Nelson International Science

Workbook 6

Anthony Russell

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Introduction

Nelson International Science Workbook 6 provides a complete copy of the *Student Book* activities for all learners to work through.

The activities are marked with this icon 📖 showing the corresponding page number in the *Student Book*.

In addition to the *Student Book* activities, there are extra activities, for example, Activity A, that can be done either in the classroom or as homework at home. They support the knowledge and understanding gained in the *Student Book* activities.

The excretory system

Activity 1 4

You will need: a pen or pencil.

1 Think of the things that you have to do every day to stay alive and well. Share your ideas with your group.

My ideas

2 Sort out those that are to do with getting rid of waste products from the body.

a Discuss with your group which organs are used to get rid of each type of waste.

Which organs get rid of which waste?

b Sort out the jumbled names of organs and waste products in the lists below.

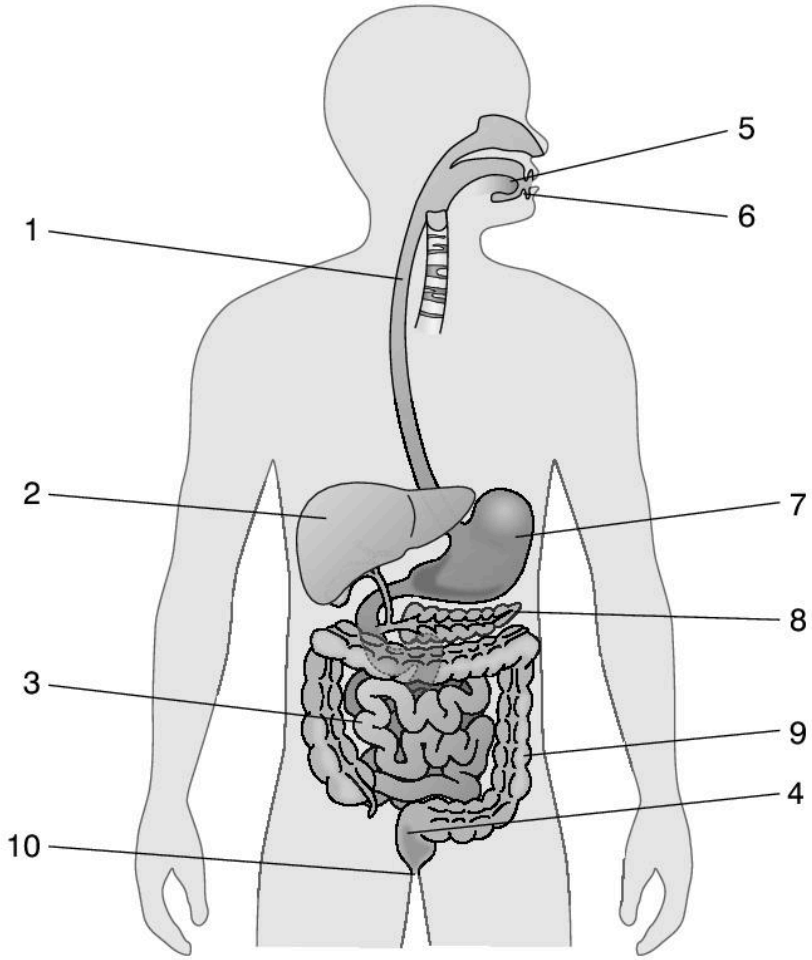
Organs:	**nksi**	**siynked**	**glnsu**	**vielr**
	_____	_____	_____	_____
Wastes:	**elbi**	**awtse**	**niuer**	**baocrn**	**dodieix**
	_____	_____	_____	_____	_____

c Match the organs and the wastes and write down the pairs.

My pairs

3 Share your answers with the class.

The digestive system



Activity 2 18–19

You will need: a pen or pencil.

1 Look at the diagram of the human digestive system.

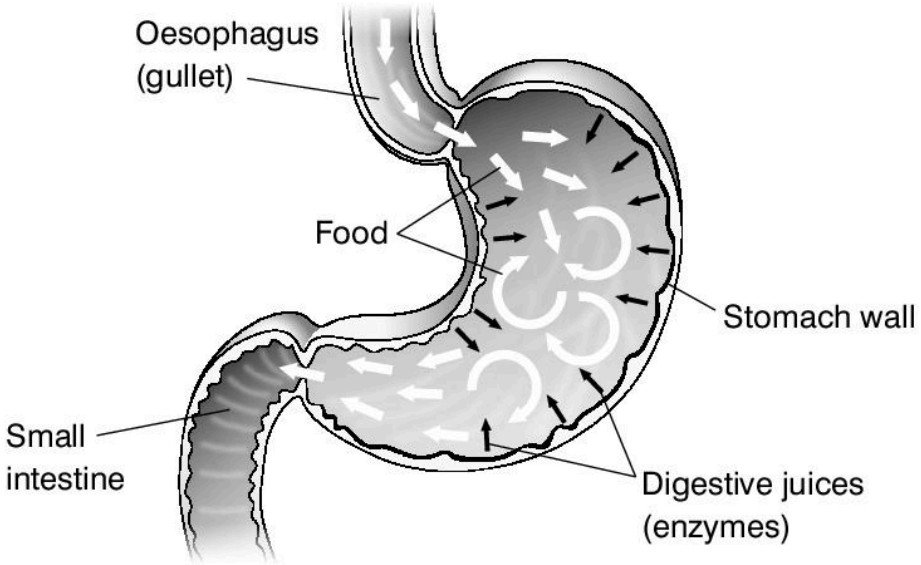
2 Read the names of the organs that form the system.

- large intestine (colon)
- teeth
- tongue
- oesophagus (gullet)
- stomach
- small intestine
- large intestine (rectum)
- liver
- anus
- pancreas

3 Match the names of the organs to the numbers.

a Write the names of each of the 10 parts onto the diagram.

b Share your answers with the class.



Activity 3 20

You will need: a pen or pencil.

1 Look at the diagram of the stomach.

2 Work out the meaning of the arrows.

The arrows mean

3 Write some sentences to explain what the function of the stomach is: what does it do to the food? Why?

4 Share your writing with the class.

Activity 4 22 – 23

You will need: a pen or pencil.

Complete these sentences using these words (you may need to use some words more than once):

oesophagus enzyme anus tongue
absorbed colon gullet teeth saliva
rectum mouth faeces

1 The _____ bite and chew the food. This breaks it into small pieces.

2 Special glands in the mouth make a liquid called _____. This _____ is mixed with the food. It begins to digest it and makes it easier to swallow.

3 The _____ pushes the food to the back of the mouth and it is swallowed. It goes down the _____ (or _____) into the stomach.

4 The large intestine has one part called the _____. The digested food is _____ there and moves into the blood.

5 The _____ is the last part of the large intestine. The parts of the food which cannot be digested are collected there. Water is absorbed and the solids become the _____.

6 The _____ is the hole at the end of the rectum. The digestive system is a tube, with a hole at each end: the _____ and the _____.

Activity 5 24 – 25

You will need: books and other resources with information about excretion, reproduction, circulation, digestion and the nervous system; and a pen or pencil.

1 Discuss with your group which system you will research using the resources available.

We will research the _____ *system.*

2 Share out the work of collecting detailed information about your chosen system.

3 Make notes and drawings as records of what you find out.

You will need more paper to record your notes and drawings but you can make a start here.

Notes and drawings

4 Produce a display of your findings to share with the class. Answer any questions that other learners may have.

5 Look at the display of work from other groups and ask them questions about what you see.

Activity 6 25

You will need: a pen or pencil.

1. Look at the two lists below. One is a list of human body systems. The other is a list of their functions.

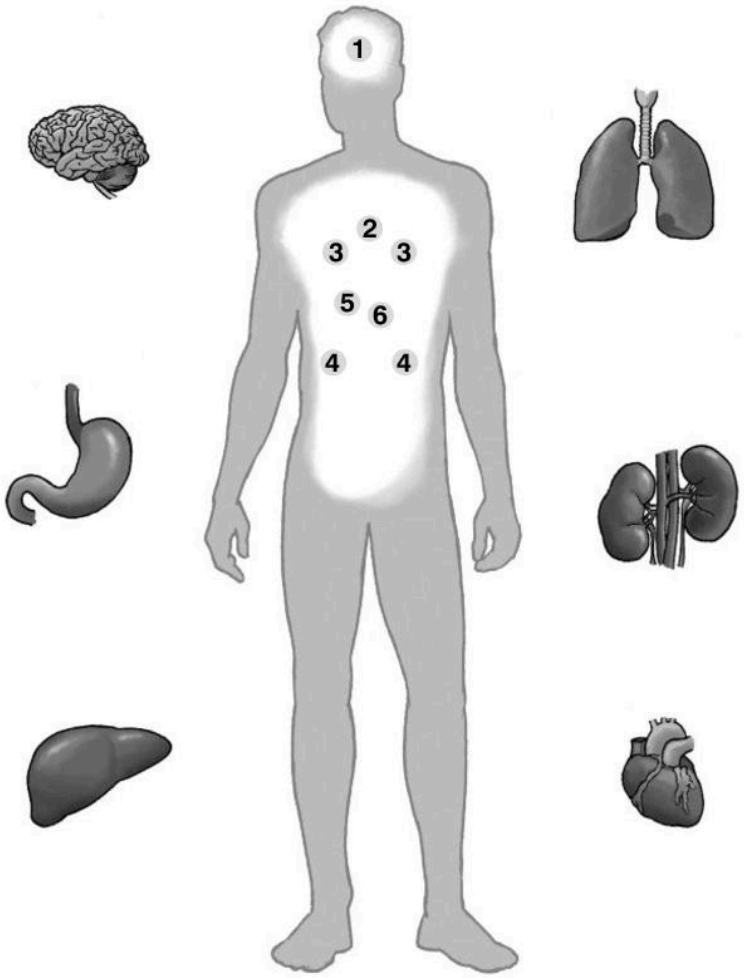
2. Try to match the systems with their functions.

Human body systems
Respiratory system
Digestive system
Reproductive system
Skeletal system
Circulatory system
Central nervous system
Excretory system

Functions
a) Supports, protects and allows movement of the body
b) Carries food, wastes, hormones and gases around the body
c) Carries messages to and from the brain
d) Removes waste products from the body
e) Collects oxygen and gets rid of carbon dioxide
f) Breaks food down into smaller and simpler parts
g) Produces sex cells/produces babies

3. Share your answers with the class.

Major organs – where are they in the body?



