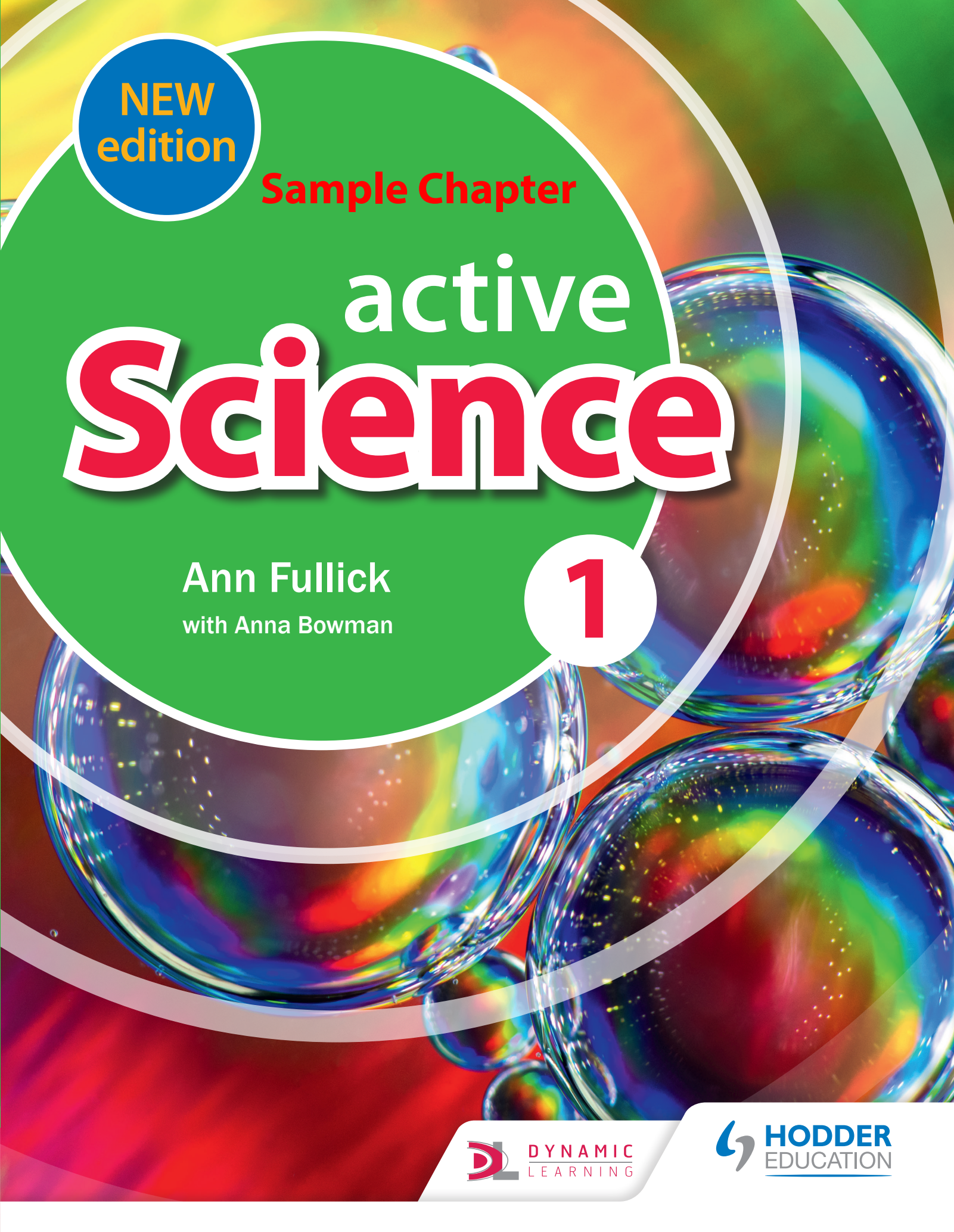

NEW edition
Sample Chapter
active
Science
Ann Fullick
with Anna Bowman
1
DYNAMIC LEARNING
HODDER EDUCATION

Active Science 1

New edition

Ann Fullick

with Anna Bowman

Contents

1 Science, scientists and scientific processes

Learning outcomes

After studying this chapter, you will be able to:

