Science@School | Book 5A

Keeping healthy

Teacher's Guide

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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.

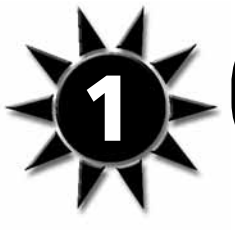
Calcium is used for building healthy bones and teeth, in the clotting of blood, and helps muscles contract.

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.



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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

6 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.

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 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.

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.

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

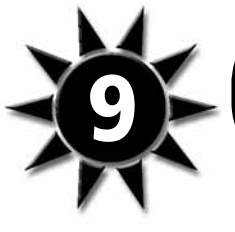
(i) You may wish to point out that scientists sometimes make models of the things they are studying to try and make the study simpler. If you wish, you could show the children some cleaned chicken bones to illustrate how they vary in size and thickness. The children should only use small pieces of paper 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.



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.

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.

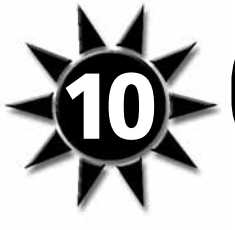
(ii) It is always important to try out each activity before you try it in class. Here you will find that a froth is produced. You will need to make sure that the jars are large enough to cope with the froth, and that it does not spill over onto the table.

(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.



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.

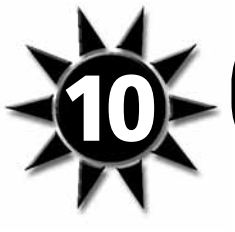
Children may ask why people take harmful substances in the first place, and you may wish to say that the harmful drugs produce short term effects which some people consider to be pleasant. However, in the long term extensive, even fatal, damage may be done to the body. There may also be danger to the 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.



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.