Contents

Sample pages

Pearson Science 2nd edition Activity Book

An intuitive, self-paced approach to science education, which ensures every student has opportunities to practise, apply and extend their learning through a range of supportive and challenging activities.

Pearson Science 2nd edition has been updated to fully address all strands of the new Australian Curriculum: Science, which has been adopted throughout the nation. This edition also captures the coverage of Science curricula in states such as Victoria, which have tailored the Australian Curriculum slightly for their students.

The *Pearson Science 2nd edition* features a more explicit coverage of the curriculum. The activities enable flexibility in the approach to teaching and learning. There are opportunities for extension as well as reinforcement of key concepts and knowledge. Students are also guided in self-reflection at the end of each topic.

Explicit scaffolding makes learning objectives clear and includes regular opportunities for reflection and self-evaluation.

In this edition, we provide a structured approach that integrates a seamless, intuitive and research-based learning hence **differentiating** the course for every student.

The Activity Book also provides richer application opportunities to take the Student Book content further with explicit coverage of Inquiry Skills, Science as a Human Endeavour and Science Understanding.

The diverse offering of worksheets allows students to be challenged at their level. Students have the flexibility to be self-paced and this new edition comes with the advantage of each worksheet being self-contained.

Be guided

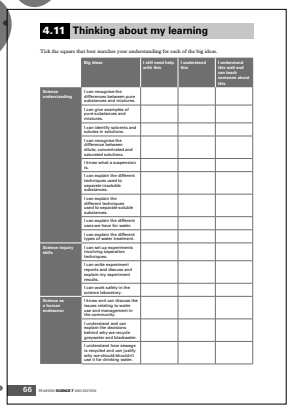
A new handy **Toolkit** at the beginning of the Activity Book has been created to build skills in the key areas of practical investigations, research, thinking, organising, collecting and presenting. Each skill developed in the toolkit is directly relevant to applications in questions, investigations and research activities throughout the student and activity books. A toolkit spread provides guides and checklists alongside models and exemplars.

Be supported

Vocabulary boxes provide definitions for key terms, within the relevant context of the task. **Hints** help students get started on a worksheet and provide support in overcoming a barrier.

Be reflective

The **Thinking about my learning** feature provides the opportunity for self-reflection and self-assessment. It encourages students to look ahead to how they can continue to improve and assists in highlighting focus areas for skill and knowledge development.


4.11 Thinking about my learning

Tick the square that best matches your understanding for each of the big ideas.

Big ideas	I still need help with this	I understand this	I understand this well and can teach someone about this
Science understanding	I can recognise the difference between pure substances and mixtures.			
	I can give examples of pure substances and mixtures.			
	I can identify solvents and solutes in solutions.			
	I can recognise the difference between dilute, concentrated and saturated solutions.			
	I know what a suspension is.			
	I can explain the different techniques used to separate insoluble substances.			
	I can explain the different techniques used to separate soluble substances.			
	I can explain the different uses we have for water.			
	I can explain the different types of water treatment.			
Science inquiry skills	I can set up experiments using separation techniques.			
	I can write experiment reports and discuss and explain my experiment results.			
	I can work safely in the science laboratory.			
Science as a human endeavour	I know and can discuss the importance of water use and management in the community.			
	I understand and can explain the principles behind why we recycle greywater and blackwater.			
	I understand how sewage is treated so that it can be recycled and safely used for drinking water.			

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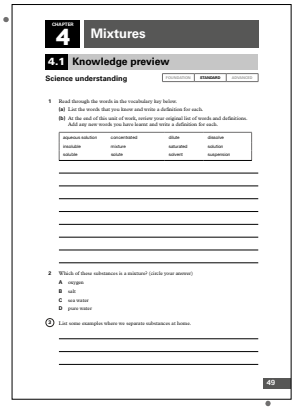
Be ready

A **knowledge preview** at the beginning of every chapter activates prior knowledge relevant to the topic, providing an opportunity for students to show what they currently know. This handy tool supports teachers in assessing students' prior knowledge.


CHAPTER 4 Mixtures

4.1 Knowledge preview

Science understanding

FOUNDATION | STANDARD | ADVANCED

1 Read through the words in the vocabulary list below.
(a) List the words that you know and write a definition for each.
(b) At the end of this unit of work, review your original list of words and definitions. Add any new words you have learnt and write a definition for each.

aqueous solution	concentrated	dilute	dissolve
insoluble	mixture	saturated	solubilise
soluble	solute	solvent	suspension

2 Which of these substances is a mixture? (circle your answer)
A oxygen
B salt
C sea water
D pure water

3 List some examples where we separate substances at home.

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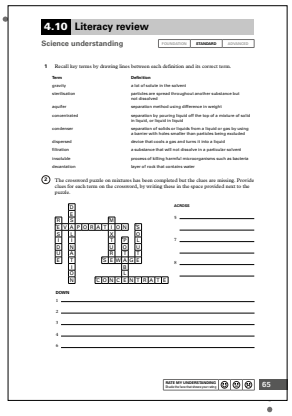
Be literate

Newly improved **literacy reviews**, in consultation with our Literacy Consultant Dr Trish Weekes, provide a deeper and broader range of language building tasks. Every chapter concludes with a literacy review which focuses on building a deeper understanding of key terms supporting students to correctly apply key terms from the topic.


