Topic 1 Photosynthesis

$8\frac{3}{4}$ hours

Unit 1.1 Plants and food

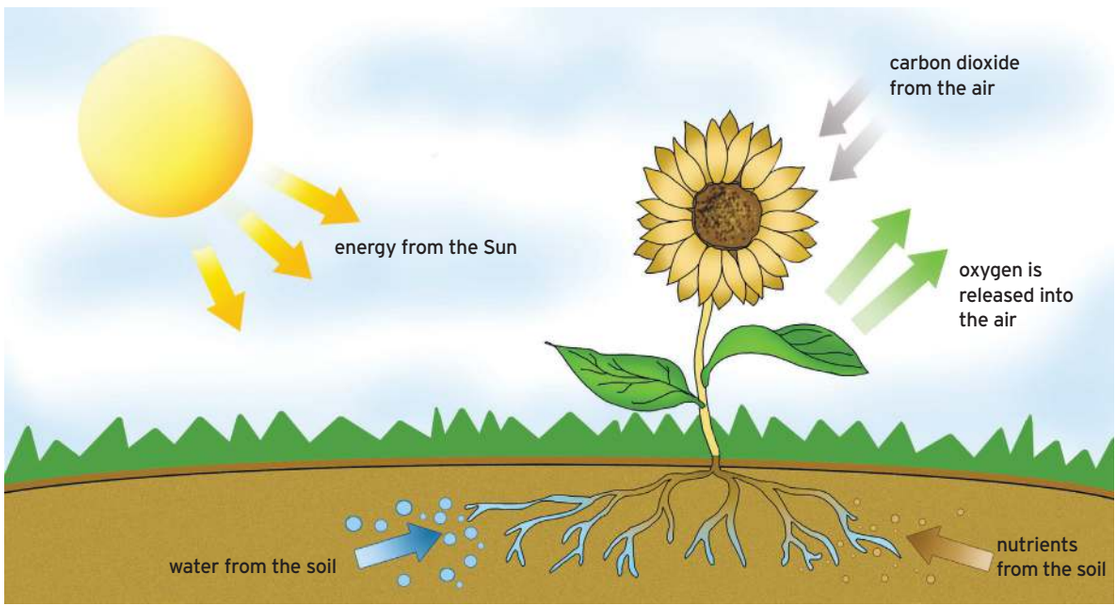
WHAT DO YOU ALREADY KNOW?

Work on your own.

1. List three things plants need to make food.
2. What would happen to life on Earth if there was no Sun?

Keywords
photosynthesis
glucose
starch

Plants make their own food (glucose sugar) by a process called **photosynthesis**. Photosynthesis mainly takes place in the leaves of green plants. During photosynthesis the plant uses energy from the Sun, carbon dioxide (from the air) and water to make **glucose** sugar. Plants change some of the glucose sugar into **starch** which they store in their leaves, stems, roots, flowers, fruits and seeds.



The process of photosynthesis

Keyword
chlorophyll

FLASH FACTS >>

Plants: nature's food factories
The cells of green plants contain a green pigment or colouring called **chlorophyll**. Chlorophyll has the ability to absorb the energy from the Sun and to convert it to chemical potential energy. This energy is stored in different parts of the plants, which people and other animals can then eat as food.

Activity 1: Draw and write about photosynthesis

Work on your own.

1. Using what you have learnt so far, draw a mind map that shows what happens during photosynthesis.
2. What are the three things that plants need to make their own food?
3. Where do plants store their food?

Activity 2: Compare glucose sugar (such as glucose sweets) and starch (such as maize flour)

Work in groups.

1. Your teacher will give each group some glucose sugar and starch to examine.
2. Take turns to carefully examine each item. Pay attention to their colour and their taste.

Work on your own.

3. Draw a table like the one given below in which you compare the glucose and the starch.

	Colour	Taste
Glucose		
Starch		

We can use iodine solution to test for starch in food. When you place a few drops of iodine solution on starch, the starch will change from brown to blue-black.

