



# Nelson International Science Workbook 5



Anthony Russell

OXFORD

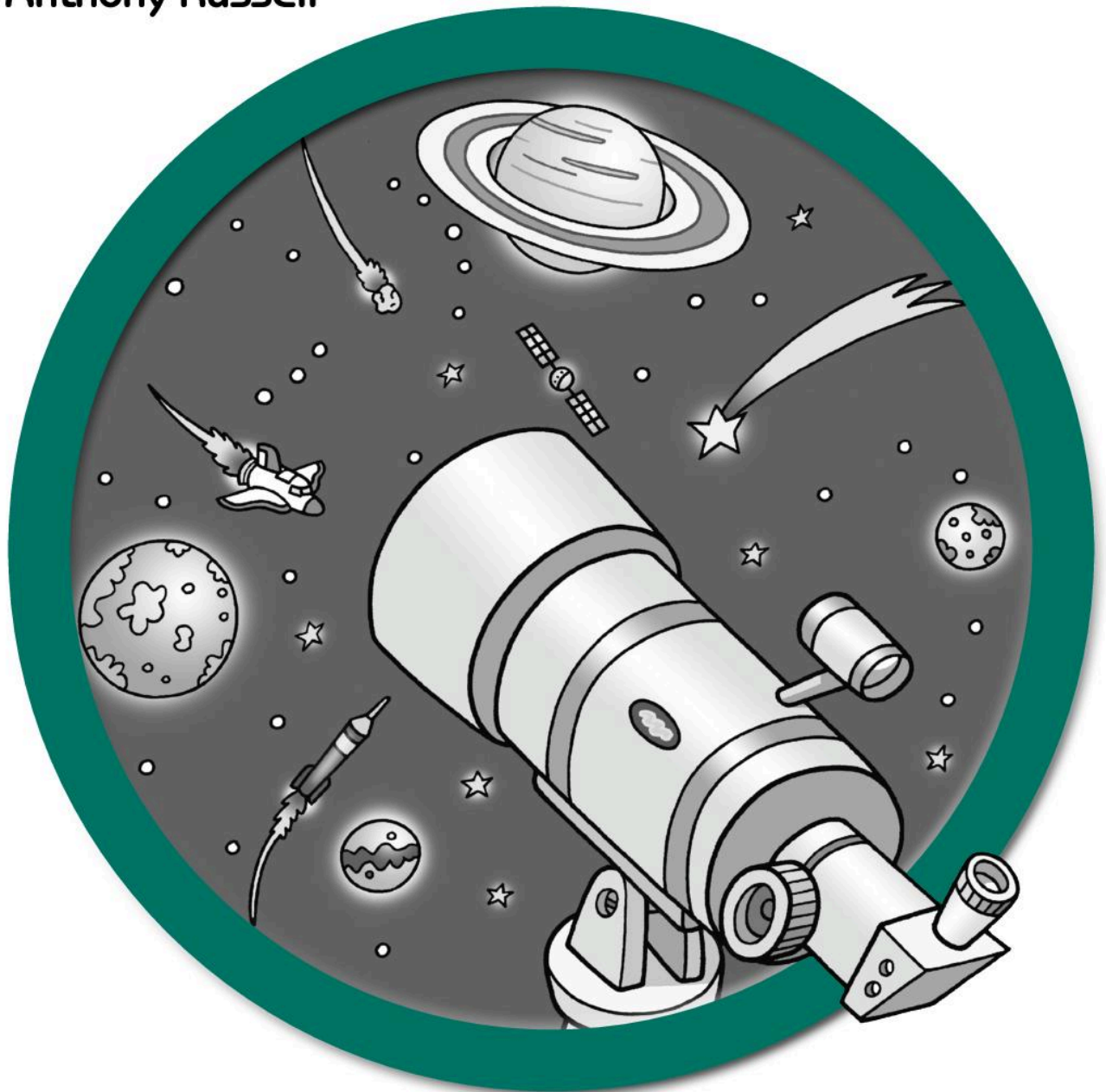




# Nelson International Science

## Workbook 5

Anthony Russell



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## Introduction

*Nelson International Science Workbook 5* provides a complete copy of the *Student Book* activities for all learners to work through.

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

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



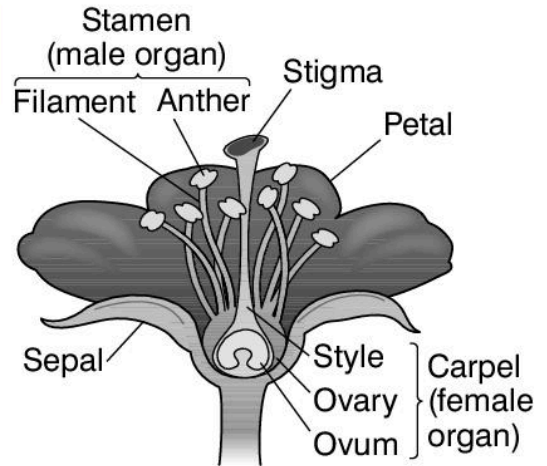
## Flowers – male and female parts

### Activity 1 6

**You will need:** some flowers, a hand lens and a pen or pencil.

- 1** Collect some flowers from outside.

Be careful when picking flowers as some can be poisonous. Your teacher will suggest good ones to choose.



- 2** In class, identify the petals and sepals of your flowers. What are the colours of the petals?

The colours of the petals are: \_\_\_\_\_

- 3** Use the hand lens to observe the small parts inside each flower.
  - a What parts can you see?

I can see: \_\_\_\_\_

- b Count the numbers of each part.

- 4** Record your observations in a table like the one below. Include the names of the plants if you know them.

Add a new row to the table for each plant.

Name of plant	Number and colour of sepals	Number and colour of petals	Number of stamens (male parts)	Number of carpels (female parts)

**Activity 1 (continued)** 

**5** Choose one flower that has a large carpel or carpels.

- a Use a sharp blade to cut the flower in half lengthwise.

 **WARNING:** Take care when using the knife.



- b Use the hand lens to identify the ova inside the ovary.

- c Count the ova.



- d Make a drawing of the flower that you have cut in half. Label the following parts on your drawing:

**petal sepal stigma style ovary ovum anther filament**

Name of flower: \_\_\_\_\_



**6** Share your drawing and your observations with the class.

- a Compare the structure of the flowers that you looked at with the ones that other learners investigated.

What is different? \_\_\_\_\_

\_\_\_\_\_

What is the same? \_\_\_\_\_

\_\_\_\_\_

- b Can you see any patterns in the observations?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

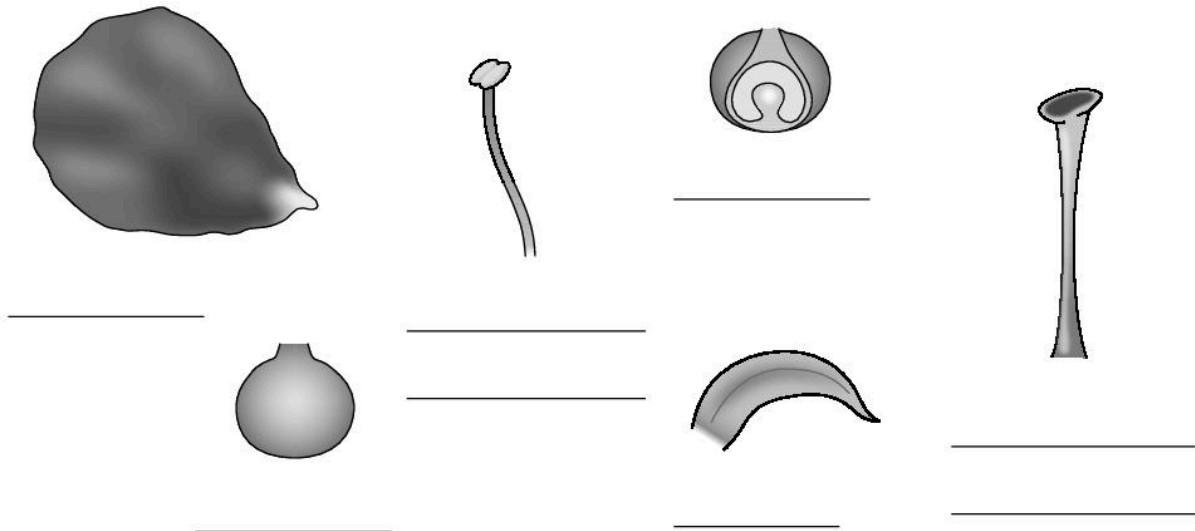


- c Share your ideas with the class.