4.10 Literacy review

Science understanding

FOUNDATION | STANDARD | ADVANCED

1 Recall key terms by drawing lines between each definition and its correct term.

Term	Definition
gravity	a list of solute in the solvent
sterilisation	particles are spread throughout another substance but not dissolved
aquifer	separation method using difference in weight
concentrated	separation by pouring liquid off the top of a mixture of solid in liquid, or liquid in liquid
condenser	separation of solid particles from a liquid or gas by using a piece of filter paper so that the particles being excluded
dispersed	device that cools a gas and turns it into a liquid
filtration	a substance that will not dissolve in a particular solvent
insoluble	process of killing harmful microorganisms such as bacteria
desalination	layer of rock that contains water

2 The crossword puzzle on mixtures has been completed but the clues are missing. Provide clues for each term on the crossword, by writing these in the space provided next to the puzzle.

ACROSS
5
7
9

DOWN
1
2
3
4
6

65

Be set

Visit **www.pearsonplaces.com.au** for digital assets and interactive resources:

- Interactive activities and lessons
- Untamed Science videos
- Weblinks
- Student investigation templates and teacher support
- Answers for Activity Book and Student Book questions and tests
- SPARKlabs
- Risk assessments
- Teaching programs and curriculum mapping audits

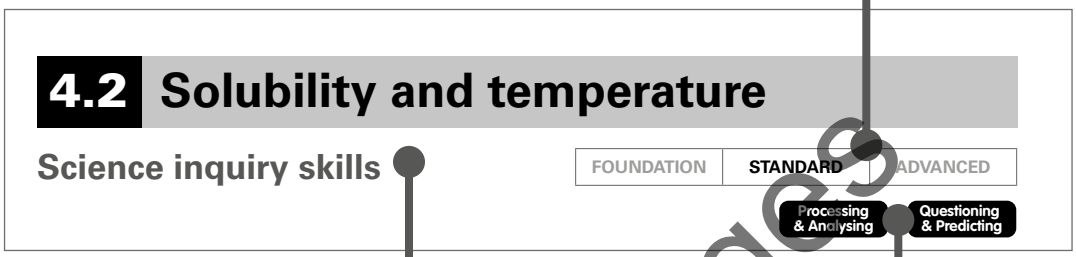
Sample pages

Worksheets

Each worksheet is classified according to the degree with which it deals with curriculum understandings.

- **Foundation** indicates the focus is on the basics like terminology.
- **Standard** indicates a focus on the core ideas, understandings and skills.
- **Advanced** indicates transfer and extension of core science understanding and skills to new or more sophisticated situations.

Teachers may use this tool to **differentiate** the worksheets allocated to students. They may select worksheets for students based on whether basic, core or extension exercises are required. The categories do not indicate the degree of difficulty of tasks on the worksheet. A worksheet labelled advanced may have tasks ranging from lower level through to higher-level thinking.



The main science **strand** is identified for each worksheet: Science Inquiry Skills, Science Understanding, Science as a Human Endeavour.

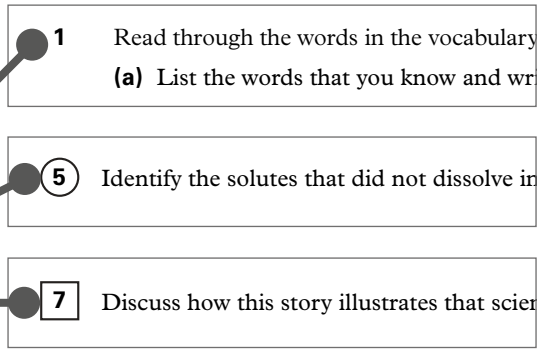
Science Inquiry Skills relevant to the worksheet are identified: Questioning and Predicting, Planning and Conducting, Processing and Analysing, Evaluating, Communicating.

Each question in a worksheet is identified according to the degree of difficulty. Bloom's taxonomy is used as the basis for question classification. The classification is intentionally subtle and unobtrusive. This tool may be used to differentiate between students, matching questions to their levels of ability.

Questions with a straight number indicate a remembering or understanding lower-order question.

Questions with a circle around the question number indicate an analysing or applying middle-order question.

Questions with a square around the question number indicate a creating or evaluating higher-order question.



An innovative tool for students to quickly and easily reflect on their understanding of each worksheet. The teacher may use the student responses as a formative assessment tool. At a glance, teachers may assess which topics and which students need intervention for improvement.

Sample pages

CHAPTER 2

Properties of substances

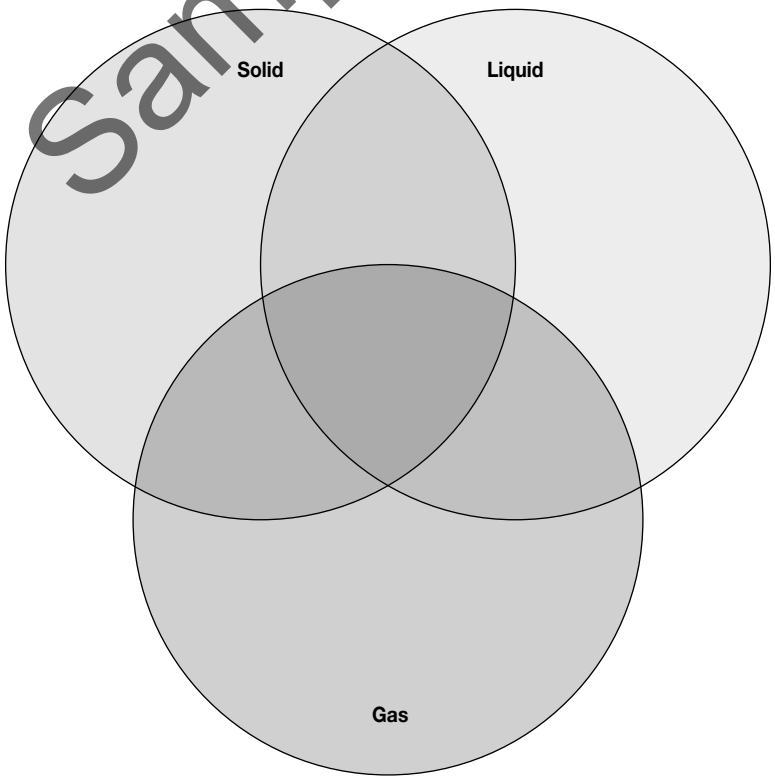
2.1 Knowledge preview

Science understanding

FOUNDATION | STANDARD | ADVANCED

1 Look at the pictures of substances in Figure 2.1.1 below. Use the Venn diagram to decide in which category each picture belongs. Write the name of the substance in the appropriate space.