Activity 7 27

You will need: a pen or pencil.

1 Look at the drawing of the body outline and find the numbers 1 to 6.

2 Look at the drawings of the six major organs and name each of them.

3 Match the names of the organs to the numbers. Write the names alongside the numbers 1 to 6.

1 _____ 4 _____

2 _____ 5 _____

3 _____ 6 _____

4 Share your answers with the class.

Activity A

You will need: a pen or pencil.

1 **Sit still and count the number of times you breathe in over a 30-second period.**

a Enter the number in the table below.

Count	Number of breaths	Average number
1		
2		
3		
1		
2		
3		
1		
2		
3		
1		
2		
3		

b Repeat the counting twice more and record the numbers in the table. Calculate the average number for the three measurements.

2 **Choose an activity that you think will make you breathe faster, e.g. running on the spot, jumping up and down, or doing press-ups.**

a Do the activity for one minute. As soon as you stop, begin to count the number of times you breathe in over a 30-second period.

b Repeat the counting twice more and record the numbers in the table. Calculate the average number for the three measurements.

3 **Repeat the same activity for a minute and count your breaths again, three times as before.**

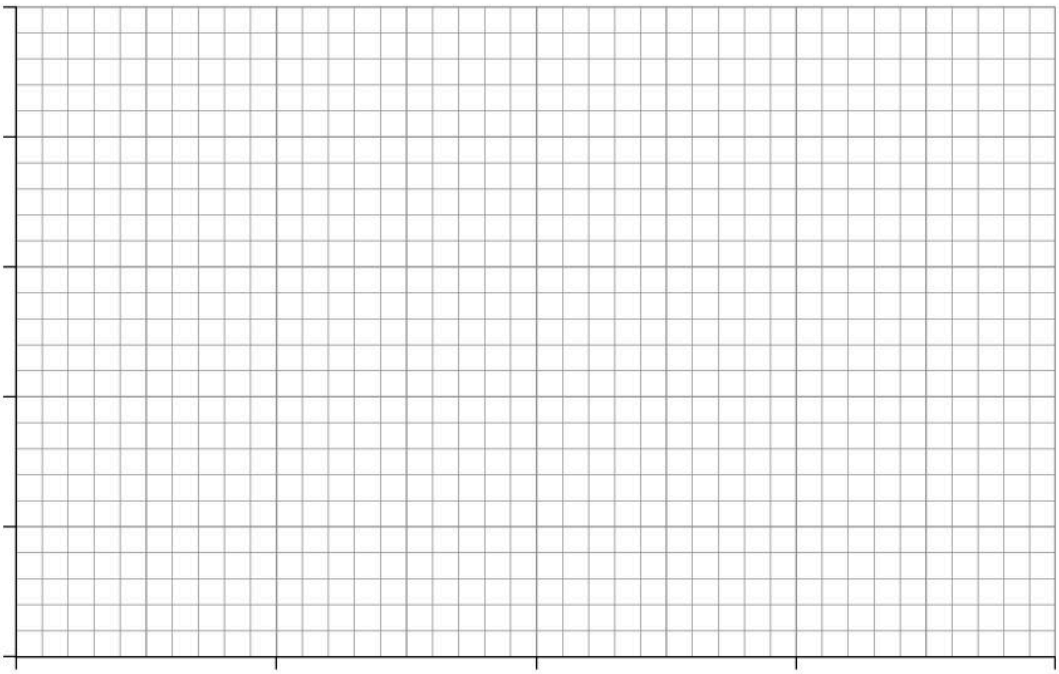
a Record the numbers in the table.

b Calculate the average.

4 **For one last time, repeat the activity and do the counting as before, recording the counts in the table and calculating the average.**

Activity A (*continued*)

5 Use the average figures to construct a line graph in the grid below. You need to label the axes and choose the scales and their ranges.



6 Compared with when you were sitting, was the breathing faster or slower after the first activity?

_____

7 Did the breathing rate stay the same each time you did the activity?

_____

8 After being active, were the three counts the same or different each time?

_____

9 Try to explain your answer to question 8.

_____

_____

_____

Activity B

You will need: a pen or pencil.

1 Here are the six body systems, with one part of each written in the table.

Respiratory	Circulatory	Reproductive	Digestive	Excretory	Nervous
windpipe	heart	uterus	stomach	kidney	brain

Write the names of as many other parts as you can in the table under the correct system. Continue on a separate sheet of paper if needed.

2 Choose **three** of the parts you have named and write **two** sentences about each of them. You can, for example, describe what the part looks like, or where it is found in the body, or what its function is.

Part 1:

Part 2:

Part 3:

Caring for the environment

Activity 1 31

You will need: books and other resources about environmental damage and a pen or pencil.

1 Use the resources to do research on one of the following environmental problems:

- Pesticides used by farmers
- Industrial waste pollution
- Deforestation
- Endangered species
- Acid rain
- CFCs and the ozone layer
- The greenhouse effect and global warming
- Smog
- Misuse of water resources
- Noise pollution
- Domestic waste disposal.

2 Explore the harmful effects of your chosen problem at the local, national and global levels.

My chosen problem is: _____

a Try to find examples of the damage done at all three levels.

Local: _____

_____

National: _____

_____

Global: _____

_____

b Try to find out what can be done to *prevent* the damage.

c Try to find out what can be done to *solve* the problems we have created.

Activity 1 (*continued*) 31

3 Make notes and drawings of what you find.

What can be done to *prevent* the damage?

Activity 1 (*continued*) 31

3 Make notes and drawings of what you find (*continued*).

What can be done to *solve* the damage?

4 Choose how your group will present your report to the class and prepare your presentation.

Activity 1 (*continued*) 31

5 **Attend to the presentations of other groups.**

a Record information from the other groups' presentations.

b Ask them questions about anything that interests you or is not clear.

Activity 2 33

You will need: books with information about compost heaps, tree planting and rubbish disposal; materials for your chosen task; and a pen or pencil.

- For a compost heap – collect wood, plastic sheeting or wire netting, and garden tools.
- For tree planting – collect young tree/s, a spade, a watering can or a bucket, and water.
- For collection of litter – collect plastic bags, disposable gloves, a rubbish bin or pit, and a spade.

1 **Discuss with your group how you will carry out the activity.**

a You should plan what you will need to do over the whole term, not just how you will start the process.

b Use the books to help you plan carefully. Write down your plan here.

Plan for _____

2 **Share out the tasks involved and begin the activity.**

Activity 2 (*continued*) 33

2 a Keep a record of the steps you follow. You can write them down here as a reminder of what happened.

Activity 2 (*continued*) 33

2 **b** Keep a record of the results of what you do as you go along. You can use this space here as a start. Remember that you can record your project using drawings, tables, notes and charts.

3 Continue with the process of caring for your local environment for the whole term. At the end of the time, write a report about the success or failure of what you have been doing.

4 Share your group's records and report with the rest of the class. Attend to what the other groups share with you about their projects.

Activity 3 40

You will need: books and other resources with information about the environment and a pen or pencil.

1 Discuss with your group what 'environment' means. Keep notes of what the group thinks.

Notes

2 Decide who will do research on particular aspects of the environment.

a Choose the local, national or global level.

The level we chose is _____

b Choose which feature of the environment you will research.

We chose the feature of _____

c Focus on the sustainable development of that feature, e.g. forest, water.

We will focus on the _____

3 Collect information from the books and other resources about your chosen environmental feature.

4 Make notes and draw pictures, maps and graphs to illustrate your findings.

5 Put all your work in a portfolio so that the class can share your findings.

Activity 4 42

You will need: large paper, colouring pens or pencils or paints, squared paper, a ruler and a pen or pencil.

1 Go outside with your group and choose a place where you can do a survey of rubbish on the ground. It might be inside or outside the school yard.

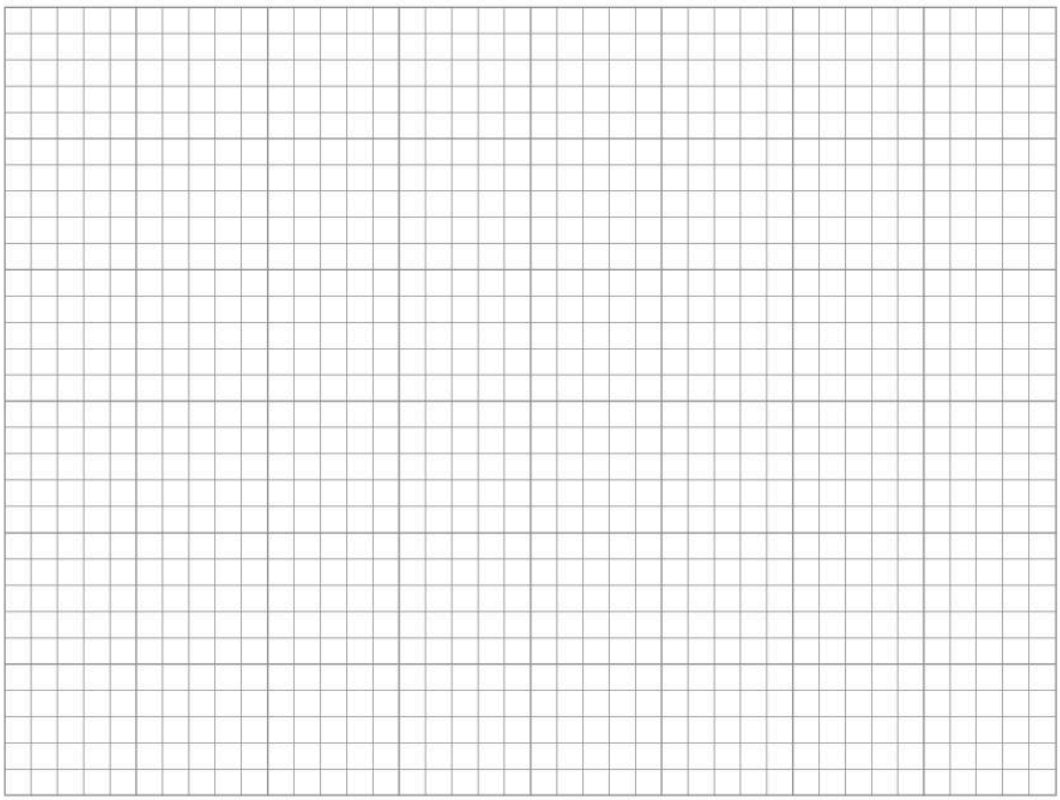
2 Keep a tally of each kind of rubbish you find (e.g. plastic bags or drinks cans). Put your tally into a table of results below.