**Activity A**

**You will need: a pen or pencil.**



**1** Identify the flower parts in the drawings and write their names on the lines.

**2** Complete these sentences. The words you will need are:

**stamen two four carpel**

- a** The \_\_\_\_\_ male parts together are called a \_\_\_\_\_.
- b** The \_\_\_\_\_ female parts together are called a \_\_\_\_\_.



# Seed dispersal

## 14 The forms of seed dispersal

The fruits and seeds shown in the pictures are all dispersed in different ways.



*Seeds are dispersed in different ways*

Try to match the methods of dispersal listed here to the pictures:

**birds water wind hairy animals other animals exploding fruit**

15 Complete these sentences using these words:

**throws juicy hard cowpea droppings eat long seeds ground coconut mango jacaranda animals hooked eaten wind fur digestive**

- a \_\_\_\_\_ fruits such as orange and \_\_\_\_\_ are dispersed by \_\_\_\_\_, which \_\_\_\_\_ them.
- b The \_\_\_\_\_ are either discarded or \_\_\_\_\_ with the fruit, which passes through the \_\_\_\_\_ system unharmed. They fall to the \_\_\_\_\_ with the \_\_\_\_\_ of the animal.
- c The \_\_\_\_\_ fruit of the \_\_\_\_\_ and other plants are carried away by the \_\_\_\_\_.
- d \_\_\_\_\_ and sticky fruits become attached to the \_\_\_\_\_ of animals and are carried away from the parent plant.
- e The fruit of the \_\_\_\_\_ floats in water and can travel \_\_\_\_\_ distances.
- f The wall of the \_\_\_\_\_ fruit splits open and \_\_\_\_\_ the seeds out, away from the plant.

**Activity 2** 

**You will need:** some fruits and seeds, a hand lens and a pen or pencil.

**1** Go outside and look for fruits and seeds. Collect four different kinds and return to class.

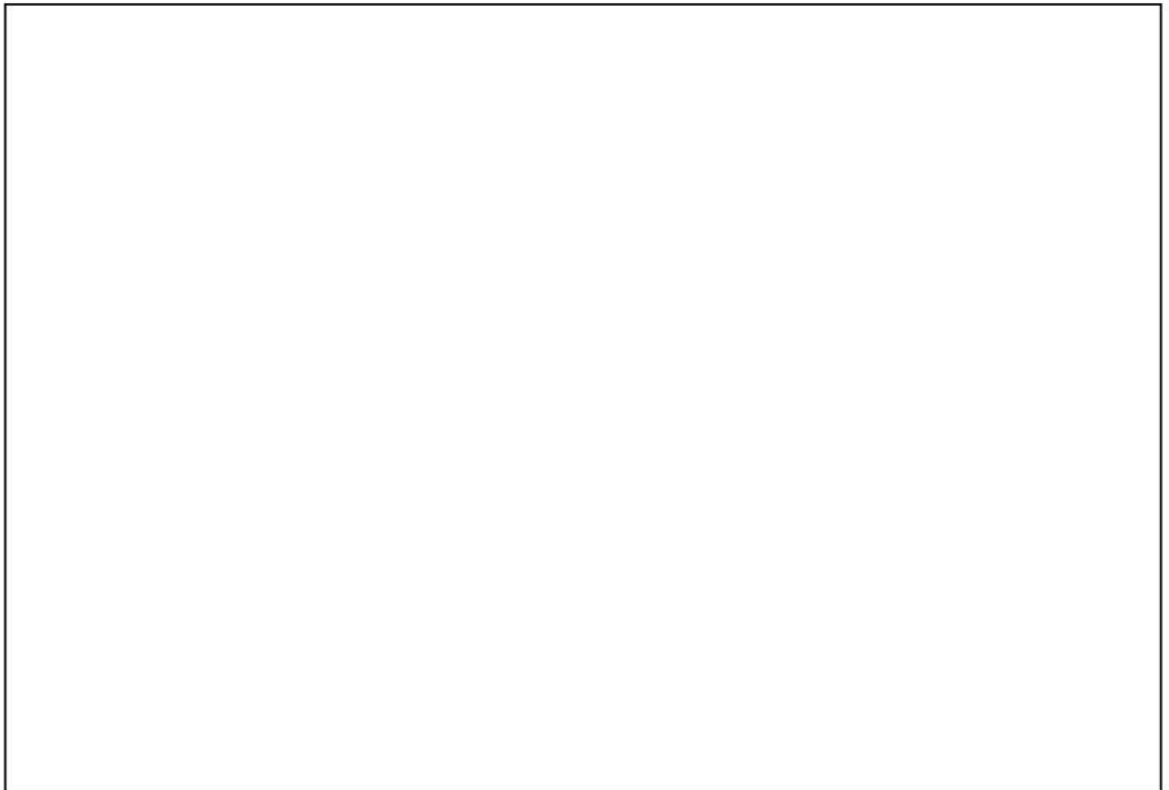


**2** Use the hand lens to observe the fruits and seeds closely.

- a** Look for clues about how the seeds are dispersed.
- b** Think about their shapes and textures. Are they spiked, hooked, juicy, winged, or feathery and light?



**3** Make large drawings of the seeds and fruits.



- a** Name them if you can.
- b** Label the features that you think are connected with seed dispersal.



**4** Display your drawings.



- a** Look at those from other learners.
- b** Sort them into groups – one for each method of dispersal.

**Activity 3: Investigating the conditions necessary for seed germination** 21 – 22

**You will need:** some seeds and a pen or pencil.



**1** Discuss with your group what conditions you think are necessary for seeds to germinate.

- a Make a list of all the factors that you think are essential.

**Conditions for germinating seeds**

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- b Share the list with the class.

**2** Choose which factors your group will investigate.



- a Discuss how you can do a fair test to investigate the effect of the factors on seed germination.

*It will be a fair test because:* \_\_\_\_\_

---

---



- b Predict what you think will happen, and write down your prediction.

*I predict that:* \_\_\_\_\_

---



**3** Make a plan of how the investigation will be done. Show the plan to your teacher.

**Plan:**

*First, we* \_\_\_\_\_

---

*Then, we* \_\_\_\_\_

---

*Next, we* \_\_\_\_\_

---



### Activity 3: Investigating the conditions necessary for seed germination (continued) 22 – 23

- 4 Collect the equipment you need and set up the test carefully. Label any containers you use so that they do not get mixed up.
- 5 Set up the test and put the containers with the seeds in a safe place where they will not be disturbed.



#### 6 Observe the seeds.

- a Keep a record of your observations each day for 7 days. Make records every day using extra paper. You could make drawings, tables and charts, as well as notes.
- b After 7 days, share the results with the class.

#### 7 Compare what has happened to the seeds in each container.

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#### 8 Continue with the test until no more seeds are germinating in your containers.

- a Discuss with your group what you think this experiment has shown.
- b Draw your conclusions based on the data you have collected.
- c Compare the outcomes with your predictions.

#### Conclusions and outcomes

*I predicted that:* \_\_\_\_\_

*The outcome was:* \_\_\_\_\_

*I conclude that:* \_\_\_\_\_

#### 9 Share your conclusions with the class.

- a Answer any questions that other learners want to ask.
- b Listen to what other groups have found from their investigations. Ask them questions if their explanations are not clear.

### Activity 3: Investigating the conditions necessary for seed germination (*continued*) 23



**10** Write down your own list of conclusions about the conditions essential for germination.

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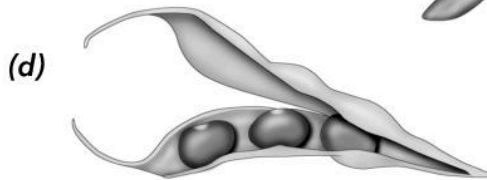
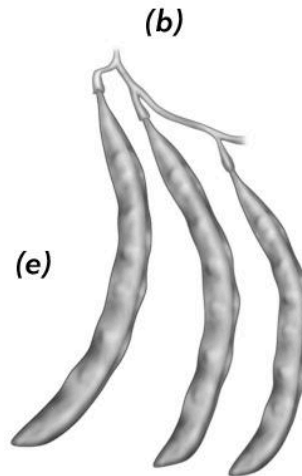
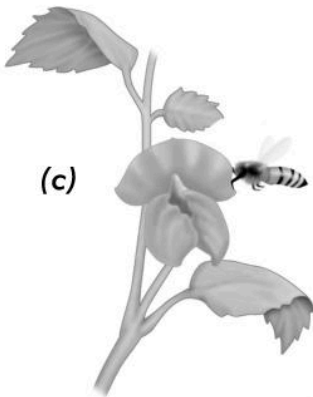
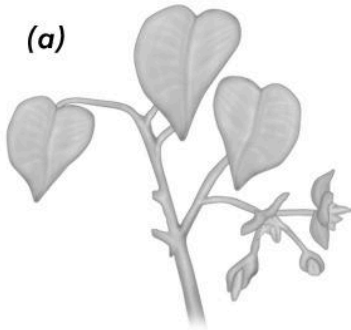
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# Life cycle of flowering plants

Here are the stages of the life cycle of a bean plant. They are not in the right order and the pictures are not matched with the names of the stages.