Figure 2.1.1



Sample pages

2 Which substances were easy to classify as solid, liquid or gas in the Venn diagram?

_____

3 Which were the most difficult to classify? Why?

_____

_____

_____

4 Add 3 more of your own examples to each circle in the Venn diagram.

5 **(a)** What could be a possible name for a group of substances that fit into more than one of these circles?

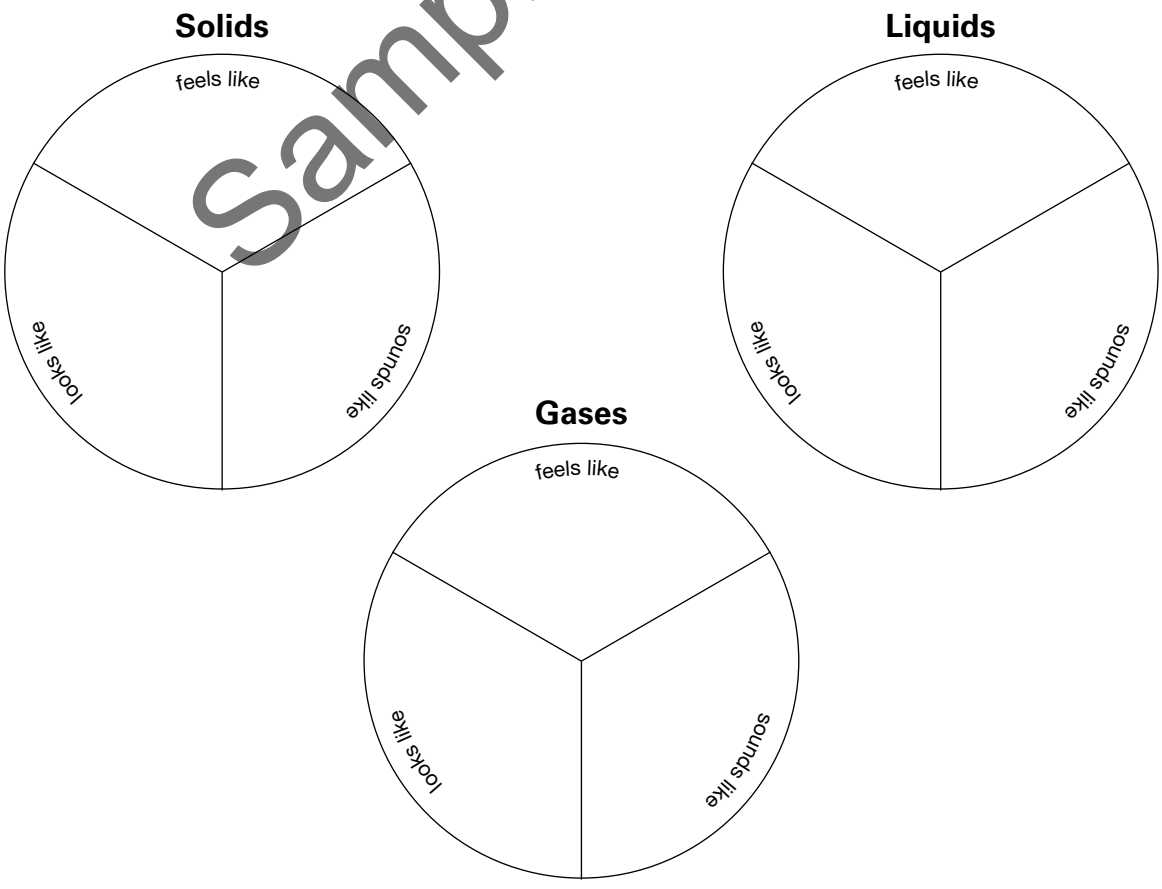
_____

(b) What are the characteristics of these substances?

_____

_____

6 Write a descriptive word in each section of the Y-charts below to describe what solids, liquids and gases LOOK LIKE, SOUND LIKE, FEEL LIKE.



Sample pages

2.1 Knowledge preview

7 Look at the key word list below. Make a list of the words you know and write a definition or description, or give an example of what it is.

boiling	chemical properties	compressed	condensation
density	evaporation	freezing	mass
melting	particle model	physical properties	sublimation
states of matter	steam	volume	

Sample pages

2.2 Biodegradability

Science inquiry skills

FOUNDATION | STANDARD | ADVANCED

Processing & Analysing

1 Define the term biodegradable.

2 List signs that indicate a substance is biodegradable.

3 Classify whether the following substances and objects are biodegradable or not by placing a tick in the correct column.

Substance or object	Biodegradable	Non-biodegradable	Substance or object	Biodegradable	Non-biodegradable
autumn leaves			fruit salad		
pebbles			glass bottle		
polystyrene cup			woollen jumper		
plastic fork			wooden log		
dead rat			lamb chop		

4 Look carefully at John's lunch box and its contents (Figure 2.2.1).

(a) Use a green marker to highlight all of the substances in John's lunch box that are biodegradable.