SAFETY FIRST

Iodine is dangerous and stains the skin. Do not touch it with your bare hands! Wear gloves to protect your hands.

Activity 3: Use iodine solution to test foods for starch

Work in small groups.

This activity is divided into two parts.

Part 1: Use iodine solution

Your teacher will give you some starch and iodine solution.

1. Place a drop of the iodine solution on the starch.
2. What colour does the starch change to?
3. What has this test shown you?

Part 2: Test foods for starch

Your teacher will give you some cooked rice, flour, potato, bread, oil, boiled egg and cheese.

1. Which of these food products do you think contains starch? Write down your answers.
2. Place a drop of iodine solution on each of the food products. Observe and record the colour change.
3. Compare your observation with what you wrote in Question 1.
4. Were you correct in all the cases?
5. What have you learnt from this investigation?

FLASH FACTS >>

Many foods that come directly from plants contain starch, while foods that come directly from animals do not contain starch.

Unit 1.2 Plants and air

Keywords
carbon dioxide
oxygen

During photosynthesis plants use **carbon dioxide** from the air and give **oxygen** back to the air. Animals, including people, use the oxygen from the air for breathing and give off carbon dioxide which is used by plants for photosynthesis. Plants also use some of the oxygen they produce during photosynthesis.

Activity 4: Plants produce oxygen

Work in small groups.

What you need

- one small plant
- two candles
- matches
- two bell jars
- two rubber stoppers
- Vaseline.

Note: If you don't have bell jars, you can use any open-ended transparent container like a plastic 2-litre cooldrink bottle with the bottom neatly cut off.

Set up the apparatus as shown in the diagram below.

Before the experiment

After the experiment

SAFETY FIRST

Remember to handle the matches and lit candles safely.

What you need to do

- Light the candles.
- Place Vaseline around the edges of the two bell jars.
- Place one of the bell jars over a candle.
- Place the second bell jar over the candle and the plant.
- Let the apparatus stand for a few hours and observe what happens.
- Record your observations and answer the following questions:
  1. What happened in the bell jar without a plant?
  2. What happened in the bell jar with a plant?
  3. Explain what happened in both bell jars.
  4. Why is it important for the bell jars to be sealed with Vaseline?

Testing for carbon dioxide

In the following activity you will use clear lime water to test for carbon dioxide. When carbon dioxide reacts with clear lime water, the water becomes milky.

Activity 5: Test for carbon dioxide

Work with another learner.

What you need

- clear lime water in a glass beaker or transparent container
- a straw.

1. Use the straw to blow some air into the clear lime water.
2. What happens to the colour of the lime water?
3. What can we conclude from this test?

Topic 2 Nutrients in food

5 1/4 hours

Unit 2.1 Food groups

Keywords
food groups
balanced diet

In this unit, you are going to learn about foods from different **food groups** that your body needs in order to grow well. You will also learn how to combine these food groups in a **balanced diet** that will help to protect your body against diseases. But before we find out more about food groups and balanced diets, let's see what you already know about food.

WHAT DO YOU ALREADY KNOW?

Work with another learner.