Pollination

Seed production

Seed dispersal

Germination

Flowering bean plant

## Activity 4 26

You will need: a pen or pencil.



**1** Look at the pictures and the stages. Match the stages to the pictures.

\_\_\_\_\_ Picture

\_\_\_\_\_ Picture

\_\_\_\_\_ Picture

\_\_\_\_\_ Picture

\_\_\_\_\_ Picture

**Activity 4 (continued)** 26



**2** Now order the stages of the life cycle of the bean plant correctly.

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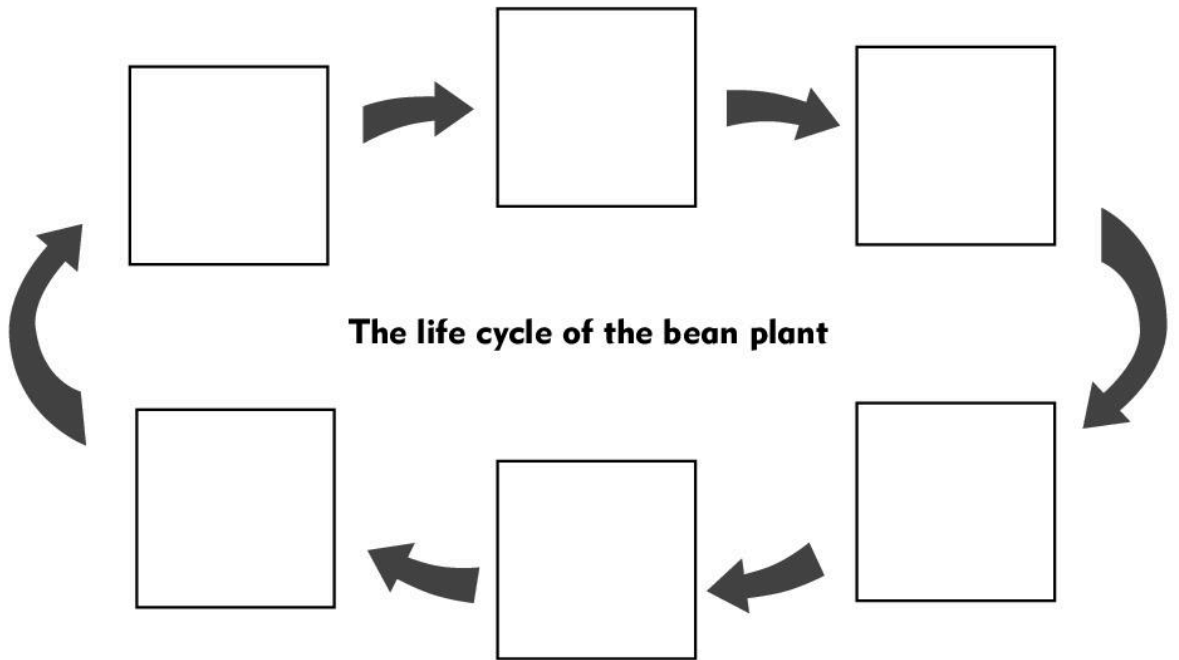
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**3** Write your cycle in a diagram like this:



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



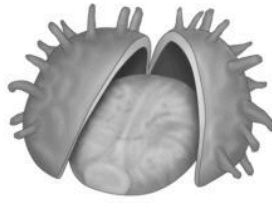
27 Complete these sentences using these words (you may need to use some words more than once):

**change pollen parents life cycle bean beginning order  
ovum seeds same stages end**

- 1 Plants grow and \_\_\_\_\_ as they get older. This is called development.
- 2 The plants go through different \_\_\_\_\_ in their development.
- 3 These \_\_\_\_\_ fit together, from the \_\_\_\_\_ to the \_\_\_\_\_ of the life.
- 4 The stages go in an \_\_\_\_\_. All of them together form the \_\_\_\_\_ of the plant.
- 5 New plants are made by \_\_\_\_\_. This is called reproduction.
- 6 Two types of sex cells are needed. One is the \_\_\_\_\_ and the other is the \_\_\_\_\_.
- 7 New plants become like their \_\_\_\_\_ but are never exactly the \_\_\_\_\_.
- 8 Male and female bean flower parts produce new \_\_\_\_\_ plants by making \_\_\_\_\_.

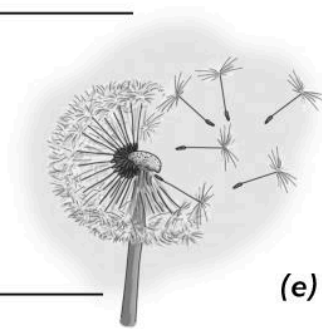
Activity B

You will need: a pen or pencil.



(a) \_\_\_\_\_

(b) \_\_\_\_\_ (c) \_\_\_\_\_



(d) \_\_\_\_\_

(e) \_\_\_\_\_



**1** Look at the pictures of five different fruits. Each one disperses its seeds in a different way.



**2** Identify which method of dispersal each one uses and write your answers on the lines provided by the pictures.

**3** Choose three of the fruits and explain their seed-dispersal methods. Write your explanations on the lines below.

Fruit: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Fruit: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Fruit: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

# Chapter 2: States of matter



## Evaporation

### Activity 1: Investigating what affects the rate of evaporation 28

**You will need:** a small piece of fabric, a plastic bag, a spoon, some water and a pen or pencil.

- 1** Go outside into the sunshine. Do the following things.
  - a** Soak a small piece of fabric in water and hang it up in the Sun.
  - b** Pour about a spoonful of water onto a plate, a plastic bag, or any other waterproof surface, and leave it out in the Sun.
  - c** Wet your hands with water. Keep one hand curled up in a fist. Open the other hand and spread the fingers. Stand in the Sun.



- 2** Observe what happens in the three situations. Note what you observe.

- a** \_\_\_\_\_  
\_\_\_\_\_
- b** \_\_\_\_\_  
\_\_\_\_\_
- c** \_\_\_\_\_  
\_\_\_\_\_



- 3** When no more changes are happening, go back to the classroom and share your results with the group.

- 4** Compare the three situations. Try to explain what you have observed.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

**shade liquid Sun dry dries skin faster gas hot**

- 1 Puddles of water \_\_\_\_ up in the \_\_\_\_\_. They dry faster when the day is \_\_\_\_\_.
- 2 Washing \_\_\_\_\_ faster in the \_\_\_\_ than in the \_\_\_\_\_.
- 3 My \_\_\_\_\_ dries \_\_\_\_\_ when the \_\_\_\_ warms it.
- 4 If I put a bucket of water in the Sun, it \_\_\_\_\_ up.
- 5 You can change \_\_\_\_\_ water into \_\_\_\_ by heating it.

