

Table of Contents

How to use this book	vi
Using Bloom's Taxonomy	xv
The literacies of science	xviii
Differentiation in the science classroom	xix
Integrating STEM inquiries	xxii
Using an inquiry approach	xxv
Using ICT in science	xxviii
Australian curriculum mapping	xxx

1 Working scientifically ■ ■ ■	1
1.1 Science and the laboratory	2
Working with Science	4
Science as a Human Endeavour	9
Review questions	10
Practical investigations	11
1.2 Practical investigations	14
Science as a Human Endeavour	18
Review questions	19
Practical investigations	21
1.3 Communicating	23
Working with Science	26
Review questions	27
Practical investigations	29
1.4 Planning your own investigation	31
Science as a Human Endeavour	34
Review questions	35
Practical investigations	36
Chapter Review	37
Research questions	38
Thinking scientifically questions	39
Glossary	40
2 Properties of substances ■ ■ ■	41
2.1 Physical and chemical properties	42
Working with Science	45
Science as a Human Endeavour	46
Review questions	48
Practical investigations	49
2.2 Solids, liquids and gases	52
Science as a Human Endeavour	56
Review questions	58
Practical investigations	59
2.3 Changing state	61
Review questions	65
Practical investigations	66
2.4 Density	70
Science as a Human Endeavour	74
Review questions	76
Practical investigations	77
Chapter Review	81
Research questions	82
Thinking scientifically questions	83
Glossary	84

3 Earth resources ■ ■ ■	85
3.1 Renewable and non-renewable resources	86
Science as a Human Endeavour	94
Review questions	96
Practical investigations	97
3.2 Energy resources	100
Working with Science	106
Science as a Human Endeavour	107
Review questions	109
Practical investigations	110
3.3 The water cycle	112
Review questions	118
Practical investigations	120
3.4 Water management	123
Science as a Human Endeavour	128
Review questions	130
Practical investigations	131
Chapter Review	133
Research questions	135
Thinking scientifically questions	137
Glossary	138
4 Mixtures ■ ■ ■	139
4.1 Types of mixtures	140
Working with Science	143
Review questions	144
Practical investigations	146
4.2 Separating insoluble substances	149
Science as a Human Endeavour	154
Review questions	155
Practical investigations	156
4.3 Separating soluble substances	159
Review questions	163
Practical investigations	164
4.4 Purifying water	166
Science as a Human Endeavour	172
Review questions	174
Practical investigations	175
Chapter Review	177
Research questions	178
Thinking scientifically questions	179
Glossary	182

5 Habitats and interactions ■ ■ ■	183
5.1 Living places	184
Science as a Human Endeavour	189
Review questions	190
Practical investigations	192
5.2 Food chains and food webs	194
Review questions	198
Practical investigations	200
5.3 Impacts on ecosystems	201
Science as a Human Endeavour	206
Review questions	208
Practical investigations	209
5.4 Effects of industry	210
Working with Science	214
Science as a Human Endeavour	215
Review questions	216
Practical investigations	217
Chapter Review	220
Research questions	222
Thinking scientifically questions	223
Glossary	225
6 Classification ■ ■ ■	227
6.1 Using classification	228
Review questions	234
Practical investigations	236
6.2 Animal kingdom	237
Working with Science	244
Science as a Human Endeavour	245
Review questions	247
Practical investigations	249
6.3 Other kingdoms	250
Review questions	257
Practical investigations	259
6.4 Classification systems	262
Review questions	269
Practical investigations	271
Chapter Review	273
Research questions	275
Thinking scientifically questions	276
Glossary	277

Key	
■ ■ ■	Science Inquiry Skills
■ ■ ■	Biological sciences
■ ■ ■	Chemical sciences
■ ■ ■	Physical sciences
■ ■ ■	Earth and space sciences