Tally table

Type of rubbish	Tally

Activity 4 (*continued*) 42

3 Use the data to make a bar chart. You can sketch out the bar chart here that your group will use. Then work with your group to produce a final one for display.



Display your group's chart with those from other groups.

4 Compare what the groups have found. Write down here what is similar and what is different.

Activity 4 (*continued*) 42

Try to explain what the bar charts show.

The bar charts show:

_____

_____

_____

5 Make a poster with a message about how and why rubbish should be disposed of properly. You can sketch out a poster here. Then work with your group to produce a final one for display.

My poster idea

Display your posters around the school.

Activity 5 43

You will need: a pen or pencil.

1 **Look at the pictures and discuss what effects such things have on:**

- **a** people
- **b** other living things
- **c** non-living parts of the environment.

Activity 5: (*continued*) 44

2 Write lists of all the effects that the group can think of.

The effects on people

The effects on other living things

The effects on non-living parts of the environment

3 Display your lists.

Activity 6 49

You will need: a pen or pencil.

Complete these sentences using these words (you may need to use some words more than once):

fish **hotter** **cars** **gases** **stone**
traffic **buildings** **dioxide** **Earth**
dissolve **trees** **cities** **lead** **burning**
poisonous **heat** **acid** **global**

1 _____ makes waste products. Some fuels produce _____ gases.

2 Petrol with _____ in it is bad. When the petrol is burned in _____ and other vehicles it makes poisonous _____.

3 In _____ this is a big problem because there is a lot of _____.

4 Some gases made in burning can make _____ rain when they _____ in water.

5 This polluted rain can kill _____, _____ and other living things. It also damages _____ made of _____.

6 Carbon _____ gas stops _____ energy from escaping back into space. This means the _____ is slowly getting _____.

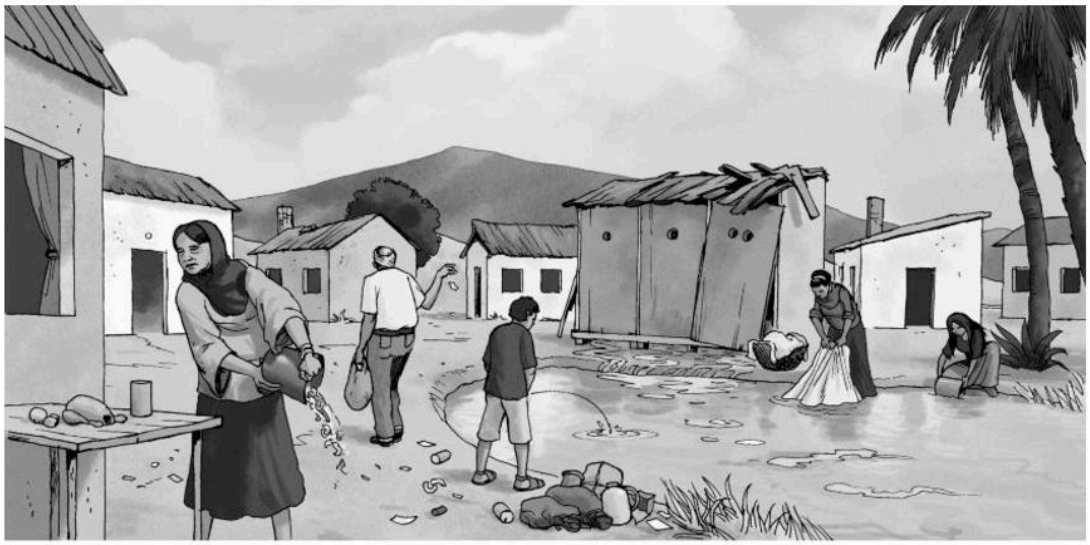
7 The more fuels we burn, the more _____ gases we make.

Activity 7 51

You will need: a pen or pencil.

1 Discuss with your group how you think the cholera germs got into the water.

2 Use these pictures to help you in your thinking about the answer.



Write down your ideas here:

How the cholera germs got into the water

3 Share your group's ideas with the class.

Activity 8 54

You will need: a pen or pencil.

1 Look at the photographs and try to work out what they show.

2 Discuss with your group how the activities shown in the pictures are connected with the topic of water pollution.

Write down your ideas here:

How are the pictures connected to water pollution?

3 Share your ideas with the class.

Activity 9 55

You will need: a pen or pencil.

Complete these sentences using these words:

industries urine poisons soluble oil polluted typhoid sea fertilisers plants pipe faeces diseases cholera

1 Water can be _____ in many ways.

2 Water can carry _____ such as _____ and _____.

3 Human _____ and _____ can pollute water.

4 Sometimes water is polluted by accident when _____ escapes from a crashed tanker or a burst _____.

5 Some _____ dump their waste in rivers or the _____. The waste can have _____ in it which kill animals and _____.

6 Farmers add _____ to crops and soil. These can pollute water because they are _____ and end up in streams and rivers.

Activity 10: Investigate the effects of pollution 56

You will need: a clipboard and a pen or pencil.

1 You will investigate the effects of pollution on a component of your local environment. Discuss with your group which component you will investigate – the air, the land or the water.

We will investigate the _____

2 Write some questions that you can ask older people from the community about how pollution affects their lives.

For example, think about rubbish collection, where the water comes from, or how many cars there are around you.

Questions

Activity 10: Investigate the effects of pollution (*continued*) 56 – 57

3 **Invite as many different people as you can to come to class to be interviewed.**

a Ask for facts and opinions. For example, what do they feel about the spoiling of their environment?

b If there are farmers you can question, ask them about how pollution affects their work with crops or animals.

c Ask your questions and write down what the adults tell you.

4 **When all the interviews are finished, discuss your notes of the interview answers.**

a Prepare a report of your findings to share with the class.

b Answer questions from others in the class.

5 **Listen to the presentations of other groups and ask them questions.**

a Compare the findings of the groups.

Comparing group results

b Come to a conclusion about the effects of pollution on the local environment and the lives of people in the locality.

Conclusion

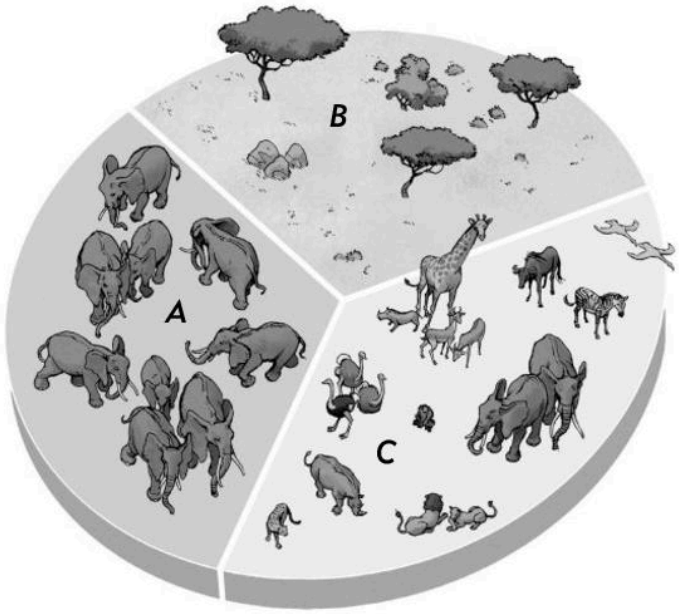
Food chains

Food chains are part of every habitat, population and community.

A **habitat** is the environment in which an animal or plant normally lives. It is shared by other individuals of the same species (e.g. many crocodiles might share the same river or swamp habitat). There will usually be populations of other species in the same habitat (e.g. crocodiles sharing the habitat with fish).

A **population** is a group of individuals of the same species that share a habitat.

A **community** is the collection of animals and plants that live together in a particular habitat.



Activity 11 59

You will need: a pen or pencil.

1 Look at the diagram. Read the definitions of habitat, community and population.

2 Write A, B and C, and match the definitions with the three parts of the diagram.

_____ _____	_____ _____	_____ _____

3 Share your answers with the class.

Activity 12: Investigate two habitats 59 – 60

You will need: a clipboard and a choice of measuring devices, e.g. thermometer, ruler, light meter; and a pen or pencil.

1 Discuss with your group which two habitats you will investigate in your locality. Try to choose two that are very different.

We will investigate:

Habitat A: _____

Habitat B: _____

2 Plan what you will look for and how you will record what you observe. Write down your plan here:

Plan

Activity 12: Investigate two habitats 60

3 Go outside with your paper, clipboard, pencil and measuring device/s and investigate the chosen habitats.

Collect enough information to be able to give a clear and full description to the class. Make some notes and drawings here.

Notes and drawings

4 Return to class and discuss with your group the information you have collected.

a Decide how you will give your descriptions to the class.

We will present our habitat information to the class by

_____

_____

_____

_____

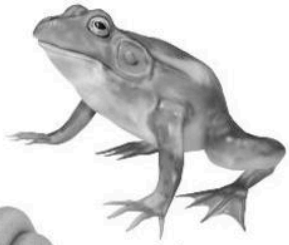
b Present your descriptions and answer questions from others in the class.

A bird of prey

A cabbage

A slug

A snake



A frog

Activity 13 62

You will need: a pen or pencil.

1 **Look at the pictures of five living things.**

a How do the things shown in the pictures depend on each other?

b Tell your group what you think.

c Write the things as a food chain, using arrows.

Draw the food chain here:

Food chain

2 **Try to explain to your group why they are in that order.**

pond weed → small fish → bigger fish → fish eagle

grass → goat → lion

grass → grasshopper → lizard → eagle

lettuce → caterpillar → bird → cat

Each of these is an example of a food chain.

Activity 14 63

You will need: a pen or pencil.

1 **Look at all the food chains in your class and:**

a Find a common feature. Tell your group what you think it is.

b Explain to your group what the arrows stand for.


Zebra


Mopane tree


Bird


Snake


Snail


Hyena


Lizard

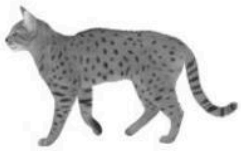

Rabbit


Cow


Grass


Caterpillar


Cabbage


Cat

Activity 15 67

You will need: a pen or pencil.