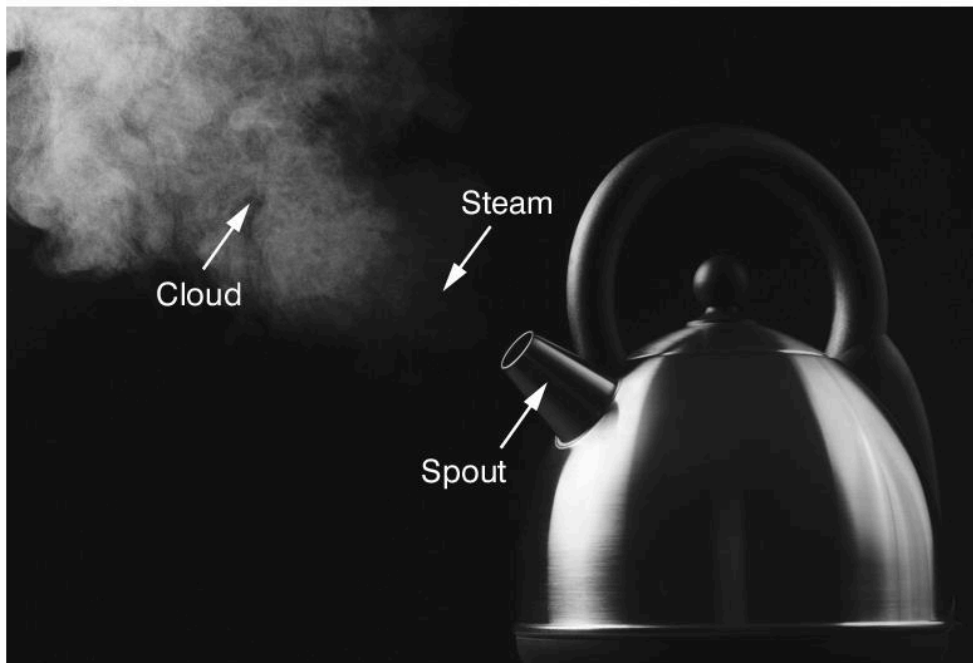







## Activity 2: Observing water changing its state 31–32

**You will need:** a kettle, a cold plate, a cloth, a bowl and a pen or pencil.

Your teacher will use the kettle and plate to demonstrate another process.



**! WARNING:** Take care when the water boils not to get too close, or to put your hand near.

-  **1** Look carefully at the spout of the kettle and see if you can observe the 'gap' between the cloud and the spout.
-  **2** Now look at the cloud.
  - a** What do you think it is – gas or liquid? Circle your answer.  
Gas   Liquid
  -  **b** Tell the class what you think.

### Activity 2: Observing water changing its state (*continued*) 32



**3** Watch carefully as the teacher holds the cold plate with the cloth and puts it into the invisible steam. The bowl is standing below the point where the plate is being held.

**a** What do you observe on the plate?

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**b** What do you observe in the bowl?

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**4** Try to explain your observations to the class.

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# The boiling point of water



## Activity 3: Investigating the boiling point of water 37 – 38

**You will need:** a metal container, a heat source, a thermometer, some water and a pen or pencil.

**! WARNING:** Take care when using the heat source and working with boiling water. Ask an adult to help you.



**1** Set up a container of water above a heat source.

- a Put a thermometer into the water.
- b Read the temperature and record it in this table:

Time	Temperature (°degrees Celsius)

Add a row to this table each time you read the temperature of the water.



**2** Read the thermometer regularly and record the time and the temperature each time in the table.



**3** When the water is boiling, read the thermometer **VERY CAREFULLY** and record the temperature.

### Activity 3: Investigating the boiling point of water (*continued*) 38



- 4** Write down what the investigation has shown you about the boiling point of water.

#### **Conclusion**

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- 5** Share your conclusion with the class.

# The melting point of ice



## Activity 4: What temperature does ice begin to melt at? 39

**You will need:** a thermometer, some ice cubes and a pen or pencil.



- 1 Measure the temperature of the ice cube with the thermometer before you start warming it. Record your reading.

Reading (°Celsius): \_\_\_\_\_



- 2 Observe the process of melting.

- a Record the temperature when the melting begins.

Reading (°Celsius): \_\_\_\_\_

- b Repeat the temperature readings every minute and record them.

Minute 1, reading (°Celsius): \_\_\_\_\_

Minute 2, reading (°Celsius): \_\_\_\_\_

Minute 3, reading (°Celsius): \_\_\_\_\_

Minute 4, reading (°Celsius): \_\_\_\_\_

Add more readings in the space below if you need to.

- c When the cube has melted completely, stop the temperature measurements.



- 3 Write down what this investigation has shown you about the melting point of ice.

**Conclusion**

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- 4 Share your result and conclusion with the class.





## Evaporation of solutions

### Activity 5: Investigating how you can get a solid back out of a solution 40

**You will need:** a solution and a pen or pencil.

- 1** Choose a solution to work with. Plan how to separate the solid from your solution:
  - a** in a slow way
  - b** in a faster way.



- 2** Write down what your group will do. Plan your investigation in detail. Use the space here to write down your plan. Remember to describe it in steps using words like 'First we', 'Then we' and 'Next we'.

**Plan**

- 3** When your plan is complete, show it to your teacher.
- 4** Make a prediction of which method will be faster, and write it down.

We predict that: \_\_\_\_\_


\_\_\_\_\_

**Activity 5: Investigating how you can get a solid back out of a solution (continued)** 41

- 5** Collect the things you need to make a solution and make enough for repeating your methods three times each.



### Activity 5: Investigating how you can get a solid back out of a solution (continued) 41–42

 **WARNING:** Take care when using the heat source and working with boiling water. Ask an adult to help you.



**6** Carry out your plan for the fast method and observe what happens. Record your observations in drawings and text as you go along.



**7** When you have a clear result, repeat the method another two times in exactly the same way. Observe and record what happens each time.

**The fast method**

**Activity 5: Investigating how you can get a solid back out of a solution (continued)** 

- 8** Now carry out the slow method. It may be possible to do all three at the same time. Observe and record what happens each time, as you did for the first method.

**The slow method**

**Activity 5: Investigating how you can get a solid back out of a solution (continued)** 

**9** Look at your results.



- a Discuss your results with your group.
- b Write down your group's conclusion and share it with the class.

**Conclusion**

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**10** Compare your methods with the methods used by other groups.

- a Which one was the fastest? \_\_\_\_\_
- b Why? Try to explain your answer.

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## Activity C

**You will need: a pen or pencil.**

Five groups carried out an investigation to get a solid back out of a solution. They all used the same mass of the solute (5 g) and the same volume of solvent (100 ml).

Only one group did the investigation carefully. The others made mistakes in their measurements and their recording.

Here is a table of the results from the five groups.

**Table of results**

Group	Solute (g)		Solvent (ml)	
	Start	End	Start	End
A	5	0	100	105
B	5	4.8	100	10
C	5	10	100	110
D	5	4.8	100	95
E	5	2	100	150



**1** Look at the data in the table and find the group that did the investigation most carefully. This group was group .

**2** Choose two other groups and explain why their results cannot be correct:

Group

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Group

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### Activity D

**You will need: a pen or pencil.**



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

**clouds      100      gas      cooling      three      tiny      sky**  
**vapour      melting      wax      water      steam      heating**  
**freezing      ice      changed      liquid      temperature**  
**evaporate      solid      frozen      condensation      boiling**  
**process      processes      evaporation**

- 1 There are \_\_\_\_\_ states of matter. Materials can be \_\_\_\_\_ from one to another by \_\_\_\_\_ or \_\_\_\_\_.
- 2 Water is found naturally in all its states. They are \_\_\_\_\_ (which is the \_\_\_\_\_ state), \_\_\_\_\_ (which is the liquid state) and water \_\_\_\_\_ (which is the \_\_\_\_\_ state).
- 3 The \_\_\_\_\_ of changing from a liquid to a gas is called \_\_\_\_\_.
- 4 \_\_\_\_\_ water makes it \_\_\_\_\_ much more quickly by turning it into \_\_\_\_\_ at \_\_\_\_\_ degrees Celsius.
- 5 Some materials, such as \_\_\_\_\_ change from liquid to \_\_\_\_\_ at room \_\_\_\_\_. This is not true for water. It has to be \_\_\_\_\_ to become a \_\_\_\_\_.
- 6 The opposite \_\_\_\_\_ that turn water from \_\_\_\_\_ to solid and back again are \_\_\_\_\_ and \_\_\_\_\_.
- 7 Water \_\_\_\_\_ can change into the liquid state by the process of \_\_\_\_\_. This is done by \_\_\_\_\_ the gas.
- 8 We can see the results of cooling water vapour when we look up at the \_\_\_\_\_ and see the \_\_\_\_\_. These are made of millions of \_\_\_\_\_ drops of \_\_\_\_\_ water.



## Shadow formation

### Activity 1: Investigating shadows

**You will need:** a camera, a ruler and a pen or pencil.



**1** Go outside on a sunny day and look at shadows. Notice their size and direction.



**2** Look at your own shadow and change it to create different shapes. Make at least three different shadow shapes.

Draw them here:

--	--	--

**3**

Share your shapes with the class and look at the shapes made by other learners.

