 The following information appears on a food label. Is the information correct?
- Energy value / 100 grams of product = 97 kcal
 - Nutritional value / 100 g of product: proteins: 6.3 g; carbohydrates: 6.0 g; fat: 2.5 g
- 61 **LS** How does the nutritional information on food products help consumers to make good decisions about the food they buy?

Food-related disorders

- 62 If a human ingests the anisakis parasite, they can become seriously ill. Find out what foods could contain anisakis and how they need to be prepared.
- 63 Does malnutrition have more serious consequences for a 6-year-old or a 35-year-old? Give reasons for your answer.
- 64 Luke's father has been diagnosed with a cardiovascular disease related to his eating habits. What could be the cause? What diet would you recommend for him?

Study skills

- I Prepare a summary of the unit that answers the following questions:
- What's the difference between nutrition and food?
 - What are the main nutrients and their functions?
 - What are our nutritional needs?
 - How do we calculate energy needs?
 - What criteria are used in the food wheel?
 - How is the wheel used?
 - What tips should be followed for a healthy diet?
 - What are the benefits of the Mediterranean diet?
 - When are special diets recommended?
 - How do consumption habits influence our health?
 - What's the nutritional information of food?
 - What are the main food-related diseases and their causes?
- II Create a mind map for the following concepts: foods, structures, nutrients, diet, diseases, balanced, regulatory, vitamins, proteins, carbohydrates, energy, minerals, malnutrition.
- III Create your own definitions of the following terms: nutrient, food, diet, fibre, basal metabolism, kilocalorie, energy expenditure, food additive, malnutrition, allergy, intolerance, intoxication, anorexia. Complete your glossary with other terms from this unit.



Passnotes



Digital revision activities



Concept map

Identifying nutrients

Biochemical indicators detect the presence of certain substances, which produce a change of colour of the indicator if they are present.

- Lugol turns dark blue in the presence of starch.
- Benedict's reagent turns orange in the presence of simple sugars.
- Biuret reagent turns violet in the presence of proteins.

As you already know, food contains different types of nutrients. In this experiment you'll identify whether certain nutrients are found in different foods.

OBJECTIVES

- Identify the main nutrients in food
- Apply and use basic biochemical indicator techniques

MATERIALS

- 12 test tubes
- test tube rack
- pestle and mortar
- funnel
- filter
- Lugol, Benedict's and Biuret reagents
- bread
- gelatine
- grape juice
- milk
- lighter

METHOD

- Put a few breadcrumbs in water and mash them in the pestle and mortar until you get a whitish liquid. Filter the mixture and pour an equal amount into three test tubes.
- Put a small amount of grape juice in three other test tubes.
- Prepare three other test tubes with milk.
- Dissolve a sheet of gelatine in water and pour it into the remaining three test tubes.
- Add a few drops of Lugol to one of the test tubes of each food.
- Do the same with the Benedict's reagent and the Biuret reagent, then gently heat the test tubes.
- Record the data in a table, putting in each cell a + sign if there was positive reaction and a - sign if it was negative.
- Write a lab report with photographs or drawings showing the colour of the test tubes after adding the reagents.

Tube	Lugol	Benedict	Biuret
1
2



Analyse the results

- What's the basic nutrient identified in each food?
- What nutrient isn't present in milk?
- Why is that nutrient not present?
- Sometimes a Lugol test is carried out to check if processed meats contain starch. Should processed meats contain starch? Why?/Why not?
- What do the results suggest regarding the nutritional values of the foods studied?
- Which of the foods analysed would you recommend if someone needed an energy boost?
- How can you prove that the results weren't obtained by chance? How would you prove the samples weren't contaminated?

Work on your key competences




How much sugar is there in my drink? Wall display and report

According to data from the WHO (World Health Organization), in 2016 there were over 340 million children and adolescents (from 5 to 19 years old) who were overweight or obese, and this tendency is growing. One of the factors that contributes to this is their high intake of sugar because this age group often consumes a lot of soft drinks, cakes and sweets.

It's easy to see how much sugar there is in food when we add it ourselves, but we are often unaware that many foods we eat daily also contain sugar.

The **aim** of this task is to find out how much sugar is in certain drinks and prepare an **explanatory wall display** and **report** that include the results and your thoughts about the risks for our health of excess consumption of sugar.


Research

- 1 Find the sugar content in the nutritional table on the labels of four drinks that you usually consume, such as soft drinks, juices and milk shakes. In order to compare the data, calculate the content per 330 ml, which is the normal size of a can of drink.
- 2 Weigh out the amount of sugar that corresponds to each drink and put it in a long thin transparent plastic bag.
- 3  Research what natural sweeteners are used as a substitute for refined sugar, and which artificial sweeteners are used in products that are labelled as light and in 'zero sugar' drinks.

Development and writing up

- 4 Draw a bar graph that compares the sugar content of the four drinks per 330 ml.
- 5 The WHO recommends that the maximum consumption of sugar should not exceed 5% of the total daily recommended calories (2 400 kcal for adolescent girls and 2 800 for adolescent boys). Note the calorie content of the drinks you have analysed and calculate the percentage of energy they provide with respect to the WHO recommended figure. Draw a bar chart to compare the results.
- 6 Make a wall display. Stick the cans for the drinks you have analysed on the display with adhesive tape and below each one stick the corresponding bag of sugar. Add a label with the sugar content in grams.
- 7 Complete the wall display with the graphs you have drawn together with a brief report that includes the consequences for our health of excessive intake of sugar.

Share your findings

- 8 The aim of the wall display is to display your conclusions but you could vary the design using sugar cubes or drawing the cans to scale (according to their sugar content). You could also add other foods that you often consume, such as yogurt or ketchup.
- 9  Using the information from step 3, discuss the pros and cons of the different natural and artificial sweeteners that are used in the food and drink industry.