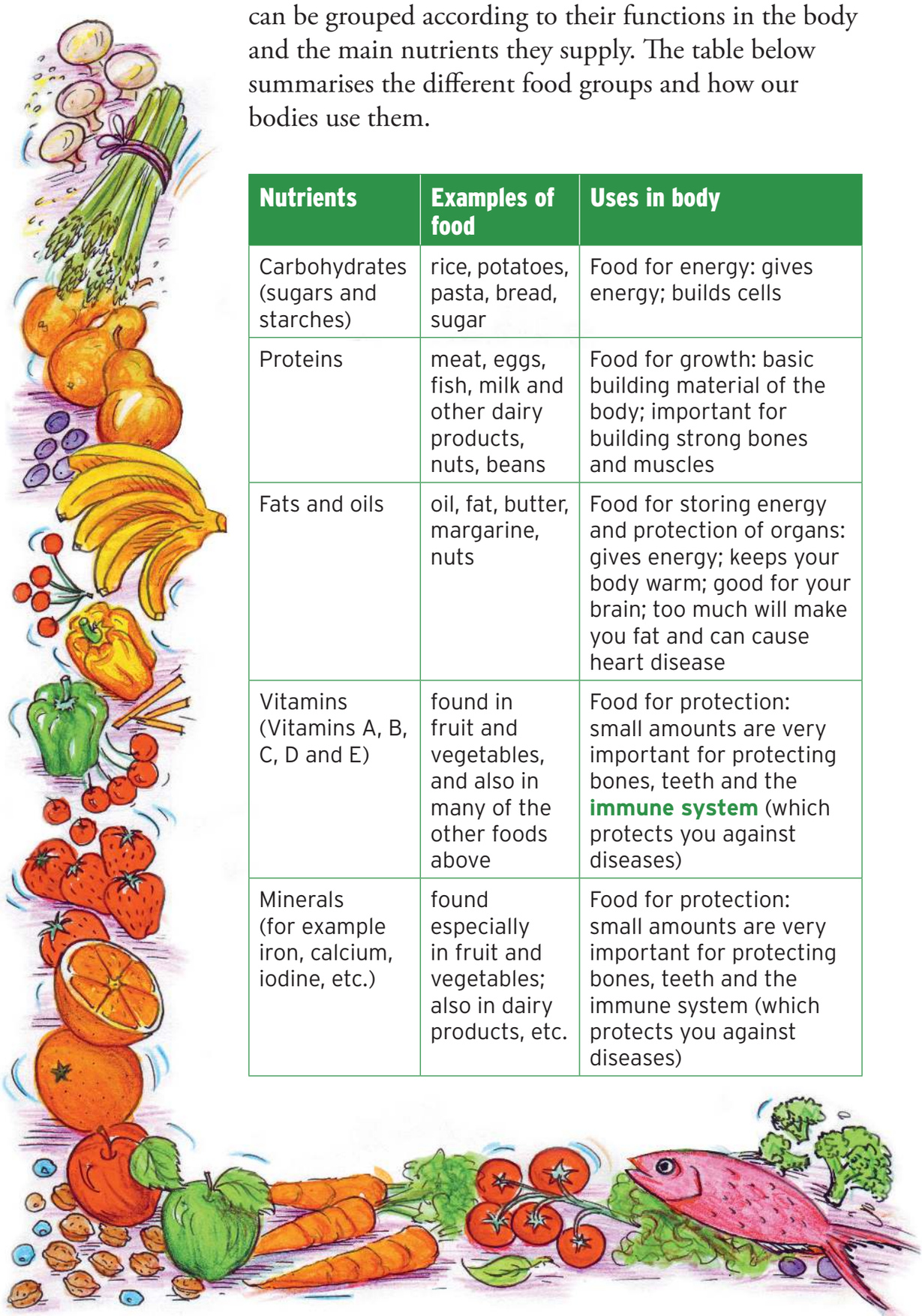
1. Look at the drawing above. Do you think this girl always eats food that is good for her? Why do you think so?
2. Now look at the drawing below. Answer these questions and give reasons for your answers.
   a) Which child eats healthy food?
   b) Which child eats unhealthy food?
   c) Does healthy or unhealthy food give you more energy? Why do you think so?

Keyword
immune system

Classification of food types

We need to eat different types of food so that our bodies can get all the nutrients we need to be healthy. Foods can be grouped according to their functions in the body and the main nutrients they supply. The table below summarises the different food groups and how our bodies use them.

Nutrients	Examples of food	Uses in body
Carbohydrates (sugars and starches)	rice, potatoes, pasta, bread, sugar	Food for energy: gives energy; builds cells
Proteins	meat, eggs, fish, milk and other dairy products, nuts, beans	Food for growth: basic building material of the body; important for building strong bones and muscles
Fats and oils	oil, fat, butter, margarine, nuts	Food for storing energy and protection of organs: gives energy; keeps your body warm; good for your brain; too much will make you fat and can cause heart disease
Vitamins (Vitamins A, B, C, D and E)	found in fruit and vegetables, and also in many of the other foods above	Food for protection: small amounts are very important for protecting bones, teeth and the **immune system** (which protects you against diseases)
Minerals (for example iron, calcium, iodine, etc.)	found especially in fruit and vegetables; also in dairy products, etc.	Food for protection: small amounts are very important for protecting bones, teeth and the immune system (which protects you against diseases)



Let's find out a bit more now about the different food groups.