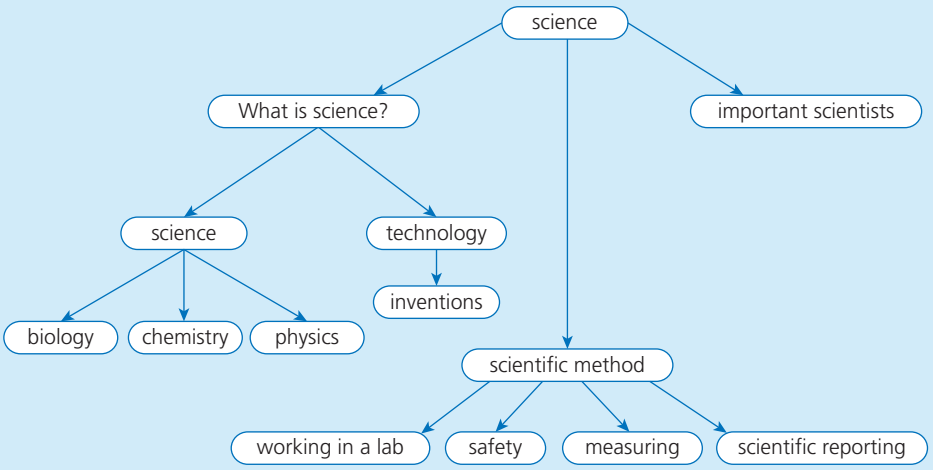
- explain what science is and list the major disciplines of science
- relate science and technology to everyday life
- list aspects of the way scientists work
- list the safety rules of the laboratory and identify common safety symbols
- understand units of measurement and use measuring instruments
- demonstrate that scientific data can be presented in a number of ways
- appreciate some of the contributions of international and regional scientists.

Key terms

Science – The study of the structure and behaviour of the physical and natural world around us, based on observation, experimentation and evidence.

Scientists – People who study science and investigate the world using the scientific method.

Scientific method – A particular way of investigating the natural and physical world involving observation, experimentation and evidence.



Science is a great body of knowledge and experiences, gathered over the years by many people called **scientists**.

Science changes every day. New ideas are developed and new discoveries are made, and as a result older ideas and models change. One day, if you decide to become a scientist, you might add to this body of knowledge. Scientists investigate the world around them in a particular way. This is called the **scientific method**. It has been developed over many years as a way of investigating things and conducting experiments that makes scientists' work valid or accepted across the world.

Figure 1.1 Scientists have to be very flexible. New discoveries can change the way we look at the world and may discredit the old ideas we have about things. That is one of the reasons why it is so exciting!

Science, and the technologies that can be developed from scientific discoveries, are responsible for most of the comforts you enjoy today. Your game system, your computer and even your mobile phone are the result of many years of scientific research. Think about life without modern medicine, your television, refrigerator, car, electricity or even the house you live in. Life would be very different to how it is today without science. Imagine the future – all the new developments will start with science.

Figure 1.2 Scientific discoveries combined with engineering ability give us the technology we take for granted today.

The disciplines of science

Science can be divided up and classified in many different ways. You will have the opportunity to study:

- **biology** – the study of living things and the environment
- **chemistry** – the study of what things are made of – atoms, molecules, reactions and different chemicals
- **physics** – the study of matter, energy and forces.

Another way of classifying science is to think about the biological sciences and the physical sciences.

Each of the different scientific disciplines focuses on different aspects of the physical and natural world. They all use the scientific method to obtain information and present results (see page 2). Each branch of science uses unique words that you may not be able to find in your English dictionary. Learning some of this scientific vocabulary will help you to feel like and think like a scientist.

Biology, chemistry and physics are not the only sciences. Can you think of any others? Examples include geology, which is the study of rocks, and astronomy, which is the study of space, stars and the Universe.

And remember – science doesn't only happen in the science **laboratory**. Other subjects you study will include scientific principles too, for example, mathematics, history, physical education, IT, food and nutrition, electronics and metalwork.

Key terms

Laboratory – A room or space where scientists work, often filled with special equipment.

Technology – The application of science to make things for practical purposes.

1 **How do these subjects involve science? Discuss your ideas with your teacher.**

Science and technology

Science explains how the world around us works. We often use that knowledge to make our lives better and more comfortable. **Technology** is how science is applied to make things for practical purposes.

2 **Have you ever seen a car from 50 years ago? Is it much different from one today? List some of the differences.**

The older car is made up of mostly metal while the new car has many plastic parts. Plastic is a lot lighter than metal so there is a reduction in weight, which increases fuel efficiency. How has technology made these changes possible? Why do you think these changes were necessary?

Figure 1.3 Sixty years of change in cars.

Technology also impacts on the environment. This impact may be positive or negative. How has technology impacted on the environment in your country?

3 Do you think the old car in Figure 1.3 has an air-conditioning system? What about modern vehicles? Think about the advantages and disadvantages of air conditioning in cars. Can you explain why some people think air conditioning is a bad thing?

The importance of technology

Technological progress is important for the development of society as a whole. The creation of big new industries means more jobs for the population and better foreign exchange. Advancements in technology have led to improvements in people's quality of life, especially in the area of medicine, with new vaccines, drugs and medical procedures continually being developed.

The agricultural sector has also benefited so that more food can be grown more efficiently and cost effectively. Crop plants have been altered to be more disease-resistant, and to produce a harvest in a much shorter period of time.