7 Forces ■ ■ ■	279
7.1 What are forces?	280
Science as a Human Endeavour	284
Review questions	286
Practical investigations	288
7.2 Friction — a contact force	292
Review questions	296
Practical investigations	298
7.3 Gravity — a non-contact force	301
Science as a Human Endeavour	305
Review questions	306
Practical investigations	308
7.4 Magnetic and electric fields	311
Review questions	317
Practical investigations	319
7.5 Simple machines	323
Working with Science	328
Review questions	329
Practical investigations	331
Chapter Review	336
Research questions	338
Thinking scientifically questions	339
Glossary	341
8 Earth in space ■ ■ ■	343
8.1 The night sky	344
Review questions	349
Practical investigations	350
8.2 Discovering the solar system	352
Science as a Human Endeavour	357
Review questions	359
Practical investigations	360
8.3 Gravity and orbits	363
Review questions	369
Practical investigations	370
8.4 Earth	373
Working with Science	376
Science as a Human Endeavour	377
Review questions	379
Practical investigations	380
Chapter Review	383
Research questions	385
Thinking scientifically questions	386
Glossary	387
Appendix	388

Activity Book	
Toolkit	399
Answers to activity book worksheets	404
Acknowledgements	471
Index	473

How to use this book • TEACHER COMPANION

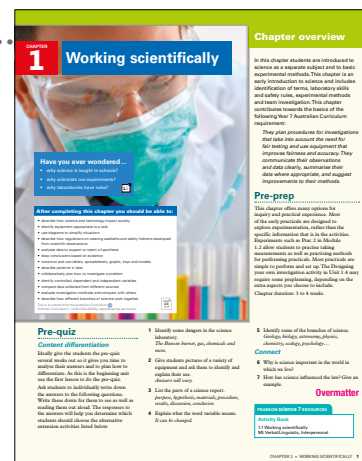
Pearson Science 2nd edition Teacher Companion

The Teacher Companion makes lesson preparation easy by combining full-colour student book pages with teaching strategies, ideas for class activities and fully worked solutions. All of the Activity Book pages are also included and are complete with model answers.

Be prepared

The **Chapter preview** provides an overview for planning purposes, including things to be aware of and organise ahead of commencing.

- The **pre-prep** gives an insight into what is coming up in the chapter and what the teacher should do to prepare. It also has an indicator to guide the time allocation to complete the chapter.
- A **pre-quiz** with answers is a quick warm-up tool that can provide some insight into the general class readiness for the topic, by allowing teachers to test prior knowledge of some key concepts.
- **What's coming up** provides a snapshot of the chapter and looks ahead to the content covered, the emphasis and how the practical activities fit into the module.



Be an expert

A further improved Teacher Companion places the support of **experts** alongside every Pearson Science 2e teachers, featuring wrap-around teaching and learning strategies and support from:

- **Literacy Consultant: Dr Trish Weekes**

Literacy support is integrated throughout each chapter, and there is a careful approach taken to ensure that literacy tasks and activities build language development – at the word, sentence, paragraph and whole text, levels. The Australian Curriculum shows that we need to be explicit about using language in Science at these four levels.

Tasks have been carefully developed to address and develop skills in:

- building vocabulary
- writing
- reading
- speaking, listening and viewing
- note-taking

A detailed spread in the preliminary pages of this book provides more support around the approach integrated in this series to 'The literacies of science'.

- **Differentiation Consultant: Anna Bennett**

Differentiation opportunities are provided at many stages throughout each chapter, and there is a careful approach taken to ensure that the key elements of effective differentiated instruction are present.

The embedded suggestions and notes enable teachers to be guided by general principles of differentiation through content, process, product and environment.

The support enables this to be done through a range of instructional strategies and according to student:

- readiness
- interests
- learning profile

A detailed spread in the preliminary pages of this book provides more support around the approach integrated in this series for 'Differentiation in the science classroom'



• School laboratory technicians: Penny Lee and Donna Chapman

Two experienced school laboratory technicians have reviewed all practical activities and activities have been trialled, amended and replaced as necessary. Teachers and students can be confident that practical activities they undertake are tested and will yield effective results.

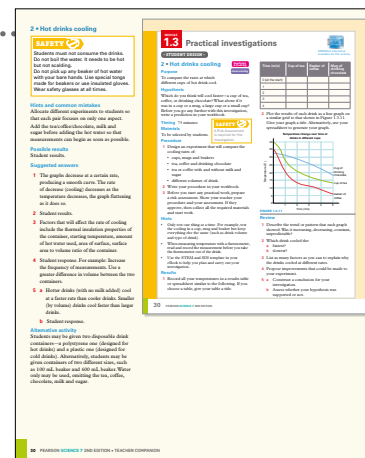
Teachers, laboratory technicians and students are supported and guided with full risk assessments, safety notes and technician's checklist and recipes, all of which have been updated to reflect new regulations around safety and materials in school science classrooms.

