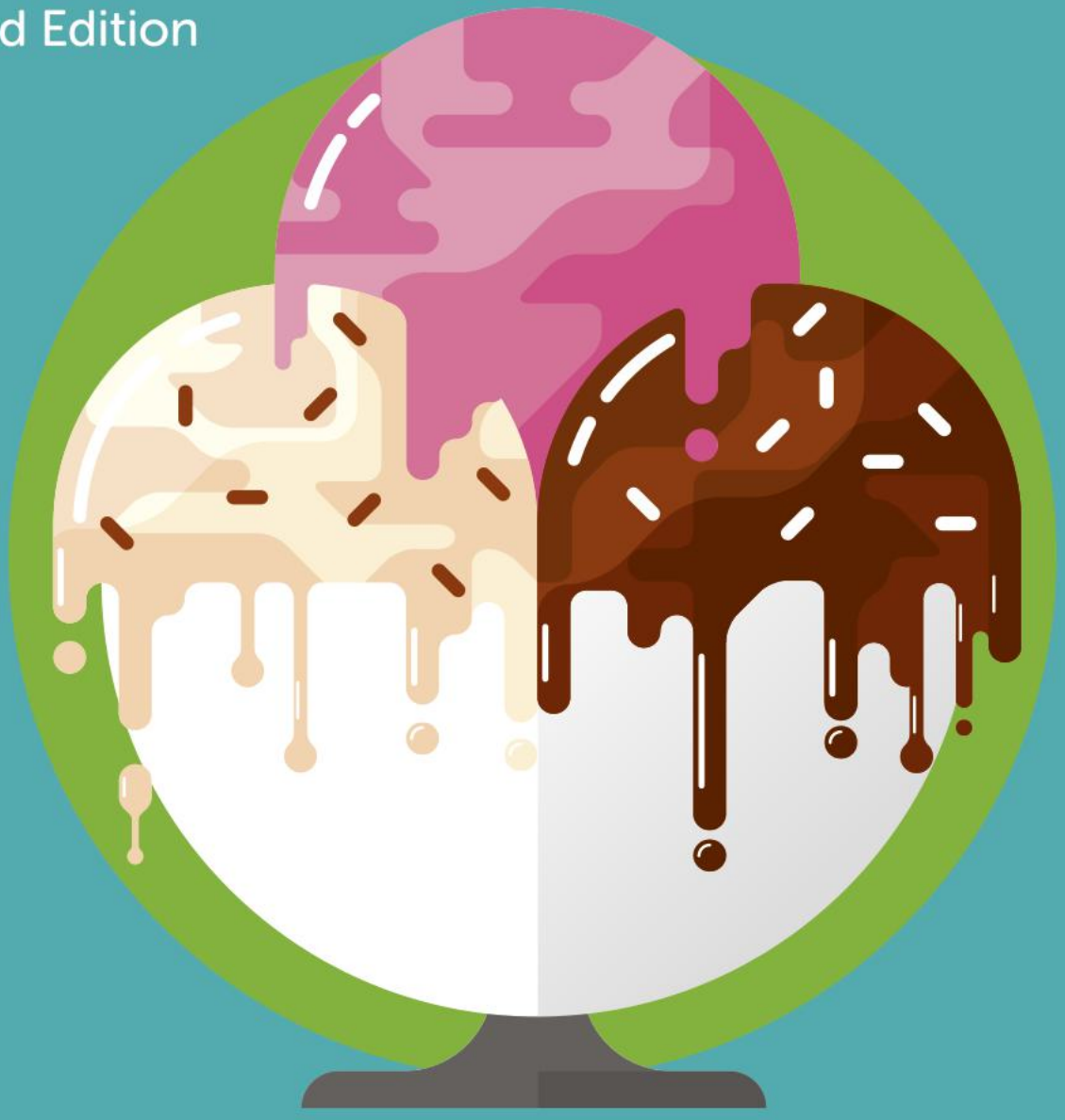
Oxford International Resources

4

Science

Student Book

Second Edition



Primary

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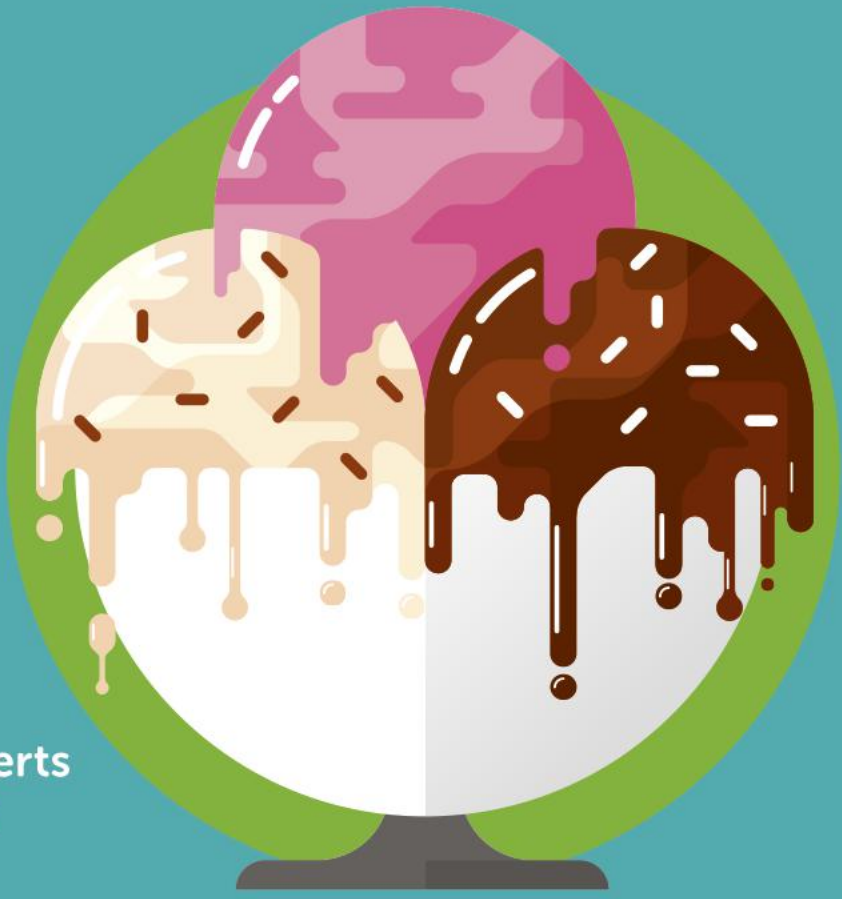

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Contents

Contents

How to Use this Book

This Student Book for Oxford International Primary Science forms part of your science lessons for this year. Your teacher will introduce the ideas through whole-class activities, then you will explore them in more detail using this book, before all coming back together to discuss what you have learned. Find out more at: www.oxfordprimary.com/international-science

Structure of the book

This book is divided into five units plus a *Being a Good Scientist* introduction and a picture Glossary:

Being a Good Scientist
Unit 1 Solids, Liquids and Gases
Unit 2 Habitats
Unit 3 Digestion and Food Chains
Unit 4 Electricity
Unit 5 Sounds
Glossary

Each unit covers a different strand of science. You will need a science notebook to write in and to record your investigation results and conclusions.

Being a good scientist

To be a good scientist you need to be curious and ask questions. This section will help you think about how to develop your scientific skills to work like a scientist.

What you will find in each unit

There are three types of lessons:
Wow introduces each unit's scientific ideas and key words. It tells you what you will learn in the unit and lets you discuss what you already know.
Focused lessons cover the scientific knowledge and skills you need to learn this year.
In **What have I learned?** you review your learning and show your teacher what you have learned about the unit.

What you will find in the lessons

Although each lesson is unique, they have common features:

The words on the Wow pages are included in the picture glossary at the back of the book. You can add your own notes for each word.

Key words
pollution
turbidity
Gives you the key words for the lesson.

In this lesson you will learn how to use identification keys. Tells you what you will learn in the lesson.

Questions to help you talk to each other and share ideas about the science you are learning and the investigations you do.


Practical and research activities to investigate and report on science topics. Sometimes your teacher will ask you to use different equipment, which is available in school. They may also ask you to carry out a test in a different way, to make sure you are safe.

Challenges you to take your learning further.

Key idea Summarises what you have learned.

Additional features

Think back Reminds you what has been covered before.

