Science@School | Book 5A

Keeping healthy

Teacher's Guide

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The pupil book explained unit by unit

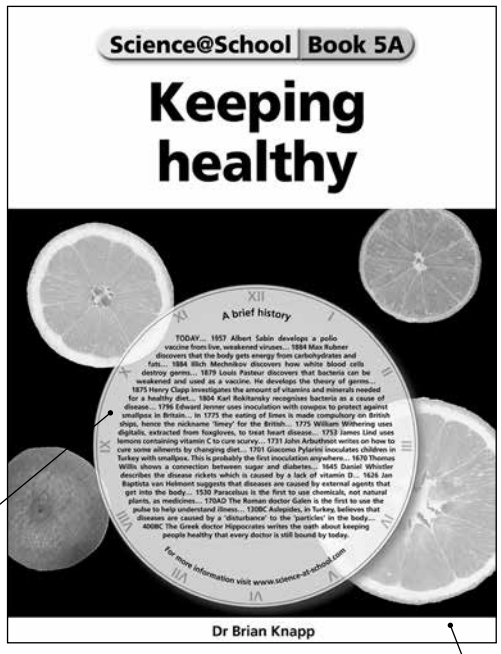
Although the pupil book – *Keeping healthy* – is clear and simple, a great deal of care and thought has been given to the structure and the content of each double page spread or unit. The worksheets and activities in this *Teacher's Guide* also link directly to the pages in *Keeping healthy*.

It is possible to use *Keeping healthy,* and the worksheets and activities, without reading this section, but we would strongly recommend that you take a short time to familiarise yourself with the construction of the pupil book.

The units are arranged in sequence, to help you with your lesson planning. In this section, a brief description of the content of each unit is given, together with hints on how to start or support it. List 1 (Starting a unit with a demonstration) on page 11 sets out the resources that you could use to do the demonstrations where suggested. The activity associated with each unit is also briefly described to help you see how the unit and activity work together.

Title page

The book begins on the title page (page 1). Here you will find information about science and technology in the form of a clock. You may want to use this to set the scene for the study of the book's contents. You may choose to focus on an event which ties in with your work in history, before moving onto the rest of the book. Alternatively, you may wish to skip over this page and return to it later. It is not a core part of the book, but helps the children see how the work they are doing now fits in with the work of scientists and engineers in the past. It may also be used to stimulate more able pupils to research the people and events that are described here.



A time clock giving additional historical information about the topic.

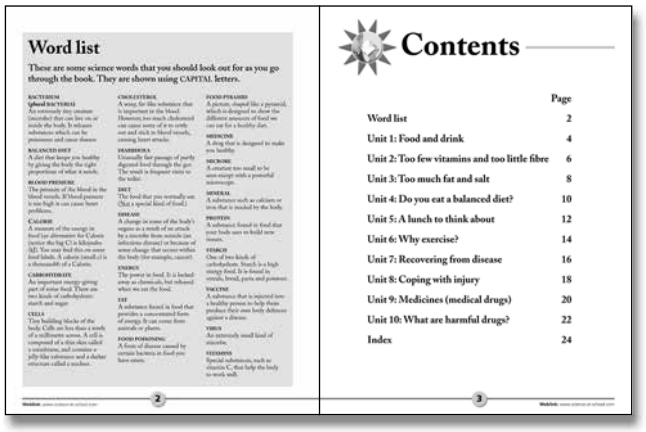
This picture shows a selection of citrus fruits, rich in vitamin C and used to cure scurvy – an early medical success in the 18th century.

Word list and contents

The core content of the book begins with a word list on page 2. This is a glossary, brought to the front for the pupils' attention. Pupils could be encouraged to look at the list and see how many of the words they already recognise.

One of the important things about science is the precision with which words are used. However, many scientific words are also common words, often used in a slightly different way from how they would be used in science. The word list presents the opportunity for pupils to consider the words they already know, and the meanings they are familiar with.

When your teaching unit has been completed, you may want to invite pupils to revisit this list and see if their understanding of the words has been enhanced or changed in any way. A visual dictionary is also given on the CD.



The entire contents are shown on page 3. It shows that the book is organised into double page spreads. Each double page spread covers one unit.

The units

Heading and introduction

Each unit has a heading, below which is an introductory sentence that sets the scene and draws out the most important theme of the unit.

Body

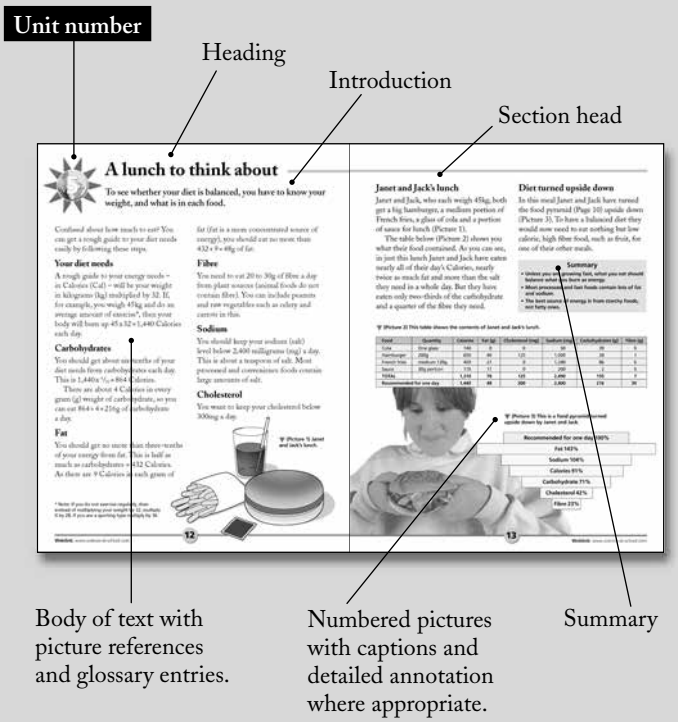
The main text of the page then follows in a straightforward, easy-to-follow, double column format.

Words highlighted in bold capitals in the pupil book are defined in the word list on page 2. A visual dictionary is also given on the CD.

The glossary words are highlighted on the first page on which they occur. They may be highlighted again on subsequent pages if they are regarded as particularly important to that unit.

Summary

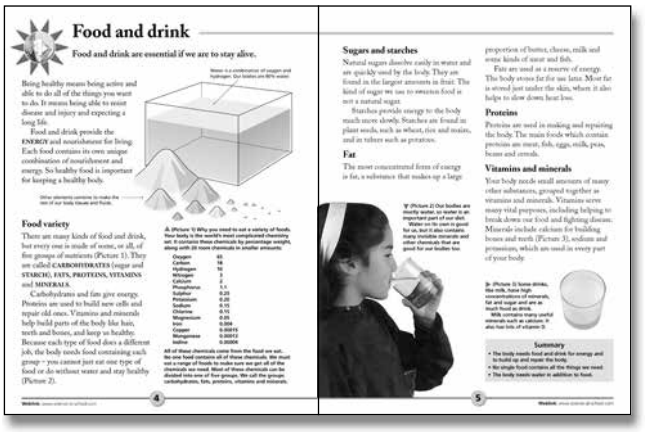
Each unit concludes with a summary, highlighting and reinforcing the main teaching objectives of the unit.



1 Food and drink

You may like to begin by asking the children to sit comfortably, fold their arms across their chests and look at the fingernails of one hand. Ask the children if they can feel their bodies move. They should answer that they can feel movement as they breathe. Ask them if they can see their fingernails growing. They should reply that they can't. Tell the children that it is easy to detect the use of energy in the body but more difficult to detect growth because it takes place much more slowly. Finish by telling the children that the energy used for breathing and the materials used for growth both come from the same place – food.

The unit begins by considering some aspects of being healthy, then moves on to show that food and drink provide the energy and nourishment the body needs. The five nutrient groups of carbohydrates, fats, proteins, vitamins and minerals are described. Examples of carbohydrates, fats and proteins are given to help easy identification of the foods, and the need to eat a variety of foods is emphasised. The unit ends by considering drinks – their water content and the minerals they possess.


Food and drink

Food and drink are essential if we are to stay alive.

Being healthy means being active and able to do all of the things you want to do. It means being able to resist disease and injury and expecting a long life.

Food and drink provide the ENERGY and nourishment for living. Each food contains its own unique combination of nourishment and energy. So healthy food is important for keeping a healthy body.

Food variety

There are many kinds of food and drink, but every one is made of some, or all, of five groups of nutrients (Picture 1). They are called CARBOHYDRATES (sugar and STARCH), FATS, PROTEINS, VITAMINS and MINERALS.

Carbohydrates and fats give energy. Proteins are used to build new cells and repair old ones. Vitamins and minerals help build parts of the body like hair, teeth and bones, and keep us healthy. Because each type of food does a different job, the body needs food containing each group – you cannot just eat one type of food or do without water and stay healthy (Picture 2).

Sugars and starches

Natural sugars dissolve easily in water and are quickly used by the body. They are found in the largest amounts in fruit. The kind of sugar we use to sweeten food is not a natural sugar.

Starches provide energy to the body much more slowly. Starches are found in plant seeds, such as wheat, rice and maize, and in tubers such as potatoes.

Fat

The most concentrated form of energy is fat, a substance that makes up a large proportion of butter, cheese, milk and some kinds of meat and fish.

Fats are used as a reserve of energy. The body stores fat for use later. Most fat is stored just under the skin, where it also helps to slow down heat loss.

Proteins

Proteins are used in making and repairing the body. The main foods which contain proteins are meat, fish, eggs, milk, peas, beans and cereals.

Vitamins and minerals

Your body needs small amounts of many other substances, grouped together as vitamins and minerals. Vitamins serve many vital purposes, including helping to break down our food and fighting disease. Minerals include calcium for building bones and teeth (Picture 3), sodium and potassium, which are used in every part of your body.

Summary

- The body needs food and drink for energy and to build up and repair the body.
- No single food contains all the things we need.
- The body needs water in addition to food.

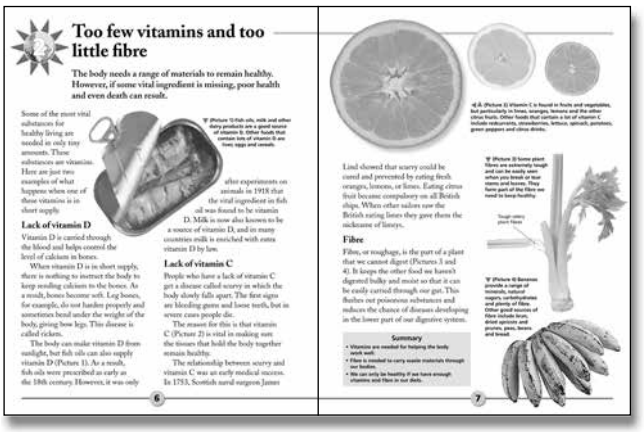
4 5

In the complementary work, the children can measure the rate of growth of their hair and examine the label on a tin of baby milk to see the wide range of nutrients. In the activity, the children examine their food and drinks and sort them into appropriate food groups.

2 Too few vitamins and too little fibre

You may like to begin by setting out three groups of food. In the first group should be pilchards, sardines, milk, eggs and cereal. In the second group should be citrus fruits, blackcurrant juice, green peppers, potatoes and lettuce. In the third group should be bananas, dried apricots, prunes and celery. Ask the children if they eat foods from group one, and tell them that if they do, they are protecting themselves against poor bone growth. Ask the children if they eat foods from group two, and tell them that if they do they are protecting themselves against a disease called scurvy. Ask the children if they eat foods from group three, and tell them that if they do they are helping their digestive system move food through their bodies.

The unit begins by making the point that a lack of certain nutrients from the diet can cause ill health and even death. The text moves on to describe vitamin D and how it affects the body. In the section on vitamin C, an account of scurvy is given and the work of James Lind is described. The unit ends by discussing the role of fibre in the body.


Too few vitamins and too little fibre

The body needs a range of materials to remain healthy. However, if some vital ingredient is missing, poor health and even death can result.

Some of the most vital substances for healthy living are needed in only tiny amounts. These substances are vitamins. Here are just two examples of what happens when one of these vitamins is in short supply.

Lack of vitamin D

Vitamin D is carried through the blood and helps control the level of calcium in bones.

When vitamin D is in short supply, there is nothing to instruct the body to keep sending calcium to the bones. As a result, bones become soft. Leg bones, for example, do not harden properly and sometimes bend under the weight of the body, giving bow legs. This disease is called rickets.

The body can make vitamin D from sunlight, but fish oils can also supply vitamin D (Picture 1). As a result, fish oils were prescribed as early as the 18th century. However, it was only after experiments on animals in 1918 that the vital ingredient in fish oil was found to be vitamin D. Milk is now also known to be a source of vitamin D, and in many countries milk is enriched with extra vitamin D by law.

Lack of vitamin C

People who have a lack of vitamin C get a disease called scurvy in which the body slowly falls apart. The first signs are bleeding gums and loose teeth, but in severe cases people die.

The reason for this is that vitamin C (Picture 2) is vital in making sure the tissues that hold the body together remain healthy.

The relationship between scurvy and vitamin C was an early medical success. In 1753, Scottish naval surgeon James Lind showed that scurvy could be cured and prevented by eating fresh oranges, lemons, or limes. Eating citrus fruit became compulsory on all British ships. When other sailors saw the British eating limes they gave them the nickname of limeys.

Fibre

Fibre, or roughage, is the part of a plant that we cannot digest (Pictures 3 and 4). It keeps the other food we have/e digested bulky and moist so that it can be easily carried through our gut. This flushes out poisonous substances and reduces the chance of diseases developing in the lower part of our digestive system.

Summary

- Vitamins are needed for helping the body work well.
- Fibre is needed to carry waste materials through our bodies.
- We can only be healthy if we have enough vitamins and fibre in our diets.

6 7

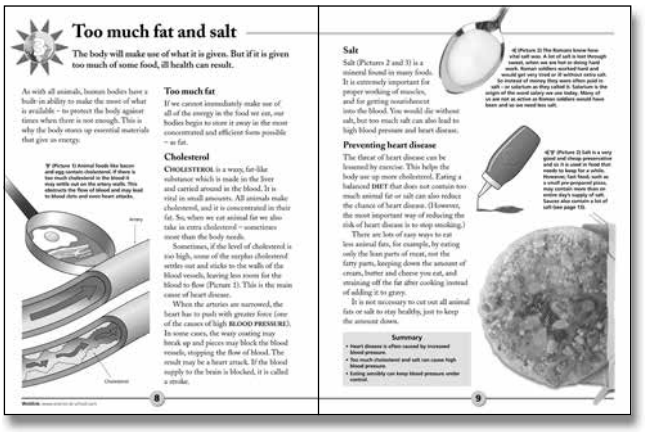
In the complementary work, the children can make a collection of labels from cereal packets to discover their vitamin content. They can also collect labels from fruit juices to find those with added vitamin C. In the activity, the children examine some celery, then mash it up and look at the effect of this work on the celery fibres.

Too much fat and salt

You may like to begin by asking some children to walk down a path between two rows of tables. Tell the class that these children are model blood cells, and the path between the table is a blood vessel called an artery. Now ask a few children to stand by the tables so that they partially block the path. Ask the 'blood cells' to move down the 'artery' again. This time they will have to move more slowly to get round the obstacles. Tell the 'obstacles' that they are lumps of cholesterol but to find out more about themselves they will have to read page 8.