**Activity 1: Investigating shadows (continued)** 44 – 45

- 4** Try to lose your shadow – make it disappear somehow. When you have done this, share your method with the class. Observe the methods used by others.



- 5** Back in class, discuss with your group what you have observed outside.

- a** Try to answer the question: how are shadows formed?

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- b** Share your group's ideas with the class.

**Activity 1: Investigating shadows (continued)** 

- 6** Plan how you can test your ideas of shadow formation, using a torch and a number of objects.
- a** Make it a fair test. Think about what conditions of the test must be made the same for each object.
  - b** Show your plan to your teacher.

**Plan**

### Activity 1: Investigating shadows (*continued*)



- 7** Decide what observations you will make and how you will record them.
- 8** Carry out your test and record what happens below. Remember you can draw the tests, write the data in sentences and use a table or chart.

**9** Look at the results for the different objects.

- a** Compare them to find any patterns.

**Conclusion**

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- b** Try to make a generalisation based on the evidence you collected.

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**10** Share your results and conclusion with the class. Listen to others.





## Activity 2: Changing shadow size 48 – 49

**You will need:** a torch, some different-sized objects and a pen or pencil.

**1** Using the torch try to change the size of the shadow around one of the objects.



**2** As you make a different-sized shadow, draw round it to record its size. You can use sheets of A3 or A2 paper to do this and stick sheets together if you need to.

Try to change the size at least three times: the biggest possible, the smallest possible and one in between.



**3** Repeat the process with at least two objects of different sizes and shapes.



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

- a** Discuss what you have all observed.
- b** Try to make a general statement about what controls shadow sizes.

**Conclusion**

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## Activity 3: Changing shadow length 50

**You will need:** a torch, some different-sized objects and a pen or pencil.

**1** Play with the torch and one object against a sheet of paper to act as a screen where you can observe the shadow.

- a Predict what will happen to the shadow length as you change the distance of the object from the torch.
- b Write down your predictions.



*I predict that:* \_\_\_\_\_

---



---



**2** Observe what happens to the shadow on the screen when the light source (torch) and the screen stay in the same position, but the object is moved further and further from the light source.

*When the object is moved further from the light source it* \_\_\_\_\_

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---



**3** Draw the shadows on the screen when the object is in at least five different positions (five different distances from the torch).

- a Measure the distance each time.
- b Measure the shadow size each time.
- c Record the measurements in the table below.

Observation	Distance from source (cm)	Length of shadow (cm)
1		
2		
3		
4		
5		

**Activity 3: Changing shadow length (continued)** 51**4** Discuss the results with your group.

- a Compare your results with your predictions.

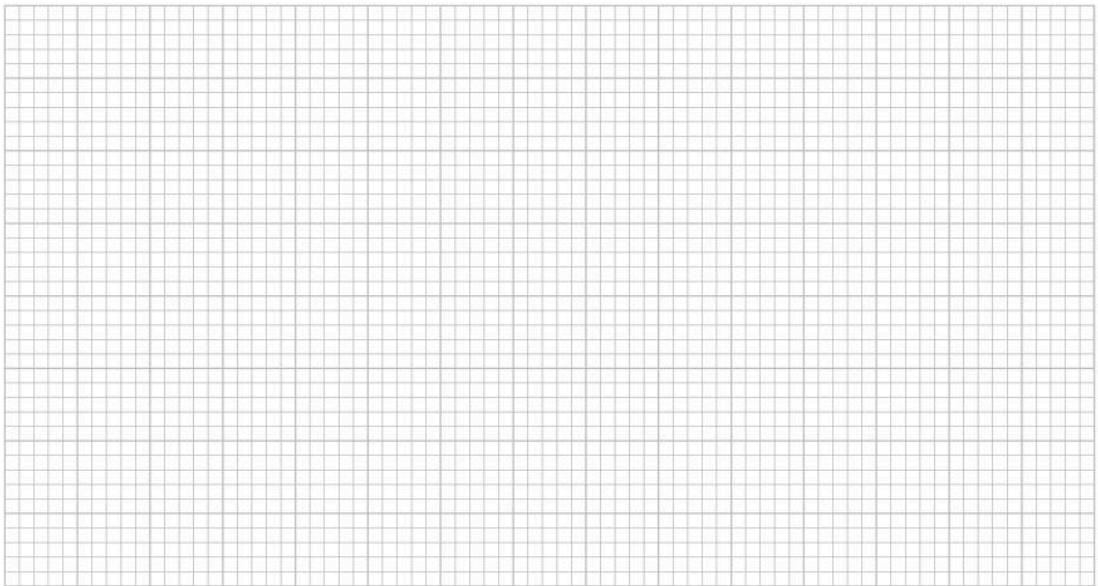
The results show that my prediction \_\_\_\_\_

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- b Present your results as a line graph. Use the space below.



- c Try to reach a conclusion and make a generalised statement about shadow length and distance from the light source.

**Conclusion**

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- 5** Share your group's ideas and graph with the class. Look at the graphs of other groups and listen to their ideas.

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

**shadow object shorter light longer close further source**

- a When the \_\_\_\_\_ is \_\_\_\_\_ to the \_\_\_\_\_ source, the shadow is \_\_\_\_\_.
- b The \_\_\_\_\_ is \_\_\_\_\_ when the object is \_\_\_\_\_ from the light \_\_\_\_\_.
- c The closer the \_\_\_\_\_ is to the light source, the \_\_\_\_\_ the \_\_\_\_\_.



## Activity 4: Investigating the changes in shadows throughout a day 52

**You will need:** a ruler, some graph paper and a pen or pencil.



### 1 Plan the investigation.

- a Write down the group's ideas, including any measurements you will make and how you will record them.
- b Think about how to make it a fair test. Think about what conditions of the test must be made the same for each object.
- c Show your plan to your teacher.

**Plan**

**Activity 4: Investigating the changes in shadows throughout a day (continued)** 52 – 53



- 2** Collect the items you need and start the investigation as early in the day as you can.

Make the first measurement and record it in your own table below. Use the table headings listed here:

Time of day	Object	Shadow 1	Shadow 2
-------------	--------	----------	----------



- 3** Repeat the measurements throughout the day for as long as possible.

- a What must you be careful to keep the same? \_\_\_\_\_
- b What two features of the shadows should you be recording? \_\_\_\_\_

\_\_\_\_\_

- 4** When all the measurements are finished, look at the results.



- a Discuss with your group what they tell you about changes in shadows over the day.



- b Complete these sentences:
  - i As the day goes by the length of the shadow \_\_\_\_\_.
  - ii The other change is the \_\_\_\_\_.