1 **Make up four different food chains using the animals and plants in the picture.**

a Each food chain should have at least four organisms and three links (arrows).

b Under each organism in the chain, state whether the organism is a producer or a consumer.

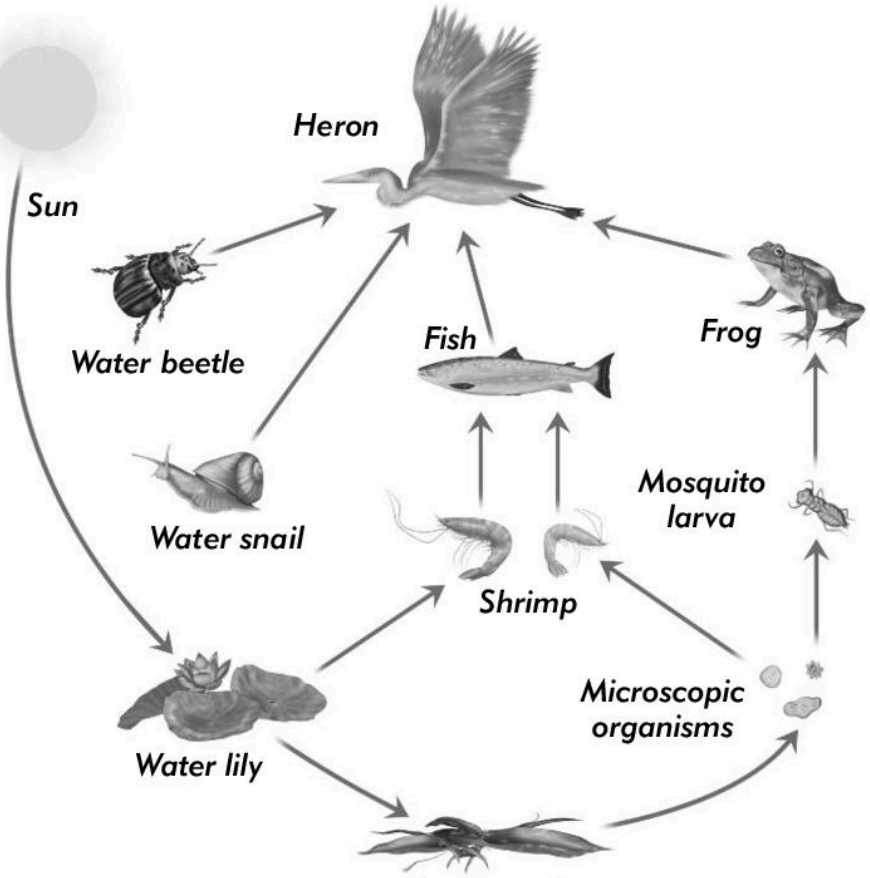
Food chain 1	**Food chain 2**

Activity 15 (*continued*) 67

Food chain 3	Food chain 4

2 Compare your food chains with others in your group.

3 Share your group's food chains with the class.



Food chains in a river habitat

Activity 16 68 – 69

You will need: a pen or pencil.

1 Look carefully at the plants and animals in the picture.

2 Identify and record the producers and consumers.

3 Make lists of each type of organism. Share your lists with the class.

The producers are:

_____

_____

_____

The consumers are:

_____

_____

_____

Activity 16 (*continued*) 69

4 Make up food chains from the following savannah plants and animals:

hyena zebra lion thorn trees gazelle grass cheetah buffalo small shrubs giraffe

5 Label the producers and consumers.

Food chain

Food chain

Food chain

6 Share your food chains with the class.

Activity C

You will need: a pen or pencil.

1 Here is a mixed-up list of consumers and producers. Sort them into two groups – the producers and the consumers:

mouse seeds cat grass hawk (bird of prey) snail worm rabbit beetle leaves roots songbird fly

2 Write your groups here:

Producers:

Consumers:

3 Use some of the living things in the two groups to make food chains. Make **two** food chains, using arrows to link the parts of the chains.

Food chain 1

Food chain 2

4 Identify each part of the chain as a producer or a consumer.

5 Write a sentence to explain why the chains both start in the same way.

Animal life (including our own lives), depends totally on plants. The energy they 'capture' in the process of photosynthesis is transferred to the animals that eat them and some of that energy moves 'up' the chains through the consumers.

If particular plants or animals are removed from the food chains, other animals are affected as there is less for them to eat. This is one reason why conservation is so important. If we kill off any population of plants or animals, we will damage the survival of many other organisms.

Changes in the environment, such as much less rainfall over a year, can affect the number of organisms in a population. For example, when rain is scarce, plants may die or grow very little. This means less food for the consumers like gazelles.

If the population of gazelles falls, with more deaths and fewer births, then the predators that eat the gazelles – for example, cheetahs – will have to hunt longer and further afield to find enough food.

If they cannot find food, they may not breed or they may even die.

So, one environmental change can have an impact throughout a whole chain.

Activity 17 70

You will need: a pen or pencil.

1 **Predict what other environmental factors could change and affect populations of plants and animals.**

I predict that

2 **Share your predictions with the class.**

Activity D

You will need: research materials on extinct animals and a pen or pencil.

1 **Do research from books and/or on the Internet about two animals that are now extinct.**

a **One** animal has just died out, without human beings doing anything to kill them off.

b The **other** animal has been made extinct because of what people have done.

List your books and websites here:

_____

_____

_____

2 **Make notes here about the first animal.**

a Include a drawing and information about where they lived and when they became extinct.

Animal 1: _____

b Explain what people did to make the animal extinct – was it accidental or was it done on purpose?

_____

_____

_____

c Explain why the actions of people made the animal extinct.

Did they kill them all? _____

Did they destroy the animal's habitat? _____

Did they reduce the animal's food supply in some way or was it something else?

_____

_____

Activity D (*continued*)

3 **Make notes here about the second animal.**

a Include a drawing and information about where they lived and when they became extinct.

Animal 2: _____

b Explain what people did to make the animal extinct – was it accidental or was it done on purpose?

_____

_____

_____

_____

c Explain why the actions of people made the animal extinct.

Did they kill them all? _____

Did they destroy the animal's habitat? _____

Did they reduce the animal's food supply in some way or was it something else?

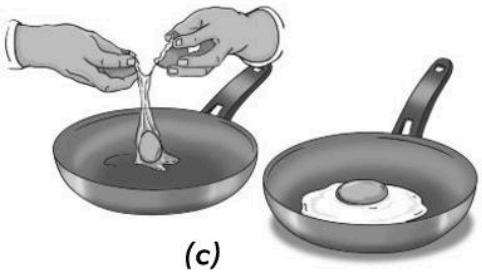
_____

_____

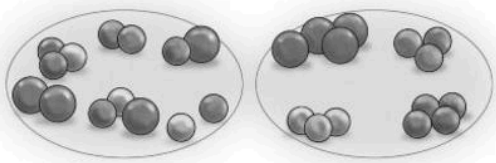
Reversible and irreversible changes

(a)

(b)



(c)



(d)

Activity 1 72

You will need: a pen or pencil.

1 One of the pictures above shows a change that can be reversed. It shows a reversible change. Look at the pictures and find the reversible change.

The reversible change is

2 Tell the class what you have chosen and explain *why* you think it is reversible.

I think it is reversible because

Activity 2: Investigate what happens to materials when they are heated 73–74

You will need: water, a container that can be heated, a heat source, a thermometer, some wax or chocolate or butter, a small piece of vegetable and a pen or pencil.

1 **Choose to investigate:**

a *either* a change of state (which you learned about in Stages 4 and 5: States of matter), *or*

b a change of temperature, *or*

c hardness (which you learned about in Stage 2: Material changes).

Write down your choice here:

We will investigate _____

2 **Collect the items needed for your chosen activity. List them here:**

3 **Discuss with your group:**

a how you will investigate the change

b how you will record the results.

4 **Write out the plan for the steps of your investigation and include your prediction of what you think will happen. Show your plan to your teacher.**

Plan

The steps of the investigation will be:

My prediction is:

Activity 2: Investigate what happens to materials when they are heated (*continued*) 74

5 Carry out the activity, observing change and recording your observations in words and/or drawings. Remember to use drawings, tables and charts, as well as notes. You can start to record some results here:

6 When the changes have ended, look at your results.

a Discuss them with your group.

b Come to a conclusion about what they tell you about the change you investigated: was it reversible *or* was it irreversible?

Conclusion

7 Share your results with the class and explain why you have come to your conclusion.

8 Listen to the results and conclusions of other groups and ask questions if you do not understand or agree.

Activity 3: Investigate how you would separate one substance from another 77

You will need: some salt, fine sand, coarse sand, iron filings, suitable equipment to help in separating the substances when you have mixed them and a pen or pencil.

1 This activity is a challenge. Choose one of the following mixtures:

- **a** salt mixed with sand
- **b** sand mixed with iron filings
- **c** fine sand mixed with coarse sand.

My group chose mixture ☐

2 The challenge is to separate the two substances in the mixture you have chosen. You will have to use your knowledge of the physical properties of the substances to do this.

3 Discuss with your group how you will do the separation. Make a plan of what you will do.

Plan

The steps of the investigation will be:

My prediction is:

4 Make a list of any equipment you will need. List it here:

_____

_____

- **a** Show your list to your teacher.
- **b** Explain how your plan will work.

Activity 3: Investigate how you would separate one substance from another (*continued*) 78

5 **The first step is to make the mixture you have chosen.**

a Record how many measures of each material you use and what units you use.

Material	Measures (unit)

b Keep a record of all the steps you take to do the separation.

Make a note of these steps here:

Steps taken to do the separation

Activity 3: Investigate how you would separate one substance from another (*continued*) 78 – 79

5 c Record your results. Remember you can make drawings, tables and charts, as well as notes.

6 Show your results and the record of your method to the class. Answer any questions from others in the class.

7 Look at what other groups have done. Compare your results and method with those of other groups.

Comparing results

Activity 4: Investigate which substances are soluble or insoluble 81

You will need: water, containers for testing solubility, various solid substances and a pen or pencil.

1 **Collect at least four different solid substances.**

a Choose two that you think are *soluble* in water.

substance 1: _____ **substance 2:** _____

b Choose two that you think are *insoluble* in water.

substance 3: _____ **substance 4:** _____

Remember water is the solvent and the solids are the possible solutes. If a solute dissolves in a solvent, it makes a solution.