The unit begins by explaining that all animal bodies can store materials containing energy. They do this in case the materials are not available in the future. Every animal has an energy store called fat. In the fat is a substance called cholesterol, which our bodies need in small amounts. If there is too much fat in the diet the cholesterol coats the arteries and causes problems with circulation, as the children showed in the model.

The text moves on to talk about the importance of salt in the diet and explains that an excess of salt in


Too much fat and salt

The body will make use of what it is given. But if it is given too much of some food, ill health can result.

Too much fat

Cholesterol

Salt

Preventing heart disease

Summary

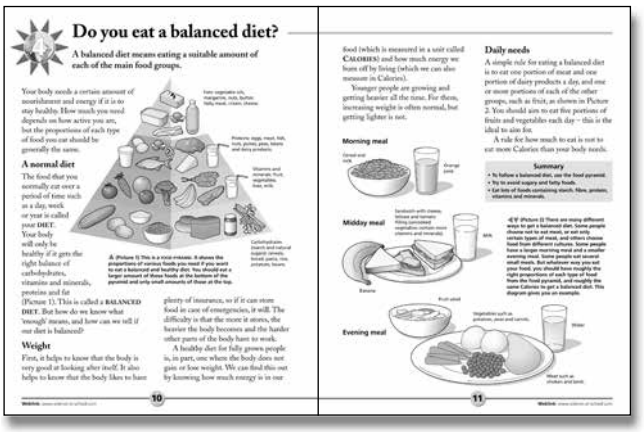
the body can lead to heart disease. The unit ends by showing how these twin dangers to health can be easily reduced in the diet so that heart disease can be prevented.

In the complementary work, the children can survey frozen food for salt content. In the activity, the children test a range of foods for fat.

Do you eat a balanced diet?

You may like to begin by drawing a large pyramid on the board. Divide it into four layers. Tell the class that you can arrange all foods into a pyramid. Those which should be eaten in only small amounts are put in the top layer and those which can be eaten in large amounts are put in the bottom layer. Hold up a range of foods and ask the children to suggest which layer they belong to. Try these foods: butter, fatty meat, lean meat, apple, carrot, potato and rice. Tell the children they can now compare their food pyramid with the one in the pupil book.

The unit begins by explaining that the body needs certain amounts of different kinds of food. The text moves on to establish the concept of the diet and the balanced diet. The text points out that a balanced diet should not cause a weight increase in adults, but children naturally increase in weight as they grow. There is a colourful food pyramid which the pupils can use to check their answers on the board. An example of three healthy meals for a day is illustrated. The children can use these pictures


Do you eat a balanced diet?

A balanced diet means eating a suitable amount of each of the main food groups.

A normal diet

Weight

Daily needs

Summary

Morning meal

Midday meal

Evening meal

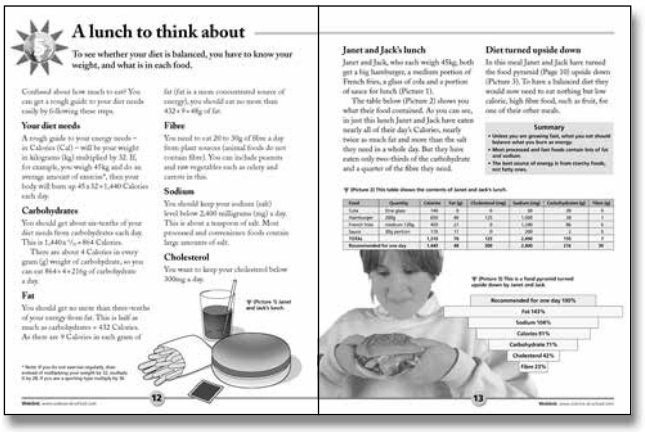
to assess the balance of their own meals. The unit ends with a simple rule for eating a balanced diet.

In the complementary work, the children can make their own food pyramid and compare it with the one on page 10. In the activity, the children plan and carry out a survey into the lunches eaten by all the children in the school.

A lunch to think about

You could begin by reinforcing the idea that food contains energy. This could be done by putting the end of a piece of spaghetti in a candle flame then holding it up to show that it burns like a match. You could tell the children that just as wood in a match is used for fuel, so starch in spaghetti is used as an energy store, or fuel, for the body. You could also point out that the candle wax is a concentrated store of energy just like fat. You may finish by saying that if the body does not immediately use all the energy in its food, that energy is stored in the body as fat.

The unit begins by showing how to calculate a person's energy needs. All that is needed is the person's weight. The text then moves on to show how much energy the person needs to obtain from carbohydrates and gives the number of calories per weight of carbohydrates. You may wish to demonstrate this by reference to yourself or a volunteer and have some scales and a bag of potatoes ready to weigh out. The amount of fat needed can also be calculated, and you may like to demonstrate this by weighing out some butter.


A lunch to think about

To see whether your diet is balanced, you have to know your weight, and what is in each food.

Your diet needs

Carbohydrates

Fat

Fibre

Sodium

Cholesterol

Janet and Jack's lunch

Diet turned upside down

Summary

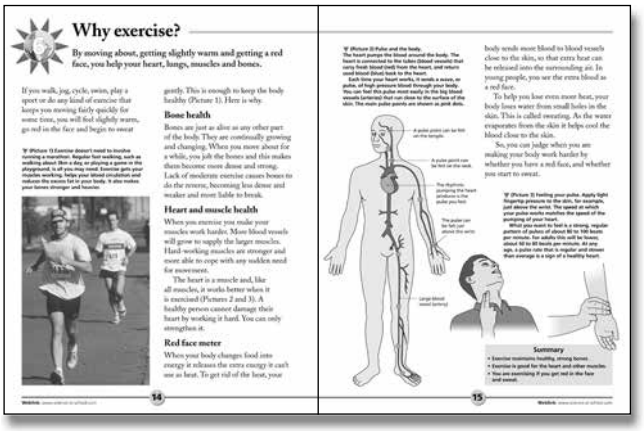
The daily requirements of fibre, salt and cholesterol also feature and the unit ends by considering a very unhealthy lunch and showing it to be a food pyramid turned upside down.

In the complementary work, the children can perform a simple investigation to see how much salt is shaken onto a meal. In the activity, the children use information about two diets to assess the healthiness of their own.

Why exercise?

You could begin by asking the children to clench their right fists. Tell them that this is about the size of their heart. Ask the children to hold their fists in the centre of their chests and tell them that their heart is behind it. Ask the children if they would like to hear their heart and produce a simple stethoscope. Let volunteers listen to their hearts while the rest of the class is silent. Let one person listen to the heart of another. Tell the children that the heart is a muscle which pushes the blood around the body. It contracts and relaxes just like the muscles in the arm, but makes these changes about seventy times a minute. Tell them that one way to keep the heart muscle healthy is to exercise the whole body.

The unit begins by introducing different forms of exercise, and describes how exercise affects the body. The text moves on to describe how exercise improves the strength of the bones, muscles and heart. The way the pulse is taken is clearly illustrated, and nine pulse points on the body are shown. The unit ends by describing how sweat prevents the body temperature from rising.


Why exercise?

By moving about, getting slightly warm and getting a red face, you help your heart, lungs, muscles and bones.

Bone health

Heart and muscle health

Red face meter

Summary

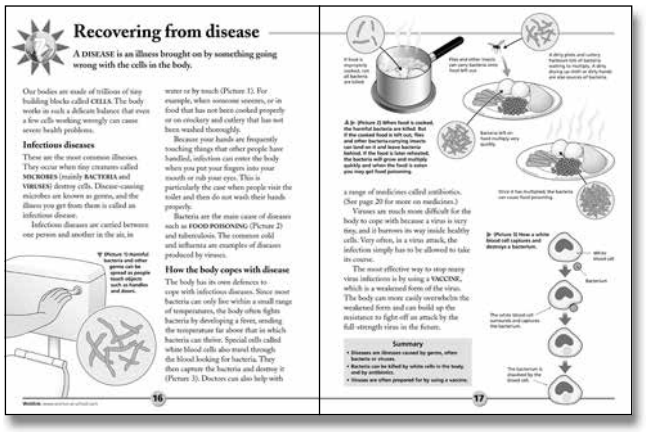
In the complementary work, the children can use a simple stethoscope to listen to how the heart-beat changes during exercise. They can also use secondary sources to find out about the circulation of the blood, and exercises used when sportsmen and women train. In the activity, the children investigate how the pulse rate changes with exercise.

Recovering from disease

You could begin by coating your hand in water-based paint. Tell the children that the paint represents germs living on your skin because you have not washed your hands for weeks. Ask a child to shake your hand. Show the class that some of your 'germs' have moved onto the hand of the other person. Ask the child to shake hands with another child and show how some of the 'germs' pass on. Let the children shake hands with others in the class to show how an infectious disease can spread.

The unit begins by stating that the body is made of trillions of cells, but if only a small number are damaged we can suffer from a disease. The text moves on to describe infectious diseases and introduces the words 'germ', 'bacteria' and 'virus'. The importance of washing hands after visiting the toilet is emphasised, and the role of flies and reheating food in food poisoning is described.

The ability of the body to defend itself against bacteria is then described. The body's defences include raising the body temperature to produce a fever, and attacking the bacteria with white blood



Recovering from disease

A DISEASE is an illness brought on by something going wrong with the cells in the body.

Our bodies are made of trillions of tiny building blocks called CELLS. The body works in such a delicate balance that even a few cells working wrongly can cause severe health problems.

Infectious diseases

These are the most common illnesses. They occur when tiny creatures called MICROBES (mainly BACTERIA and VIRUSES) destroy cells. Disease-causing microbes are known as germs, and the illness you get from them is called an infectious disease.

Infectious diseases are carried between one person and another in the air, in water or by touch (Picture 1). For example, when someone sneezes, or in food that has not been cooked properly or on crockery and cutlery that has not been washed thoroughly.

Because your hands are frequently touching things that other people have handled, infection can enter the body when you put your fingers into your mouth or rub your eyes. This is particularly the case when people visit the toilet and then do not wash their hands properly.

Bacteria are the main cause of diseases such as FOOD POISONING (Picture 2) and tuberculosis. The common cold and influenza are examples of diseases produced by viruses.

How the body copes with disease

The body has its own defences to cope with infectious diseases. Since most bacteria can only live within a small range of temperatures, the body often fights bacteria by developing a fever, sending the temperature far above that in which bacteria can thrive. Special cells called white blood cells also travel through the blood looking for bacteria. They then capture the bacteria and destroy it (Picture 3). Doctors can also help with a range of medicines called antibiotics. (See page 20 for more on medicines.)

Viruses are much more difficult for the body to cope with because a virus is very tiny, and it burrows its way inside healthy cells. Very often, in a virus attack, the infection simply has to be allowed to take its course.

The most effective way to stop many virus infections is by using a VACCINE, which is a weakened form of the virus. The body can more easily overwhelm the weakened form and can build up the resistance to fight off an attack by the full-strength virus in the future.

Summary

- Diseases are illnesses caused by germs, often bacteria or viruses.
- Bacteria can be killed by white cells in the body, and by antibiotics.
- Viruses are often prepared for by using a vaccine.

16

17

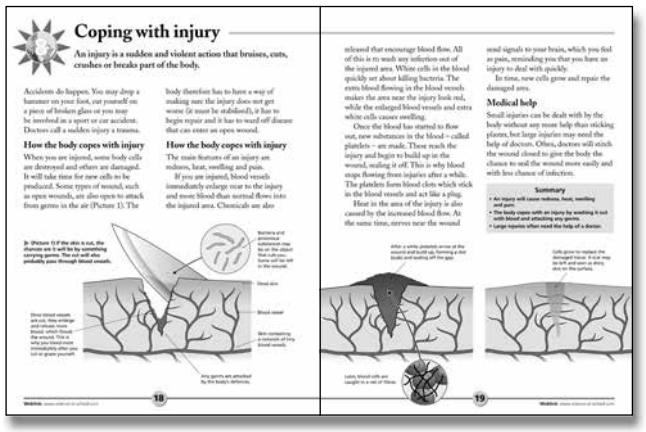
cells. The action of a white blood cell on a bacterium is clearly illustrated. The difficulty of combating viruses, due to their small size, is explained and the use of vaccines is described.

In the complementary work, the children can use secondary sources to find out about antibiotics and vaccines. In the activity, the children examine their diets to see if they are eating enough vitamins to protect them from disease.

Coping with injury

You may like to begin by asking the children about recent cuts, bumps and bruises. This survey might illustrate how frequently people experience minor body damage, and how many of the class have a minor injury at the moment. Ask the children to describe their minor injuries and record words such as 'pain', 'heat', 'swelling' and 'blood' on the board. Tell the children that they are now going to find out how these unpleasant features of wounds actually help the body recover.

The unit opens by describing a range of accidents, and introduces the word 'trauma' to describe a sudden injury. Large, clear illustrations show how the body is damaged when cut, and how it reacts to heal the wound. The main features of a wound – redness, heat, swelling and pain – are described and explained. The importance of keeping the wound clean and free from bacteria is emphasised, and the role of white blood cells in killing bacteria is described. The unit ends by



Coping with injury

An injury is a sudden and violent action that bruises, cuts, crushes or breaks part of the body.

Accidents do happen. You may drop a hammer on your foot, cut yourself on a piece of broken glass or you may be involved in a sport or car accident. Doctors call a sudden injury a trauma.

How the body copes with injury

When you are injured, some body cells are destroyed and others are damaged. It will take time for new cells to be produced. Some types of wound, such as open wounds, are also open to attack from germs in the air (Picture 1). The body therefore has to have a way of making sure the injury does not get worse (it must be stabilised), it has to begin repair and it has to ward off disease that can enter an open wound.

How the body copes with injury

The main features of an injury are redness, heat, swelling and pain.

If you are injured, blood vessels immediately enlarge near to the injury and more blood than normal flows into the injured area. Chemicals are also released that encourage blood flow. All of this is to wash any infection out of the injured area. White cells in the blood quickly set about killing bacteria. The extra blood flowing in the blood vessels makes the area near the injury look red, while the enlarged blood vessels and extra white cells causes swelling.

Once the blood has started to flow out, new substances in the blood – called platelets – are made. These reach the injury and begin to build up in the wound, sealing it off. This is why blood stops flowing from injuries after a while. The platelets form blood clots which stick in the blood vessels and act like a plug.

Heat in the area of the injury is also caused by the increased blood flow. At the same time, nerves near the wound send signals to your brain, which you feel as pain, reminding you that you have an injury to deal with quickly.

In time, new cells grow and repair the damaged area.

Medical help

Small injuries can be dealt with by the body without any more help than sticking plasters, but large injuries may need the help of doctors. Often, doctors will stitch the wound closed to give the body the chance to seal the wound more easily and with less chance of infection.

Summary

- An injury will cause redness, heat, swelling and pain.
- The body copes with an injury by washing it out with blood and attacking any germs.
- Large injuries often need the help of a doctor.

18

19

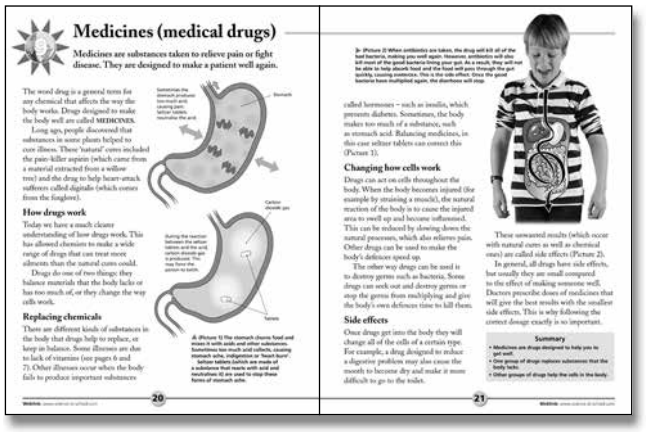
explaining why stitching shut a large wound helps the body to recover.