Science fact Interesting and amazing science facts.


Highlights the skills needed to be a good scientist.


Important notes about how to stay safe.

Teacher's Guide

There is a Teacher's Guide to help your teacher to work out the resources needed and to offer alternative activities and approaches.

Workbook

At the bottom of each page in this book is a link to a Workbook, where you can record your work and get extra practice to do in your lesson or at home.

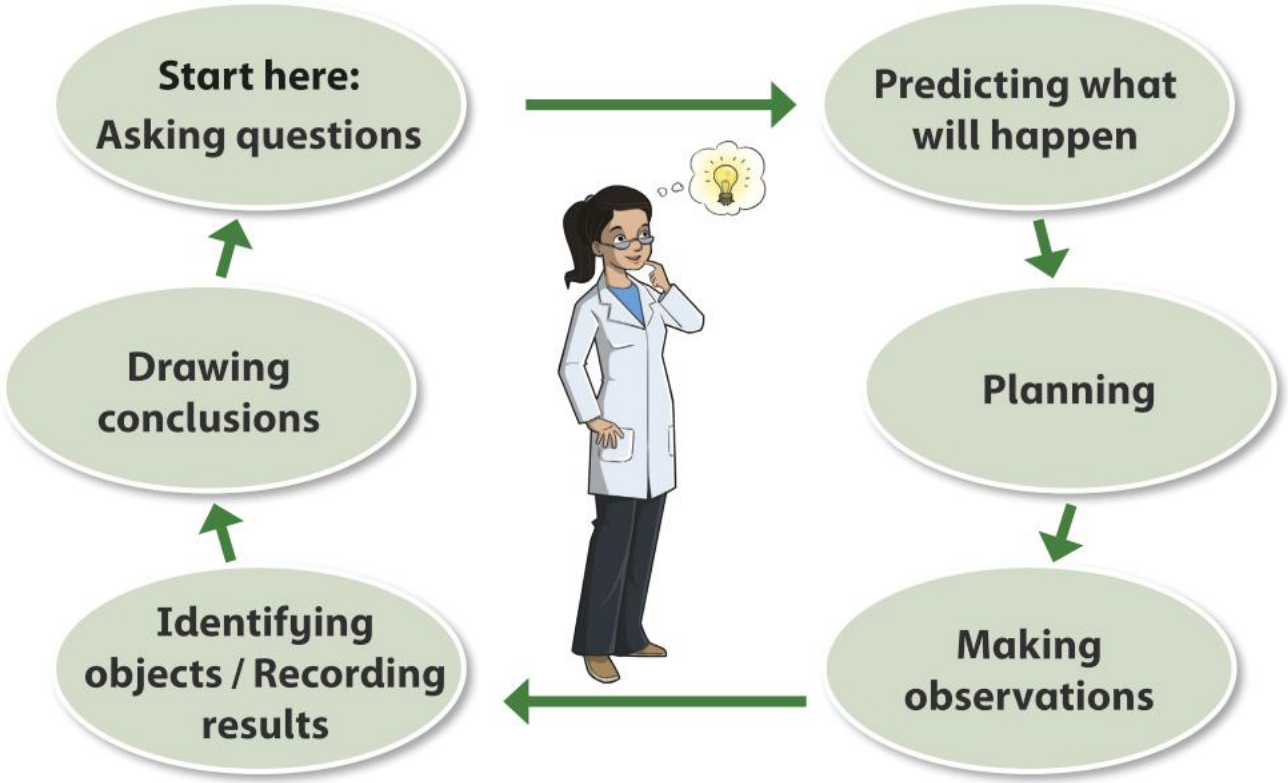
Being a Good Scientist

Science is the study of the world around us. To be a good scientist you need to be curious and ask questions. This section will help you think about how to develop your scientific skills to work like a scientist.

Scientists look carefully at the world to explain why things happen and to guess if things may happen. Science is used to develop new technologies. It also helps us know more about health and diseases. This means we can develop medicines and machines to keep people healthy.

You will have to make decisions about the type of scientific investigations you should be doing and which observations you should be carrying out. You will need to bring all of your skills together to plan and carry out fair tests and to record and present your findings.

The diagram shows the steps you can take to plan and carry out investigations like a scientist.