(b) Use a yellow marker to highlight all of the substances that are non-biodegradable.

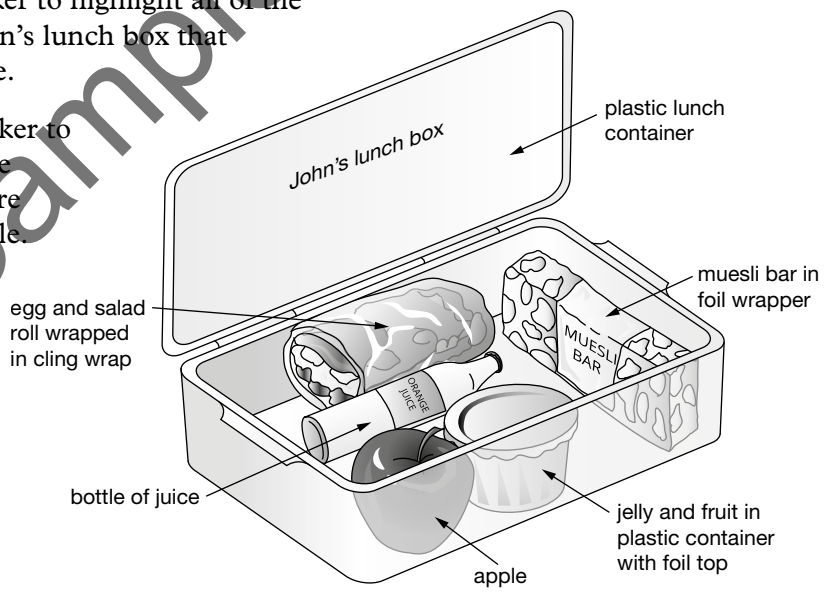


Figure 2.2.1

5 Explain why we should all recycle non-biodegradable substances.

Sample pages

2.3 The particle model

Science inquiry skills

FOUNDATION | STANDARD | ADVANCED

Processing & Analysing

Four balloons were blown up to different sizes in different rooms of a house. The temperature of each room was different. The balloons are shown in Figure 2.3.1.

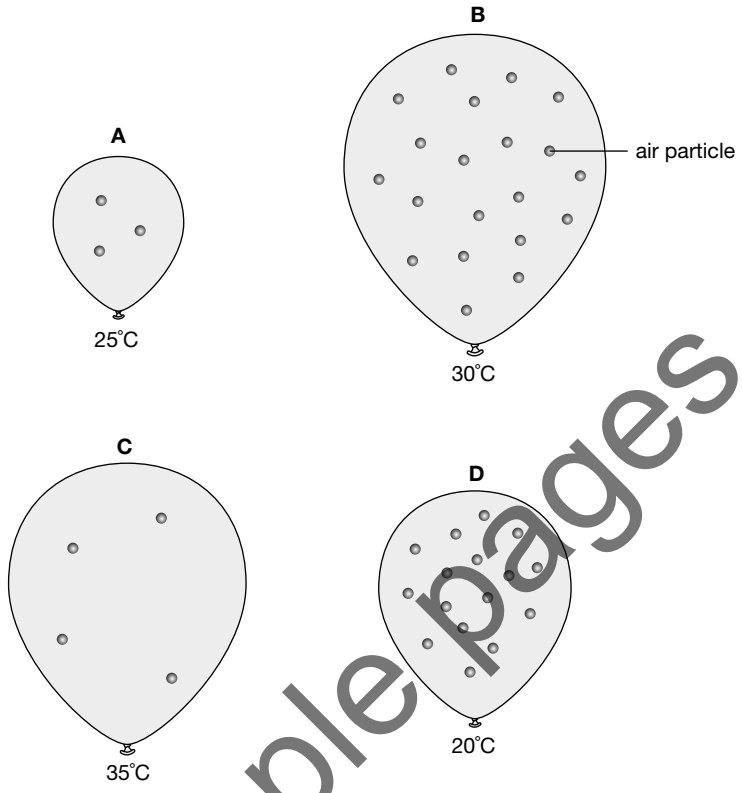


Figure 2.3.1

Sample pages

1 Identify the balloon (A, B, C or D):

(a) in which the air particles would be moving the fastest _____

(b) in which the air particles would be moving the slowest _____

(c) in which the air particles are furthest apart _____

(d) in which the air particles are closest to each other _____

(e) that would be the heaviest _____

(f) that would be the lightest _____

(g) that has the most space/greatest volume _____

(h) that has the least space/smallest volume _____

(i) with the densest air _____

(j) with the least dense air _____

RATE MY UNDERSTANDING
Shade the face that shows your rating ☺ 😐 ☹

2.4 Changes of state

Science understanding

FOUNDATION | **STANDARD** | ADVANCED

The three main states of matter—solid, liquid and gas are shown in Figure 2.4.1.