In the complementary work, the children could use secondary sources to find out about the work of doctors and nurses in an accident and emergency unit. In the activity, the children carry out an investigation to find out how the thickness of a bone affects its strength.

9 Medicines (medical drugs)

You could begin by showing the children a sprig of mint. Do not tell them what it is, but let them rub its leaves and then smell their fingers. Ask them to try and identify the smell. When the children have identified the plant, tell them that the mint plant was used in ancient times to help cure indigestion and that mint is still used for that purpose today, as well as being a flavouring for food. Show the children some other plants such as thyme, rosemary, sage and fennel. Let them rub their leaves and detect each plant's characteristic smell. Tell the children that these plants also had medicinal uses as well as being flavourings for food.

This unit begins by defining the word 'drug', and makes the meaning of the word 'medicine' clear. The text then moves on to explain that some of the first medicines came from plants such as the willow and the foxglove. It mentions that many medicines used today are made from chemicals. Then the ways in which drugs work are described.


Medicines (medical drugs)

Medicines are substances taken to relieve pain or fight disease. They are designed to make a patient well again.

The word drug is a general term for any chemical that affects the way the body works. Drugs designed to make the body well are called MEDICINES.

Long ago, people discovered that substances in some plants helped to cure illness. These 'natural' cures included the pain-killer aspirin (which came from a material extracted from a willow tree) and the drug to help heart-attack sufferers called digitalis (which comes from the foxglove).

How drugs work

Today we have a much clearer understanding of how drugs work. This has allowed chemists to make a wide range of drugs that can treat more ailments than the natural cures could.

Drugs do one of two things: they balance materials that the body lacks or has too much of, or they change the way cells work.

Replacing chemicals

There are different kinds of substances in the body that drugs help to replace, or keep in balance. Some illnesses are due to lack of vitamins (see pages 6 and 7). Other illnesses occur when the body fails to produce important substances

A (Picture 1) The stomach churns food and mixes it with acids and other substances. Sometimes too much acid collects, causing stomach ache, indigestion or 'heart-burn'. Seltzer tablets (which are made of a substance that reacts with acid and neutralises it) are used to stop these forms of stomach ache.

20

called hormones – such as insulin, which prevents diabetes. Sometimes, the body makes too much of a substance, such as stomach acid. Balancing medicines, in this case seltzer tablets can correct this (Picture 1).

Changing how cells work

Drugs can act on cells throughout the body. When the body becomes injured (for example by straining a muscle), the natural reaction of the body is to cause the injured area to swell up and become inflammed. This can be reduced by slowing down the natural processes, which also relieves pain. Other drugs can be used to make the body's deficient speed up.

The other way drugs can be used is to destroy germs such as bacteria. Some drugs can seek out and destroy germs or stop the germs from multiplying and give the body's own defences time to kill them.

Side effects

Once drugs get into the body they will change all of the cells of a certain type. For example, a drug designed to reduce a digestive problem may also cause the mouth to become dry and make it more difficult to go to the toilet.

These unwanted results (which occur with natural cures as well as chemical ones) are called side effects (Picture 2).

In general, all drugs have side effects, but usually they are small compared to the effect of making someone well. Doctors prescribe doses of medicines that will give the best results with the smallest side effects. This is why following the correct dosage exactly is so important.

Summary

- Medicines are drugs designed to help you to get well.
- One group of drugs replaces substances that the body lacks.
- Other groups of drugs help the cells in the body

21

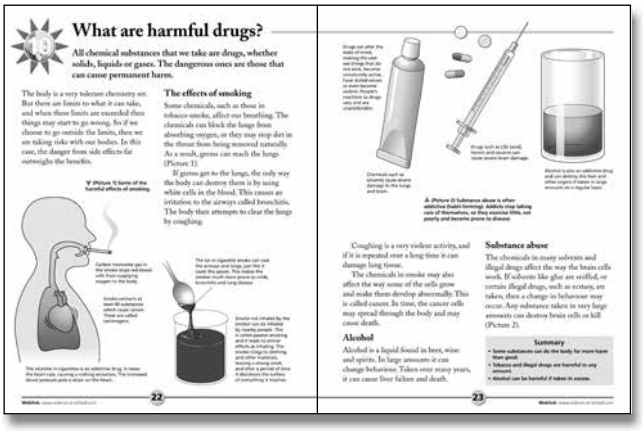
The unit ends by considering the side effects of drugs and emphasising that the correct dosage should be taken to keep side effects at a minimum.

In the complementary work, the children can use secondary sources to consider the range of everyday medicants such as foot powders and mouth washes. In the activity, the children investigate the way a seltzer tablet reacts with acid.

10 What are harmful drugs?

Pick up a pen and hold it vertically in one hand. Place the other hand about eight centimetres below it with the thumb and fingers apart. Release the pen, and catch it as soon as you can with the other hand. Tell the children that people are able to do this because of the speed at which their nerves work. Repeat the activity, but this time say the word 'one' before you try and grasp the pen. You may find the pen may only just be caught or may fall through the hand completely. Tell the children that harmful drugs, such as alcohol and illegal drugs, slow down the speed of the nerves just as you slowed down the action by saying the word one before you tried to grasp the pen. Let the children try the activity to appreciate how response time can be slowed down, and discuss how this could be dangerous.

The unit begins by explaining that the body has a limit to the amount of some substances it can tolerate. If the limit is exceeded, permanent damage may be done. The text moves on to describe in detail the effect of smoking and the harm caused by


What are harmful drugs?

All chemical substances that we take are drugs, whether solids, liquids or gases. The dangerous ones are those that can cause permanent harm.

The body is a very tolerant chemistry set. But there are limits to what it can take, and when these limits are exceeded then things may start to go wrong. So if we choose to go outside the limits, then we are taking risks with our bodies. In this case, the danger from the effects far outweighs the benefits.

The effects of smoking

Some chemicals, such as those in tobacco smoke, affect our breathing. The chemicals can block the lungs from absorbing oxygen, or they may stop dirt in the throat from being removed naturally. As a result, germs can reach the lungs (Picture 3).

If germs get to the lungs, the only way the body can destroy them is by using white cells in the blood. This causes an irritation to the airways called bronchitis. The body then attempts to clear the lungs by coughing.

▼ (Picture 3) Some of the harmful effects of smoking.

Carbon monoxide gas in the smoke stops red blood cells from supplying oxygen to the body.

Smoke contains at least 40 substances which cause cancer. These are called carcinogens.

The tar in cigarette smoke can coat the airways and lungs, just like it coats the spoon. This makes the smoker much more prone to colds, bronchitis and lung disease.

Smoke not inhaled by the smoker can be inhaled by others. This is called passive smoking and it leads to similar effects as inhaling. The smoke clings to clothing, hair and furniture, leaving a strong smell, and after a period of time it discolours the surface of everything it touches.

The nicotine in cigarettes is an addictive drug. It makes the heart race, causing a rushing sensation. The increased blood pressure puts a strain on the heart.

22

Coughing is a very violent activity, and if it is repeated over a long time it can damage lung tissue.

The chemicals in smoke may also affect the way some of the cells grow and make them develop abnormally. This is called cancer. In time, the cancer cells may spread through the body and may cause death.

Alcohol

Alcohol is a liquid found in beer, wine and spirits. In large amounts it can change behaviour. Taken over many years, it can cause liver failure and death.

Substance abuse

The chemicals in many solvents and illegal drugs affect the way the brain cells work. If solvents like glue are sniffed, or certain illegal drugs, such as ecstasy, are taken, then a change in behaviour may occur. Any substance taken in very large amounts can destroy brain cells or kill (Picture 2).

Summary

- Some substances can do the body far more harm than good.
- Tobacco and illegal drugs are harmful in any amounts.
- Alcohol can be harmful if taken in excess.

23

drinking large amounts of alcohol. The unit ends by considering the damage caused by using solvents and illegal drugs.

In the complementary work, the children could watch the demonstration of a smoking machine. In the activity, the children investigate breathing to make them aware of the process, and reflect on how their bodies could be damaged if they took up smoking.

Index

There is an index on page 24.

Using the pupil book and photocopiable worksheets

Introduction

There is a wealth of material to support the topic of keeping healthy in the pupil book and in the *Teacher's Guide*. On this and the following three pages, suggestions are made on how to use the worksheets and their associated teacher's sheets, and how to integrate them for lesson planning. On the page opposite you will find the resource lists for introductory demonstrations, the complementary work and the activity worksheets. The learning objectives are shown on pages 12 and 13.

Starting a unit

Each unit in the pupil book forms the basis for a lesson. You may like to start by reading it with the class, or begin with a demonstration (see List 1). Always begin the unit by reading the introductory sentences in bold type. This helps focus the class on the content of the unit and to prepare them for the work.

The first part of the main text introduces the content, which is then developed in the headed sections. The illustrations are closely keyed to the main text, and the captions of the illustrations develop the main text content.

With less skilled readers, you may prefer to keep to the main text and discuss the illustrations when they are mentioned. With more skilled readers, you may want to let them read the captions for themselves. Each unit ends with a summary. The children can use this for revision work. They can also use it to test their understanding by trying to explain the points made in the summary.

You can find the learning objectives for each unit of this *Teacher's Guide*.

The style and content of the unit also make it suitable for use in literacy work, where the needs of both English and science are met. You may wish to use the unit as a topic study in literacy work, or you may want to perform an activity in science time and follow it up with a study of the unit during literacy work.

Using the comprehension worksheets

Each unit in the pupil book has one photocopiable comprehension worksheet in this *Teacher's Guide* to provide a test. The learning objectives are for these comprehension worksheets and relate directly to the knowledge and understanding component of the science curriculum.

The comprehension worksheets begin with simple questions and have harder questions towards the end.

The worksheets may be used singly, after each unit has been studied, or they may be used along with other worksheets to extend the study.

The teacher's sheet, which is opposite the comprehension worksheet, shows the answers and background information to the unit. This teacher's sheet also carries a section on work complementary to the study topic. This work may feature research using other sources. It may also have value in literacy work.

Using the activity worksheets

The activities are designed to develop skills in scientific enquiry. The learning objectives for practical skills associated with each unit are given here. The activities may be small experiments, may focus on data handling or comprise a whole investigation.

Each activity section is a double page spread in this *Teacher's Guide*. On the left hand page is a photocopiable activity worksheet to help the children in practical work, or it may contain data for the children to use or interpret. The page opposite the worksheet is a teacher's sheet providing a step-by-step activity plan to help you organise your work. Each plan has a set of notes which provide hints on teaching or on the use of resources. The activity plan ends with a conclusion, which you may like to read first, to help you focus on the activity in your lesson planning.

Planning to use a unit

The materials in this pack are very flexible and can be used in a variety of ways. First, look at the unit and activity objectives. Next, read the unit in the pupil book, and the associated worksheet and activity units in this *Teacher's Guide*. Finally, plan how you will integrate the material to make one or more lessons. You may wish to add more objectives, or replace some of the activity objectives with some of your own.

Safety

The practical activities feature equipment made from everyday materials or available from educational suppliers. However, make sure you carry out a risk assessment, following the guidelines of your employer, before you do any of the practical activities in either the pupil's book or the *Teacher's Guide*.

Resources

The three lists below show the resources needed to support the photocopiable worksheets.

- List 1 shows resources for demonstrations suggested for starting a unit.
- List 2 gives resources needed for the complementary work featured on the teacher's sheet associated with each comprehension worksheet.
- List 3 details those resources needed for the 10 activity worksheets.

List 1 (Starting a unit with a demonstration)

▼ UNIT

1. Packets of snack foods (optional).
2. A collection of foods: sardines, pilchards, milk, eggs, cereals, citrus fruits, blackcurrant drink, strawberries, green peppers, potatoes, lettuce, celery, bananas, dried apricots, prunes.
3. Tables or desks.
4. A collection of food: butter, fatty meat, lean meat, apple, carrot, potato, rice.
5. A candle, a match and a piece of dry spaghetti.
6. A plastic or rubber tube and two funnels which fit in the ends of the tube.
7. Watercolour paint, brush, soap, access to a sink and towels.
8. –
9. A sprig of mint, sprigs of thyme, rosemary, sage and fennel.
10. Pen.

List 2 (Complementary work)

Each group will need the following items:

▼ UNIT

1. Ruler.
2. A collection of cereal packets, a collection of fruit-drink cans, cartons and bottles.
3. (a) Empty packets of frozen meals.
4. –
5. Bag of salt, teaspoon, two pieces of paper, salt cellar, plate.
6. (a) Simple stethoscope; (b) Secondary sources about the circulation of the blood; (c) Secondary sources about the exercises athletes use when they are training.
7. Secondary sources about antibiotics and vaccines.
8. Secondary sources about doctors and nurses in accident and emergency units.
9. Empty packets, bottles or tubes of the following substances: foot powders, antiseptic cream, mouthwash, toothpaste, spot treatment.
10. Smoking machine, cigarettes, matches, large space (for example, hall or playground).

List 3 (Activity worksheets)

Each group will need the following items:

▼ UNIT

1. –
2. Celery, plastic bowl, rolling pin or similar object (a mortar and pestle can be used as an alternative).
3. Sheets of paper, selection of foods – some containing fat and some not containing fat, lamp or bright window.
4. Access to other classes in the school.
5. –
6. Places to rest, walk and run, clock.
7. –
8. Sheets of paper, sticky tape, scale pan, weights, tables.
9. Vinegar, bicarbonate of soda, teaspoon, eggshell, two jars.
10. Tape measure or string and ruler, places to rest and run, clock.

Learning objectives

Comprehension worksheets

The table below shows the learning objectives for knowledge and understanding associated with each unit in the pupil book, using the comprehension worksheets in this *Teacher's Guide*:

Unit 1

- Food provides energy and nourishment for living.
- There are five groups of nutrients.
- Water is an important component of the diet.

Unit 2

- If the diet is deficient in a vitamin, the body may suffer from a deficiency disease.
- Fibre is needed to help the gut move undigested food.

Unit 3

- Too much fat in the diet can cause heart disease.
- Too much salt in the diet can cause heart disease.
- Cholesterol can coat the inside of the arteries and damage health.

Unit 4

- The food normally eaten over a period of time is called the diet.
- A balanced diet is needed for good health.
- There are many ways to achieve a balanced diet.

Unit 5

- Certain quantities of nutrients are needed in the diet.
- Calculations can be made to find nutritional requirements.
- Energy should be provided by starchy foods, not fatty ones.

Unit 6

- There is a range of healthy exercises.
- Exercise can make bones healthy.
- Exercise can make the heart and muscles healthy.

Unit 7

- Infectious diseases are spread by air, water and by touch.
- Diseases are caused by bacteria and viruses.
- The body can defend itself against germs but sometimes it needs help.

Unit 8

- An open wound can become infected.
- The body can repair its wounds.
- Large wounds need medical help.

Unit 9

- Medicines are designed to make the body well.
- Drugs change how cells work.
- A drug may have side effects.

Unit 10

- Health is affected by smoking.
- Alcohol can be harmful if taken in excess.
- Solvents and illegal drugs can cause great damage to the body.