Technology has made the world a much smaller place. The internet allows us to communicate and share information at a much faster rate than ever before. You do not even have to leave your home to go to the library. The internet brings the library to you.

However, like most things in life, technology is not all good. Many technological developments have led to the production of pollutants, which are sometimes released into the atmosphere and waterways. These pollutants can destroy living things in the environment and damage natural habitats.

Activity 1.1

How have science and technology helped us?

Scientific skills: Recording and reporting

Method

A Look around you and make a list of five objects that are based on important scientific discoveries or new technologies.

B Conduct research on the internet or in an encyclopaedia to find out who invented your chosen items. You can use a table like the one below to write your answer. One example has already been done for you.

Object	How it helps human beings	Inventor
light bulb	helps me to see in the dark	Thomas Edison

Links

Use your skills from **English** to help you here.

How scientists work

Scientists work in a special way known as the scientific method. Although this does not fit all scientific ideas, it gives us a useful framework that all scientists know and understand.

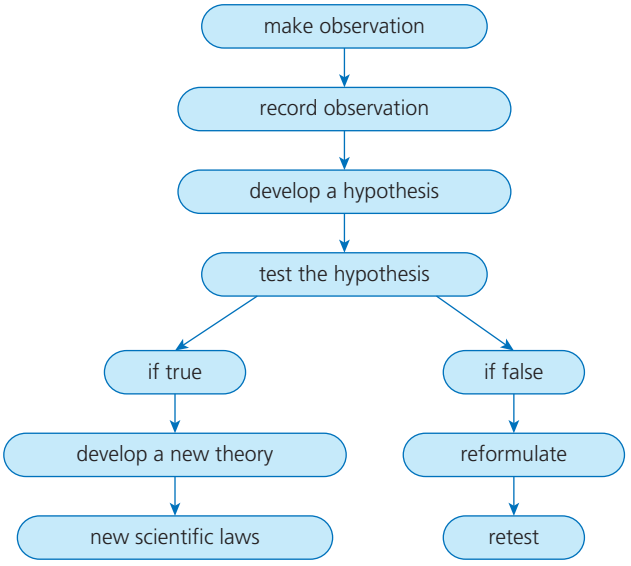


Figure 1.4 The scientific method.

Observation

Scientists are very curious people. They observe closely what is going on in their surroundings. To make observations they make use of all their senses: they look, sometimes listen, sometimes touch, sometimes smell and sometimes taste. (Note: never taste substances in a science lab.)

Figure 1.5 Following the scientific method.

Recording

Scientists record their observations in many different ways. They may write them down, take pictures, use video cameras or even their mobile phones. We must use the new technology when we work as scientists.

The information or data from observations may be recorded in table form. This allows for easy organisation and analysis. It is very important to record the units of measurement you have used.

Hypothesising

A **hypothesis** is a statement that a scientist makes to explain the observations that have been made. It is stated in such a way as to be testable. At this stage the reasoning may be true or false.

Experimenting

To test a hypothesis, the scientist must design and conduct an experiment. There are many skills to be used when experimenting; these are observing, classifying, collecting data, inferring, measuring, predicting, interpreting data, controlling variables and coming to conclusions. The results of the experiments can support or discredit the hypothesis. If the hypothesis is supported by several experiments, a new theory is developed and eventually a new scientific law may be produced. However, if the hypothesis is not supported, it can be changed or adjusted and retested. You will learn more about this on page 15.

Figure 1.6 A student recording data – when you experiment to test a hypothesis, you must record your results carefully and accurately.

Key term

Hypothesis – A statement that a scientist makes to explain observations, which can be tested.

Working in a laboratory

The laboratory is a special place where scientists work. It is filled with lots of special equipment to help scientists perform experiments to test their hypotheses. Do not think, however, that all scientists are confined to a laboratory; many scientists work in forests, under the sea, in caves, on volcanoes and in many other places. These scientists take their laboratory with them wherever they go. Ask your teacher to take you to one of the school's laboratories, but remember that there are several safety rules you must learn and follow when you are in the laboratory.

Figure 1.7 A school science laboratory.

Key term

Apparatus – Name given to scientific equipment used in experiments and investigations.

Safety first!

The laboratory can be a very dangerous place. Great care should be taken at all times. It contains lots of chemicals that are poisonous, explosive or that can burn your skin. There are many different kinds of glass **apparatus** in the laboratory, which have many different uses, but they are very delicate and must be handled with care. There are also Bunsen burners in the laboratory, which are used for heating chemicals. We must be very careful in the laboratory and follow safety rules.