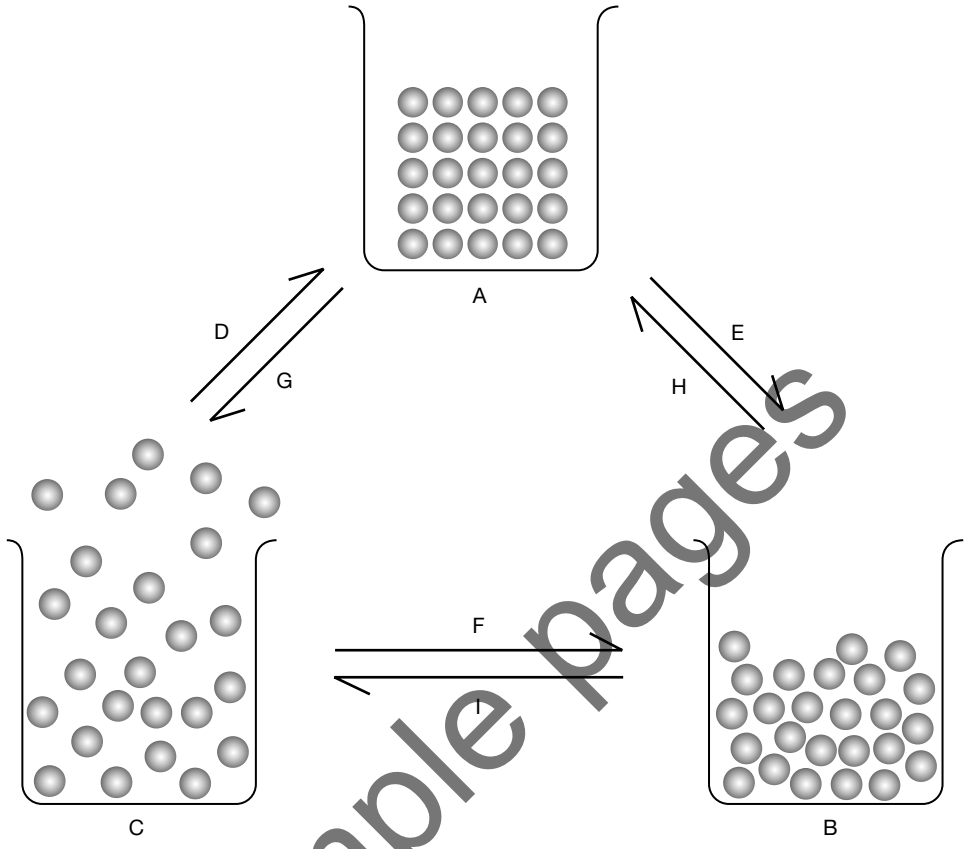


Figure 2.4.1

Sample pages

1 Identify which diagram (A, B or C) best represents a:

(a) solid _____ **(b)** liquid _____ **(c)** gas _____

2 Identify which arrows (D, E, F, G, H or I) represent the following changes of state:

(a) melting _____ **(d)** condensation _____

(b) freezing _____ **(e)** sublimation _____

(c) evaporation _____ **(f)** deposition _____

3 Explain why the melting point of a substance is the same as its freezing point.

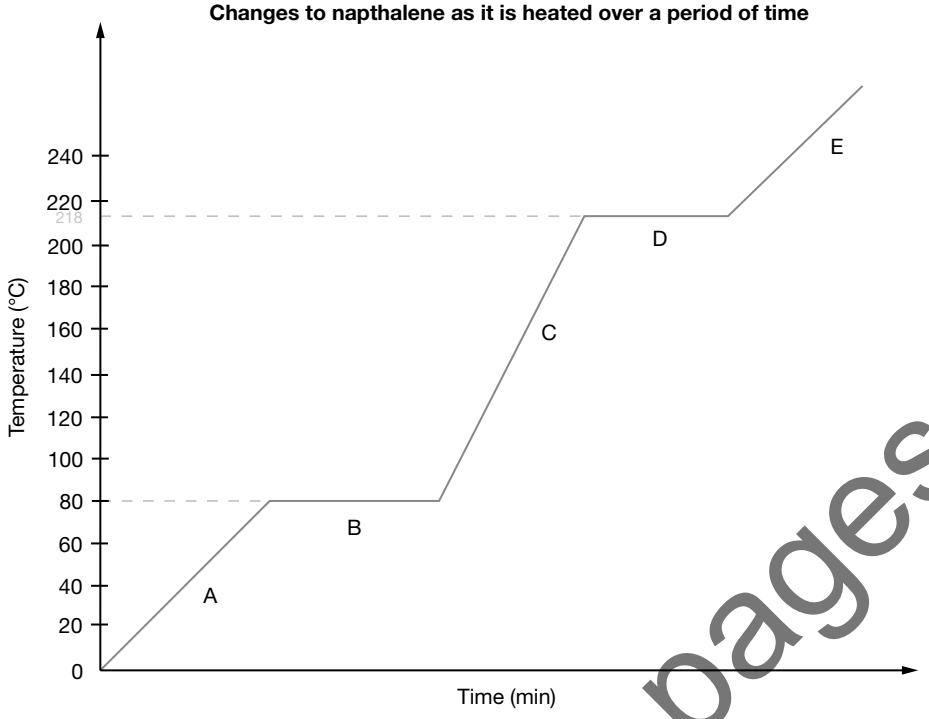
_____

_____

2.4 Changes of state

Naphthalene is a smelly chemical commonly used in mothballs. Some flakes of naphthalene were heated up until they melted then boiled. The graph below shows the important stages in this heating.

mothballs *(n)* small balls of chemicals, usually naphthalene, used to protect clothing from moths



4 Identify which section of the graph (A, B, C, D or E) best represents when naphthalene was:

(a) all gas _____

(b) in both gaseous and liquid states _____

(c) all liquid _____

(d) in both liquid and solid states _____

(e) all solid _____

5 Use the graph to predict the melting point of naphthalene. Which of the following options is correct?

A 0°C **C** 100°C

B 80°C **D** 218°C _____

6 Use the graph to predict the boiling point of naphthalene. Which of the following options is correct?

A 0°C **C** 100°C

B 80°C **D** 218°C _____

Sample pages

RATE MY UNDERSTANDING
Shade the face that shows your rating ☺ 😐 ☹

2.5 Cooling curve

Science understanding

FOUNDATION | **STANDARD** | ADVANCED

Salty water was being heated on a hotplate. When it boiled it was then removed from the hotplate and placed in a freezer to cool. Its temperature was measured every minute. The measurements taken are shown in Table 2.5.1 below.