Learning objectives

Activity worksheets

The table below shows the learning objectives for practical skills associated with each unit in the pupil book, using the activity worksheets in this *Teacher's Guide*:

Unit 1

- Sort items into groups.
- Fill in a table.
- Interpret data.

Unit 2

- Use simple equipment safely.
- Make careful observations.
- Make a prediction and compare it with a result.

Unit 3

- Use simple equipment safely.
- Follow simple instructions.
- Make a table and record results in it.
- Interpret data.

Unit 4

- Plan and carry out a survey.
- Handle data and present it in summary form.
- Evaluate an investigation.

Unit 5

- Make comparisons.
- Use knowledge and understanding in a practical situation.

Unit 6

- Plan and carry out an investigation.
- Repeat measurements where appropriate.
- Draw tables and record results in them.
- Identify a pattern.

Unit 7

- Handle data from previous work.
- Apply knowledge and understanding to the data.
- Interpret new data.

Unit 8

- Handle equipment safely.
- Make predictions and compare them with results.
- Identify a pattern.

Unit 9

- Handle equipment and materials safely.
- Follow instructions.
- Make careful observations.

Unit 10

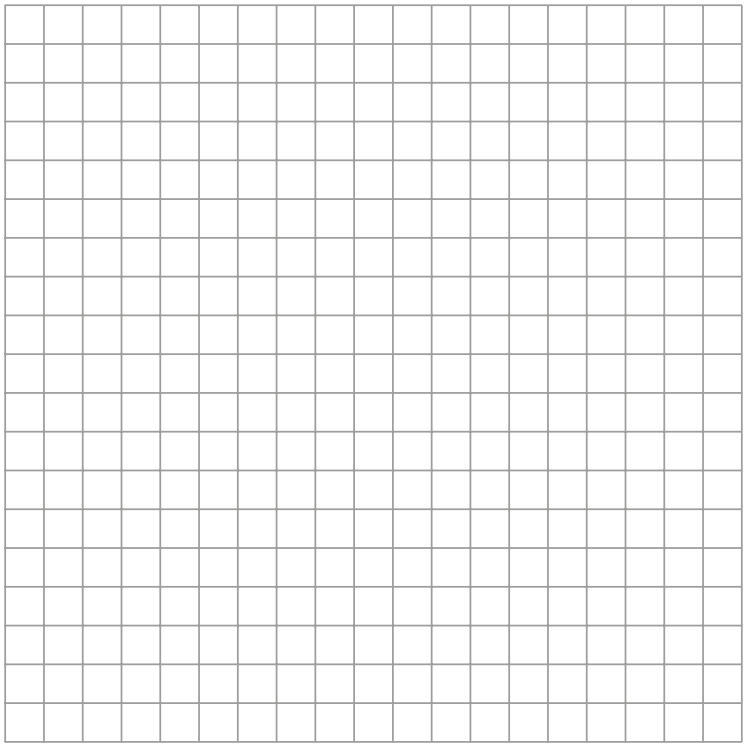
- Plan and carry out an investigation.
- Repeat measurements where appropriate.
- Interpret data.

Name: ..... **Form:** .....

See **pages 4 and 5** of *Keeping healthy*

Food and drink

Food and drink are essential if we are to stay alive.



Q1. A food contained 10 grams of protein, 5 grams of fat and 15 grams of carbohydrate. Use the graph paper on the right to make a bar graph to show this data.

Q2. Which food group do sugars and starch belong to?

✎.....

Q3. Which food group contains foods to build and repair the body?

✎.....

Q4. What do cheese and butter contain large amounts of?

✎.....

Q5. Which food group contains foods to help you fight disease?

✎.....

Q6. Name five chemicals which the body is made up of.

1 ✎..... 2 ✎.....

3 ✎..... 4 ✎.....

5 ✎.....

Teacher's sheet: comprehension

See **pages 4 and 5** of *Keeping healthy*

Answers

1. **The Y axis should show the weight scale up to 15g and be labelled 'Weight (g)'. The bars should rise from the X axis, rise to the correct height and be labelled 'Protein', 'Fat' and 'Carbohydrate'.**
2. **Carbohydrates.**
3. **Proteins.**
4. **Fats.**
5. **Vitamins.**
6. **Oxygen, carbon, hydrogen, nitrogen, calcium, phosphorus, sulphur, potassium, sodium, chlorine, magnesium, iron, copper, manganese, iodine.**

Complementary work

(a) The children could measure how fast their hair grows by measuring its length each week.

(b) The children could examine the label from a tin of baby milk and see the wide range of nutrients that are included. This will reinforce the idea that the body really is a complicated chemistry set.

Teaching notes

You may wish to use the idea of the body as a complicated chemistry set that needs new chemicals from food. It is important not to become too detailed with this and to avoid confusion with food additives. If the children ask about the table on page 4, the following information may satisfy their curiosity.

Carbon, hydrogen and oxygen are joined together to make carbohydrates. Fats contain mostly carbon and hydrogen while proteins contain carbon, hydrogen, oxygen and nitrogen. Some proteins also contain sulphur and phosphorus.

Calcium is used for building healthy bones and teeth, in the clotting of blood, and helps muscles contract.

Iron is used to make the red blood pigment haemoglobin which carries oxygen around the body in the red blood cells.

Phosphorus is used to build healthy bones and teeth and in helping muscles contract. Potassium takes part in chemical reactions which keep the cells alive. It also helps the nerves send messages.

Sodium helps the nerves send messages and is needed to make the kidneys work.

Food additives are found in manufactured foods where they are used to give the food colour, flavour, keep it in good condition (e.g. emulsifiers) and preserve it (e.g. sugar, salt and vinegar). These additives are not added to improve the nutritional content of the food. Some additives, such as vitamins and minerals, are added to improve the nutritional content of the food.

Name: ..... **Form:** .....

Based on **pages 4 and 5** of *Keeping healthy*

Grouping food

Try this...

1. Foods can be divided into groups. Foods containing protein include meat, fish, eggs and peas. Foods containing fat are butter, cheese, milk and cream. Foods containing carbohydrates include potatoes, cereals, bread and biscuits. Vitamins and minerals are found in fruit and vegetables. Look back at this information as you work through the activity.

2. Think about what you had for your breakfast yesterday. Divide up the foods into the columns in table 1. For example, if you had cereal and milk, you would write cereals in the carbohydrate column and milk in the fat column.

3. Repeat step 2 for your lunch, tea and supper yesterday.

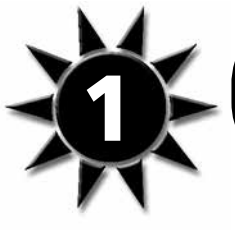
Meal	Protein	Fat	Carbohydrate	Vitamins and minerals
Breakfast				
Lunch				
Tea				
Supper				

4. Think about the snacks you have had today or plan to have today. Write down the approximate time of your snack, such as mid-morning and mid-afternoon, and fill in the food groups. If you are having a packet food, such as crisps, look on the side of the packet to find the table of food substances. It will help you decide how to group your snack.

Snack time	Protein	Fat	Carbohydrate	Vitamins and minerals

Looking at the results.

5. Use a separate sheet to describe your results.



Teacher's sheet: activity

Based on **pages 4 and 5** of *Keeping healthy*

Introducing the activity

(a) Give each child a card and ask them to write down the name of their favourite food. Put the headings of the food groups on the wall or the floor. Ask each child, in turn, to hold up their card, and ask the class which food group the food should go in. When they have decided, ask the child to stand in the appropriate group. Repeat with the whole class (see note (i)). Now tell the children they are going to investigate all the foods that they have eaten recently.

Using the sheet

(b) Give out the sheet, let the children fill in their names and form, then go through task 1 (see note (ii)).

(c) Go through task 2, then let the children try it (see note (iii)).

(d) Go through task 3 and let the children try it.

(e) Go through task 4 (see note (iv)).

(f) Let the children try task 4.

(g) Go through task 5, then let the children try it.

Completing the activity

(h) Let the children compare their results.

(i) Collate all the results into a class table and look to see if certain meals are linked to certain food groups.

Conclusion

The individual results will vary, but when the results of the class are combined a pattern may be seen. For example, fats and carbohydrate may feature strongly in many breakfasts, while protein is associated with lunch. There may be a lack of vitamins or minerals in main meals, and especially snacks, due to children not eating enough fruit and vegetables.

Teaching notes

(i) If there are a large number of sugary foods, you may like to mention the effect of sugary food on teeth. If there are a large number of fatty foods, you may like to take note of this for use in later units. It is important to note that vitamins and minerals are found in other foods besides fruit and vegetables, but these foods are particularly good sources of vitamins and minerals.

(ii) The purpose of this step is to give the children some information which will help them group their foods.

(iii) The children may wish to put some of their foods in more than one group. This is acceptable.

(iv) You may like to show the children some packets of snack food and demonstrate how to read the label.

Name: ..... **Form:** .....

See **pages 6 and 7** of *Keeping healthy*

Too few vitamins and too little fibre

The body needs a range of materials to remain healthy. However, if some vital ingredient is missing, poor health and even death can result.

Banana **Milk** **Fish oil**

Orange **Celery** **Liver**

Lime **Beans** **Lemon**

Q1. (i) Draw a circle round the names of foods that are rich in vitamin D; (ii) Draw a square round the names of food that are rich in vitamin C; (iii) underline the names of foods that are rich in fibre.

Q2. What disease do people get if their diet lacks vitamin D?

✎.....

Q3. What disease do people get if their diet lacks vitamin C?

✎.....

Q4. What substance helps to carry undigested food through the gut?

✎.....

Q5. Who was James Lind? ✎.....

Q6. What did James Lind do in 1753?

✎.....

✎.....

Teacher's sheet: comprehension

See **pages 6 and 7** of *Keeping healthy*

Answers

1. **(i) Fish oil, milk, liver; (ii) orange, lemon, lime; (iii) banana, celery, beans.**
2. **Rickets.**
3. **Scurvy.**
4. **Fibre.**
5. **A Scottish naval surgeon.**
6. **He showed that scurvy could be cured by eating fresh oranges, lemons and limes.**

Complementary work

(a) The children could make a collection of cereal packet labels to find out the vitamin content of the products. They could also collect labels from fruit drinks to find out which ones add vitamin C.

Teaching notes

Scurvy was a major problem facing sailors in the eighteenth century, when longer sea voyages became more common. For example, one ship with almost a thousand sailors on board lost over six hundred of them to scurvy.

James Lind performed an experiment on sailors to discover that citrus fruits cured scurvy. He gave the sailors a basic diet of mutton broth, gruel and hard biscuits. He then gave groups of sailors one extra supplement to their diet. The supplements were either sea water, vinegar, dilute sulphuric acid, cider, oranges and lemons, garlic and mustard paste. Only the citric fruits were successful in treating scurvy.

Similar experiments were also performed on animals. Young animals were fed different diets and were regularly examined to find out how they grew. In this way the essential ingredients for a healthy diet, such as vitamin D and vitamin C, were proved to be present in only certain foods.

Animal experimentation is naturally an emotive subject and should be handled with care. You might discuss how past diseases such as night blindness (due to lack of vitamin A) and rickets (due to lack of vitamin D) caused a great deal of human suffering. These diseases are now absent from many parts of the world due to our knowledge of vitamins. However, you could also discuss how some other experiments are much more difficult to justify.

Vitamin D helps the body take up calcium and phosphorus from food so they can be used to make teeth and bones. Vitamin D is also made in the skin when the sun shines on it.

2

Name: ..... **Form:** .....

Based on **pages 6 and 7** of *Keeping healthy*

Looking at fibre

Try this...

1. Celery contains large fibres. You can see them running along the length of the stalk. You can see their ends when you look at the stalk end on. Take a piece of celery and look at it end on. In box A, make a drawing of what you see. Label the ends of the fibres.

A

2. Break off a piece of the celery which holds just one fibre. Peel away the white tissue from around the fibre.

3. Put the tissue in a plastic bowl and squash it several times with the end of a rolling pin. Describe what happens to the tissue.

✎.....

✎.....

B

4. Repeat step 3 with the fibre.
Describe what happens to the fibre.

✎.....

✎.....

5. Predict what will happen if you take the rest of the celery and squash it a few times with the rolling pin. In box B, draw what you expect to see.

6. Put the rest of the celery in the bowl and squash it several times with the rolling pin. Describe what you see.

✎.....

Looking at the results.

7. How accurate was your prediction?

✎.....

Teacher's sheet: activity

Based on **pages 6 and 7** of *Keeping healthy*

Introducing the activity

(a) Tell the children that they are going to examine some fibres in a plant, then see what happens to them as they model the digestion process (see note (i)).

Using the sheet

(b) Give out the sheet, let the children fill in their names and form, then go through task 1 (see note (ii).

(c) Let the children carry out task 1.

(d) Go through tasks 2 and 3, then let the children try them (see note (iii)).

(e) Go through task 4, then let the children try it.

(f) Let the children try task 5.

(g) Let the children try task 6.

Completing the activity

(h) Let the children try task 7.

(i) If you can provide satisfactory hygienic conditions you may wish to let the children eat some celery so that they can feel the fibres as they chew and swallow them (see note (iv)).

(j) You may show the children a piece of onion and ask what they think may happen to it if you modelled the digestion process on it (see note (v).

(k) You may model the digestion of the onion to show that fewer fibres are present than in a celery stalk.

Conclusion

When celery is mashed up, only the soft white flesh is squashed and torn up. The fibres break and separate a little but are not destroyed.

Teaching notes

(i) The part of the digestion process to be modelled is the breaking up of food in the mouth.

(ii) The children may have come across these fibres before in a different context. If a celery stalk is dipped in blue ink and left for a while the ink travels up the fibres, showing that they conduct water. Around the water-conducting tubes are fibres which give strength to the stalk. Both the tubes and the fibres make a single large fibre in the stalk – the fibres the children can see.

(iii) The tissue, or white flesh, around the fibre should come away easily if the children pick at it with their fingernails. Tell the children the action of the rolling pin in the bowl is a simulation, or model, of the conditions in the mouth when the teeth are chewing food.

(iv) The fibres will not be digested further along the gut, but will be used to add bulk to the other undigested foods so that they are easier to push by the gut muscles.

(v) The children should predict that some fibres will not be broken up but there will be fewer of them than in the celery.

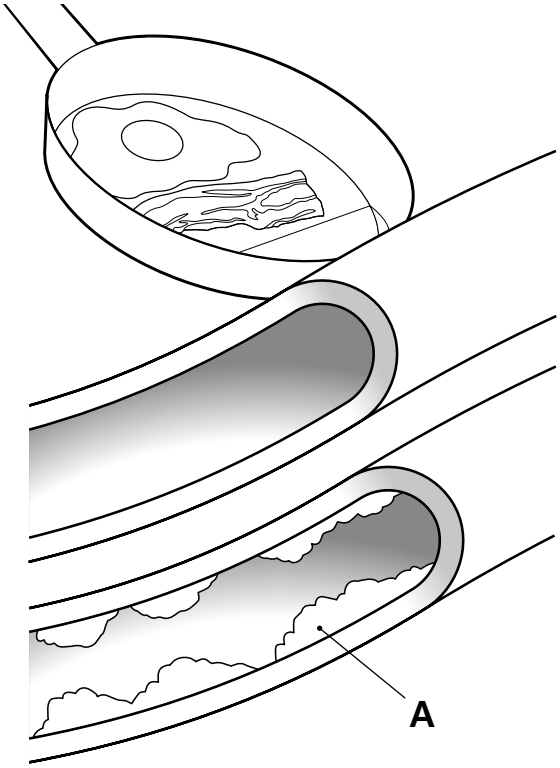
3

Name: ..... Form: .....