Safety rules of the laboratory

1. Never enter a laboratory without a teacher.
2. Follow all instructions given by your teacher.
3. Do not perform any test without your teacher's permission.
4. Handle all chemicals and apparatus carefully as instructed by your teacher.
5. Do not eat or drink in the lab.
6. Do not play around in the lab.
7. Tie hair back away from the face.
8. Always wear goggles or other protective eyewear when mixing or heating chemicals, and whenever your teacher tells you to do so.
9. Do not mix any chemicals unless instructed to do so by your teacher.
10. Do not pour any unused chemicals back into the container.
11. Wash all apparatus used and return to its proper place.
12. Wash your hands thoroughly after all lab work.
13. Do not remove anything from the lab.

Project

Plan and design a safety poster to be displayed in your school science classroom or laboratory. You can choose to show all of the safety rules for the lab, or just one of them. Make sure your poster is clear, bright and colourful and gets a clear message across to other students.

Links

Use your skills from **visual arts** to help you here.

Activity 1.2

Safety in the lab 1

Scientific skills: Analysing and inferring

Method

A For each of the safety rules listed above, discuss why you think it is necessary.

B Record your thoughts in your notebook.

C Are there any rules you can add to the list above?

Links

Use your skills from **English** to help you here.

Activity 1.3

Safety in the lab 2

Scientific skills: Observing and recording

Figure 1.8 Spot the problems!

Method

A **Look carefully at Figure 1.8. This is NOT a safe school laboratory!**

B **Record all of the ways in which these students are breaking the safety rules for how to behave in a laboratory.**

C **Explain clearly why each of the behaviours you have observed is dangerous in a laboratory.**

Links

Use your skills from **English** and **visual arts** to help you here.

Safety symbols

A **safety symbol** is a sign that alerts us to danger or hazards in our environment. There are many safety symbols to be found at home, on the roads, in the mall and in many other places we visit.

Key term

Safety symbol – A sign alerting people to dangers or hazards in the environment.

4 **Name three safety symbols you have seen.**

There are also safety symbols in the laboratory; some are discussed below.

FLAMMABLE

This symbol means **flammable**. This means we must be careful when we use this substance because it catches fire easily. Have you ever seen this symbol before? Where? Which substances do you think should have this safety symbol as a label? Name three.

FLAMMABLE

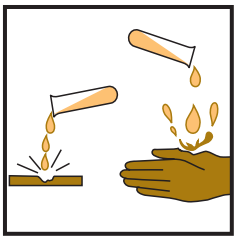
TOXIC

This symbol indicates that the chemical is poisonous. We must take great care when using substances with the **toxic** symbol. If we contaminate our hands or it gets into our mouth it can poison us and we may get very sick or even die. Have you seen this symbol before? Where?

TOXIC

CORROSIVE

This symbol is used for **corrosive** chemicals. It means that the substance can burn our skin or our clothes. This will cause us a lot of pain so we must not use these substances unless we are closely supervised by our teacher. Where have you seen this symbol before?



CORROSIVE

EXPLOSIVE

This symbol means **explosive**. There are chemicals in the lab that can explode and cause great damage to us. Do not touch these substances. Where might this symbol be placed?

EXPLOSIVE

IRRITANT

This symbol represents an **irritant**. These substances may cause your skin, eyes or nose to itch or become inflamed. You should be very careful when using these substances. Have you seen this symbol on grocery items? Which ones?

IRRITANT

RADIOACTIVE

This symbol is reserved for **radioactive** substances. Substances with this symbol give off radiation. Radiation is invisible but can cause you much harm. You can get cancer from radiation. If you do not know what cancer is you can research it on the internet or you can ask your teacher.

It is important to learn all the rules of the laboratory and all the safety symbols.

RADIOACTIVE

Key terms

Flammable – A substance that catches fire easily.

Toxic – A substance that is poisonous.

Corrosive – A substance that can cause chemical burns to the skin or clothes.

Explosive – A substance that can explode.

Irritant – A substance that can irritate your skin or eyes, causing itching and swelling.

Radioactive – Substances that give off radiation, which can be very damaging.

Activity 1.4

Safety in the home

Scientific skills: Observation, recording and reporting

Method

A Examine bottles of substances at home, like insecticide, oven cleaner and drain cleaner, and identify the safety symbols.

B Make a list of as many as you can find.

C Construct a wall chart to display the different safety symbols.

Links

Use your skills from **English** and **visual arts** to help you here.

Working scientifically

As you know, scientists work using the scientific method. To become scientists, you must follow the scientific method in your school investigations and experiments. You will learn to use different types of equipment – known as apparatus – in your scientific experiments. These will range from test tubes and beakers to Bunsen burners and microscopes. You will learn about the different types of apparatus as you need to use them – but they must all be handled carefully and safely.

Key terms

Measurement – A way of quantifying things.

SI units – System International units used for measuring in science.

Measurements and units

Measurement is an important part of science. A very important skill for all scientists is to be able to take accurate measurements.

Long ago there were many different ways of measuring. For example, one way of measuring length was by using the length of a person's forearm – called a cubit. It was the distance from the fingertip to the elbow.