Table 2.5.1

Time (minutes)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Temperature (°C)	104	103	102	91	82	70	59	51	40	28	20	11	2	–1	–4	–4	–4

(1) **(a)** Construct a graph by plotting these values on the grid provided.

(b) Write a title for the graph.

(2) Read each statement and indicate whether it is true or false by circling the correct answer.

(a) After 2 minutes in the freezer, the salty water had a temperature of 104°C. True / False

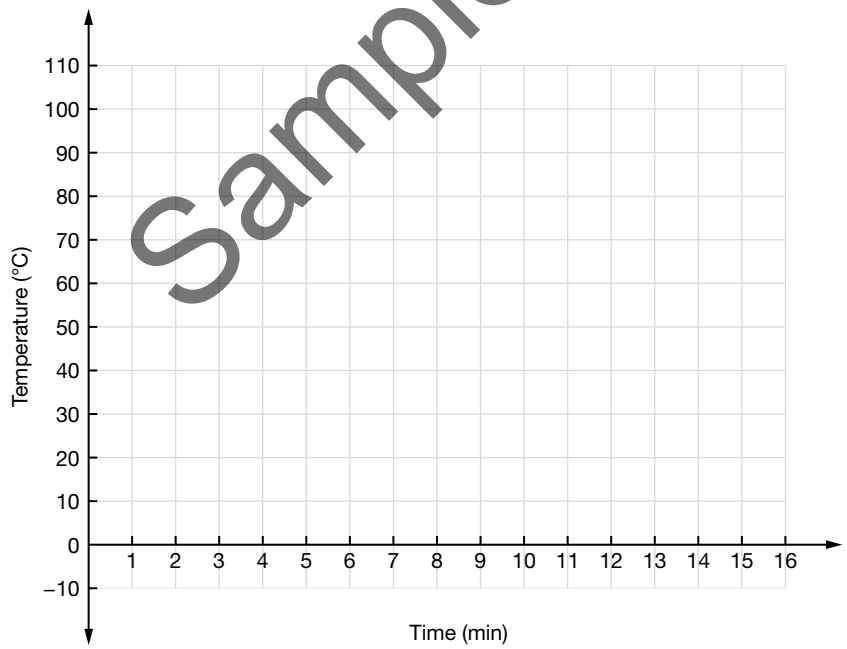
(b) The temperature reached 40°C after 8 minutes. True / False

(c) The temperature dropped by 12°C between the 8th and 9th minute. True / False

(d) Every minute the temperature dropped by 12°C. True / False

(e) The data was collected over 15 minutes. True / False

(f) Over the time data was collected, the temperature dropped by 108°C in total. True / False



(3) Use your graph to estimate:

(a) the boiling point of salty water _____

(b) the freezing point of salty water. _____

Sample pages

2.6 Incomplete experiment report

Science understanding

FOUNDATION | **STANDARD** | ADVANCED

A cooling curve experiment was conducted to obtain the data shown in Worksheet 2.5, page 23. A complete investigation report was not provided.

Use the information in Worksheet 2.5 and the practical investigation report checklist in Figure 2.6.1 below to complete the following tasks.

controlled variable *(n)* factor that stays the same

dependent variable *(n)* what is being measure or tested

independent variable *(n)* what is being changed and how it is being changed to test the dependent variable

Practical investigation report checklist

Title

- □ what was investigated

Purpose

- □ the purpose describes what you wanted to show, prove or find out in an investigation
- □ can be a statement or a question
- □ one or two sentences
- □ often written as 'To investigate the effect of ... on ...'

Hypothesis

- □ a hypothesis is a prediction about the result of your investigation
- □ a short statement
- □ describes the different things you tested (these are called dependent and independent variables)
- □ not always included in a scientific report

Materials

- □ a list of all the important equipment, chemicals and materials that you used
- □ includes quantities of substances and sizes of equipment

Procedure

- □ the procedure or method is a detailed list of what you did in the experiment, in the exact order you did it
- □ written in short, numbered steps
- □ includes the quantities you used (e.g. 5 g, 2 spatula loads, 10 mL)
- □ can include diagrams of the experiment (2D scientific diagrams)

Results

- □ results are a record of all the observations and measurements you took during the investigation
- □ observations can be written and can include diagrams, photos and videos
- □ written observations are best presented in a table
- □ include any graphs or calculations

Review

- □ an analysis of your observations and measurements
- □ analyse any table, spreadsheet or graph you produced
- □ compare your findings with other groups or with information found from textbooks or the internet
- □ evaluate how you could make your investigation better
- □ construct a short conclusion that summarises what you found out in the experiment
- □ use your conclusion to evaluate how accurate your hypothesis was

Sample pages

Figure 2.6.1

1. On the checklist, tick all the parts of a report that are covered in Worksheet 2.5.

2. What do you think the aim of the experiment was?

_____

_____

3. Name the dependent variable.

_____

_____

2.6 Incomplete experiment report

4 Determine whether the data collected is qualitative or quantitative.

_____

> **qualitative data** *(n)* data collected as descriptions, e.g. hot
> **quantitative data** *(n)* data collected as numbers, e.g. 35°C

5 List the ways data is presented.

_____

_____

6 A materials list is not included in Worksheet 2.5. Write the materials list exactly as it would appear on a practical investigation report.