See **pages 8 and 9** of *Keeping healthy*

Too much fat and salt

The body will make use of what it is given. But if it is given too much of some food, ill health can result.



Q1. The diagram shows blood vessels.
(i) What kind of blood vessels are they?

✎.....

(ii) What is the substance labelled A?

✎.....

(iii) Draw in the path of blood through each blood vessel.

Q2. In what form do our bodies store energy?

✎.....

Q3. The substance labelled A in the diagram can affect a part of the body and cause it to become diseased. What is the part of the body called?

✎.....

Q4. How does salt help the body?

✎.....

✎.....

Q5. What happens to the body if it receives too much salt?

✎.....

✎.....

Q6. State three ways in which people can reduce the amount of fat in their diet.

✎.....

✎.....

✎.....

Teacher's sheet: comprehension

See **pages 8 and 9** of *Keeping healthy*

Answers

1. **(i) Arteries; (ii) Cholesterol; (iii) A single straight arrow should show the path of the blood in the upper artery. A series of wavy arrows should show the path of the blood in the lower artery.**
2. **Fat.**
3. **The heart.**
4. **It helps to make the muscles work properly and helps bring nourishment into the blood.**
5. **It may suffer from high blood pressure and heart disease.**
6. **Eat lean meat, eat less cheese, butter and cream, strain fat after cooking, do not add fat to gravy.**

Complementary work

(a) The children can examine packets of preserved and processed foods such as frozen meals to find their salt content. Children's intake of salt should stay below 2,400mg (2.4g) and even an adult should aim for less than 5,000mg (5g) of salt a day. Children can investigate by how much this would be exceeded if a person ate preserved and/or processed foods for every meal of the day.

Teaching notes

Discussions of fat often lead to mentioning people being overweight and even obese. This means that the topic must be approached with sensitivity from the outset. However, as the link between fat and heart disease is well established, the children must be made aware of this and take it into account in diet planning. People who have lost excess fat can be mentioned, and quotes about how much fitter they feel when carrying much less weight can be highlighted. Care must be taken not to distress any overweight children in the class. They may have problems not related to diet.

The kidneys are organs that filter the blood to remove unwanted substances. The kidneys use salt to remove excess water from the blood. If there is too much salt in the kidney it draws in too much water. Although blood looks like a red liquid, most of it is made from a straw-coloured, watery liquid called plasma. The redness is due to the red blood cells which are spread out in the plasma.

3

Name: ..... **Form:** .....

Based on **pages 8 and 9** of *Keeping healthy*

Testing food for fat

Try this...

1. If a food containing fat is rubbed on a piece of paper, it will leave a greasy mark. When the paper is held up to the light, some light can pass through it. The fatty food has made a translucent mark. You need to remember this information for the following test.

2. Make a collection of different foods.

3. Rub each food on a clean piece of paper and hold the paper up to the light.

4. Make a table and record the results of your test in it.

Looking at the results.

5. What do your results show?

✎.....

✎.....

Teacher's sheet: activity

Based on **pages 8 and 9** of *Keeping healthy*

Introducing the activity

(a) Ask the children to describe the paper in which fish and chips are wrapped. Look for answers using the words greasy, stain and shiny. Explain that chips are cooked in oil (a kind of fat), and when this touches paper it makes a greasy mark, which lets light though. Tell the children that this observation can be used to test foods for fats. Ask them to suggest how the test might work and look for the idea of rubbing the food on paper (see note (i)).

Using the sheet

(b) Give out the sheet and let the children fill in their names and form, then go through task 1.

(c) Go through tasks 2 to 4, then let the children try them (see note (ii)).

Completing the activity

(d) Let the children complete task 5.

(e) Let the children compare their results.

Conclusion

Foods which contain fat leave a translucent mark when rubbed on paper. Foods which do not contain fat do not leave a translucent mark when they are rubbed on paper.

Teaching notes

(i) You may wish to demonstrate the test with a piece of cheese or hard butter.

(ii) Make sure the collection has at least five foods which show the fat test clearly.

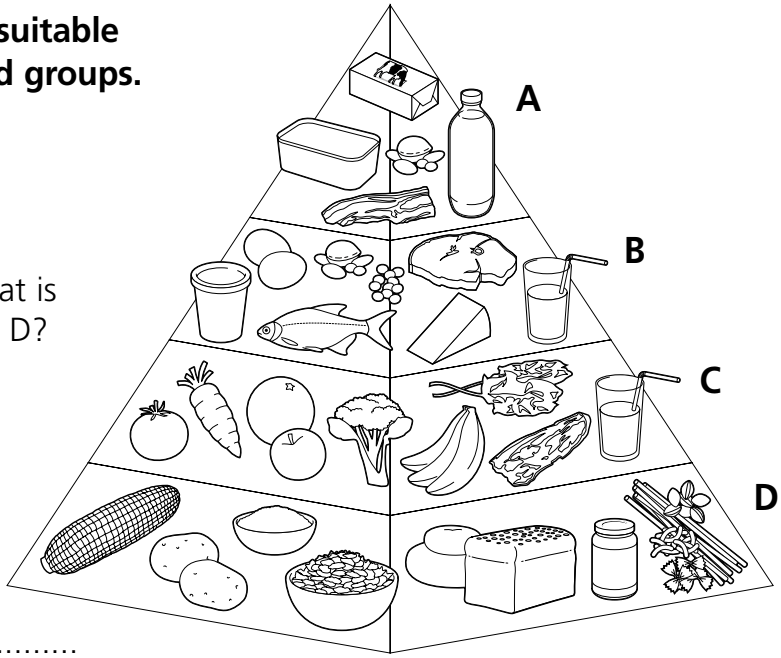
4

Name: ..... **Form:** .....

See **pages 10 and 11** of *Keeping healthy*

Do you eat a balanced diet?

A balanced diet means eating a suitable amount of each of the main food groups.



Q1. Look at the food pyramid. What is the main food group in A, B, C and D?

✎A .....

✎B .....

✎C .....

✎.....

✎D .....

Q2. Which food group should be the smallest part of the balanced diet?

✎.....

Q3. Which food group should be the largest part of a balanced diet?

✎.....

Q4. If a fully grown person eats a balanced diet, should their weight (a) increase, (b) decrease, (c) stay the same?

✎.....

Q5. What are the units used to measure energy? ✎.....

Q6. What is a simple rule for eating a balanced diet?

✎.....

✎.....

✎.....

✎.....

Teacher's sheet: comprehension

See **pages 10 and 11** of *Keeping healthy*

Answers

1. **(i) Fats; (ii) Proteins; (iii) Vitamins and minerals; (iv) Carbohydrates.**
2. **Fats.**
3. **Carbohydrates.**
4. **(c) stay the same.**
5. **s.**
6. **Eat one portion of meat, one portion of dairy products and one or more of the other food groups. Five portions of fruit and vegetables is ideal.**

Complementary work

(a) The children can make their own food pyramids to represent their diet. They may find that the top of the pyramid needs a thicker layer due to large quantities of crisps being eaten, and that the fruit and vegetable layer is thinner, due to poor consumption of these items.

Teaching notes

One way of looking at a balanced diet is to imagine it as a pair of scales, and think about what would happen if the scales were unbalanced.

If one scale pan dipped down, this could mean that a person is receiving less nutrients than they should. The following are examples of this. If iron is lacking, a person is anaemic and becomes weak and prone to illness. If vitamin A is lacking, a person is unable to see shapes in dim light and is said to be night blind. Some babies in developing countries develop swollen stomachs after they have been weaned. This is due to a lack of protein in their diet as starchy foods are often cheaper than protein-rich foods.

If the other scale pan dipped down, this could mean that a person is receiving too much of certain nutrients. For example, they could be receiving too much fat, which threatens the health of the heart, or too much sugar, which damages the teeth.

You may wish to point out to the children that many crisps contain large amounts of fat. You may also show them packets which have a reduced fat content. When the children are making their pyramids in the complementary activity, they will need to thicken the fat layer if they eat large quantities of crisps. You could point out to the children that they could alter their pyramid by snacking on fruit, celery and raw carrot instead of crisps. This would make their pyramids look healthier.

4

Name: ..... Form: .....

Based on **pages 10 and 11** of *Keeping healthy*

Investigating lunch

Try this...

1. Find out how many classes you can visit.

2. Decide how many people you wish to survey in each class.

3. Take a sheet of paper for each class you are going to visit. On the sheet of paper write the class name and a table with these headings:

Lunch	Protein	Fat	Carbohydrate	Vitamins and minerals

Under each heading, add one row for each person you have decided to survey as part of task 2.

4. Ask each person what they have eaten or plan to eat for lunch, or ask them to show you the contents of their lunch boxes. Record each one by number. For example, if you were recording the lunches of five people in a class, the entries on the table would be numbered 1 to 5. Put a tick in the appropriate column for each food.

5. Look at the table. Count up the number of lunches which have foods from all five groups in them. Put the total at the bottom of the sheet.

6. Look at the table and count up all the lunches which have foods from less than five food groups. Put the total at the bottom of the sheet.

7. Take another sheet of paper and put the title 'Summary of results'.

8. Make a table with these headings:

Class	Lunches with five food groups	Lunches with less than five food groups

Under each heading, add one row for each class you have visited. Fill in the table using the results from tasks 5 and 6.

Looking at the results.

9. What do the results show?

✎.....

✎.....

Teacher's sheet: activity

Based on **pages 10 and 11** of *Keeping healthy*

Introducing the activity

(a) If the children have done the activity in Unit 1 you can remind them of it now. Tell them that it was a survey of their own meals over a day. Now they are going to try a survey of what different people are eating for lunch.

Using the sheet

(b) Give out the sheet and let the children fill in their names and form, then go through task 1 (see note (i)).

(c) Let the children perform task 1.

(d) Go through task 2, then let the children try it (see note (ii)).

(e) Go through task 3 and let the children try it (see note (iii)).

(f) Go through task 4 with the children in their own classroom to make sure they understand what to do when they make their class visits.

(g) Let the children make their class visits to perform task 4 (see note (iv)).

(h) Go through tasks 5 and 6, then let the children try them.

(i) Go through tasks 7 and 8, then let the children try them.

Completing the activity

(j) Let the children try task 9.

(k) Let the children compare their results. You may like to produce a summary of the whole class results on the board.

You could ask the children if they thought the survey provided accurate information about people eating balanced and unbalanced diets in the school (see note (v)).

Conclusion

The survey provided information about meals that featured all the food groups and those that did not. It was not accurate enough to identify a balanced or unbalanced diet.

Teaching notes

(i) In literacy time, you could assign the children to write a letter to the teacher of each of the classes they wish to visit. In the letter, they could explain why they wish to make the survey and enquire politely for the teacher's help.

(ii) This will depend on how many children in your class are taking part in the activity. For example, if six children are doing it, then the classes they visit can be divided into six. If the entire class is doing it, then each group should have a similar-sized group to survey in each class.

(iii) Some children may need help in organising themselves.

(iv) They should have the appropriate sheet for each class they visit, and a pen or pencil. A reminder about manners would probably not go amiss.

(v) They may answer that people who were not eating a meal with foods from all the food groups were identified as having unbalanced diets. However, people eating meals containing all the food groups may not be balanced because, for example, they may be eating more fat than protein. All children may have been eating other meals later which made their diet balanced. The children should realise that this survey has limitations.

5

Name: ..... **Form:** .....

See **pages 12 and 13** of *Keeping healthy*

A lunch to think about

To see whether your diet is balanced, you have to know your weight, and what is in each food.

Food	Quantity	Calories	Fat (g)	Cholesterol (mg)	Sodium (mg)	Carbohydrates (g)	Fibre (g)
Cola	One glass	140	0	0	50	39	0
Hamburger	200g	600	40	125	1,000	28	1
French fries	medium 120g	400	21	0	1,240	86	6
Sauce	30g portion	170	17	0	200	2	0
TOTAL		**1,310**	**78**	**125**	**2,490**	**155**	**7**
Recommended for one day		**1,440**	**48**	**300**	**2,400**	**216**	**30**

Q1. Look at the table and answer these questions.

(i) How many carbohydrates are there in a portion of sauce? ✎.....

(ii) Which food contains the most Calories? ✎.....

(iii) Which foods contain fibre? ✎.....

(iv) Two of the substances in the meal exceed the recommended amount for an entire day. Which substances are they?

✎..... ✎.....

Q2. How much of your total diet needs should you get from carbohydrates:

(i) three-tenths; (ii) six-tenths; (iii) nine-tenths? ✎.....

Q3. How much of your total diet needs should you get from fats:

(i) three-tenths; (ii) six-tenths; (iii) nine-tenths? ✎.....

Q4. Which type of foods do not contain fibre?

✎.....

Q5. Mina weighs 40kg and takes little exercise. Find the Calories her body needs by multiplying her weight by 28. ✎.....

Q6. Mina takes up sport. Find the total Calories her body needs each day by multiplying her body weight by 36. ✎.....

Teacher's sheet: comprehension

See **pages 12 and 13** of *Keeping healthy*

Answers

1. **(i) 2g; (ii) Hamburger; (iii) Hamburger and French fries; (iv) Sodium and fat.**
2. **(ii) six-tenths.**
3. **(i) three-tenths.**
4. **Foods from animals.**
5. **1,120 s.**
6. **1,440 s.**

Complementary work

(a) The children could take a teaspoon of salt and pour it on some paper. They could then ask a volunteer to shake the same amount of salt onto a plate as they would shake onto a meal. The salt could then be collected and put on a second piece of paper. The amounts of the two piles of salt could be compared. The children could see how close the volunteer came to shaking the daily requirements of salt onto just one meal.

Teaching notes

Energy is measured in units called Calories. The Calorie is an early unit of measurement which, in science, has been replaced by the joule. However, as the word 'Calorie' had already entered the general culture, it is still often used outside scientific disciplines. On food packets the word Calorie (Cal) or kilocalories (kcal) are used. Joules are sometimes shown as the unit kilojoule (kJ).

The energy requirements of a person do not depend only on their weight but also on how active they are. For example, people doing sedentary jobs, such as working in an office, need less energy than people who do more active jobs, such as working on a building site. People who change an active job to a more sedentary job, but keep the same diet, put on weight because their body will store the excess energy as fat.

This unit helps the children to see that there is a quantitative dimension to their diet and to their body's needs. If the quantities of nutrients taken in (eaten) are the same as the quantities needed by the body, the body will be healthy. If not, illness may result.

Remember to handle issues involving body weight in a sensitive manner.

5

Name: ..... **Form:** .....

Based on **pages 12 and 13** of *Keeping healthy*

Assessing a diet

Try this...

1. Here are two diets. Read about them before answering the questions.

Diet A Breakfast – biscuits, tea.
Morning snacks – sweets, crisps.
Lunch – chips, beefburger, beans, rice pudding, coffee.
Afternoon snacks – chocolate, sweets, fizzy drink.
Evening meal – sausage, chips and beans, apple pie and cream, fizzy drink.
Evening snacks – crisps, chocolate and fizzy drinks.

Diet B Breakfast – cereal and milk, marmalade and toast, tea.
Morning snacks – apple.
Lunch – meat, potatoes, green vegetables, banana, coffee.
Afternoon snacks – stick of celery.
Evening meal – vegetable curry and rice, fruit salad, tea.
Evening snack – biscuits and milk.

2. Write a paragraph about your diet in the style of the two diets on this page.

✎.....

✎.....

✎.....