2 **Discuss with your group how you can make this a fair test.**

We will make it a fair test by:

_____

_____

_____

_____

Write a plan of how you will do this investigation into solubility.

Plan

The steps of the investigation will be:

My prediction is:

Remember you need to treat each substance in the same way, so that you can compare the results.

Show the group's plan to the teacher.

Activity 4: Investigate which substances are soluble or insoluble 81 – 82

3 Draw a table for your results, using column headings like this:

Table of results

Substance	Soluble	Insoluble

4 Carry out the investigation on each of your chosen substances in the same way.

5 Observe what happens and record the results in the table.

a Discuss the results with your group and come to a conclusion.

b Share your results and conclusion with the class.

Conclusion

Activity 5: Investigate what happens when you add solids to water 84

You will need: some water, a container to mix water with solids, at least two solids – such as baking powder (sodium hydrogen carbonate) or Epsom salts (magnesium sulphate), a spoon or stirrer and a pen or pencil.

1 **Investigate what happens when you add a spoonful of one of the solids to water.**

a Predict what you think will happen.

b Write down your prediction.

Solid 1: _____

I predict that: _____

Solid 2: _____

I predict that: _____

2 **Test the first solid.**

a Carefully observe the result of adding it to water and stirring them together.

b Record your observations here in writing and drawings.

Activity 5: Investigate what happens when you add solids to water (*continued*) 84

3 **Repeat the same process with the second solid.**

a Carefully observe the result of adding it to water and stirring them together.

b Record your observations here in writing and drawings.

4 **Compare the results with your predictions and discuss them with your group. Were the predictions correct?**

Solid 1:

Solid 2:

5 **Share your findings with the class and try to explain the changes you observed.**

Activity 6 85

You will need: some sugar, some water, test tubes or other small containers (e.g. plastic beakers) and a pen or pencil.

⚠ **WARNING:** Do not use any solids that you do not recognise. Check with your teacher first before using any substance for mixing. If you are not certain, do not try to make a solution.

1 Explore the process of making a solution of sugar and water. Write down your plan here.

Plan

2 Record what you do and what happens. Use the space here.

Activity 6 (*continued*) 85 – 86

3 When you have made the solution, try answering the question:

Is the sugar still present, or has it changed into a new material?

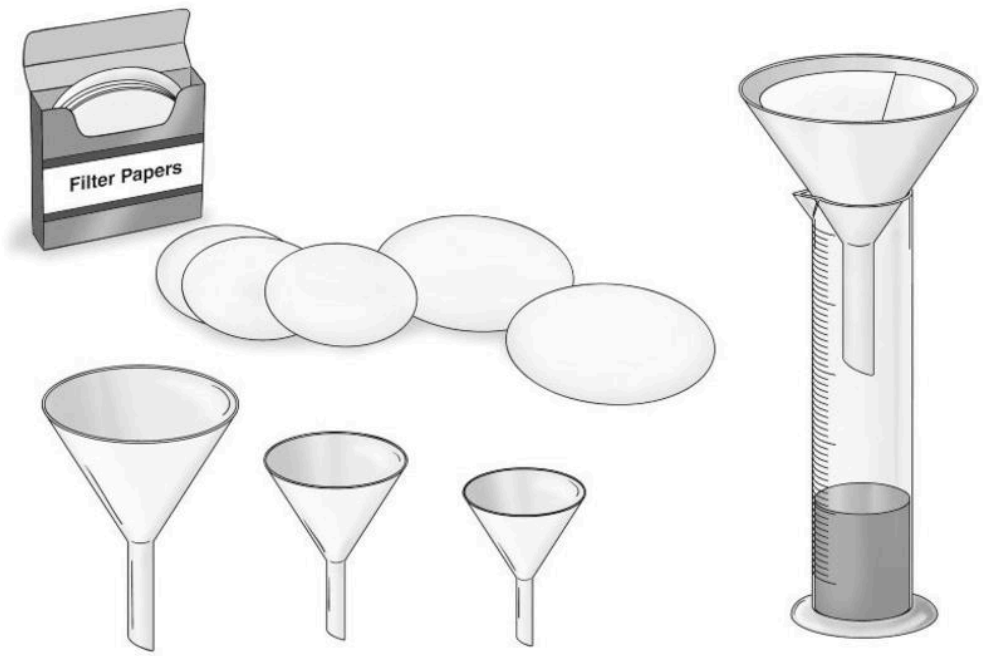
4 When you have an answer to this question, write down how you came to your conclusion.

Conclusion

5 Share your findings with the class and listen to those of other groups.

6 You can repeat the same activity using other soluble substances used at home in cooking.

> ⚠ **WARNING:** Do not use any solids that you do not recognise. Check with your teacher first before using any substance for mixing. If you are not certain, do not try to make a solution.



Filter papers and funnels

Activity 7: How does filtering work? 88

You will need: filter papers, filter funnels, containers to stand funnels in, insoluble solids, some water and a pen or pencil.

1 Explore how filtering works, using the solids you have chosen.

2 Plan the steps you will follow, from making the mixture to using the filter papers and funnels to separate the parts of your mixture. Write down your plan here.

Plan

Activity 7: How does filtering work? (*continued*) 88

3 Observe what happens as you try to separate the materials of your mixture, and record your observations.

4 Repeat the process using a different insoluble solid.

5 Compare what happened with each of your solids and come to a conclusion about how filtering works.

Conclusion

6 Share your results and conclusions with the class.

Activity E

You will need: a pen or pencil.

Complete these sentences using these words (you may need to use some words more than once):

sieving **solution** **melting** **state** **materials**
can **soluble** **heating** **dissolve** **cooling** **mixture**
solvent **reversible** **cannot** **evaporating** **dissolving**
filtering **irreversible**

1 There are of two kinds of changes: _____ or _____.

2 _____ is very different to burning. The first _____ be reversed but the second _____.

3 A change of state is reversible. For example, _____ and _____.

4 Making a _____ can be reversed. Two ways of separating the mixed _____ are _____ and _____.

5 _____ or _____ are needed to cause changes of _____.

6 Some materials are _____. When mixed with a _____ they _____ to make a _____.

Activity F

You will need: a pen or pencil.

1 **At home, keep a tally of how many times soluble solids are used.**

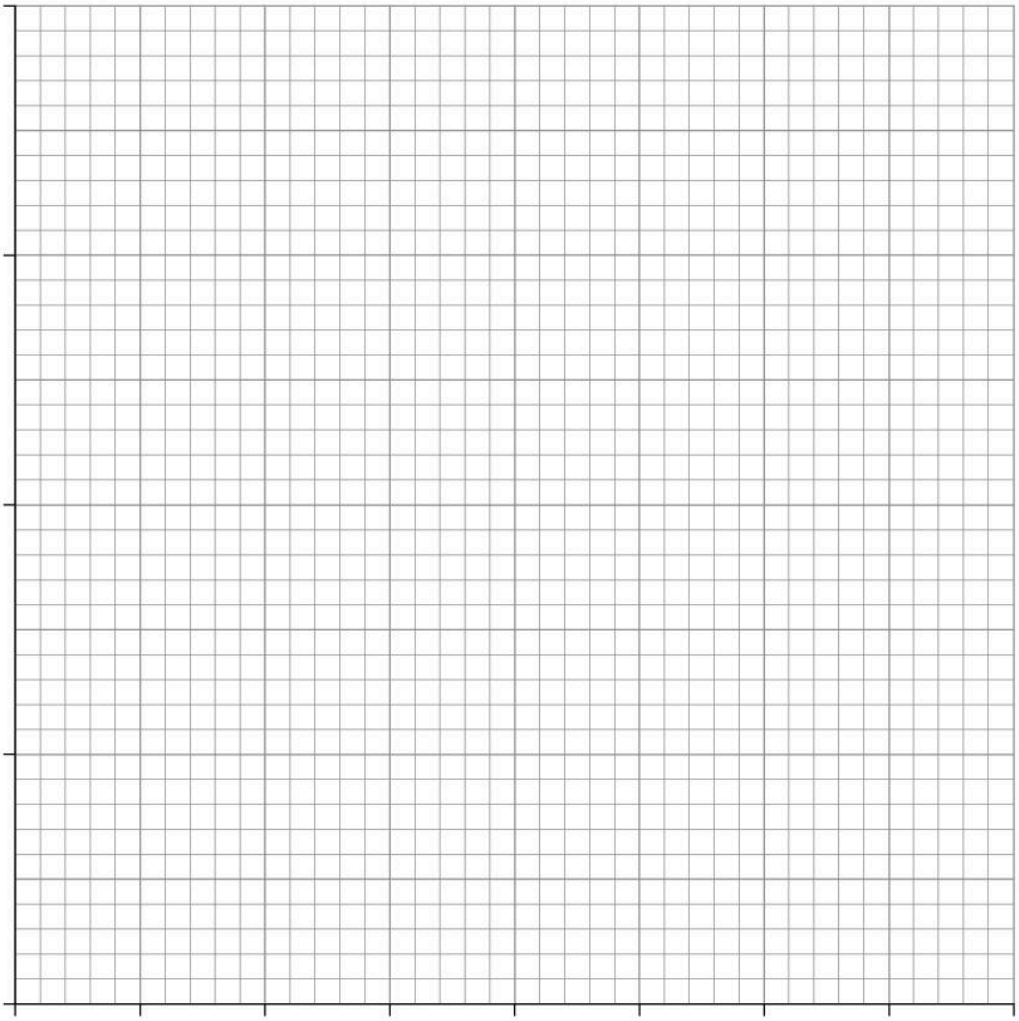
a Record your observations in the table below. Some soluble solids are written in the table and there are rows for you to add others you see being used.

Solid	Tally	Totals
Sugar		
Salt		

b When you have finished collecting the data, total the tally for each solid and write the numbers in the totals column.

Activity F (*continued*)

2 Use the totals to draw a bar chart in the grid below. Remember to label the axes and to add a scale to the vertical axis. Colour the bars when you have drawn them.



3 Which solid was used most often? _____

4 Which solid was used least often? _____

5 Are there other soluble solids in your home that were not used when you were doing the observations?

If there are, name them here:

_____

_____

Mass and weight

Activity 1 90

You will need: something that can tell you the mass of objects, a collection of at least four different objects and a pen or pencil.