5 **What problems do you think people may have had when using this way to measure length?**

Today, all measurements have been standardised; this means that the units are more consistent. The System International or **SI units** have been developed to ensure that all instruments take the same measurements, using the same units, in all countries.

Figure 1.9 Standards of the SI system – these are the measurement standards you will be using in your science lessons.

Units

Table 1.1 Units of measurement

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Temperature	degrees Celsius	°C
Time	seconds	s
Current	ampere	A

The units in Table 1.1 are called the base quantities. Other quantities can be obtained from them; for example, area is length by breadth or metres squared (m^2). Area is a derived quantity, which means that it came from base quantities. Volume is another derived quantity. In a regular object, like a brick, volume is length × breadth × depth, or metres cubed (m^3). In the laboratory we often measure the volume of liquids using measuring cylinders. In the laboratory, volumes are usually smaller for example, cm^3.

The SI units are based on a decimal system. This means that there are larger and smaller units that are all multiples of 10.

- **kilo** means the base unit multiplied by 1000, for example, a kilometre is 1000 metres
- **mega** means the base unit multiplied by 1 000 000
- **giga** means the base unit multiplied by 1 000 000 000
- **centi** means divide by 100, for example, a centimetre is 1/100 or 0.01 of a metre
- **milli** means the base unit divided by 1000, for example, a millimetre is 1/1000 or 0.001 of a metre
- **micro** means the base unit divided by 1 000 000
- **nano** means the base unit divided by 1 000 000 000

Activity 1.5

Investigating measuring instruments

Scientific skills: Observation, recording and researching

Your teacher will take you to the lab or bring a selection of measuring instruments to class and explain how they are used.

Method

A Conduct research in the library or on the internet on the different instruments used by scientists for measuring.

B Make a drawing or photocopy a picture of each instrument and describe how it is used. Your teacher may split you into groups and divide the instruments among the groups.

C Create a poster to display in the classroom to show some of the different types of measuring instruments used by scientists.

Here is a list of instruments for you to research:

- metre rule
- tape measure
- micrometre screw gauge
- Vernier calliper
- spring balance
- scale balance
- triple beam balance
- mercury thermometer
- clinical thermometer
- maximum and minimum thermometer
- millisecond timer
- stopwatch
- ammeter and milli-ammeter

Links

Use your skills from **mathematics** and **English** to help you here.

Activity 1.6

Conversion of units

Scientific skills: Recording

A Convert the following to metres.

a 250 cm = _____ m

b 500 km = _____ m

c 1350 mm = _____ m

d 400 cm = _____ m

B Convert the following amounts in metres to the required units.

a 1200 m = _____ km

b 50 m = _____ cm

c 3 m = _____ mm

d 56 m = _____ mm

Links

Use your skills from **mathematics** to help you here.

The laboratory report

When a scientist designs an experiment to test an hypothesis, they set an aim, gather the materials and apparatus needed and plan a step-by-step procedure. They collect observations and results, and analyse the data. The scientist uses this analysis to reach a conclusion, deciding if the hypothesis is accepted or rejected.

The **laboratory report** is a record of everything you do as part of your investigation or experiment. It is important to keep a comprehensive record of experimental work so other people can see what you did and repeat your experiment if necessary. Writing a clear lab report is a scientific skill, and like any other skill you will get better with practice! When you write about a scientific investigation, your report must follow a logical format and be written in reported speech, which means it is in the past tense and words like I, me, you, he and she are not used.

- **Date:** The date must be recorded to ensure that you know exactly when you performed the experiment.
- **Title of the experiment:** This is a word or two that indicates what the experiment is about.
- **Aim:** This statement describes what your experiment hopes to achieve.
- **Apparatus and materials:** This is a list of all the instruments, chemicals and other substances used in the experiment.
- **Procedure or method:** This is a step-by-step account of what was done when performing the experiment. The procedure describes how the observations were made and if any measurements were taken. In an experiment, you change one thing at a time. This is called the **independent variable**. When possible, you carry out a **control**, a version of the investigation where nothing changes for comparison with the experimental set-up.
- **Results:** This is a record of all the observations made and all the measurements taken. It is usually recorded in a table. This information is now called data.
- **Data analysis:** When results are collected the data must be examined closely. Calculations can then be made, sometimes graphs can be plotted from the results, and trends and patterns may be observed.
- **Conclusion:** This is a general statement that connects the findings from the results to the aim of the experiment. If there was a hypothesis it can now be supported or rejected.

Key terms

Laboratory report – A record of everything done and observed in a scientific investigation.

Independent variable – a factor that is changed by the experimenter.

Control – a version of an investigation where nothing is changed, for comparison with the experimental set up.

Activity 1.7

Writing a lab report

Scientific skills: Hypothesising, observing, recording and inferring

Links

Use your skills from **English** to help you here.