_____

_____

_____

_____

_____

7 Worksheet 2.5 does not include a description of the method used for the experiment, as it should appear on a practical investigation report. Write the method section of the practical investigation.

_____

_____

_____

_____

_____

8 This experiment was only carried out once. What could be done to ensure the results are fair?

_____

_____

Sample pages

2.7 Archimedes

Science as a human endeavour

FOUNDATION | STANDARD | **ADVANCED**

density *(n)* the mass of material that is packed into an object

mass *(n)* the amount of material in an object

prism *(n)* a solid object such as a cube or cylinder

volume *(n)* the amount of space that an object occupies

Archimedes lived from about 287 to 212 BCE. He was born in Syracuse, on the island of Sicily. Although it is now a part of Italy, Syracuse was then a colony of ancient Greece. Little is known about Archimedes' life and most of what we do know comes from stories written by Roman historians long after his death.

Archimedes and density

According to a Roman story, illustrated in Figure 2.7.1, Archimedes worked out how to calculate the density of an irregular object. Density is the mass of an object divided by its volume. Hiero II, the king of Syracuse, suspected that his goldsmith had cheated him by substituting cheaper silver for gold in a wreath the king had ordered to be made.

Figure 2.7.1 Archimedes found a non-destructive way of finding the volume of an object.

Archimedes was asked to work out whether the wreath was pure gold or not. He knew that if the wreath contained silver, then its density would be less than that of gold. In order to work out the wreath's density he needed to measure both the mass and volume of the wreath. Mass could be easily measured using scales, but he wondered how he could measure the volume of such an irregularly shaped wreath. One way was to melt down the wreath, make it into a regular box-shaped prism, and then calculate its volume. However, this would have destroyed the wreath. Archimedes needed to find a non-destructive way of testing the wreath.

While pondering this question, Archimedes supposedly took a bath. On lowering himself in, he noticed that the water level rose. He instantly realised that the water rose by the same volume as his body. He realised he could use the same method to measure the volume of the wreath! Excited by his discovery, Archimedes allegedly ran naked into the streets shouting 'Eureka, eureka!'

Sample pages

1 Propose reasons why the wreath could not be melted down.

_____

_____

2 Propose what a destructive test of the wreath would be.

_____

_____

3 Destructive tests would never be carried out in the following situations. For each situation, propose a reason why.

(a) Testing the strength of the Sydney Harbour Bridge.

(b) Testing the amount of chemical pollutants that would kill people.

(c) Testing the force in a punch that would cause brain injury.

4 Assume that Archimedes' experiment had the following results:

- the wreath's mass was 80 g
- the volume of displaced water was 5 cm^3

Calculate the density of the wreath.

5 Do you think that Archimedes' experiment provided him with all the information he needed to prove whether the wreath was made of pure gold or not? Justify your answer.

6 Explain what further test/tests need to be done to find whether the wreath is or is not made of pure gold.

Sample pages

2.8 Density calculations

Science understanding

FOUNDATION | **STANDARD** | ADVANCED

If an object has a regular shape like a cube or a box, then you don't need to use a measuring cylinder to find its volume. You can use maths instead. The volume of a box can be calculated using the formula:

Volume = length × width × height

$V = lwh$

1 **(a)** Use the formula $V = lwh$ to calculate the volume of the rectangular prisms shown in Figure 2.8.1.

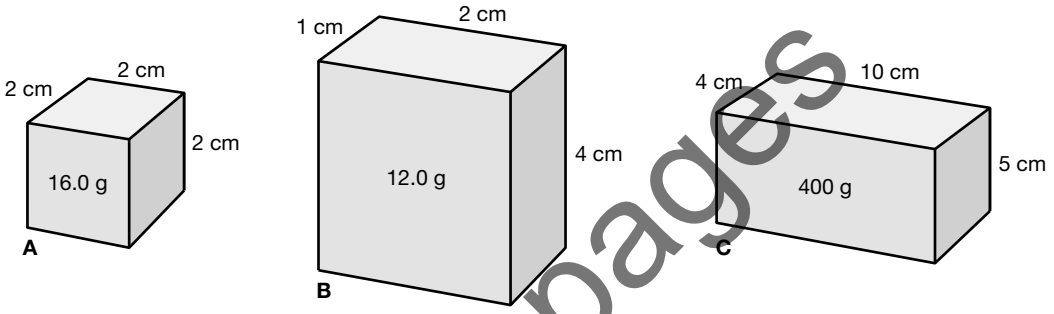


Figure 2.8.1

Prism A: $V =$ _____ cm³

Prism B: $V =$ _____ cm³

Prism C: $V =$ _____ cm³

(b) Use the masses given for each of the prisms to calculate their densities.

Prism A: $d = \frac{m}{V} =$ _____ / _____ = _____ g/cm³

Prism B: $d = \frac{m}{V} =$ _____ / _____ = _____ g/cm³

Prism C: $d = \frac{m}{V} =$ _____ / _____ = _____ g/cm³

Sample pages

2 **(a)** Calculate the volume of the irregular object shown in Figure 2.8.2 that has been put inside a measuring cylinder containing some water.