The laboratory technicians assure that safety regulations are met and that all the necessary checks and testing of all practical activities have been carried out.

Additional safety boxes are included within practical activities, and specific teacher support within the Teacher Companion, assists further in the implementation and assessment of practical activities including:

- alternative materials and equipment lists
- hints and common mistakes
- possible results
- suggested answers

It is important that the materials and procedures are followed to ensure that the safety of these activities is not compromised.

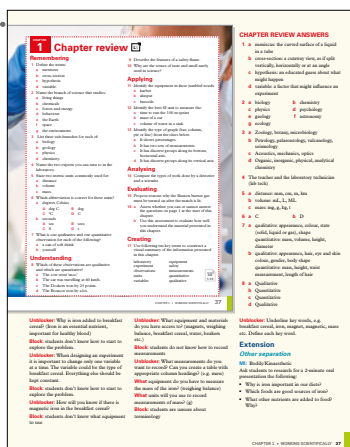


Be informed

Student book questions have full answers included for all science4fun, STEM4fun, module reviews, chapter review sets, Try yourself activities, Working with Science features, Science as a Human Endeavour spreads, practical activities, STEM investigations and Thinking Scientifically features enhance the students' learning experiences.

For module and chapter reviews, the answers are structured under the relevant Bloom's category (see pages xvi–xvii).

Diagrammatic answers can be found in the appendix at the end of the book.



Be progressed

A wide range of **learning strategies** are provided in each module and these assist teachers to support students in developing their understanding. When questions are given for teachers to ask, suggested answers are provided. Some examples of strategies include:

- inquiry activity: short hands-on activities that stimulate learning; often drawn from the text, photos or activities within the Student Book
- using visuals: ideas for using visual stimuli to promote greater understanding and interest or active engagement in content
- catering for diversity of learners: strategies to help cater for a range of students from different backgrounds with different learning needs and styles
- homework: suggested homework ideas.

Most learning strategies use a multiple intelligences (MI) approach. The multiple intelligences for each activity are listed.

To help students evaluate their preferred ways to learn, the Toolkit in Activity Book 7 contains a learning styles quiz. Use these findings to assist you in selecting or guiding students towards activity options that are most suited to their learning preferences.

How to use this book *continued*

Be inventive

science4fun

science4fun inquiries provide background support, and possible outcomes and information for going forward in the module or chapter.

STEM4fun

STEM4fun activities include hints and suggestions as well as possible results and information for going forward in the module or chapter.



Be informed

A variety of **assessment** ideas are provided at the end of each module.

The focus is on **formative assessment** and the range of options can be categorised as:

- **alternative assessment** which has a focus on creative and interesting assessment tasks that can be used to assess students' understanding of module content
- **evaluate understanding** which includes strategies for the teacher to evaluate students' understanding through stimulus questions, short revision quiz ideas or other activities
- **reteach relearn** which provides ideas for re-teaching or revising key ideas.

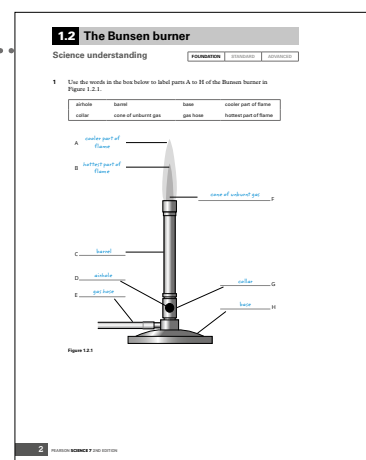
Summative assessment opportunities are provided in the chapter tests accessible via the Teacher ProductLink as well as in the teacher version of the eBook. The chapter review in LightBook Starter provides an additional option for summative assessment.

Be ready

Answers to activity book worksheets

The final section of the *Pearson Science 2nd Edition Teacher Companion* provides answers to all worksheets in the Pearson Science 2nd edition Activity Book. For clarity these are presented in the actual worksheet.