Method

A Perform an experiment at home or in the lab to determine if vinegar prevents apples from turning brown when they are cut.

B Follow the format on page 15 and write a report of your experiment.

C Use two sets of trials – one set of apples that were not soaked in vinegar and another set with vinegar.

Questions

1 Why do you think it is necessary to have one set of apples with vinegar and one set without vinegar? Discuss this with your teacher in class.

The apples without the vinegar are the control. It allows us to be sure it is the vinegar that prevented the apples from turning brown. Whenever possible, experiments should have a control to make the results valid.

Activity 1.8

Planning, designing and carrying out an experiment, and writing a lab report

Scientific skills: Hypothesising, planning, recording and inferring

Links

Use your skills from **English** and **mathematics** to help you here.

Jevon observed that when his mother left a bunch of green bananas in a brown grocery bag they became ripe very quickly and spoiled. He also noticed that bananas left on the countertop took a longer time to ripen.

Method

Develop possible hypotheses for Jevon's observation and plan and design an experiment with the help of your teacher to test your hypothesis. You can follow the format outlined for you here.

- Your hypothesis
- The aim of the experiment
- The apparatus used

- **The method or procedure**
- **Variables: what you controlled and what you changed in your investigation**
- **The results you obtained**
- **Analysis of results**
- **Your conclusion (Did your conclusion support or not support your hypothesis? Why?)**
- **Write your lab report**

Have you made any observations about things you have noticed in the world around you and wondered why they happen? Come up with your own observations and hypothesis, then plan and design your own experiment to test your hypothesis.

Important scientists

To end this chapter, we are going to look at some of the many scientists who over the years have developed the understanding of science we have today. Some of these scientists lived and worked a long time ago, but are still remembered. These include:

- Albert Einstein – a German theoretical physicist who developed the theory of relativity
- Marie Curie – a Polish chemist and physicist who did pioneering work on radioactivity and discovered radium and polonium; she won two Nobel Prizes
- Charles Darwin – a British biologist who developed the model of evolution by natural selection
- George Washington Carver – an American agricultural scientist who helped prevent soil erosion and develop alternative crops to cotton
- Jonas Salk – an American medical researcher who developed one of the first polio vaccines.

Figure 1.10 Marie Curie - a female scientist who won two Nobel prizes.

6 **Would you like to be a famous scientist? State three reasons why.**

There are also many Caribbean scientists who have made important contributions to the development of science, especially over the last century. Some of these scientists include:

- Dr Compton Seaforth from Trinidad and Tobago – an agricultural chemist who did a lot of work on herbal remedies
- Professor Nazeer Ahmad from Guyana – who was a world-recognised expert on tropical soils
- Professor Marilyn Raphael from Trinidad and Tobago – well known for her outstanding work on climate change
- Dr Henry Lowe – a Jamaican medical scientist working on a drug to reduce and eliminate prostate cancer
- Dr Thomas P. Lecky – a Jamaican agronomist, who was well known for breeding cattle adapted for the local climate
- Dr Andrea Andrew from St Lucia – appointed post-doctoral research scientist at the NASA Goddard Space Flight Centre in Maryland, United States
- Dr Simone Badal – a Jamaican chemist and cancer researcher who has won international prizes for her work.

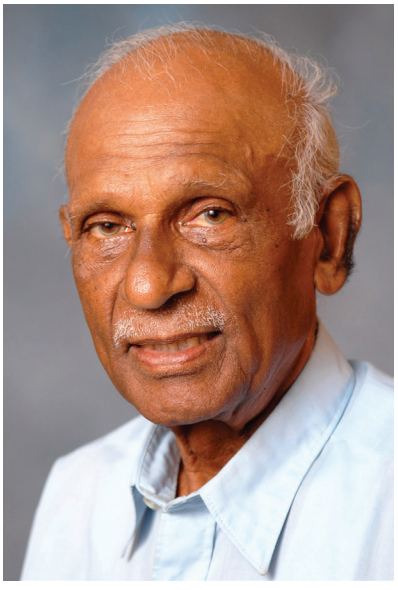


Figure 1.11 Professor Nazeer Ahmad (left) and Dr Simone Badal (right) – just two of the many Caribbean scientists who have changed our ideas about the world we live in.

Links

Use your skills from **English** to help you here.

Research project

Your teacher will divide your class into groups and assign each group one scientist. Use the internet or try to interview local scientists, if possible, to find out about their contribution to science. Present your report to the class so that all the information can be shared.

End of chapter questions

For questions 1–6, choose the correct answer from A–D.