V = _____ mL = _____ cm³

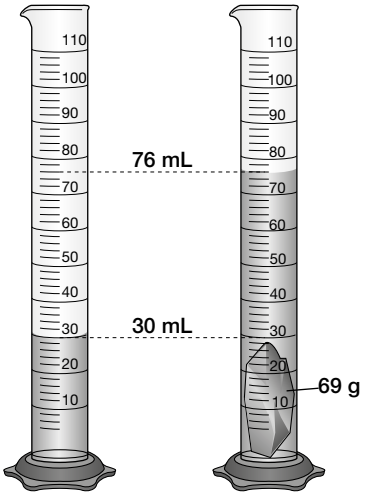


Figure 2.8.2

(b) Use the mass given for the irregular object in part (a) to calculate its density.

Irregular shape: $d = \frac{m}{V}$ = _____ / _____ = _____ g/cm³

3 The mass of an unknown liquid was determined by the method shown.

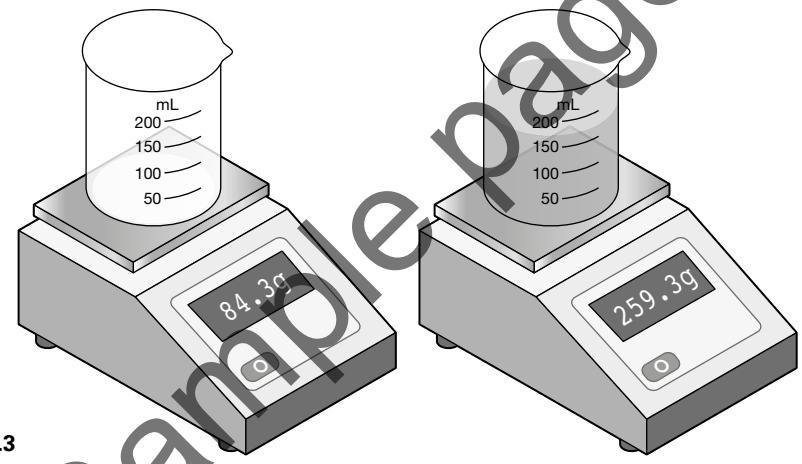


Figure 2.8.3

(a) Use the information in Figure 2.8.3 to calculate the density of the liquid.

_____

(b) From its density, propose what the unknown liquid is most likely to be.

_____

4 Prism A in question 1 was dropped into the measuring cylinder in Figure 2.8.4. Modify the second measuring cylinder by marking the level the water should rise to.

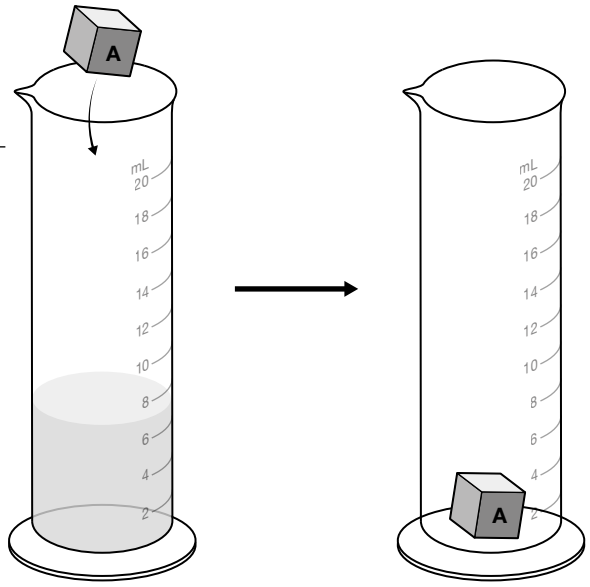


Figure 2.8.4

Sample pages

2.9 Literacy review

Science understanding

FOUNDATION | **STANDARD** | ADVANCED

1 Look at the list of properties in the box below.

50 millilitres of water in a glass	mixing sand in water	burning a timber log
iceberg in Antarctica	rusting iron fence	dynamite explosion

(a) Identify the physical properties and highlight them in yellow.

(b) Identify the chemical properties and highlight them in green.

(c) Explain the difference between physical and chemical properties.

2 Think about solids, liquids and gases by referring to water particles. Use the spaces below to:

(a) describe/draw what water particles look like in solid (ice), liquid (water) and gas (water vapour) states

(b) describe what happens if the temperature changes, as prompted on the table.

Solid (ice)	Liquid (water)	Gas (water vapour)
Description/drawing of particles	Description/drawing of particles	Description/drawing of particles
If temperature increases	If temperature increases If temperature decreases	If temperature decreases

HINT
Boiling point: at 100°C water turns into vapour

Sample pages

RATE MY UNDERSTANDING
Shade the face that shows your rating

2.10 Thinking about my learning

Tick the square that best matches your understanding for each of the big ideas.

	Big ideas	I still need help with this	I understand this	I understand this well and can teach someone about this
Science understanding	I can draw a model to represent a solid, liquid and a gas.			
	I can give examples of solids, liquids and gases.			
	I understand why we use the particle model to represent solids, liquids and gases.			
	I can explain how the particles in solids, liquids and gases react when there is a change in temperature.			
	I know what physical and chemical properties are and can give examples of each.			
	I can use chemical and physical properties to describe solids, liquids and gases.			
	I can use the correct words to describe the processes of how solids, liquids and gases change from one state to another.			
	I can explain the difference between mass, volume and density.			
	I can give examples of substances that are more dense and less dense than water.			
Science inquiry skills	I can follow a method and set up experiments involving solids, liquids and gases.			
	I can write experiment reports and discuss and explain my experiment results.			
	I can identify problems with experiment methods and results and suggest improvements that could be made.			
	I can work safely in the science laboratory.			
Science as a human endeavour	I know and can discuss the issues relating to biodegradable and non-biodegradable substances and the impact they have on the environment.			
	I can explain how our knowledge of particles and the particle model has developed over time.			

Sample pages