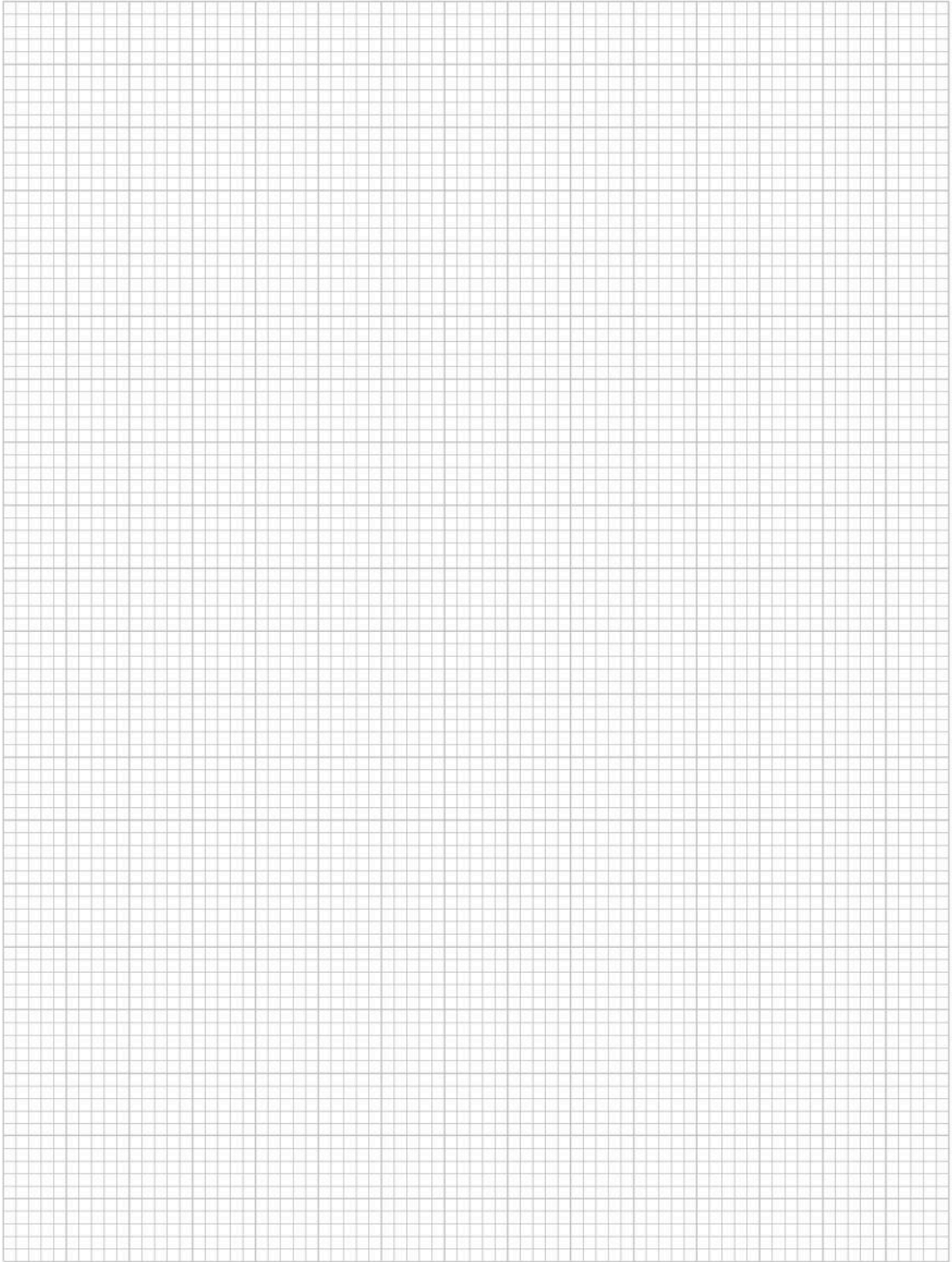


- c Share your answers with the class.



**Activity 4: Investigating the changes in shadows throughout a day (continued)** 53

- 5** Use the length measurements to draw a bar chart in the space below, showing the changes over the time you made your observations.



- 6** Display your chart and the record you made of the directions/positions of the shadows over the day.



## Measuring light intensity

### Activity 5 57

**You will need:** a light meter and a pen or pencil.

**1** Handle the light meter and become familiar with how to use it and to read it.



**2** Complete the table below to record your readings of light intensity in different places. Draw in as many table rows as you need.

**Table of results**

Place	Prediction	Meter readings					Average readings

- a** Write down the places in the first column of the table. Try to choose places where you predict the intensity will be very different.
- b** Write down your predictions of where you expect the intensity to be *highest* and *lowest* in the second column.

**Activity 5 (continued)** 58**3** Take the light readings. Take several in each place.

- a Think about why you need to take several readings in the same place.

*I have taken readings in the same place because* \_\_\_\_\_

\_\_\_\_\_



- b Record the readings in your table.

**4** When you have finished taking the readings, work out the average for each place. Write the averages in your table.

- a Compare your averages with your predictions.

\_\_\_\_\_

\_\_\_\_\_

- b Come to a conclusion about the readings you made.

**Conclusion**

\_\_\_\_\_

\_\_\_\_\_

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

- a Discuss what you have all learned about light intensity readings.
- b Try to make a generalised statement about light intensity and meter readings.

**Statement**

\_\_\_\_\_

\_\_\_\_\_

58 Sort out this jumbled sentence:

**reading greater higher the the the the the the light of on meter intensity**

Share your answer with the class.



# Opaque and transparent materials

## Activity 6: Exploring opaque and transparent materials 59 – 60

**You will need:** some different materials and a pen or pencil.

**1** Plan an investigation with your group, to explore transparent and opaque materials.



**2** Choose a variety of materials for your investigation.

- a Write down the names of the materials you have chosen.

*The materials I have chosen for this investigation are:* \_\_\_\_\_

- b Now write down your predictions about how the materials will behave when you try to pass light through them.

**Material 1**

*I predict that:* \_\_\_\_\_

**Material 2**

*I predict that:* \_\_\_\_\_

**Material 3**

*I predict that:* \_\_\_\_\_

**Material 4**

*I predict that:* \_\_\_\_\_



**Activity 6: Exploring opaque and transparent materials (continued)**  60

- 3** Plan what you will do. Make sure it is a fair test, by doing the same to each material. Show your plan to your teacher.

**Plan**



- 4** Test each material one by one.
- a** Record your results in the table below.
  - b** Identify each material as transparent or opaque (or translucent).
  - c** Write these words in the table and compare the results of your test with your predictions.

**Table of results**

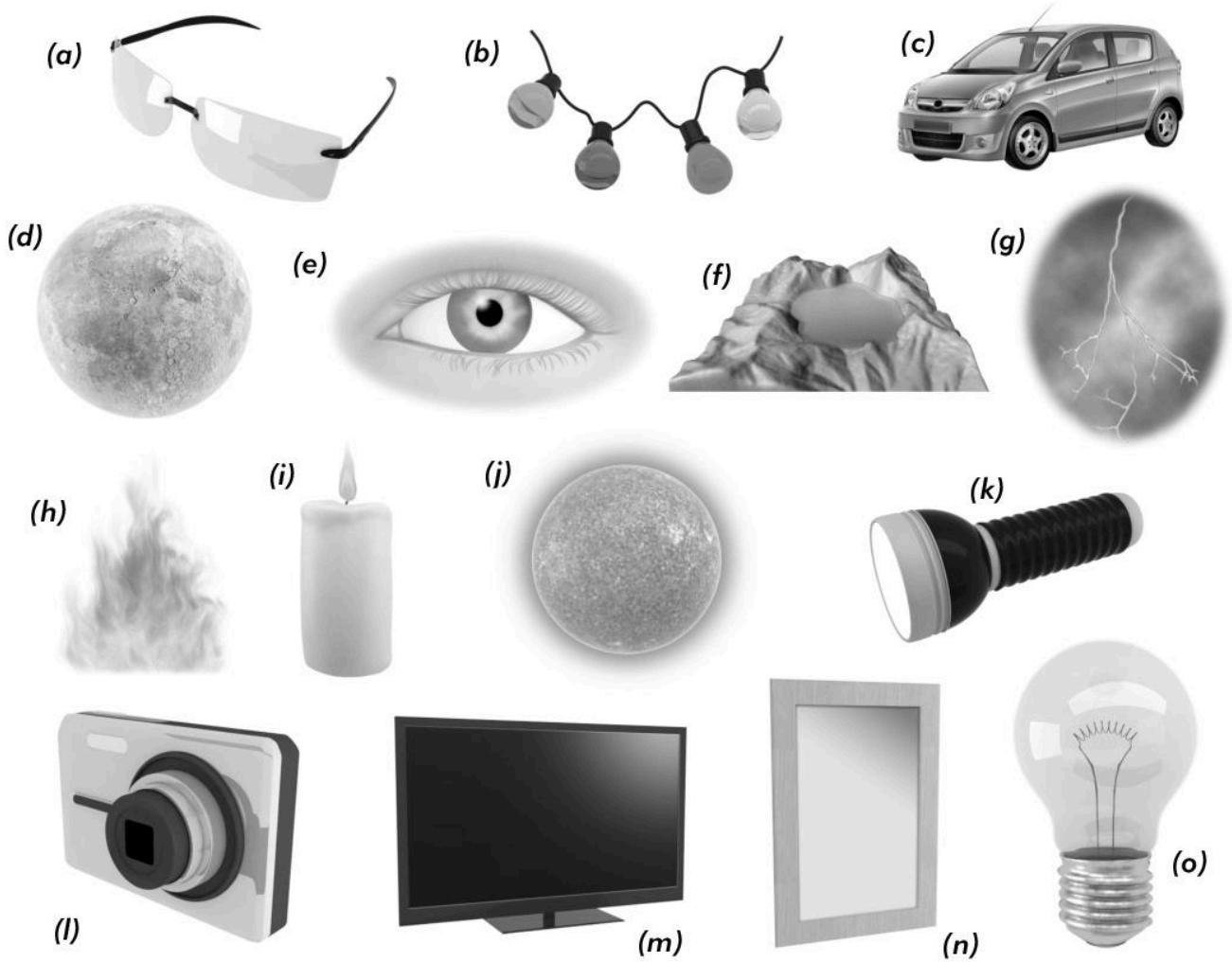
Material	Transparent	Opaque	Translucent

- 5** Share your results with the class.