Learning to be a scientist allows you to develop scientific skills such as observing (looking), measuring and recording. It helps you to notice patterns in the things you observe and to sort things into groups. It also helps you to test your own ideas about how the world works.

Asking questions

Scientists ask questions about the world around them. This is called scientific enquiry.

A good way to start is to think of questions that start with words such as 'which', 'what', 'why', 'how', 'do' and 'does'. Your questions should lead you towards planning an investigation or carrying out research to find out more about a subject.

Does the substance have a fixed volume?

Does it have a fixed shape?

Think of your own questions to ask about materials. Think about different properties the materials can have.

The questions you ask will give you a good start to your investigation.

Questions can also come out of the results of an investigation. For example, when investigating materials you might observe that materials changed when they were cooled or heated. What questions would these results make you think about?

That is why the investigative process is shown in a circle. Each investigation can lead to new questions to investigate.

Predicting what will happen

Next, scientists try to work out what will happen. Scientists call this a prediction.

They need to talk about their ideas and think about what they already know about a topic. You might have already learned something about the question you are trying to answer. Scientists usually know something before they make predictions.

Use what you know about melting to help you think about this question.

What would you observe if you warmed a cube of ice on a windowsill?

Do you think the ice would change?

What did you think about to help you decide?

As a scientist, you draw on your previous experiences to help. Think about when you have seen ice and water. You could also think about how water can be changed into different forms in a kitchen. This makes your prediction much better than a guess. It is based on scientific knowledge and evidence.

Scientists often use **models** to represent objects or the way things work. Models help scientists to think about new ideas or things that cannot be seen. For example, your classmates can model how particles in a solid and liquid change when materials melt and freeze. Scientists use models to make predictions and to explain observations.

Planning an investigation

Scientists plan what they are going to do. They always discuss their plans before they start. This helps to check that the plan will work.

You will be encouraged to set up what are called **comparative tests**. This is when you design an investigation to compare different things. For example, you might want to compare the insects and plants in two different areas.

How are the students investigating plants and insects?

Why are they using small quadrats or squares?

It is important that an investigation is a **fair test**. Scientists make their investigations fair by following some simple rules:

- They think about what to keep the same.
- They think about what to change.

For example, when investigating different habitats, you should survey the same amount of ground to make a fair comparison.

If you surveyed a large area in one place and a small area in another place, then it would not be a fair test to compare which has the most plants or insects.

Scientists think about the **equipment** they need. They make a list and make sure everything is available. For example, if you are going to survey the number of insects in an area you might make a list like this:

quadrat
pooter
net
measuring tape
hand lens
small collecting pot

Science fact

Scientists do not always plan their own investigations. Sometimes they follow other scientist's plans. This is why it is very important to make the plans clear.

Sometimes it is not possible to plan an investigation to answer your questions. For example, if you want to know about insects high up in trees or on a cliff face, you will not be able to reach there to observe them. It would not be safe. You will have to use other sources of information such as the internet, books and magazines. These are called **secondary sources of information**.

When have you used secondary sources to find out more about science?

What were they?

How did you use them?

Making observations

Scientists use their observation skills during investigations.

What are the different senses you can use when observing investigations? Write a list.

Why do you have to be careful when using these senses?

Scientists do not just observe investigations when they have a bit of time. They plan carefully to make observations at the right times. They use computers, data loggers and other devices, such as smartphones and electronic scales, to help them to take accurate measurements.

Some of the pieces of equipment you will use this year are shown below.

Scientists are very careful to use standard units to record their results. Standard units allow people from all over the world to understand the results. For example, when measuring plant heights, they would use millimetres or centimetres. They would not use grams or degrees.

Which standard units would you use to measure: a) temperature, b) the distance between villages, c) the amount of flour needed in a recipe?

Good scientists take a measurement more than once. This is to make sure they have not made any mistakes. They then find out the average for their readings. The example below shows the results of a habitat survey.