✎.....

✎.....

3. Which diet, A or B, is the healthier diet? ✎.....

4. Here is a scale with diet A and diet B on it. On which part of the scale would you put your diet? (Mark the spot with an X.)

1	2	3	4	5	6	7
A						**B**

5. How would you make your diet healthier?

✎.....

✎.....

Teacher's sheet: activity

Based on **pages 12 and 13** of *Keeping healthy*

Introducing the activity

(a) Ask the children if they think their diets are healthy. Ask them how they think they know. Look for answers about comparing their diets with a healthy one. Tell the children that in this activity they are going to compare their diets with two other diets to see if it will help them in their assessments.

Using the sheet

(b) Give out the sheet, let the children fill in their names and form. Go through task 1, then let the children try it (see note (i)).

(c) Go through tasks 2 and 3, then let the children try them.

(d) Go through task 4, then let the children try it.

(e) Let the children try task 5 (see note (ii)).

Completing the activity

(f) Let the children compare their assessments of their diets (see note (iii)).

(g) Let the children talk about the difficulties they would have in changing their diet (see note (iv)).

(h) Let children work out their own action plan to improve their diet (see note (v)).

Conclusion

Diet A is an unhealthy, unbalanced diet. Diet B is a healthy, balanced diet. The healthiness of a diet can be assessed by using a simple scale. It provides an opportunity to improve the healthiness of a diet.

Teaching notes

(i) Do not tell the children which is the healthier diet. Let them decide for themselves.

(ii) Diet can be related to lifestyle and lifestyle can be related to income. It is important to keep this in mind and treat the topic with sensitivity where appropriate.

(iii) Some children may think that their diet is healthier than it really is. Their friends may point this out.

(iv) Children may talk about their favourite foods and how they would not like to give them up. They may talk about not liking green, or raw, vegetables.

(v) This must only be done after parental consultation and following school policies. The action plan could be simple, such as cutting out crisps at break. Again, as in note (ii), it must be handled with sensitivity.

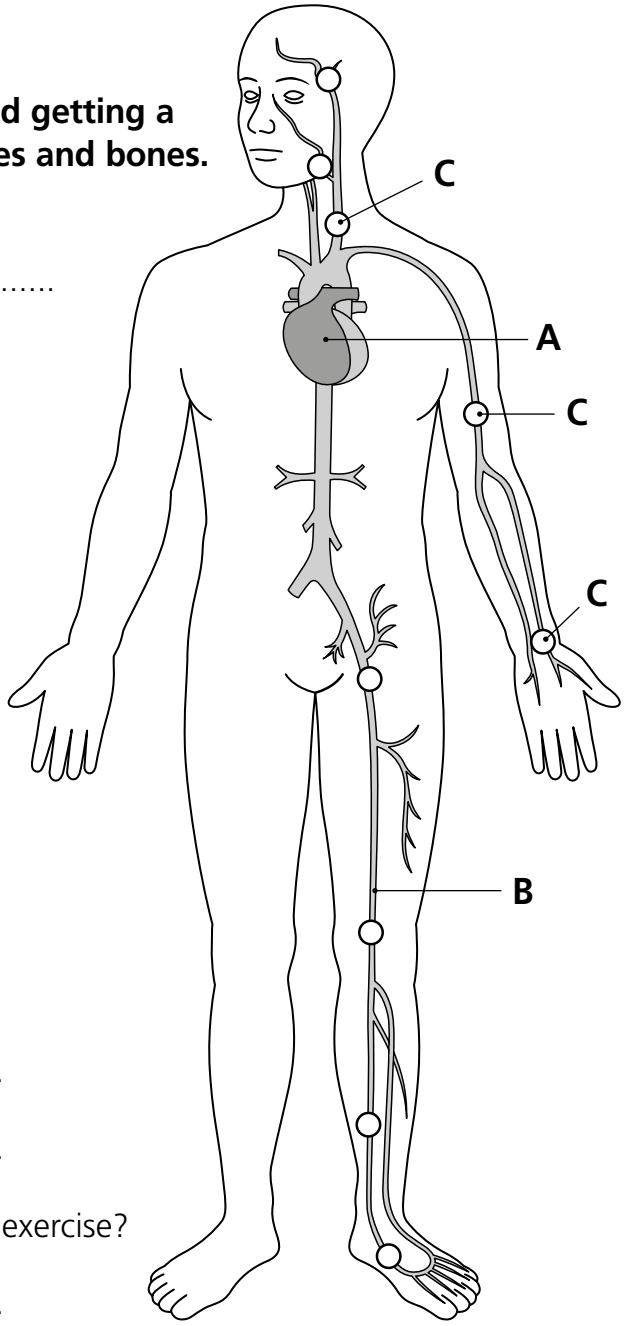
6

Name: ..... **Form:** .....

See **pages 14 and 15** of *Keeping healthy*

Why exercise?

By moving about, getting slightly warm and getting a red face, you help your heart, lungs, muscles and bones.



Q1. (i) What is A? ✎.....

(ii) What kind of blood vessel is B?

✎.....

(iii) What are the places labelled C?

✎.....

Q2. Name three types of exercise.

✎.....

✎.....

✎.....

Q3. How does exercise change your bones?

✎.....

✎.....

Q4. What happens to your muscles when you exercise?

✎.....

✎.....

Q5. Why do people sweat when they are exercising?

✎.....

✎.....

✎.....

✎.....

Teacher's sheet: comprehension

See **pages 14 and 15** of *Keeping healthy*

Answers

1. **(i) Heart; (ii) Artery; (iii) Pulse points.**
2. **Walking, jogging, cycling, swimming and playing a sport.**
3. **They become more dense and strong.**
4. **They work harder. They grow more blood vessels.**
5. **To get rid of the heat their bodies cannot use. The blood takes heat to the skin. As water (sweat) evaporates from the skin it helps cool the blood close to the skin.**

Complementary work

(a) The children can use a simple stethoscope to hear how the heartbeats change when a person rests, and then when they take part in some exercise.

(b) The children can use secondary sources to find out how blood moves round the body.

(c) The children can use secondary sources to find out about the exercises athletes use when they are training.

Teaching notes

The inside of the heart is divided into two halves. Each half is divided into two chambers – one above the other. The upper chambers are called the atria (singular is atrium) and the lower chambers are called the ventricles. Blood with fresh oxygen from the lungs passes into the top of the left atrium and moves through a valve into the left ventricle below it, and then out into the body through another valve along a large artery called the aorta.

After the blood has moved through the valves, they shut like slamming doors. The vibrations of these closing valves can be heard as the 'lub dup' sound of the beating heart. The louder 'lub' sound is made by the closing valves between the atria and ventricles (they both close at the same time) and the softer 'dup' sound is made when the valves leading to the body close (also at the same time).

The blood passing through the right hand side of the heart comes from all parts of the body and is pumped away to the lungs. The blood on the left hand side of the heart comes from the lungs and goes to all parts of the body.

The blood vessels by which the blood leaves the heart are called arteries. The movement of blood through the arteries can be felt at various places in the body as the pulse. Arteries are deep in the flesh. The blood travels back to the heart along blood vessels called veins. They are closer to the skin and can sometimes be seen through it.

The heart muscle has its own blood vessels called the coronary artery and coronary vein. If the coronary artery becomes blocked, the heart muscle around it becomes starved of oxygen and a heart attack (sometimes called a coronary) occurs.

Name: ..... **Form:** .....

Based on **pages 14 and 15** of *Keeping healthy*

Investigating the pulse

Try this…

1. How fast is your pulse when you are resting?

Write down a plan to test this question. On a separate piece of paper, draw a table in which to record your results.

✎.....

✎.....

✎.....

✎.....

2. Check your plan with your teacher. If your teacher approves, try the investigation and fill in your table.

3. Does your pulse change after you have walked for two minutes?

Write down a prediction. ✎.....

Make another table in which to record your results. If your teacher approves, try the investigation and fill in your table.

4. Does your pulse change after you have run for two minutes?

Write down a prediction. ✎.....

Make another table in which to record your results. If your teacher approves, try the investigation and fill in your table.

Looking at the results.

5. How did your predictions compare with your results?

✎.....

6. What do the results show?

✎.....

Teacher's sheet: activity

Based on **pages 14 and 15** of *Keeping healthy*

Introducing the activity

(a) Use this activity after the children have studied the pulse on page 15 of the pupil book. Ask the children to show you how they would take their pulse. Get them all to try and find their pulse at the same time and help those who are having difficulty. Tell the children they are going to investigate how the pulse changes (i).

Using the sheet

(b) Give the children the sheet, let them write their names and form on it, then go through task 1 and let the children try it (see note (ii)).

(c) Let the children carry out task 2 if appropriate.

(d) Go through task 3, but ask the children how they will perform the test (see note (iii)).

(e) Let the children try task 3.

(f) Go through task 4 (see note (iv)).

(g) Let the children try task 4.

(h) Let the children complete tasks 5 and 6.

Completing the activity

(i) Let the children compare their results.

(j) Help the children to produce line graphs from their data.

(k) Remind the children that the pulse is produced by the action of the heart, and doctors use the pulse to check on the heart's condition (see note (v).

Conclusion

The beating of the heart produces the pulse. The pulse rate is the speed at which the pulse beats in a minute. The pulse rate is lowest during rest. It increases as the body becomes more active. As the activity of the body increases, the pulse rate also increases.

Teaching notes

(i) Do not use the thumb to take the pulse. The thumb has a small pulse point in it and this makes it difficult to be accurate.

(ii) The children may take the pulse for the full minute or for half a minute and multiply their result by two. The table should have two columns, headed 'Trial' and 'Number of beats'. The trial column should be numbered 1, 2 and 3, for the child to make three measurements. A clock or timer should be mentioned in the plan.

Trial	Number of beats
1	
2	
3	

(iii) The children should mention that they have to wait between trials for their pulse to get back to the resting rate before they try each trial. They should produce a table like the one in task 1.

(iv) Make sure the children have a safe place to run that is in accordance with school policies. The children should be reminded to rest between each period of running. They should produce a table like the one in task 1.

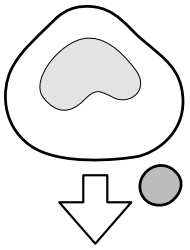
(v) Some children may have a history of heart disease or have family members suffering from heart problems. It is important to treat this subject with sensitivity.

7

Name: ..... **Form:** .....

See **pages 16 and 17** of *Keeping healthy*

Recovering from disease



A disease is an illness brought on by something going wrong with the cells in the body.

Q1. What are the tiny building blocks in the body called?

✎.....

Q2. The diagram on the right shows a white blood cell and a bacterium. Draw the missing diagrams that show what happens to the bacterium.

Q3. Name two kinds of microbes.

✎.....

✎.....

Q4. Name three ways in which infectious diseases can travel.

✎..... ✎.....

✎.....

Q5. How does a fever help the body fight disease?

✎.....

✎.....

Q6. Why can you get food poisoning by reheating cooked food?

✎.....

✎.....

✎.....

✎.....

✎.....

Teacher's sheet: comprehension

See **pages 16 and 17** of *Keeping healthy*

Answers

1. **Cells.**
2. **A series of pictures showing the white cell engulfing the bacterium.**
3. **Bacteria, viruses.**
4. **By air, by water, by touch.**
5. **It sends the body temperature far above that in which bacteria can thrive.**
6. **If the cooked food was left out so that flies could land on it, the flies could leave bacteria behind. When the food is reheated the bacteria breed quickly so there are enough to cause food poisoning.**

Complementary work

(a) The children can use secondary sources to find out about antibiotics and vaccines.

Teaching notes

Bacteria and viruses are so small that they are measured in special units. These units are called micrometres (one micrometre is one-thousandth of a millimetre) and nanometres (one nanometre is one-millionth of a millimetre). Bacteria range in size from 100 to 2,000 micrometres. Viruses have sizes ranging from 10 to 300 nanometres.

When a bacterium travels from body to body it is enclosed in a spore. This is a thick-walled case around the microbe. It prevents the bacterium drying out and gives it some resistance to heat. A bacterium has many of the same structures that a cell possesses, and can definitely be classified as a living thing.

Viruses consist of genetic information (DNA and RNA) surrounded by a protective coating. Outside the cell, viruses do not show any of the properties of life and can be stored in a jar like crystals. Once a virus is inside a cell, the DNA breaks out and makes copies of itself. Each copy forms a virus. In this process the cell is turned into a virus factory.

Bacteria cause diseases such as tetanus, whooping cough and food poisoning. Viruses cause diseases such as the common cold, influenza and rubella.

Antibiotics are chemicals which are used to kill bacteria. They do not destroy viruses. Antibodies are substances which the body produces to destroy bacteria and viruses. The body makes an antibody for each kind of microbe. The white blood cells work with the antibodies to destroy the microbes.

A vaccine contains weakened microbes which cause a particular disease. This allows the body to produce antibodies without getting the disease. After vaccination the body is better able to defend itself if it is invaded by stronger microbes of the same kind.

7

Name: ..... Form: .....

Based on **pages 16 and 17** of *Keeping healthy*

Foods that help to keep disease away

Try this…

1. Read this passage about why we need certain vitamins.

The surface of the body is not just made up of skin. It also includes the moist surfaces inside the body, like the lining of the nose and mouth. All these surfaces can be damaged if the body does not get enough vitamin A and C. Vitamin B helps the body use the energy in food to keep all parts of the body healthy.

2. Vitamin A is found in the following foods: butter, margarine, milk, liver, fish liver oils, carrots, tomatoes, apricots, mangoes, red peppers, spinach and kale.

Keep a record of what you eat for one week. Look at your diet and write down the meals which contain vitamin A.

✎.....

✎.....

3. Vitamin B is found in lean meat, liver and kidneys, fish, potatoes, beans, nuts, brown rice, milk, eggs and breakfast cereals.

Look at your diet and write down the meals which contain vitamin B.

✎.....

✎.....

4. Vitamin C is found in oranges, lemons, limes, blackcurrant, strawberries, kiwi fruit, potatoes, cabbage, sprouts, peppers and tomatoes.

Look at your diet and write down the meals which contain vitamin C.

✎.....

✎.....

Looking at the results.

5. What do your results show?

✎.....

Teacher's sheet: activity

Based on **pages 16 and 17** of *Keeping healthy*

Introducing the activity

(a) Tell the children that the body's first line of defence against disease is its surface and that is why if anyone cuts themselves they should clean the wound and cover it with a plaster to keep out infection. The body can be helped to keep its first line of defence in order by eating certain kinds of foods. Some foods also help the body release energy from food so it can be in good health and ready for action if germs get through the first line of defence.

Using the sheet

(b) Give out the sheet and let the children fill in their names and form, then let the children try task 1 (see note (i)).

(c) Go through task 2, then let the children try it (see note (ii)).

(d) Go through task 3, then let the children try it.

(e) Go through task 4, then let the children try it (see note (iii)).

(f) Let the children try task 5.

Completing the activity

(g) Let the children compare their results.

(h) The children could design a poster to highlight the foods which help keep disease at bay.

Conclusion

This will vary but may show that not enough foods containing vitamin A and C are eaten because children do not eat enough fruit and vegetables.

Teaching notes

(i) There are ten different types of vitamin B and most of them help the body release energy from food. For simplicity, the sources of the main types are given under just one heading. The ten types are: B1 (thiamin), B2 (riboflavin), B3 (niacin), B5 (pantothenic acid), B6, B12, folic acid, biotin and lecithin.

(ii) The children could use the data they collected in the activity in Unit 1.