Keywords
carbohydrates
sugar
proteins
insulate

Carbohydrates: Food for energy and growth

Food such as potatoes, rice and maize porridge are rich in starch, which is a form of the food group called **carbohydrates**. **Sugar** is also a kind of carbohydrate. Our bodies burn carbohydrates for energy, and they help with building cells. However, if we eat more sugar and starch than our bodies can burn through our daily activities, the extra energy is also stored as fat in the body. Other examples of carbohydrates include pasta, barley, bananas, oats and corn.

Proteins: Food for growth

Proteins are very important for the normal growth and development of cells that are the building blocks of all living things. They also ensure that the cells work correctly. Growing children and pregnant women need a little more protein than other people, to help them develop properly. Examples of protein include meat, fish, cheese, milk, yoghurt, eggs, nuts and seeds, peas, lentils, beans, soya beans, rice, lentils and dried beans.

Fats and oils: Food for storing energy and the protection of organs

Fats and oils are rich sources of energy for people and animals. If we take in more fats and oils than our bodies can burn up through our daily activities, the extra energy is stored as fat in the body. When extra energy is needed again, the fat is broken down in the body and the energy is made available for the body to do work. However, you will also learn that storing too much fat in your body can be very bad for your health.

Animals, such as polar bears that live in the icy regions of the North and South Poles, have thick layers of fat under their skins to **insulate** them from the cold.

FLASH FACTS >>

Fast foods such as hamburgers, chips and boerewors rolls, are often fried in fat. These foods can make you gain weight. Being overweight can lead to many health problems. Choosing healthier foods and getting more exercise will give you more energy to enjoy life.