1 Discuss with your group which objects you will use to explore the measurement of mass, and collect them.

The objects we will use are: _____

_____

2 Choose a measuring device for finding the mass of your objects.

The measuring device we will use is: _____

3 Draw a table here and record the names and the mass (in grams and/or kilograms) of your chosen objects.

4 When you have 'weighed' them all, look at the results and sort the objects in order of mass, from the 'lightest' to the 'heaviest'.

5 Share your results with the class and compare everyone's figures.

6 Look at the following statements and use the class results to choose the true statement:

Heavier objects are always larger then lighter objects. True/False

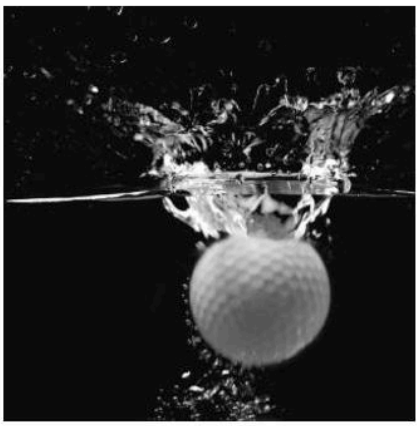
Lighter objects are sometimes larger than heavier objects. True/False

7 Tell the class which statement you think is true and provide evidence to support your answer.

(a)

(b)

(c)



(d)

(g)

(e)

(f)

Activity 2 93

You will need: a pen or pencil.

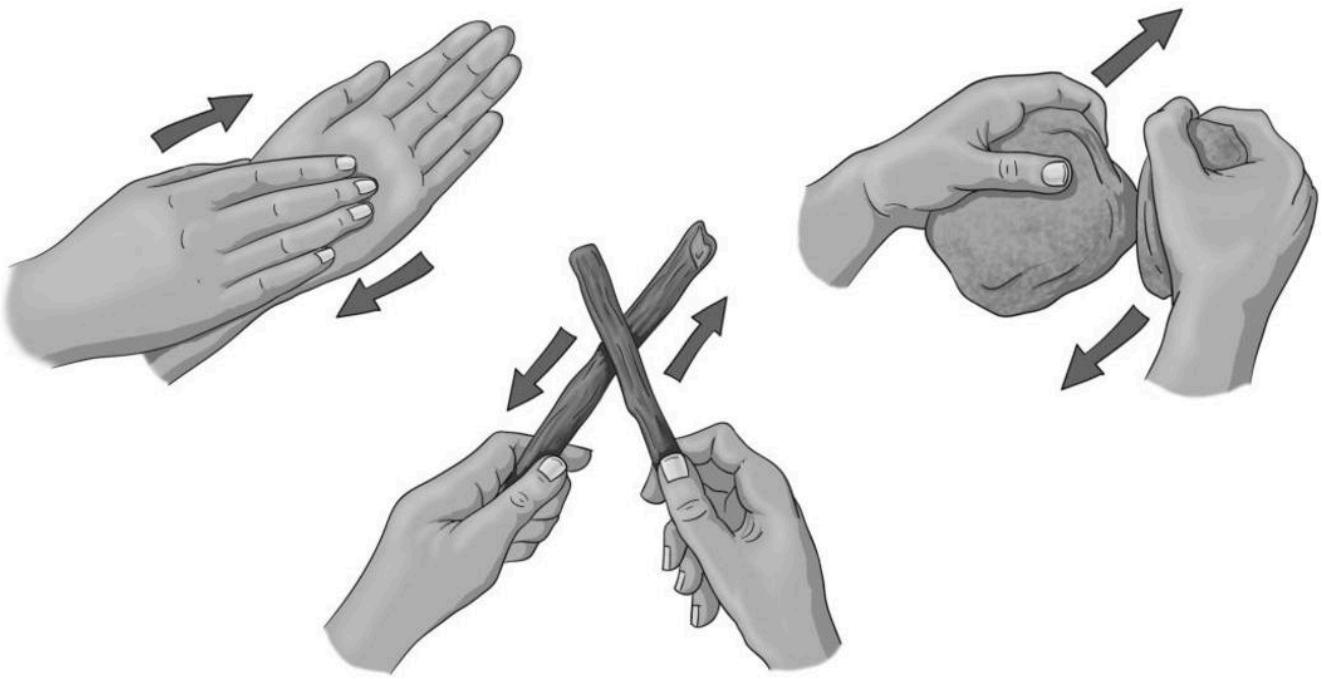
1 Look at the pictures, which show forces acting on different objects.

Activity 2 (*continued*) 94

2 Try to work out the directions of the forces in each picture. There may be more than one force acting at the same time.

3 Write the letters (a) to (g) here, and record your answers beside them.

4 Share your answers with the class and compare them with those from others.



Activity 3 95

You will need: two rough sticks, two stones and a pen or pencil.

1 Carry out each of the three activities shown in the pictures.

⚠ **WARNING:** Take care when rubbing the stones together.

2 Observe what happens each time and make a note of your observations.

3 Share what you found with the rest of the class and listen to what others say.

Activity 4: What is the effect of the surface of the slope on round objects travelling down it? 96 – 97

You will need: marbles or balls of different sizes, a slope, various materials to cover the surface (e.g. plastic sheet, sandpaper, rubber mat, soft fabric such as a towel), a watch or stop clock and a pen or pencil.

1 This investigation is to explore if the type of surface changes the movement of the balls/marbles down the slope: is the movement slowed down or speeded up?

2 Set up the slope in a place where the balls can roll down it without causing danger or damage.

a Draw a table for recording the results.

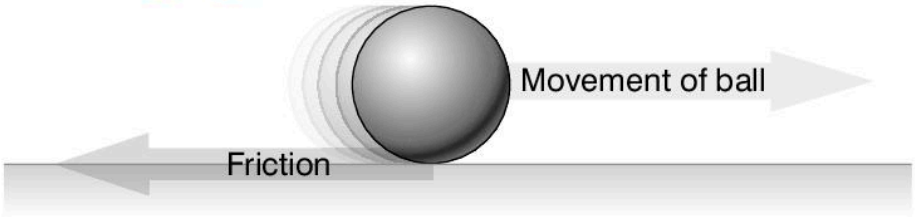
b Draw columns for each of the marbles or balls that you will test, and rows for each of the surfaces you will test.

c Write down your predictions for all the surfaces you are testing.

Draw your table here:

3 Carry out your test.

Activity 4: What is the effect of the surface of the slope on round objects travelling down it? (*continued*) 97 – 98



4 **Look at the results and compare the times taken.**

5 **Look for patterns in the results.**

a What conclusion can you make about the surfaces and the frictional force they produce based on the pattern of results?

Conclusion

b Discuss these things with your group and come to your conclusions.

6 **Share your results and conclusions with the class.**

Activity 5: Discuss the effect of speed on stopping 100

You will need: a pen or pencil.

1 **Discuss this question with your group:**

'Why is it harder to stop a fast-moving car than a slow-moving car?'

a Explain your answer using what you know about the forces involved.

b Write down your group's ideas.

2 **Discuss this question with your group:**

'What can be done to improve road safety, using your knowledge of forces?'

a Write down your group's ideas.

b Explain how they will improve safety.

3 **Share your group's ideas and explanations with the class.**

Activity 6 101

You will need: dry soil, some sort of oil and a pen or pencil.

1 Rub your thumb and forefinger together. Write a note describing how it feels – use words like rough, slippery, sticky.

Notes

2 Now rub some dry soil between your thumb and forefinger. Write a sentence describing how it feels, compared to rubbing your clean fingers.

3 Wash and dry your hands, and then dip your thumb and forefinger into the oil.

a Rub them together as before.

b Write a sentence describing how it feels, compared to the other times you did it.

4 Discuss the results with your group and answer these questions:

- When did you feel most friction?
- When did you feel least friction?
- How was friction reduced?
- Is this useful in daily life?

5 Share the group's answers with the class.






Activity 7: Showing how to reduce friction 104

You will need: a pen or pencil.

Choose one of the methods of reducing friction shown in the pictures above. Then:

1 **Collect the items and materials you need to demonstrate your chosen way of reducing friction:**

- **a** *rollers* – pencils or other rods, stalks or branches; a load to pull, with and without rollers
- **b** *wheels* – materials to make a vehicle, with and without wheels
- **c** *ice* – cubes of ice and a variety of items/materials to test them on
- **d** *ball bearings* – marbles, lid of a jar or tin, a load to pull, with and without ball bearings

Activity 7: Showing how to reduce friction (*continued*) 104

e *polish* – a surface and a load that can be tested unpolished and polished

f *streamlined shape* – paper or wood or plastic that can be made into a plane or boat shape, with and without streamlining

2 **Discuss with your group how you will show that your chosen method does reduce friction. To prove that it does, you will have to compare two measurements:**

a *without* the rollers, ball bearings, etc.

b *with* the rollers, ball bearings, etc.

Write down your chosen comparison here:

_____

_____

_____

_____

_____

_____

3 **Decide what you will measure – time, distance or mass of the load.**

I will measure: _____

Activity 7: Showing how to reduce friction (*continued*) 105

4 Prepare a plan and a record sheet in which you will write the measurements.

Plan

Record sheet

5 Show the plan and record sheet to your teacher before you begin the investigation.

Activity 7: Showing how to reduce friction (*continued*) 105

6 **When the teacher allows you to begin, start the investigation *without* the friction-reducing method.**

a Carry out your chosen measurements.

b Record them on the record sheet.

7 **Repeat each measurement at least three times. Then calculate and write down the mean.**

The mean: _____

8 **Introduce your method of reducing friction (e.g. streamline your plane or boat, polish the load and the surface).**

a Repeat the same test as before and take at least three groups of measurements, recording them on the record sheet.

b Calculate and write down the mean.

The mean: _____

9 **Compare the two groups of measurements – *without* and *with* the friction-reducing method.**

Comparison

_____

_____

_____

_____

10 **Discuss with your group what the results tell you.**

a Come to a conclusion – was friction reduced or not?

Conclusion

_____

_____

_____

_____

b Share your results and conclusion with the class.

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)

Activity 8 108

You will need: a pen or pencil.