(iii) They could also use the data they have collected here to improve their diet plans in the activity in Unit 5.

8

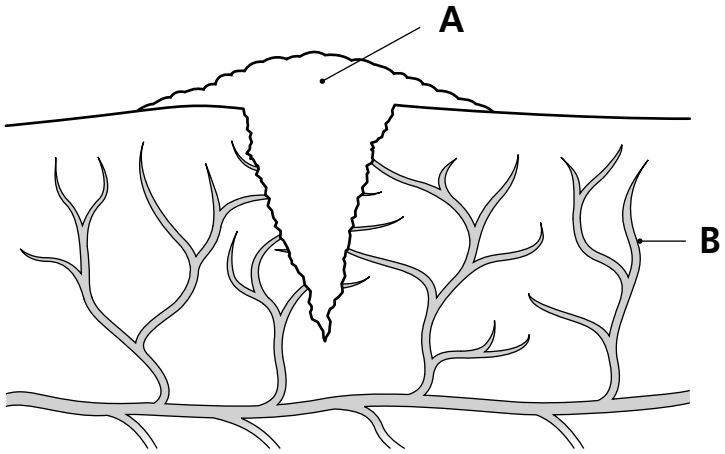
Name: ..... Form: .....

See **pages 18 and 19** of *Keeping healthy*

Coping with injury

An injury is a sudden or violent action that bruises, cuts, crushes or breaks part of the body.

Q1. The diagram shows a wound that is beginning to heal.



(i) What are A and B?

A ✎.....

B ✎.....

(ii) What is in A that stops the blood escaping?

✎.....

Q2. What do doctors call a sudden injury? ✎.....

Q3. What are the main features of an injury?

✎.....

Q4. (i) How do blood vessels near an injury change?

✎.....

(ii) Why do the blood vessels change?

✎.....

Q5. How do platelets help the body?

✎.....

✎.....

Q6. Why are some wounds stitched by doctors?

✎.....

✎.....

Teacher's sheet: comprehension

See **pages 18 and 19** of *Keeping healthy*

Answers

1. **(i) A = clot, B = blood vessel; (ii) A network of fibres.**
2. **Trauma.**
3. **Redness, heat, swelling, pain.**
4. **(i) They enlarge; (ii) So more blood can wash infections out of the injury.**
5. **They build up a blood clot which acts like a plug in a blood vessel. This stops the bleeding.**
6. **It gives the body a chance to seal off larger wounds more easily and reduce the chance of infection.**

Complementary work

(a) The children can use secondary sources to find out about the work of nurses and doctors in an accident and emergency unit.

Teaching notes

This topic may need treating with some sensitivity, especially if children or their families have been involved in accidents which have resulted in serious injury.

Begin by looking at minor injuries as suggested in the explanation of Unit 8 given on page 12 of this *Teacher's Guide*. This may help draw the children away from considering serious injuries. If the topic of serious injury does arise, then it must be treated in a positive way by considering how people cope and endeavour to lead as normal a life as possible. At whatever level the topic is addressed, it is important to keep focused on the body's power of healing.

An adult body contains between five and six litres of blood. Just over half of it (55%) is made from a watery liquid called plasma. The remaining 45% is made up of cells. There are two kinds of cells: red blood cells and white blood cells. They are made in the bone marrow.

There are 500 red cells for every white cell. Red cells carry oxygen round the body. White cells attack bacteria in the body and at the site of a wound. As they kill the bacteria, the white cells also die and the dead cells collect as pus in the wound. The body responds to the invasion of bacteria by producing extra white blood cells to deal with the attack. When the wound has healed, the level of white blood cells in the blood falls again.

Platelets are fragments of cells which form in the bone marrow. They release a chemical, called an enzyme, into the blood. Enzymes cause another substance to change into fibres which block the wound and stop the flow of blood.

8

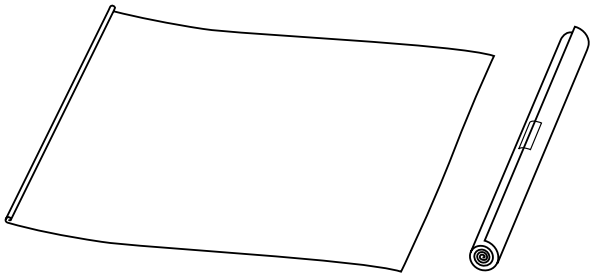
Name: ..... **Form:** .....

Based on **pages 18 and 19** of *Keeping healthy*

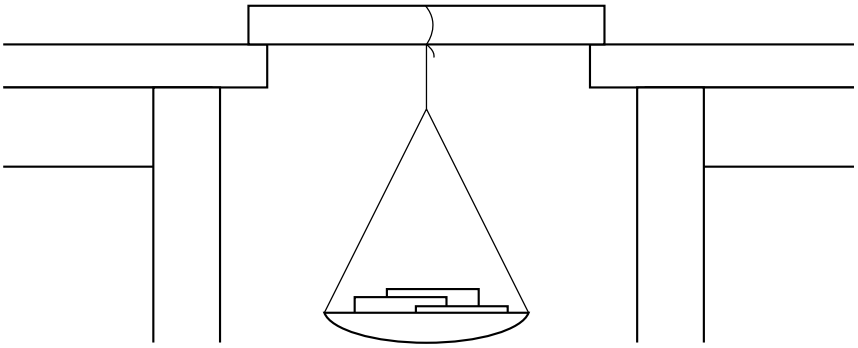
Are thicker bones stronger?

Try this…

1. Make a model bone by rolling a piece of paper into a tube. Hold the tube together with a piece of sticky tape.



2. Set up the model bone between two tables and hang a scale pan from it.



3. Add weights to the scale pan until the bone begins to bend.

4. Record the weight at which the model bone bent. ✎.....

5. Make a thicker model bone by rolling two pieces of paper into a tube.

6. Predict the weight needed to bend the second model bone. ✎.....

7. Repeat steps 2 and 3 with the second model bone and record your result.

✎.....

8. Test model bones made from three sheets and four sheets of paper.

9. Present all the results in a table.

Looking at the results.

10. What do the results show?

✎.....

✎.....

Teacher's sheet: activity

Based on **pages 18 and 19** of *Keeping healthy*

Introducing the activity

(a) If possible, show the children some X-ray photographs of broken bones. Tell them that the bones can heal again, once they are pulled straight and set. Show the children a model or a picture of a skeleton and point out that some bones are thin and others are thick. Tell the children that they are going to investigate the strength of weak and strong bones.

Using the sheet

(b) Give out the sheet and let the children fill in their names and form, then go through task 1 (see note (i)).

(c) Let the children try task 1.

(d) Go through tasks 2 to 4, then let the children try them.

(e) Go through tasks 5 to 7, then let the children try them.

(f) Ask the children to compare their predictions with the results (see note (ii)).

(g) Go through tasks 8 and 9, then let the children try them (see note (iii)).

(h) Let the children try task 10.

Completing the activity

(i) Let the children compare their results.

Conclusion

The thickness of a bone affects its strength. A thin bone is weaker than a thick bone. As the thickness of a bone increases, its strength also increases.

Teaching notes

(i) You may wish to point out that scientists sometimes make models of the things they are studying to try and make the study simpler. If you wish, you could show the children some cleaned chicken bones to illustrate how they vary in size and thickness. The children should only use small pieces of paper to make small bones which bend under a small weight. Try to avoid using large weights in this activity, or put a box beneath the scale pan to keep the children's feet out of the way.

(ii) Some children may have predicted only that a greater weight would be needed, while others may have suggested a value for that weight. If the children have suggested a value, ask them how close their prediction was to their result. The children may like to predict values for the bending weights in task 8 and compare them when the tests are done.

(iii) The table should have two columns. Their headings could be 'Thickness of bone (number of sheets)' and 'Bending weight (g)'.

Thickness of 'bone' (number of sheets)	Bending weight (g)
1	
2	
3	
4	

Note: The terms weight and weights are used in this activity for simplicity, in case you prefer to try the experiment before you have introduced the concept of mass. If the children are familiar with the term mass, you may like to amend the worksheet accordingly in steps 3 and 4.

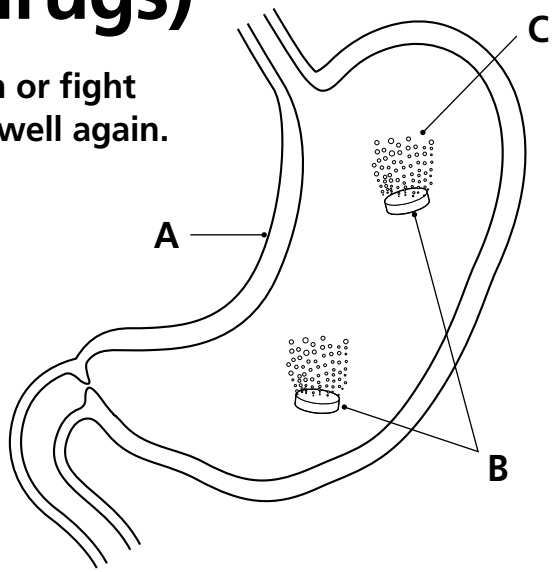
9

Name: ..... **Form:** .....

See **pages 20 and 21** of *Keeping healthy*

Medicines (medical drugs)

Medicines are substances taken to relieve pain or fight disease. They are designed to make a patient well again.



Q1. (i) What is the part of the body labelled A?

✎.....

(ii) What are the objects labelled B?

✎.....

(iii) What are the objects labelled C?

✎.....

(iv) The diagram shows an illness being cured. What is the illness?

✎.....

Q2. What does the word 'drug' mean?

✎.....

✎.....

Q3. What are medicines?

✎.....

✎.....

Q4. Which plant does aspirin come from? ✎.....

Q5. What disease does insulin control? ✎.....

Q6. Why is it important to follow the correct dosage of a medicine?

✎.....

✎.....

✎.....

Teacher's sheet: comprehension

See **pages 20 and 21** of *Keeping healthy*

Answers

1. **(i) Stomach; (ii) Seltzer tablets; (iii) Bubbles of carbon dioxide gas; (iv) Stomach ache, indigestion.**
2. **Any chemical that affects the way the body works.**
3. **Drugs that are designed to make the body well.**
4. **Willow tree.**
5. **Diabetes.**
6. **This gives the smallest side effects, while letting the medicine work well at curing the illness.**

Complementary work

(a) The children can examine secondary sources such as the empty packets and bottles of footpowders, acne treatments, mouthwashes and antiseptic cream to find out about the chemicals they contain. This exercise is aimed at raising the children's awareness of the use of chemicals. It is not intended that they should learn the names of the chemicals they find.

Teaching notes

Any work on medicines needs to be done with care and sensitivity. However, medicines are so much a part of life that children may be prepared to talk freely about medications they take, such as asthma sprays.

It is important that the children realise that they should keep to the prescribed dosage, and carefully follow the instructions on a product, to reduce the risk of side effects.

People have probably known about the healing properties of some plants from the earliest times. A simple example about which most people know is rubbing a dock leaf on a nettle sting to reduce the pain. Even 2,000 years ago, over 250 plants and 120 minerals were regularly used for medicinal purposes.

The healing chemicals in plants are often accompanied by other chemicals which can produce side effects. Today scientists work out the structure of a medicinal chemical in a plant, then make it from other chemicals. By doing this, they make a purer substance which has fewer side effects.

Even today scientists are looking at a wide range of plants, especially those in rainforests, for new medicines. New drugs take a long time to develop because they have to be tested for any poisonous effects they may have on living tissue, and for any side effects they have on people. It may take over ten years of testing before a drug is considered safe to use.

Name: ..... **Form:** .....

Based on **pages 20 and 21** of *Keeping healthy*

Can an acid attack be stopped?

Try this…

1. Take two jars and put one teaspoon of vinegar in each one.

2. Add four teaspoons of water to each jar.

3. Add half a teaspoon of bicarbonate of soda to one jar. Record what you see.

✎.....

4. Stir the bicarbonate of soda and the vinegar. What happens to the surface of the liquid after a short time?

✎.....

5. Put some pieces of broken egg shell in each jar (two pieces about the size of postage stamps). Make sure that the shells are the outside up and that they are completely under the surface of the liquid.

6. Look at the surface of the egg shells with a magnifying glass. Write down what you see happening in each glass.

✎.....

7. Leave for ten minutes. Look in both glasses again and record what you see.

✎.....

Looking at the results.

8. Vinegar contains an acid. It attacks eggshell and dissolves it. When the acid attacks the eggshell, bubbles of gas are made all over the shell. Did the eggshells in both jars show signs of an acid attack?

Explain your answer.

✎.....

✎.....

9 Teacher's sheet: activity

Based on **pages 20 and 21** of *Keeping healthy*

Introducing the activity

(a) Use this activity after the children have studied Unit 9 in the pupil book. Remind them how the seltzer tablet destroys the excess acid in the stomach and cures stomach ache (see note (i)). Tell the children that they are going to investigate the effect of acid on a substance.

Using the sheet

(b) Give out the sheet and let the children write their names and form, then go through task 1 and let the children try it.

(c) Go through task 2, then let the children try it.

(d) Go through task 3, then let the children try it (see note (ii)).

(e) Let the children try task 4 (see note (iii)).

(f) Let the children try task 5 (see note (iv)).

(g) Let the children try tasks 6 and 7.

Completing the activity

(h) Let the children try task 8 (see note (v)).

(i) Let the children compare their explanations.

Conclusion

When acid is allowed to mix with an eggshell, it attacks the eggshell and produces bubbles of gas all over its surface. When bicarbonate of soda is mixed with acid, frothing takes place. This weakens the acid. When the solution of vinegar and bicarbonate of soda is added to an eggshell, only a small number of bubbles are produced (see note (vi)). Bicarbonate of soda stops an acid attack, just like a seltzer tablet helps reduce acidity in the stomach.

Teaching notes

(i) If you have already done some work on acids you may wish to use the word neutralise. Bicarbonate of soda is an alkali. When it is added to an acid it neutralises the acid. The mixture then does not have acidic properties.

(ii) It is always important to try out each activity before you try it in class. Here you will find that a froth is produced. You will need to make sure that the jars are large enough to cope with the froth, and that it does not spill over onto the table.

(iii) The liquid may froth up again a little but should then die down. Look for signs of undissolved bicarbonate of soda in the bottom of the solution. This tells you that all the acid has been neutralised.

(iv) Egg shell, like buttered toast, seems to have a habit of always landing the wrong way up. The children may need to turn the shells over with a clean spoon.

(v) Some children may have difficulty matching what they have seen with the written text and will need extra help.

(vi) When vinegar and bicarbonate of soda are mixed, bubbles of carbon dioxide gas are produced. Even when the froth has gone, there may be small amounts of carbon dioxide gas dissolved in the liquid. These form some small bubbles on the surface of the eggshell.

10

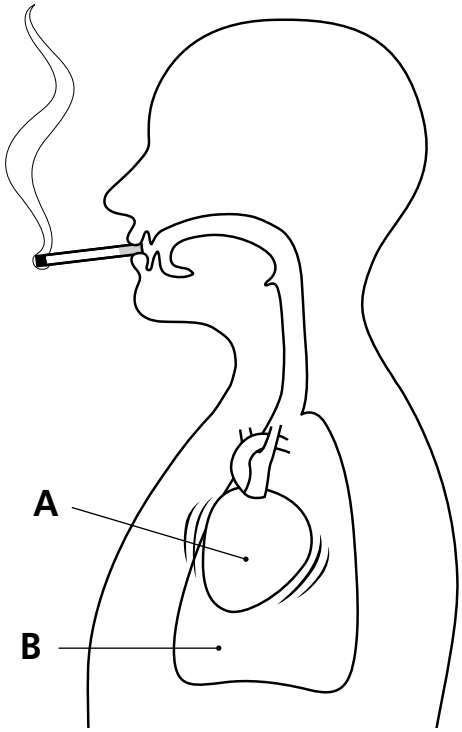
Name: ..... **Form:** .....