# Reflection and vision



## Activity 7 63

**You will need:** a pen or pencil.



- 1 Look at the pictures above. Some show sources of light and some show non-sources of light.



**Activity 7 (continued)** 63 – 64**2** Sort them into two groups:

- a The light sources *and* the non-sources of light.

**Group 1: light sources****Group 2: non-sources of light**

- b Write the letters (a–o) in the groups.

**3** Now sort the light sources into two sub-groups:

- a artificial light sources  
b natural light sources.

**Group 1: artificial light sources****Group 2: natural light sources****4** Share your groups with the class.

Luminous objects produce or reflect light.

The moon is a luminous object, but it is not a source of light. It reflects light that comes from the Sun.

### Activity 8: How is light reflected? 65

**You will need:** mirrors, foil, water, a plate or bowl and a pen or pencil.



**1** Discuss the reflection of light with your group.

- a** Try to name three other examples of natural reflection.

Example 1: \_\_\_\_\_

Example 2: \_\_\_\_\_

Example 3: \_\_\_\_\_

- b** Try to name three examples of artificial reflection.

Example 1: \_\_\_\_\_

Example 2: \_\_\_\_\_

Example 3: \_\_\_\_\_



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



**3** Play with the mirrors and explore how they reflect.



**4** Compare a mirror with a smooth sheet of foil.

- a** Can you see images in both of them?  
**b** Record what you observe.

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**5** Crumple the foil and look again. Make a note of what you observe.

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**Activity 8: How is light reflected? (continued)** 

**6** Put some water into a plate or bowl and let it stand still on the desk.

- a Look down into it.
- b Make a note of what you see.

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**7** Gently shake the desk and look down into the water again. Record what you see this time.

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## Direction of light

### Activity 9: Investigating reflected light 67

**You will need:** two shiny objects, a mirror, a torch, a wall and a pen or pencil.

- 1** Use the mirror to create as many different effects as you can.
- 2** Switch on the torch. Using a mirror, can you make the light from your torch beam shine on a wall.
- 3** When you have succeeded, draw a diagram of how you did it. Use arrows to show the direction and path of the light from its source to the mirror, and from the mirror to the wall.



**Diagram title:** \_\_\_\_\_

**Activity 9: Investigating reflected light (continued)** 

- 4** Collect two shiny objects and take them outside into the sunlight.

Shiny object A: \_\_\_\_\_

Shiny object B: \_\_\_\_\_



- 5** Try using the shiny objects to re-direct the sunlight onto a wall or other shaded surface. How did you do it?

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- 6** Back in class, draw a diagram of what you did with the shiny objects.

**Diagram title:** \_\_\_\_\_

**Activity 9: Investigating reflected light (continued)** 



**7** Discuss your results with your group.

- a Try to explain how the light was re-directed by the mirror and the shiny objects.

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- b Compare the three surfaces. What is similar about all of them?

**Comparison**

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**8** Share your results and explanations with the class.



**Activity 10: Investigating reflections** 

**You will need:** a mirror, paper and a pen or pencil.



- 1** Write out the alphabet in capital letters on a sheet of paper. Make each one at least 2 cm tall.



- 2** Hold up the paper in front of the mirror. If the mirror is large enough you will see all the letters at once. If it is small, look at each letter one at a time.

- a** What do you notice about the letters when you look at their images in the mirror?
- b** Write down what you see.

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- c** What do you notice about the images of these letters?

**A H I M O T U V W X Y**

- d** Write down what you see.

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- 3** Try to make a word that looks exactly the same on the paper and in the mirror.

Which word did you choose?

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- 4** Look at yourself in the mirror and touch your left ear with your right hand. What do you see in the mirror?

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**Activity 10: Investigating reflections (continued)** 



**5** Discuss the results of all these investigations with your group.

- a Try to come to a conclusion about how plane mirrors make reflections.

**Conclusion**

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- b Share your words from question 3 and your conclusion with the class.

## Activity E

**You will need:** six different objects from home as listed in step 1 and a pen or pencil.



**1** Collect six different objects at home and sort them into three groups:

- **two transparent objects**
- **two translucent objects**
- **two opaque objects.**



**2** Draw pictures of the objects in the spaces below and write their names under the drawings. Name each group on the lines above them.

**Group 1.** \_\_\_\_\_ **Group 2.** \_\_\_\_\_ **Group 3.** \_\_\_\_\_

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**3** Explain why you put the objects into these groups. Describe what you did to help you to decide. Write your answers below:

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**Activity F**

**You will need: a pen or pencil.**

- 1** A class had collected data over 11 hours one day. They put a stick in the ground out in an open place. Every hour, from 7am to 5pm, they measured the length of the stick's shadow and recorded it.
- 2** They forgot to put the data in a table and it was very mixed up:  
Shadow lengths (cm) : **35, 5, 45, 45, 15, 35, 55, 25, 15, 55, 25**
- 3** Enter these measurements in the correct spaces in the table below:

Time (hour)	7 am	8 am	9 am	10 am	11 am	12 noon	1 pm	2 pm	3 pm	4 pm	5 pm
Shadow length (cm)											

- 4** Plot the data as a line graph in the grid below.



- 5** Answer these questions in the space below:
  - a** Why did the length of the shadow change over the 11 hours?  


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  - b** When was the shadow at its shortest and why?  


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  - c** When was the shadow at its longest and why?  


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# Chapter 4: The Earth and beyond

## Apparent movement of the Sun





Look at the picture and explain the differences you see. Think about the position of the Sun in your explanations.



*A village scene at different times of day*

### Activity 1: Does the Sun move? 70 – 71

**You will need:** a large ball, a torch or lamp and a pen or pencil.

-  **1** Write a mark on a ball to represent your home.
- 2** Make the room dark, or go into the darkest corner of the room.
- 3** Hold the ball at the top and bottom so that you can turn it slowly.
- 4** Get another group member to shine the torch or lamp onto one side of the ball.
-  **5** Slowly spin the ball as the light shines on it from one side. Watch your mark on the ball as it goes into and out of the light.

**Activity 1: Does the Sun move? (continued)**  71



**6** Discuss with your group what you have done and seen.

- a** Try to explain what the ball and the torch represent, as well as the movement of the mark into and out of the light.

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- b** Connect your ideas to the pictures of the village.

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**Activity 1: Does the Sun move? (continued)** **7** Record what this activity shows.

- a Make drawings of what you have done.

- b Write an explanation of what this activity shows.

**Explanation**

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**8** Share your drawings and your explanation with the class.



# The turning Earth

## Activity 2 73

**You will need:** a pen or pencil.



**1** Discuss these questions with your group:

- Does the Sun travel around the Earth?

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- What actually happens?

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- What causes night and day?

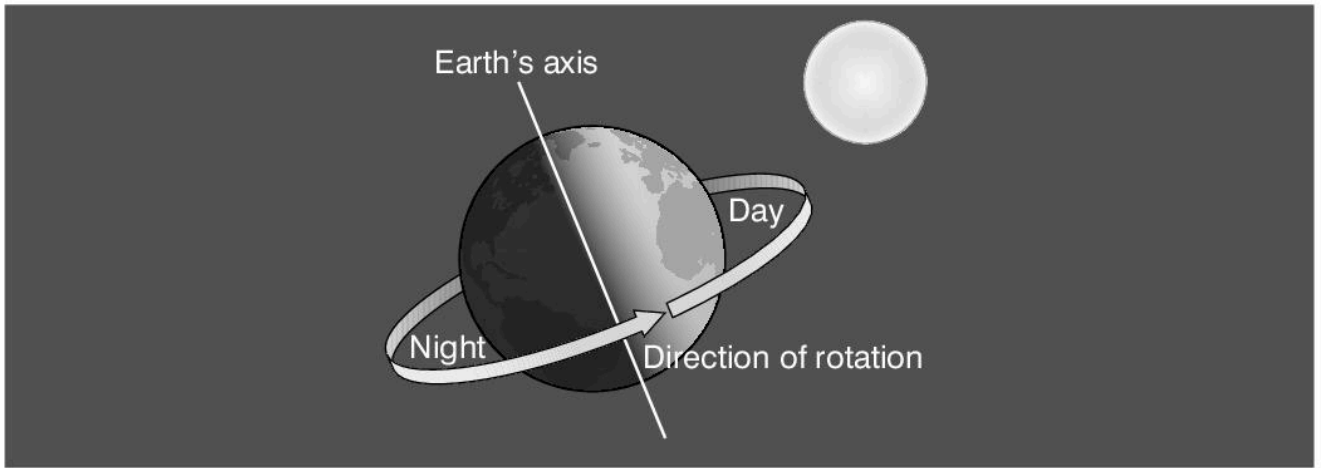
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**2** Share your group's answers with the class.