1 Look at the pictures on page 74 and work out what the energy is being used for in each activity.

a _____ e _____

b _____ f _____

c _____ g _____

d _____ h _____

2 Share your ideas with the group. What is the same about each activity?

_____

_____

3 Tell the class what you think.

Activity G

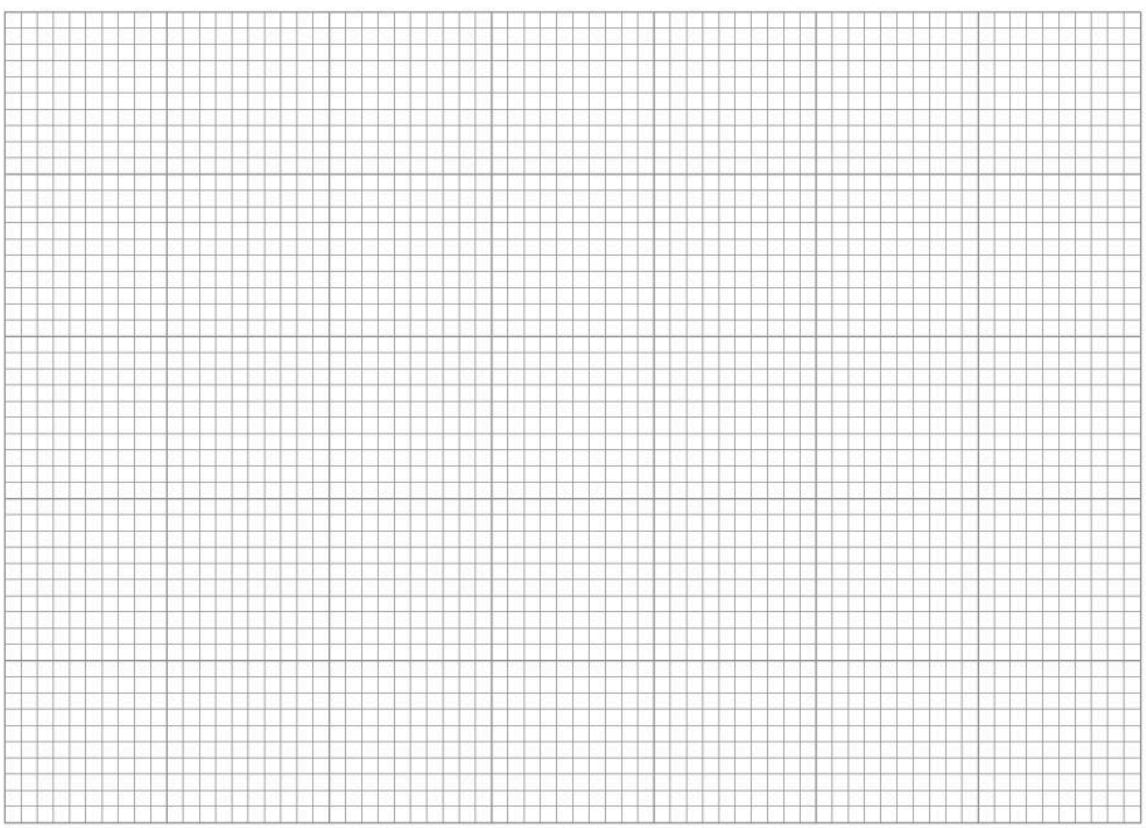
You will need: a pen or pencil.

The table below shows the stopping distances for vehicles travelling at different speeds.

1 Use the data to plot a line graph in the grid below. You need to:

- **a** label the axes
- **b** decide on the scales
- **c** decide on the range of the figures on both axes.

Speed (km/h)	Stopping distance (m)
20	12
30	23
40	36
50	53
60	73
70	96



Activity H

You will need: a pen or pencil.

Complete these sentences using these words (you may need to use some words more than once):

downward	**pulls**	**Newton**	**ships**	**several**	**grams**
same	**gravity**	**mass**	**water**	**balanced**	**measuring**
force	**logs**	**pushes**	**kilograms**	**weight**	**upthrust**

1 When we weigh something, we are _____ its _____.The units of _____ are _____ and _____.

2 The _____ of _____ on an object is measured in its _____.

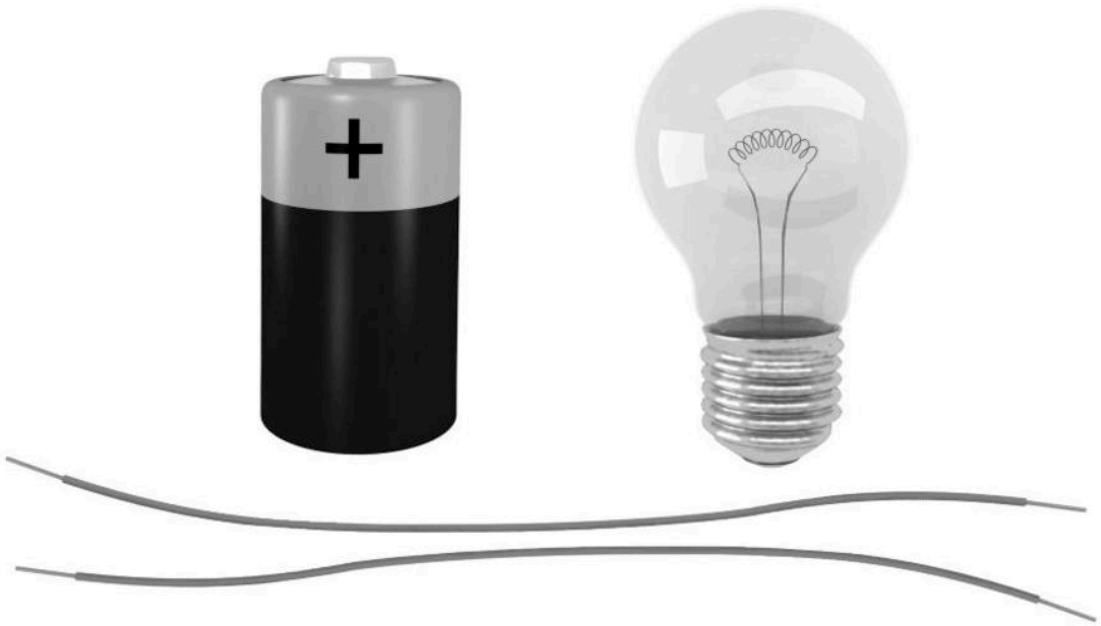
3 The unit of force is the _____.

4 The greater the mass of an object, the greater its _____ as the _____ of _____ pulls on it.

5 Forces, as _____ and _____ can act in different directions. There can be _____ forces acting on an object at the _____ time.

6 Some times forces are _____, acting in opposite directions, such as the _____ force of _____ and the upward force of _____. When balanced, objects such as _____ and _____ float in the _____.

Electrical conductors



Activity 1 109

You will need: a cell, a lamp, two insulated wires with their bare ends showing and a pen or pencil.

1 Collect the items shown in the picture.

2 Try to arrange the four things so that the lamp lights up.

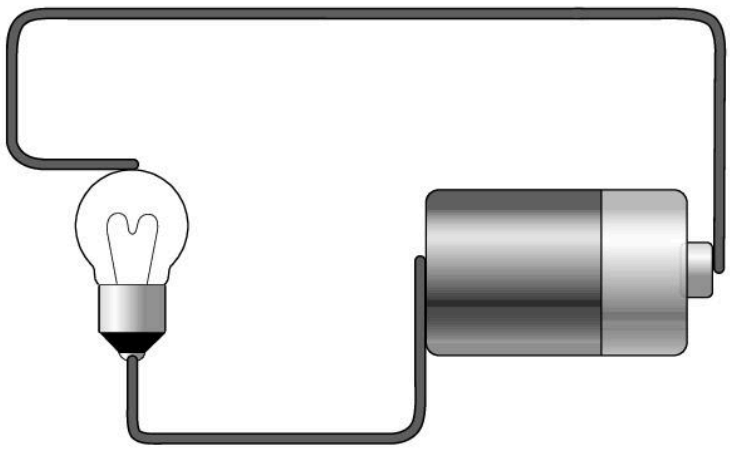
a Change the way you arrange them.

b Record in simple drawings all those ways that make the lamp light up.

Activity 1 (*continued*) 110

3 **Be careful to show which places on the cell and lamp are touching the wires.**

a Try the arrangement in the picture below:



b Does it make the lamp light up?

Yes No

4 **Share your results with the class.**

Activity 2: Which materials are conductors and which are insulators? 112

You will need: 10 items made of different materials, a lamp and holder, a cell and holder, three insulated wires and a pen or pencil.

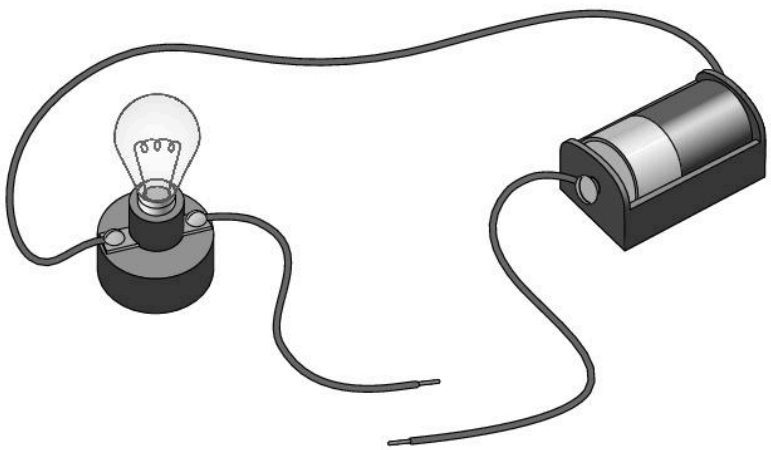
1 Collect at least 10 items made of different materials. You can use this list to help you.

wooden ruler **coin** **rubber** **nail** **glass jar** **plastic ruler** **ballpoint pen** **teaspoon** **paper**

Some must be made of metal. Try to find at least three *different* metals.

Items for testing

2 Use a lamp in a holder, a cell in a holder and three wires to make a circuit with a gap. Use the picture to help you.



Activity 2: Which materials are conductors and which are insulators? (*continued*) 113

3 **Think about the following questions.**

a How will you use the circuit to test the items?

_____

_____

b How will you know if the material is a conductor or an insulator?

_____

Tell your group what you think.

Activity 2: Which materials are conductors and which are insulators? (*continued*) 113

4 In the table, record what you find for each item that you test.

Item	Conductor	Insulator

Put a tick in the conductor or insulator columns for each item.

5 **Discuss your results with your group.**

a What is common about all the conductors?

Conclusion

_____

_____

b Share your results with the class.