1 All of the following are branches of science except for:

A biology
B geography
C chemistry
D physics

2 The application of science to improve our lives is called:

A diversity
B adversity
C technology
D physiology

3 Which of the following shows the correct order of the stages in the scientific method?

A Hypothesising, recording, observing and testing
B Recording, observing, testing and hypothesising
C Testing, observing, recording and hypothesising
D Observing, recording, hypothesising and testing

4 Which one of the following is not a correct lab safety rule?

A Follow all instructions
B Do not play in the lab
C Taste all chemicals before use
D Do not eat in the lab

5 Kilo means:

A 1000
B 10
C 100
D 10 000

6 An effective polio vaccine was developed by:

A Jonas Salk
B Albert Einstein
C Marie Curie
D Thomas Edison

7 What is the difference between science and technology?

8 List three branches of science and state what is studied in each one.

9 Explain how science and technology have impacted the way that you live. Give five examples.

10 List five safety rules of the laboratory. For each rule listed, explain why it is important that students follow it.

11 The following safety symbol was seen at a gas station:

FLAMMABLE

a) Why do you think this safety symbol was posted at the gas station?
b) What would happen if this symbol was ignored?
c) What other safety symbols would you expect to see at a gas station?

12 Draw a flowchart showing the scientific method.

13 Name three scientists whom you have studied and explain how their contributions were important to society.

Summary

- Science is the study of the structure and behaviour of the physical and natural world around us, based on observation, experimentation and evidence.
- Science has many branches. Each branch studies a specific area of science.
- Technology is the use of science to make our lives better. New discoveries in science have fuelled technological advances like the internet and new drugs to cure diseases.
- The scientific method is a special way of approaching a problem. Observations lead to a hypothesis, which is then tested by experimentation. Support for the hypothesis can lead to a new theory, which can then become a new scientific law over a period of time.
- The laboratory is a place where scientific experiments are carried out. It contains special apparatus and instruments.
- There are important safety rules to follow when working in a laboratory.
- Safety symbols alert us to dangerous substances or hazards in our environment. It is important that we can identify them and understand what they mean.
- Measurement is very important in science. Special standard (SI) units are used.
- When an experiment is performed, a laboratory report must be written up using a specific format. It is important to follow this format.
- There are many famous scientists, both local and international. Their hard work and dedication make our life what it is today.

Taking it further

If you continue to study science you will:

Find out more about how different scientists have changed the way we understand the world

Did you know that in 1869, one famous chemist worked out the relationships between all the chemical elements? He even predicted the properties of elements that people hadn't discovered at the time – and he was right!

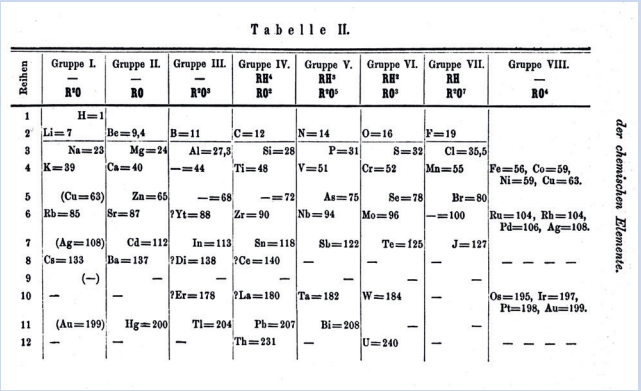


Tabelle II.

Reihen	Gruppe I. — R^2O	Gruppe II. — RO	Gruppe III. — R^2O^3	Gruppe IV. RH^4 RO^2	Gruppe V. RH^3 R^2O^5	Gruppe VI. RH^2 RO^3	Gruppe VII. RH R^2O^7	Gruppe VIII. — RO^4
1	H=1							
2	Li=7	Be=9,4	B=11	C=12	N=14	O=16	F=19	
3	Na=23	Mg=24	Al=27,3	Si=28	P=31	S=32	Cl=35,5	
4	K=39	Ca=40	—=44	Ti=48	V=51	Cr=52	Mn=55	Fe=56, Co=59, Ni=59, Cu=63.
5	(Cu=63)	Zn=65	—=68	—=72	As=75	Se=78	Br=80	
6	Rb=85	Sr=87	?Yt=88	Zr=90	Nb=94	Mo=96	—=100	Ru=104, Rh=104, Pd=106, Ag=108.
7	(Ag=108)	Cd=112	In=113	Sn=118	Sb=122	Te=125	J=127	
8	Cs=133	Ba=137	?Di=138	?Ce=140	—	—	—	— — — —
9		(—)	—	—	—	—	—	
10	—	—	?Er=178	?La=180	Ta=182	W=184	—	Os=195, Ir=197, Pt=198, Au=199.
11	(Au=199)	Hg=200	Tl=204	Pb=207	Bi=208	—	—	
12	—	—	—	Th=231	—	U=240	—	— — — —

der chemischen Elemente.