Answers to STEP-UP chapter worksheets are accessible via the Teacher ProductLink as well as in the teacher version of your eBook.



Be supported

Pearson Science resources

Pearson Science resource boxes are a reminder of what resources are available in the Pearson Science package.

These include:

- teacher and student support on Pearson eBook, such as:
- learnetic interactive activities
- Untamed Science videos
- SPARKlabs
- weblinks to relevant information to support learning and research activities
- risk assessments and much more.

How to use this book • STUDENT BOOK

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. Since some states have tailored the Australian Curriculum slightly for their own particular students, the coverage of the new **Victorian Curriculum: Science** is also captured in this new edition.

All aspects of the student books have been thoroughly reviewed by our **Literacy Consultant, Dr Trish Weekes** and the result is **more accessible** content, **enhanced scaffolding** and **strengthened question and instructions sets**. There is also the added bonus of an option to engage with **extension** and **revision** opportunities. The design is updated to improve the readability and navigation of the text.

In this edition, we retain a flexible approach to teaching and learning. A careful mix of **inquiry**, **STEM** and a range of **practical investigations**, along with **fully updated** content, reflect the dynamic and ever-changing nature of scientific knowledge and curricula. Combined with the improved and enhanced sets of questions, this series provides a rich assortment of choice, supporting a **differentiated approach**.

An integrated and research-based approach to science education, which ensures every student has engaging, supportive and challenging opportunities.

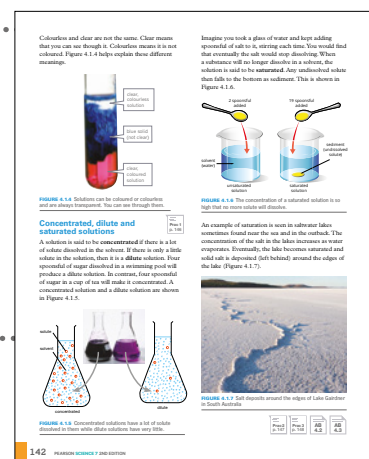
Be set

The **chapter opening page** sets a context for the chapter, engaging students through questions that get them thinking about the content and concepts to come. The chapter learning outcomes are provided in student-friendly language and give transparency and direction for the chapter. Each chapter is divided into self-contained modules. The **module opening page** includes an introduction that places the material to come in a meaningful context.



Be interested

Stunning and relevant **photos and illustrations** are purposefully selected to build understanding of the text. Students know when and how they should engage with artwork as each image is clearly referenced from within the text, to develop understanding. Captions for every artwork, along with labels for more difficult images, build further meaning and understanding.



Be inventive

The **STEM4fun** activities are simple STEM-based applications are provided in each chapter. Students are given an open-ended problem and asked to create, design or improve something. These problems require students to draw on their acquired knowledge and skills, but focus on the process more than the actual solution.

MODULE 4.1 Types of mixtures

What is a mixture?

A pure substance is one that is made up of only one type of substance. For example, pure water is made of only water and different sugar is made up of only sugar. In science, a mixture is any substance that:

- Is made from two or more pure substances that have been mixed together.
- Can be separated back into its original pure substances.

Paints, colts, drinks, air and seawater are examples of mixtures.

Solutions

Watch carefully as sugar is stirred into water and the solid sugar will seem to disappear! The sugar has dissolved. The sugar breaks up into tiny particles that are so small they can't be seen. These particles spread throughout the water. Although these sugar particles cannot be seen, if you taste the water the sweetness of the liquid tells you the particles are still there. This is what it means when something is said to dissolve. A substance that dissolves like this is described as soluble. A substance that does not dissolve is described as insoluble.

When things mix really well, like when sugar dissolves in water, the mixture is known as a solution. When you stir sugar into water, you make a sugar solution.

STEM 4 fun

Undo water pollution

PROBLEM

Can you undo water pollution?

COMPETENCES

- Investigate, design, construct, model, evaluate, fabricate, communicate, teamwork, problem-solving.

PLAN AND DESIGN Design the solution. What alternative do you need to solve the problem? Draw a diagram. Make a list of materials you will need and explain your plan.