Activity 2: Which materials are conductors and which are insulators? (*continued*) 114

6 Sort the things shown in the picture into two groups, using the letters beside them to record your groups:

- the group of those that *allow* current to flow through them (the _____)
- the group of those that *block* the flow of current through them (the _____)

7 Share your answers with the class.

Changes to circuits

Activity 3: Investigate what happens when you make changes to a circuit 117 – 118

You will need: a range of components for you to choose from: including cells, lamps, wires of different lengths and thicknesses, switches, buzzers, motors; and a pen or pencil.

1 **Choose to investigate either:**

a What happens when you change the *number* of a particular component in the circuit, e.g. lamps or cells.

OR

b What happens when you change the *type* of components in the circuit, e.g. changing from buzzers to motors.

OR

c What happens when you change the *size* of components in the circuit, e.g. short wires to long wires, thin wires to thick wires.

OR

d What happens when you try a combination of all three changes.

I chose to investigate option ☐

2 **Discuss your choice with your group.**

a Plan a fair test to find out what effects the changes produce.

The test will be fair because: _____

_____

b Decide what observations you will make to assess the outcome (the effect) of the change each time.

I will observe: _____

_____

c Prepare some form of record for your results. Describe it here:

_____

_____

_____

3 **When the planning is complete, show it to your teacher and, when it has been agreed, collect the components you need for your investigation.**

Activity 3: Investigate what happens when you make changes to a circuit (*continued*) 118

4 Before each change, write down your prediction of what effect the change will have.

Predictions

5 **Carry out the testing in a fair way.**

- **a** Do everything the same each time, and making only ONE change at a time.
- **b** Record the outcome each time, before making the next change in the circuit.

Activity 3: Investigate what happens when you make changes to a circuit (*continued*) 119

6 **When all the changes have been made, look at your results and do four things:**

a Compare the results with your predictions – were they supported by the evidence of your observations?

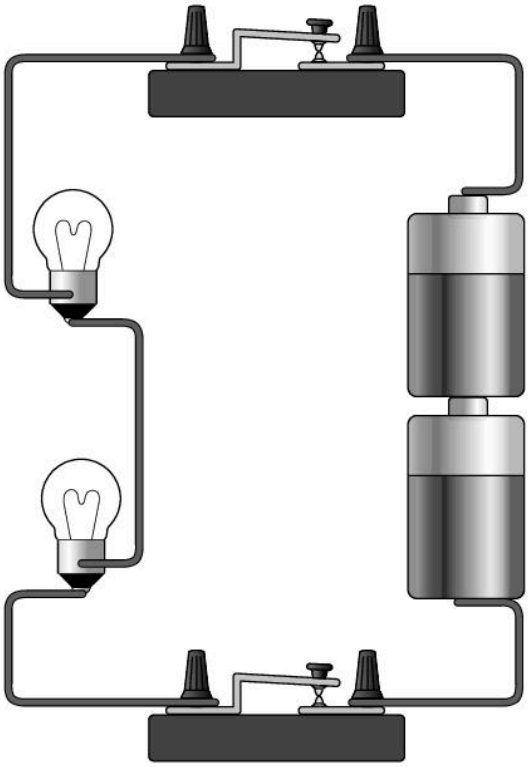
b Look for patterns in the results – was there any pattern and were there any results that seem 'odd'?

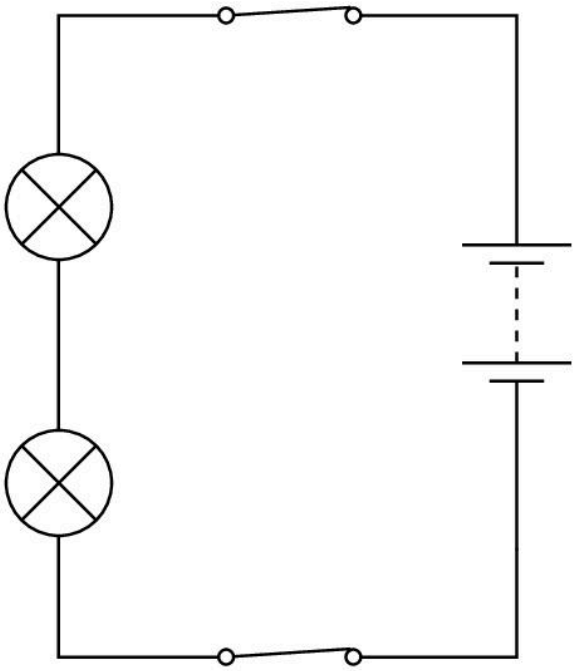
c Use your results to draw conclusions.

d Use your scientific knowledge and understanding of circuits to explain what you observed.

7 **Share your results, conclusions and explanations with the class.**

Series circuits – drawings and symbols





Activity 4 121

You will need: a pen or pencil.

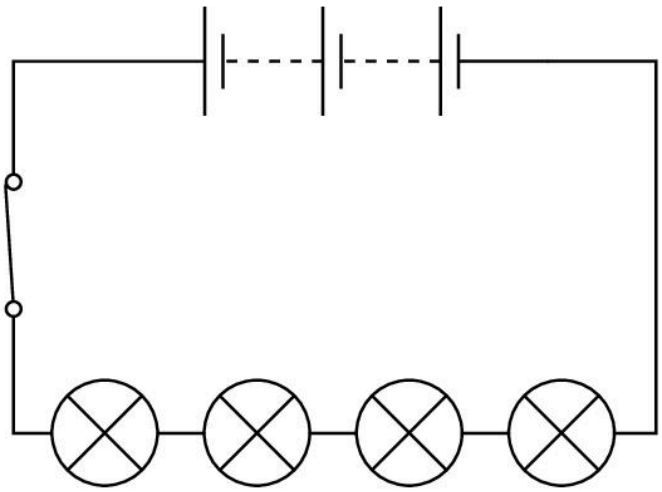
1 Look at the drawing and the diagram of the same series circuit. Compare them.

2 Match the symbols in the diagram to the items in the drawing. Draw lines from each symbol to each item above.

Activity 4 (*continued*) 122

3 Use the symbols to draw a *diagram* of a series circuit with three lamps, three switches and two cells.

4 Share your diagrams with the class.



Activity 5 122

You will need: various electrical components from the collection in class and a pen or pencil.

1 Look at the diagram shown above and work out what the components are.

The components are: _____

_____

2 Use the diagram to build the circuit using the components you have in class.

3 When the circuit is complete, make a drawing of it.

a Show the circuit and the drawing to the class.

b Look at the circuits and drawings made by others.

Activity 1

You will need: a pen or pencil.

Complete these sentences using these words (you may need to use some words more than once):

components copper dangerous cables short wires metals electricity wood safe thin circuit flow diagrams aluminium insulators glass long plugs thick conductors plastics switches current conduct symbols change cover

1 Some materials are better _____ of _____ than others.

2 Most _____ are good conductors. Materials like _____, _____ and _____ are not.

3 Plastics are used to _____ wires, _____ and _____ so that they are _____ to handle.

4 Metals are used for _____ and _____ because they are good at allowing the _____ of electricity to _____ through them. _____ and _____ are two metals used in this way.

5 Materials which do not _____ electricity are called _____. They are very important. Without them _____ would be too _____ to use.

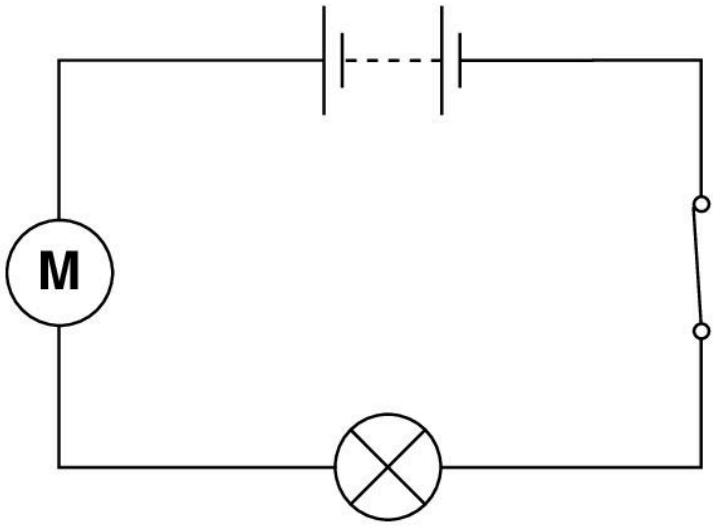
6 Changing the number of _____ in a _____ will _____ the flow of the _____ through it.

7 If the wire is _____ and _____ the flow of current will be less than when it is _____ and _____.

8 Circuits can be shown in _____ using _____.

Activity J

You will need: a pen or pencil.



1 Look at the circuit diagram and identify all the components using the symbols. If you do not recognise any of them, refer to books and/or the Internet to identify them.

2 In the space below make a **drawing** of the same circuit and add the names of the components.

Activity J (*continued*)

3 In the space below draw a circuit **diagram** using symbols.

The circuit has four cells in separate positions, three lamps, two switches, wires and a motor.

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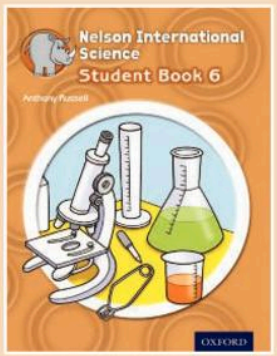

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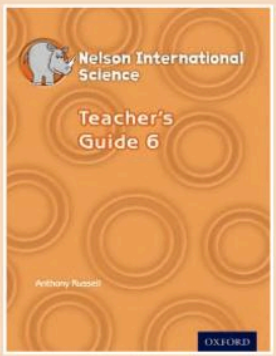

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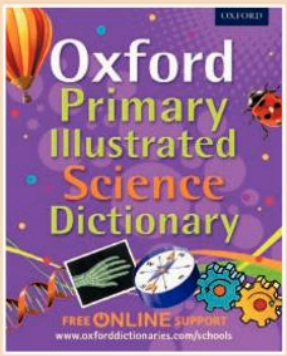

Student Book 6 and *Workbook 6* cover the Stage 6 objectives of the Cambridge Primary Science curriculum framework. The accompanying *Teacher's Guide 6* provides insightful support for fully integrating the Scientific Enquiry strands of the curriculum framework into the teaching of every Stage 6 topic.

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How to get in contact:
web www.oxfordprimary.com/cambridge
email schools.enquiries.uk@oup.com
tel +44 (0)1536 452620
fax +44 (0)1865 313472

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