73 Look at the picture.



Compare with other learners your ideas on what it shows. Change your explanation of what causes night and day if you think you need to.

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**Activity G**

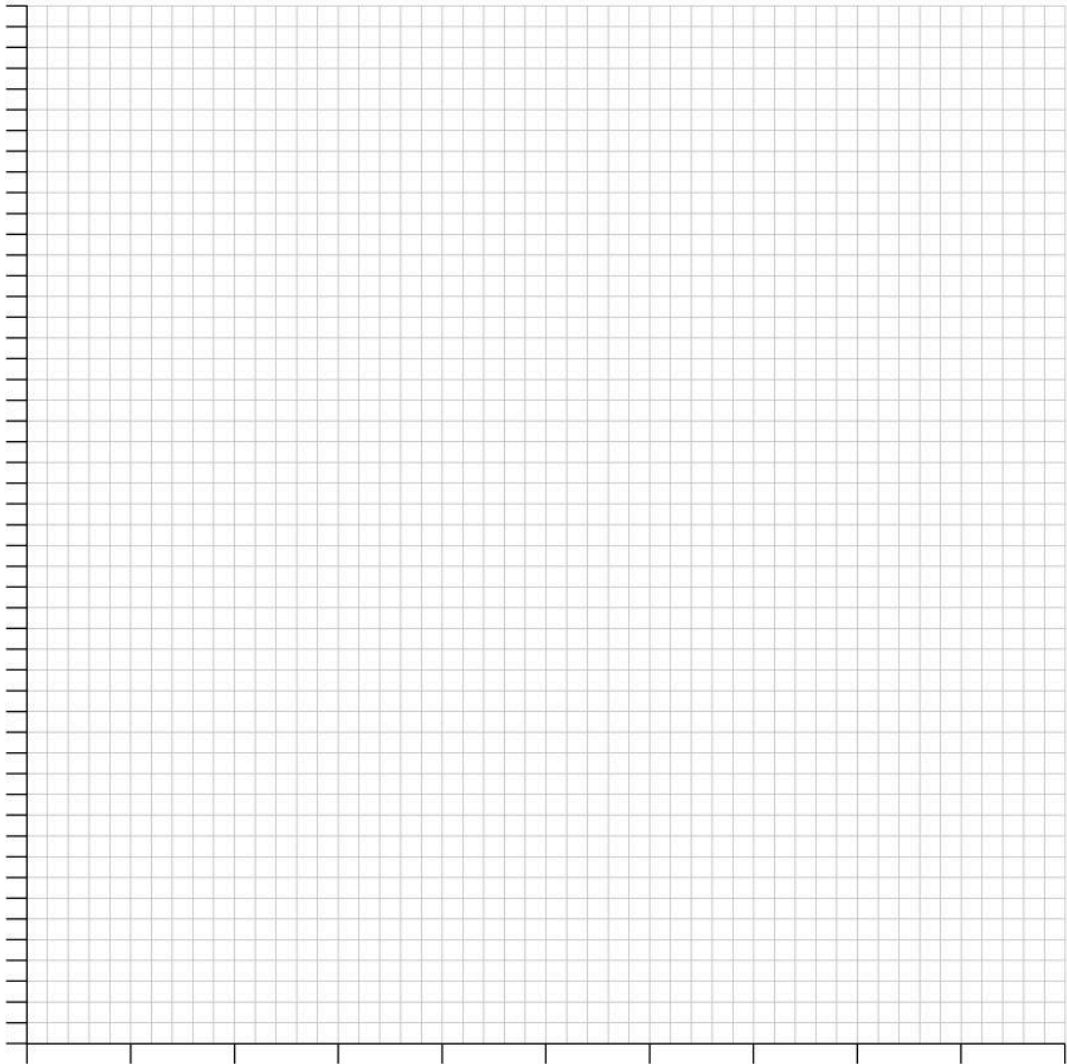
**You will need: a ruler and a pen or pencil.**

**1** Here is a table of data collected by a group of students. It records the altitude (height) of the Sun above the horizon over a period of 10 hours in one day.

Time (Hours)	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700
Altitude (Degrees)*	3	16	24	32	39	42	40	36	28	19	8

\* Angular degrees, as shown on a protractor.

**2** Plot the results in the grid below to produce a line graph showing how the position of the Sun changes over the time. Remember to label the axes of your graph.





## Activity 3 82

**You will need:** reference sources (such as encyclopedias or the Internet) and a pen or pencil.

### 1 Find out more about astronomy.

- a Choose a time or a place that you want to explore. Describe it here:

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- b Carry out research into the work of scientists from that time or place who have investigated the solar system or other parts of the universe.



### 2 Use books, CD-ROMs, your school library database and the Internet to gather information on the lives and the discoveries of the people of your chosen time or place.

List your resources here:

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### 3 Make notes and drawings as you find useful and interesting information. Use extra paper to do this.



### 4 When you have completed your research, produce a display of what you have found.



- a Share your work with others in the class.
- b Be prepared to answer questions about your research findings.

### 5 Look at what others have displayed and ask questions if anything is not clear, or if you want more details.

**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):

northern	angle	Galileo	months	planets	seasons
parts	night	opposite	24	rotation	sunrise
system	axis	Pythagoras	day	orbit	astronomers
sunset	towards	year	positions	southern	Sun
		movement	times	travels	Earth

- The \_\_\_\_\_ of the stars and \_\_\_\_\_ as well as the moon and the \_\_\_\_\_ have been studied for thousands of years by scientists called \_\_\_\_\_.
- Two world-famous such scientists were \_\_\_\_\_ and \_\_\_\_\_.
- Every \_\_\_\_\_ hours we all have \_\_\_\_\_ and \_\_\_\_\_. This is caused by the \_\_\_\_\_ of the \_\_\_\_\_ on its \_\_\_\_\_.
- This rotation also causes \_\_\_\_\_ and \_\_\_\_\_.
- The \_\_\_\_\_ of the Sun across the sky is not real. It is due to the Earth's daily \_\_\_\_\_.
- The Sun is at the centre of the solar \_\_\_\_\_ and each of the planets, including the \_\_\_\_\_, travels around it in a pathway called an \_\_\_\_\_.
- The Earth takes a \_\_\_\_\_ to \_\_\_\_\_ the Sun once. The \_\_\_\_\_ are caused by this movement around the Sun.
- The \_\_\_\_\_ of the Earth is not vertical. It is at an \_\_\_\_\_ to its orbit, so this tips first one part of the Earth \_\_\_\_\_ the Sun, then another part towards it as it \_\_\_\_\_ around the Sun.
- This is why different parts of the Earth have \_\_\_\_\_ and colder \_\_\_\_\_ each year, but at different \_\_\_\_\_.
- Winter in the \_\_\_\_\_ hemisphere is in the months from November to February but in the \_\_\_\_\_ hemisphere it is in the \_\_\_\_\_ months of the year.





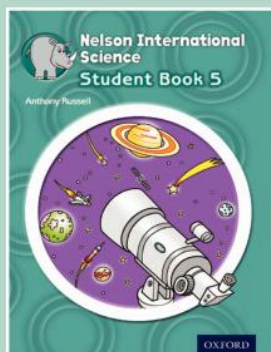
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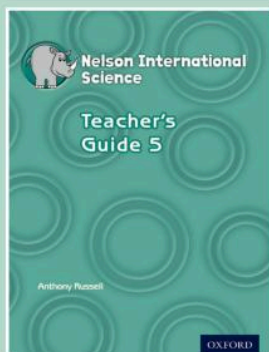
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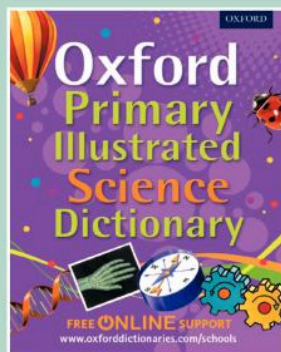
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