Animal	Number of animals found under a stone			
	Count 1	Count 2	Count 3	Average
woodlouse	2	8	5	
ant	3	1	2	
worm	1	1	1	

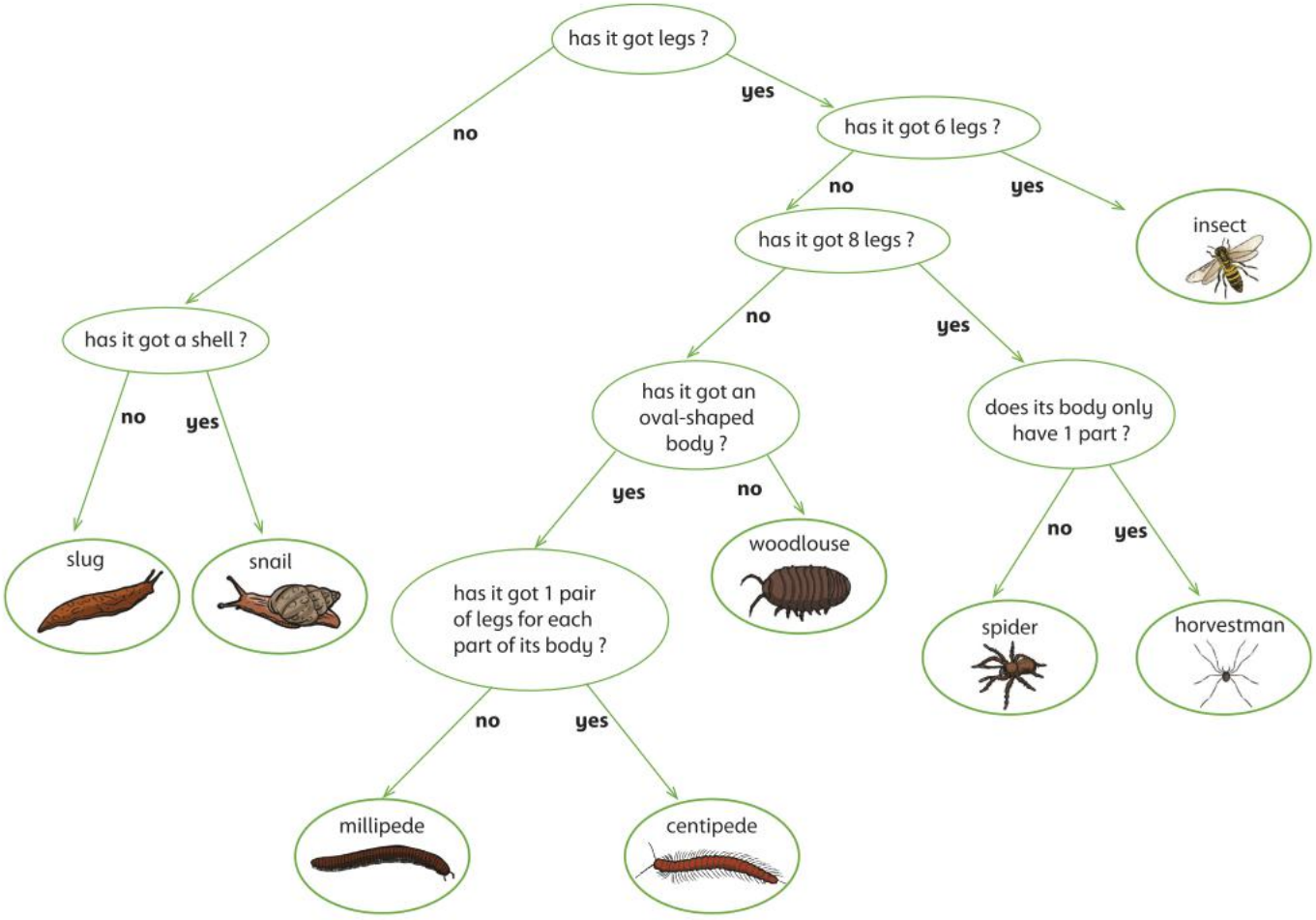
What should the average readings be for each animal? Which animal was the most common under the stone? Why was it useful to not just take the first readings?

To identify objects you may use a key. This is a diagram with simple questions. As you answer the questions it moves you closer to the object you are trying to identify.

Look at this invertebrate key.

Identify a millipede, using the key.

Why are keys useful?



Recording results

Scientists write down or record what they have found from their observations and measurements. This helps them to see patterns or to sort things into groups.