See **pages 22 and 23** of *Keeping healthy*

What are harmful drugs?

All chemical substances that we take are drugs, whether solids, liquids or gases. The dangerous ones are those that can cause permanent harm.

Q1. (i) Name A and B on the diagram.



A ✎.....

B ✎.....

(ii) Put an X where you would find carbon monoxide.

(iii) How does carbon monoxide affect the body?

✎.....

✎.....

Q2. What is a carcinogen?

✎.....

✎.....

Q3. (i) What is the drug in a cigarette called? ✎.....

(ii) How does this drug affect the body?

✎.....

Q4. What is passive smoking? ✎.....

✎.....

Q5. (i) Name two alcoholic drinks 1 ✎..... 2 ✎.....

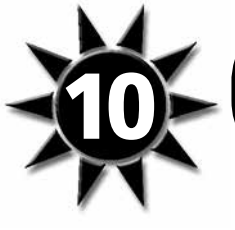
(ii) Which part of the body can alcohol damage? ✎.....

Q6. (i) Name an illegal drug ✎.....

(ii) Which part of the body do illegal drugs affect? ✎.....

(iii) Name something which contains a solvent. ✎.....

(iv) What parts of the body do solvents damage? ✎.....



Teacher's sheet: comprehension

See **pages 22 and 23** of *Keeping healthy*

Answers

1. **(i) A = heart, B = lung; (ii) The X should be in the cigarette smoke; (iii) It stops the red blood cells supplying oxygen to the body.**
2. **A substance that causes cancer.**
3. **(i) Nicotine.**

   (ii) It raises the heart rate – makes the heart beat faster.
4. **Inhaling the smoke from a cigarette being smoked by someone else nearby.**
5. **(i) Beers, wines, spirits; (ii) Liver.**
6. **(i) LSD, heroine, ecstasy, cocaine; (ii) Brain; (iii) Glue; (iv) Lungs and brain.**

Complementary work

(a) Make sure that the following activity fits in with school policy. If it does, show the children a cigarette and break open the filter. Tell them that this collects some of the substances in smoke. Use a smoking machine in accordance with its instructions. The machine must be used in a large open space such as in a school hall or outside. When the machine has smoked a cigarette, show the children the opened filter and the filter paper in the machine. They should see brown stains in each. Ask the children to imagine how the tar builds up inside the lungs of a person who smokes twenty cigarettes every day.

Teaching notes

You may wish to use this unit in part of your school's health education programme, where other issues such as peer pressure may be discussed.

Children may ask why people take harmful substances in the first place, and you may wish to say that the harmful drugs produce short term effects which some people consider to be pleasant. However, in the long term extensive, even fatal, damage may be done to the body. There may also be danger to the body while the person is under the influence of the drug. For example alcohol, solvents and illegal drugs can change the behaviour of a person and make them behave recklessly. This can result in injury and even death, not just to the drug user, but to others.

The effect of alcohol on the body depends on the size of the body. A certain volume of alcohol will cause a person with a small body (or a child) to become intoxicated more quickly than a person with a larger body. Young people who drink alcohol are in danger of becoming so intoxicated that they become unconscious. When this happens, they are in danger of choking on their own vomit.

When someone takes a drug over a length of time, they have to take larger and larger amounts to achieve the desired effect. This can further increase damage to the body.

In time, a person may become dependent on the drug. That person is then an addict.

The topic of addicts and drug taking in all its forms in adults should be treated with care and sensitivity.

10

Name: ..... **Form:** .....

Based on **pages 22 and 23** of *Keeping healthy*

Breathing

Try this…

1. Ask a friend to put a tape measure round your chest when you have breathed out. How far is it round your chest when you breathe out?

Record the measurement here. ✎.....

2. Ask a friend to put a tape measure round your chest when you have breathed in. How far is it round your chest when you breathe in?

Record the measurement here. ✎.....

3. How much did your chest expand when you breathed in? ✎.....

4. How often do you breathe when you are resting? Plan an investigation to find out. On a separate piece of paper, make a table for your results.

✎.....

✎.....

✎.....

5. Show your plan to your teacher. If your teacher approves, try your investigation.

6. How often do you breathe after you have been running? Plan an investigation to find out. Make a table for your results.

✎.....

✎.....

✎.....

7. Show your plan to your teacher. If your teacher approves, try your investigation.

Looking at the results.

8. What do the results show?

✎.....

Teacher's sheet: activity

Based on **pages 22 and 23** of *Keeping healthy*

Introducing the activity

(a) Use this activity after the children have studied Unit 10 in the pupil book. Tell the children that the lungs are like two large, pink sponges inside the chest which soak up oxygen when they are given the chance. You may point out that people who smoke are spoiling the work of the lungs and will, in time, probably damage their health (see note (i)).

Tell the children they are going to investigate how their own lungs work.

Using the sheet

(b) Give out the sheet and let the children fill in their names and form, then go through task 1 (see note (ii)).

(c) Let the children try task 1.

(d) Go through tasks 2 and 3, then let the children try them.

(e) Go through task 4. You may like to remind the children of their work on the pulse rate and ask them for predictions. The work on the pulse rate may help them with their planning (see note (iii)).

(f) Let the children try task 5, if appropriate.

(g) Let the children try task 6.

(h) Let the children try task 7, if appropriate.

(i) Let the children try task 8.

Completing the activity

(j) Let the children compare their results to their investigations (see note (iv)).

(k) You could ask the children how they think their breathing rate would be affected after walking rather than running. The children could test their prediction.

Conclusion

When air is breathed into the lungs, the chest expands. When air is breathed out of the lungs, the chest decreases in volume. The rate of breathing is low at rest and high after running.

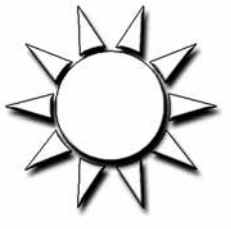
Teaching notes

(i) After studying how the body can be damaged, this activity allows the children to end the study on an upbeat note by looking at how a pair of healthy lungs work. The emphasis here is, "Don't damage your breathing mechanism by starting to smoke".

(ii) You may prefer to use string instead of a tape measure, and let the children measure the string against a ruler.

(iii) The plan should feature resting for a few minutes, then counting the breaths (one cycle of breathing in and out) for one minute. This should be repeated three times and an average found.

(iv) The emphasis here should be on the pattern of the results, not who breathed the most slowly or the most quickly.



QUESTIONS

Name: ..... **Form:** .....

Q1. Which two food groups give you energy?

Tick two boxes: Fats ☐ Proteins ☐ Vitamins ☐ Carbohydrates ☐

Q2. Which food group provides materials for growth and repair of the body?

Tick one box: Minerals ☐ Proteins ☐ Fats ☐ Carbohydrates ☐

Q3. Which food group does calcium belong to?

Tick one box: Minerals ☐ Proteins ☐ Fats ☐ Vitamins ☐

Q4. (i) Which food group does starch belong to?

✎.....

(ii) Name two foods that are rich in starch.

✎..... ✎.....

Q5. Mina rubbed some butter on a piece of paper.

(i) What must she do now to see if the butter contains fat?

✎.....

(ii) How can she tell if the butter contains fat?

✎.....

(iii) Mina tested these foods: peas, margarine, carrots, cheese. Which foods do you think contained fat?

✎.....

QUESTIONS

Name: ..... Form: .....

Q6. Paul looks at an old photograph. It shows a person with bowed legs.

(i) What disease could the person be suffering from?

✎.....

(ii) What vitamin is missing from the person's diet?

✎.....

(iii) Name two foods that prevent a person getting this disease.

✎..... ✎.....

Q7. James Lind was a surgeon in the navy. He saw many sailors develop bleeding gums and lose teeth. Many sailors eventually died.

(i) What disease did the sailors have? ✎.....

(ii) What foods did Lind give the sailors to cure them?

✎.....

(iii) What is in these foods that cures the disease?

✎.....

Q8. Which substance can line the walls of an artery?

Tick one box: Fibre ☐ Salt ☐ Sugar ☐ Cholesterol ☐

Q9. Which mineral do people lose when they sweat? ✎.....

Q10. Which substance in food helps the food to travel through the digestive system?

✎.....

QUESTIONS

Name: ..... **Form:** .....

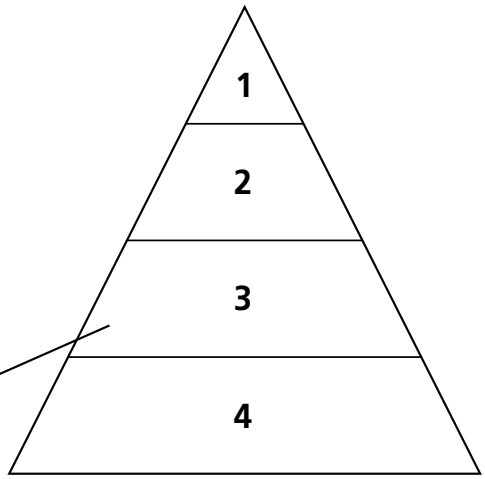
Q11.

Proteins

Carbohydrates

Fats

Vitamins and minerals



The food pyramid is for a balanced diet. Match each label box to a layer in the pyramid by drawing a line between them. One has been done for you.

Q12. A scientist tested 100 grams of different foods to find out how many grams of fat, protein and carbohydrate they contain. Here is a table of her results.

Food	Carbohydrate (g)	Fat (g)	Protein (g)
Bread	48	3	10
Cheese	0	36	25
Chicken	0	7	20
Banana	20	0	1
Peanut	9	49	28

(i) How much fat did the bread contain? ✎.....

(ii) Which food contained 20 grams of protein? ✎.....

(iii) How many foods contain carbohydrate? ✎.....

(iv) Which food contained the most fat? ✎.....

(v) Arrange the foods in order of their protein content. Start with the food that contains the most protein.

✎.....

(vi) A person eats a large amount of all five foods. Which two foods should he eat less of to prevent heart disease?

✎..... ✎.....

QUESTIONS

Name: ..... Form: .....

Q13. Four childen took their pulse after resting before exercise, straight after exercise and one minute after exercise Here are their results.

Name	Before exercise (bpm)	After exercise (bpm)	One minute after exercise (bpm)
Andrew	68	95	75
Jane	70	90	76
Mina	69	91	67
Paul	67	93	74

(bpm) = beats per minute.

(i) Whose heart was beating most rapidly before exercise? ✎.....

(ii) What was Mina's pulse rate straight after exercise? ✎.....

(iii) Whose heart rate fell by 20 beats after one minute's rest? ✎.....

(iv) Who may have made a mistake in taking their pulse rate?

✎.....

(v) When was the mistake made? ✎.....

(vi) Explain why you think a mistake was made.

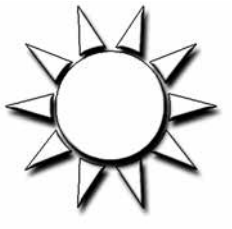
✎.....

✎.....

Q14. How do you take your pulse at your wrist?

✎.....

✎.....



QUESTIONS

Name: ..... **Form:** .....

Q15. What kills bacteria in the blood?

Tick one box: Red cells ☐ White cells ☐ Platelets ☐ Fibres ☐

Q16. Why should food be protected against flies?

✎.....

Q17. What forms a blood clot to heal a wound?

Tick one box: Platelets ☐ White cells ☐ Red cells ☐ Blood vessels ☐

Q18. Jane made three model bones and hung weights from each one until they just started to bend. Here are her results.

Bone	Thickness (mm)	Weight supported (g)
A	5	20
B	10	50
C	15	120

(i) Which was the weakest model bone?

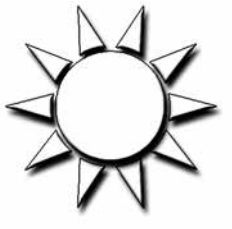
✎.....

(ii) What weight could the 10mm thick bone support?

✎.....

(iii) What pattern can you see in the results?

✎.....



QUESTIONS

Name: ..... Form: .....

Q19. Paul has indigestion. It is caused by too much acid.

(i) Where has the acid collected?

✎.....

(ii) What could Paul take to cure his indigestion?

✎.....

(iii) What happens to the acid to make him feel well again?

✎.....

Q20. There is a drug found in cigarettes.

(i) What is the drug in cigarettes called? ✎.....

(ii) How does the drug affect the heart?

✎.....

Cigarette smoke can make some of the body cells change.

(iii) What do these cells grow into?

✎.....

Q21. Jane's older brother smokes twenty cigarettes a day, eats meals which contain a large amount of fat, and lies on the sofa watching television in his free time.

What is the best advice someone could give him to improve his lifestyle?

✎.....

ANSWERS

1. Fats, carbohydrates. *2 marks*

2. Proteins. *1 mark*

3. Minerals. *1 mark*

4. (i) Carbohydrates. *1 mark*
(ii) Rice, cereals, potatoes. *2 marks*

5. (i) Hold it up to the light. *1 mark*
(ii) Light passes through the paper. *1 mark*
(iii) Margarine, cheese. *2 marks*

6. (i) Rickets. *1 mark*
(ii) Vitamin D. *1 mark*
(iii) Oily fish, liver, eggs, cereal, milk, dairy products. *2 marks*

7. (i) Scurvy. *1 mark*
(ii) Oranges, lemons, limes, citrus fruit. *1 mark*
(iii) Vitamin C. *1 mark*

8. Cholesterol. *1 mark*

9. Salt. *1 mark*

10. Fibre. *1 mark*

11. 1 = fats, 2 = proteins, 4 = carbohydrates. *3 marks*

12. (i) 3g. *1 mark*
(ii) Chicken. *1 mark*
(iii) 3. *1 mark*
(iv) Peanut. *1 mark*
(v) Peanut, cheese, chicken, bread, banana. *1 mark*
(vi) Peanut and cheese. *2 marks*

13. (i) Jane's. *1 mark*
(ii) 91 bpm. *1 mark*
(iii) Andrew's. *1 mark*
(iv) Mina. *1 mark*
(v) One minute after exercise. *1 mark*
(vi) It's much lower than the others. It does not follow the pattern shown by the others. *2 marks*

14. Press two fingers on the underside of the wrist to find the pulse then count the beats for a minute. *2 marks*

15. White cells. *1 mark*

16. They carry bacteria which can cause food poisoning. *2 marks*

17. Platelets. *1 mark*

18. (i) A. *1 mark*
(ii) 50g. *1 mark*
(iii) The thicker the bone the greater the weight it can support. *1 mark*

(Note: The term weight and weights is used for simplicity, in case the children have yet to be introduced to the concept of mass. If the children are familiar with the concept of mass you may like to amend the question accordingly.)

19. (i) In his stomach. *1 mark*
(ii) Seltzer tablets. *1 mark*
(iii) It is weakened by the seltzer (neutralised). *1 mark*

20. (i) Nicotine. *1 mark*
(ii) It makes the heart beat faster and puts more strain on it. *1 mark*
(iii) Cancer. *1 mark*

21. Stop smoking, eat a balanced diet, take more exercise. *3 marks*

Total 56 marks