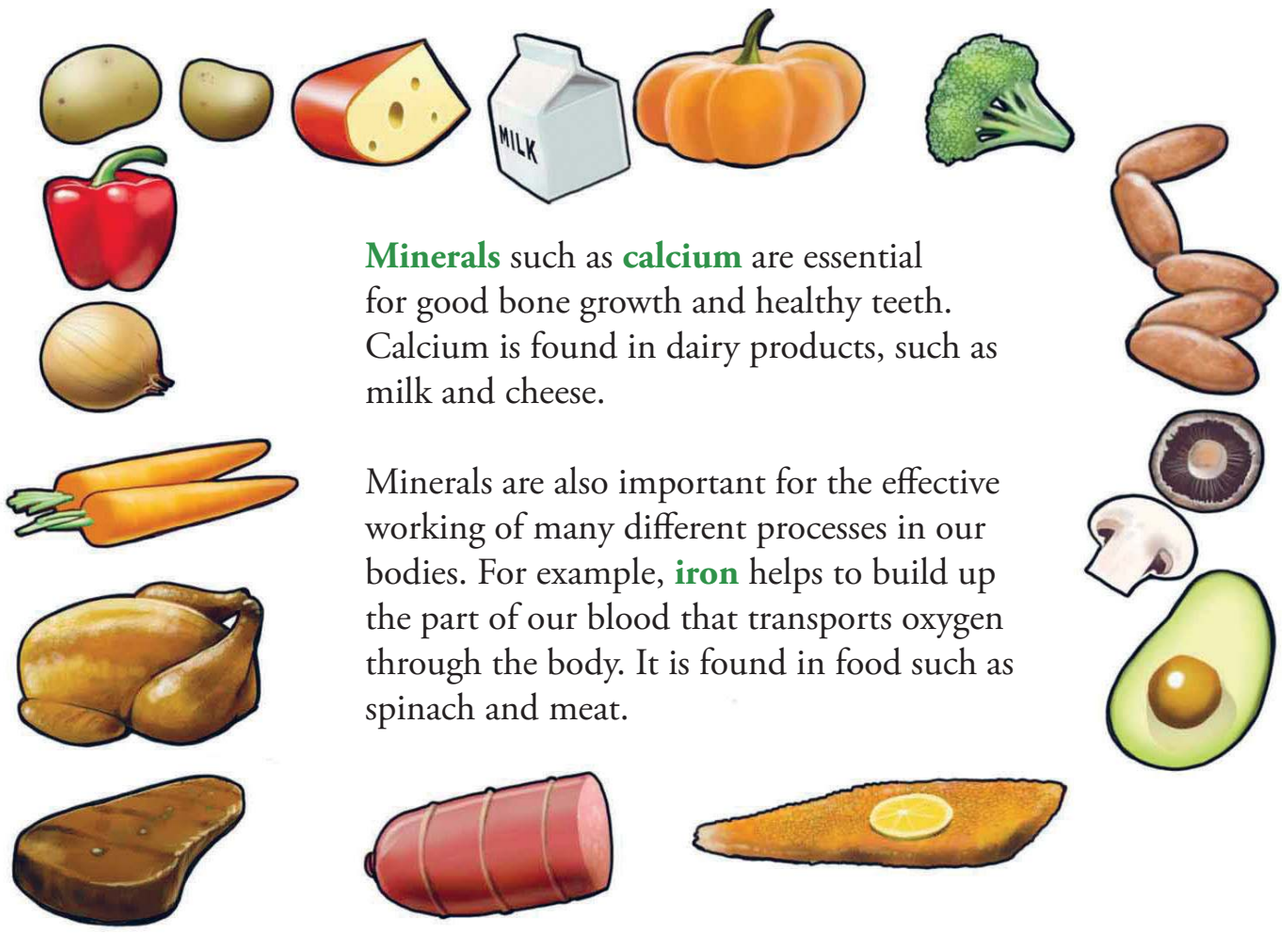
Fats insulate the bodies of humans and animals against cold. Under the skin there is a thin layer of fat which protects the body against low temperatures. Fat people are better insulated against the cold than thin people.

Fats also protect different organs in the body from damage caused by falls and bumps. For example, your eyes are protected by fat tissue. Some examples of fats and oils include margarine, cooking oil and butter.

Vitamins and minerals: Foods for protecting bones, teeth and the immune system

Keywords
minerals
calcium
iron

Vitamins and minerals are found in many different types of food, but especially in fresh fruits and vegetables. Bright red, yellow and green fruit and vegetables have the most vitamins and minerals.



Minerals such as **calcium** are essential for good bone growth and healthy teeth. Calcium is found in dairy products, such as milk and cheese.

Minerals are also important for the effective working of many different processes in our bodies. For example, **iron** helps to build up the part of our blood that transports oxygen through the body. It is found in food such as spinach and meat.

Keywords
vitamins
infection
scurvy

Vitamins also have many functions in keeping our bodies working well. They are especially important in strengthening our immune system, which helps our bodies to fight germs.

Fresh fruit such as strawberries, oranges and guavas, as well as leafy green vegetables and tomatoes all contain Vitamin C. This is a vitamin that protects our bodies from **infection**.

Fruit and vegetables that are rich in Vitamin C prevent a disease called **scurvy**. This disease can cause bleeding gums, weakness and even death.

FLASH FACTS >>

Long ago when people travelled around the world on slow ships, many people died from scurvy on the ships because they did not have fresh food, such as oranges, that contained Vitamin C.

The oranges and other fruit and vegetables at this farm stall are rich in vitamins and minerals that help to protect our bodies against diseases.

Most natural foods contain a mixture of more than one nutrient group. Let us look at meat as an example. Meat is a good source of protein as well as the mineral iron. Lentils are also a good source of protein and carbohydrates. Can you think of others?

Dairy products such as milk, butter, cheese, and fats and oils such as nuts, margarine and oils contain Vitamins A, D, E and K. They are also rich sources of protein and fats and oils.