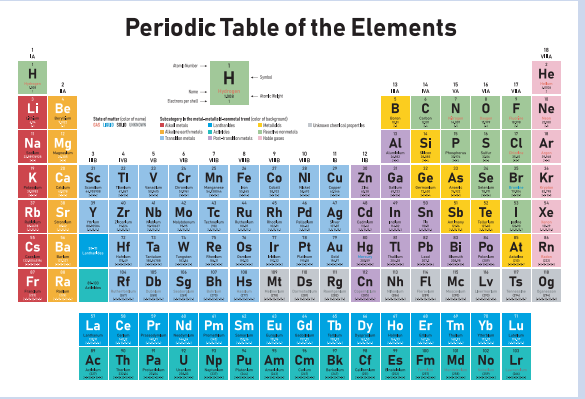


Figure 1.12 The basic understanding of all the chemical reactions you will ever carry out is in these two tables – the first one was worked out over 150 years ago!

Discover some of the scientists behind important ideas in science today

Figure 1.13 The different wavelengths of light are beautifully demonstrated in a rainbow.

We all know a little bit about light – that we need it to see the world around us, and that it can be split into different colours. But it has taken hundreds of years and the work of many physicists to build our current model of light. As you study science further, you will discover that scientists don't always agree! Our models of light have changed with the ideas and experiments of people from Newton to Einstein and beyond – with some fierce arguments along the way. In CSEC Physics, you will learn about some of the rival theories of light put forward by different scientists – and you'll be able to explain why some of them were wrong!

Questions

1 Which scientists are linked with the force of gravity, with the theory of evolution by natural selection, and with the Periodic Table in chemistry? Find out a little about each scientist and write a brief paragraph about them.

2 Scientists do not always agree, and they do not always behave as well as they should. Investigate and write a news report on the work of James Watson, Francis Crick, Rosalind Franklin and Maurice Wilkins on the discovery of the structure of DNA.

Links

Use your skills from **English** to help you here.

active Science 1

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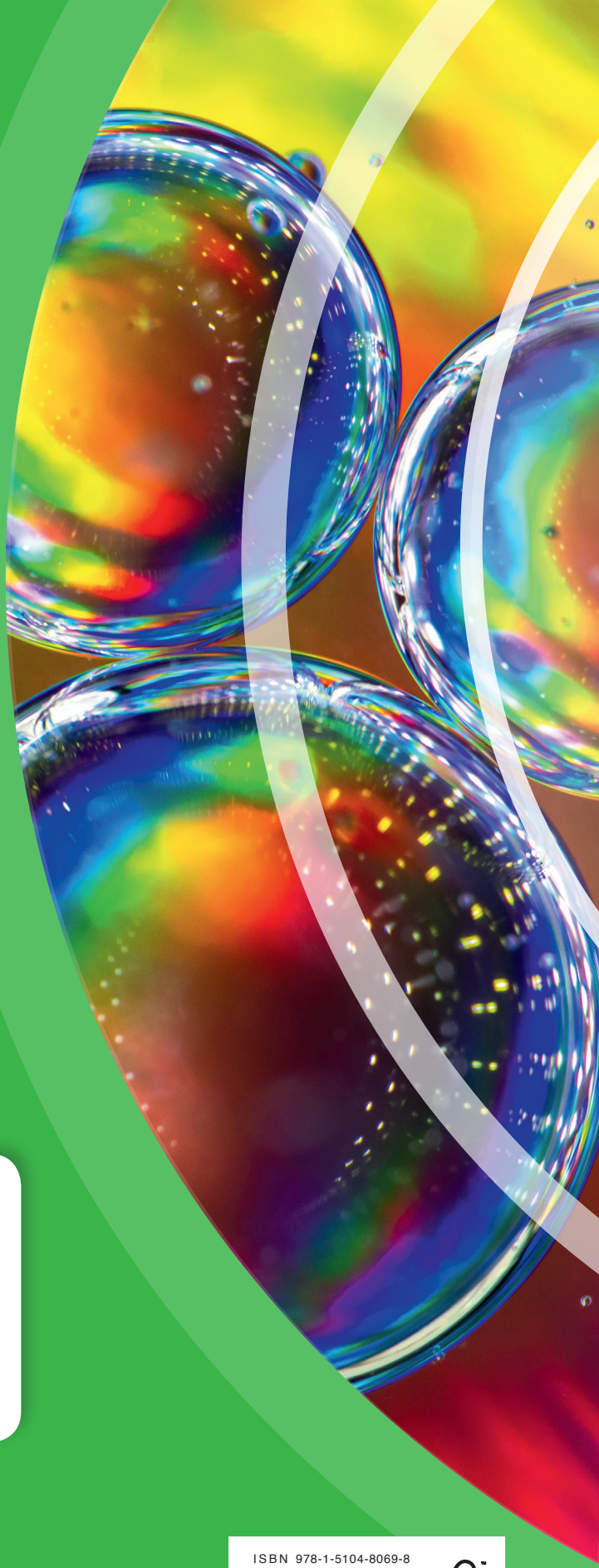

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