CONSTRUCT Follow your plan. Draw your solution to the problem.

EVALUATE What works? What doesn't? How do you know? Is your solution the best? What could you improve? Modify your design to make it better. Test it out.

1. What area of STEM did you work in today?

2. What was the activity related to?

3. If another group were to do this task, what advice would you give?

Be inquiring

science4fun are inquiry-based activities. They pre-empt the theory and get students to engage with the concepts through a simple activity that sets students up to 'discover' the science before they learn about it. Broadly speaking, they encourage students to think about what happens in the world and how science explains this.

MODULE 4.4 Purifying water

Brought in much of Australia has forced us to find ways to save water. One solution is to recycle water, cleaning dirty water and then using it again. Water can be cleaned using separating techniques such as filtration and distillation. New methods of providing clean water are also being developed. Some of these methods can produce drinking water from toilet water or seawater.

science 4 fun

Cleaning water

Can you clean water?

Collect this...

- some fairly clean sand
- some small stones like blue metal or road gravel
- a bucket of muddy water
- an empty or reusable container
- some dishcloth rags for a stand
- 3 cups to catch liquid

Do this...

1. Make a small hole in the bottom of your container for the water to drain.
2. Set up your equipment as shown.
3. Pour the muddy water in and let it pass through into the container at the bottom. Put this sample up and aside.
4. Repeat step 2, but instead of setting the sample aside, pour it through the sand and stone again.
5. Continue pouring the collected sample through the sand and stone until the sample you collect at the bottom has little suspended mud in it.

Discuss this...

1. Compare this final sample with the original sample you set aside.
2. Describe what happened.
3. Explain why you think this happened.

Be inspired

Working with Science career profiles cast a spotlight on the diversity of career opportunities available through science with a focus on future science directions, STEM and women in science. Career profiles include questions that relate to the topic.

Suspensions

Seed does not dissolve when it is mixed into water. This type of mixture is called a suspension. It is made of even and big particles throughout the water. The type of mixture is called a suspension. It is made of even and big particles throughout the water. The type of mixture is called a suspension. It is made of even and big particles throughout the water.

ScifiLife

Shake your bottle

Mixtures are a common liquid that mixes. Mixtures are a common liquid that mixes. Mixtures are a common liquid that mixes. Mixtures are a common liquid that mixes.

Working with Science

GREEN CHEMIST

Dr Donna D'Alessandro

Green chemistry is a new and exciting area of science that aims to find environmentally responsible ways of making and using chemicals. Dr Donna D'Alessandro is a green chemist who works at the University of Sydney. She is a green chemist who works at the University of Sydney. She is a green chemist who works at the University of Sydney.

QUESTIONS

1. Why is green chemistry an important area of science?
2. What other types of scientists might a green chemist work with?

Be amazed

The **Science as a Human Endeavour** strand is addressed throughout the modules as well as in spreads. Many of the spreads have a special focus on Australian Scientists and highlight exciting developments, innovations and discoveries across all science fields. This feature also includes questions to help students build connections with the content they are learning and the relevance of these contributions.

SCIENCE AS A HUMAN ENDEAVOUR

Use and influence of science

Ocean bins

Two brothers from Perth have come up with a solution to the problem of plastic pollution in the ocean. They have created ocean bins that can be used to collect plastic waste from the ocean. The bins are made of plastic and have a mesh bag inside. The bins are made of plastic and have a mesh bag inside. The bins are made of plastic and have a mesh bag inside.

Ocean pollution

Plastic pollution is a growing environmental problem. Scientists have estimated that around 8 million tonnes of plastic rubbish gets into the oceans every year. It is thought that up to 240,000 tonnes of plastic is currently floating on the ocean surface. As well as plastic, there is also pollution from oil spills, sewage and toxic chemicals. This pollution is having serious impacts on ocean life, human health and the use of the oceans. There is a need to find ways to reduce plastic pollution and to clean up the oceans.

The Seabin solution

The Seabin is a floating net that catches rubbish and oil from the water. It is used to collect plastic waste from the ocean. The Seabin is a floating net that catches rubbish and oil from the water. It is used to collect plastic waste from the ocean. The Seabin is a floating net that catches rubbish and oil from the water. It is used to collect plastic waste from the ocean.