You will need to use your results to draw conclusions. This is the next part of the investigation process. This means that if you do not record your results carefully, you may not be able to make the most sensible conclusions. There are lots of different ways to record results.

Tables

One way to record results is to complete a table.

You could use a table like this one to record how quickly 100 cm^3 of water will evaporate at different temperatures. The water should be poured into identical shallow dishes.

Temperature (°C)	Time taken for the water to evaporate (minutes)
20	180
30	170
40	150
50	100
60	70
70	30

Look at the table. Answer these questions with your partner.

Which temperature shows the fastest evaporation time?

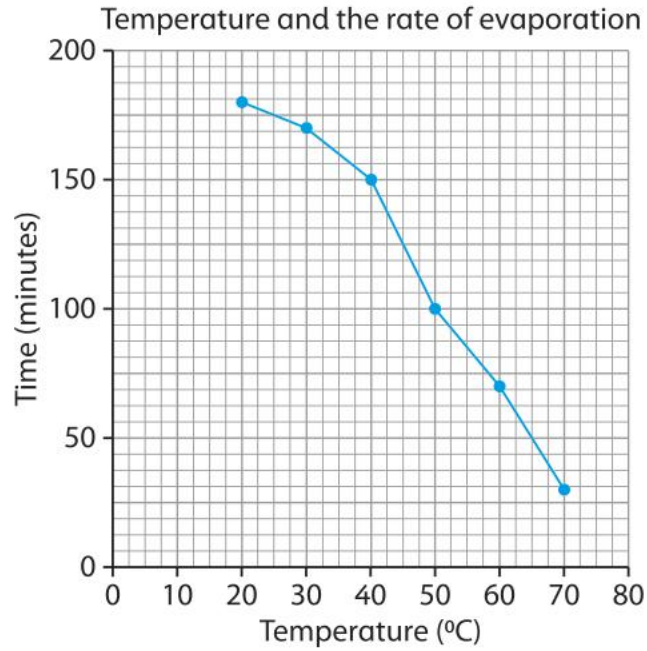
Describe any patterns you can see in the results.

Name another thing that needs to be kept the same in this investigation.

Charts

Results from tables can be shown as charts or graphs.

This chart shows the results of the evaporation investigation.



The time it takes for the water to evaporate (the measurement that changes) is plotted from bottom to top on this chart. This is the y-axis.

The temperatures investigated (the measurement that is agreed at the start) are plotted along the bottom on this chart. This is the x-axis.

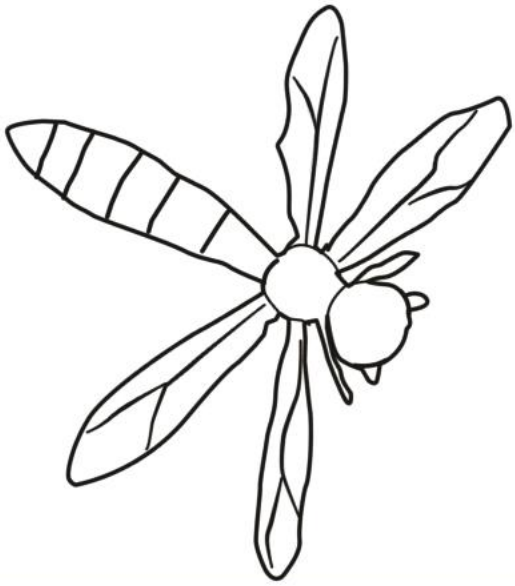
Do you think the chart on page 11 is easier or harder to read from than the table of results?

Predict the time it would take for water to evaporate from the dishes at 10°C and 80°C.

Using charts can sometimes make it easier to see patterns in the results. We can also extend the lines of a graph to help us to make predictions.

Drawings, photographs and videos

You have worked with scientific drawings before. Remember they are not like the pictures you paint.



Scientific drawings are much simpler

Scientists also use modern technology to take photographs and video clips of their investigations and results.

Photographs show a lot of detail

This is a very accurate way to record results. This level of detail would not be possible without using a camera.

Filming allows us to see things that may be impossible to see in person.

Scientists can see tiny details, such as how a water droplet behaves, by slowing down a film

How could you use a camera or video recorder to observe what happens as water is heated?