REVIEW

1. Why are inventions like the Seabin so important?
2. The Seabin can remove oil from seawater. What properties of oil and water allow them to be separated?
3. What other ways can science and our understanding of water and pollutants help to remove rubbish from the ocean?

Be skilled

Skill Builders outline a method or technique and are instructive and self-contained. They step students through the skill to support science application.

SkillBuilder

Folding a filter paper

There are two methods to fold filter paper. The central fold is shown in Figure 4.2.6.

How to filter

To filter, set up the equipment as shown in Figure 4.2.7.

QUESTIONS

1. Why is green chemistry an important area of science?
2. What other types of scientists might a green chemist work with?

Be guided

Worked examples scaffold problems and techniques with a new thinking and working approach to guide students through solving problems and applying techniques to master and practice key skills.

Strong keys

A strong key refers to features that do not change. Some features or characteristics are better to use to identify things than others. Size, colour and shape can change as organisms grow and develop, or may vary within the same level of organism. Structural features make a much stronger key that can be used in any time, regardless of age of the organism. It is easy to construct a strong key for something like the human because they do not change. People and other things change with time and environmental conditions. If a key is to be used both now and in some time in the future then it has to use features that will not change. Look at the new keys in Figures 4.1.1. There are two newly observed differences between these two keys. Only one has a pony tail and therefore long hair. The other has short hair and no pony tail. One has blue eyes and the other brown eyes.

Worked example

Constructing a dichotomous key

Problem

Use the four shapes in Figure 4.1.2 to create a dichotomous key.

Solution

Look for some difference that has only two choices. Looking for the square and triangle have two choices but the circle and oval have curved sides. Looking for the square and triangle have two choices but the circle and oval have curved sides. Looking for the square and triangle have two choices but the circle and oval have curved sides.

QUESTIONS

1. Why is green chemistry an important area of science?
2. What other types of scientists might a green chemist work with?

Be confident

Each module concludes with a comprehensive **module review** that checks for understanding of key concepts and ideas. Activities are developed through a carefully prepared range of Bloom's categorised questions. Students enjoy the benefit of checkpoint opportunities to engage with module review questions at key points throughout the module.

4.1 Review questions

Remembering

- Define the terms:
 - a mixture
 - soluble
 - insoluble
 - solvent
 - solutes
- What term best describes each of the following?
 - a substance that will not dissolve in a liquid
 - a clear mixture in which a substance dissolves in water
 - a mixture that has a lot of substance dissolved in it
 - a mixture that cannot dissolve any more of a substance
 - a mixture in which a fine powder does not dissolve but separates out to form a sediment
- List two examples each of a solvent, a solute and a solution.
- What are four types of separation? Give an example of each.
- List three types of separation and give an example of each.
- Name a solvent that will dissolve:
 - sugar
 - oil

Understanding

- Coating oil breaks into lots of small droplets when added to water, but seems to disappear when added to detergent. Explain why.
- Hydrox is an unusual liquid used to replace kerosene. Why do you think the label only says to 'dilute to benzene' before using it?
- Outline how you could show that a sugar solution is not saturated.
- What types of mixtures might be present in a rubbing alcohol sample such as that used in the STEAM activity on page 140?

Applying

- A child dissolved salt in boiling water that he was going to use to cook pasta. Identify whether the salt, water or salty water was the:
 - a solvent
 - a solute
 - a suspension
 - a solution
- Compare a concentrated glass of cordial with a dilute glass of cordial.
- Compare a sugar solution with a suspension of sand in water.

Analysing

- Classify each of the following as a solution or a suspension:
 - a solid in water
 - carbon dioxide gas in kerosene
 - clouds
 - food colouring in water
 - clay in oil
 - smoke from a car exhaust

Evaluating

- Place about 10 mL of water mixed with an amount of sugar that makes 5 teaspoons or 10 teaspoons of sugar into the liquid. Prepare an explanation for this.
- Figure 4.1.10 shows milk being poured into milk. Identify which substance is the solute, and justify your answer.

Creating

- Design a separation method to separate a mixture of sand, sugar and water.

4.4 Review questions

Remembering

- Define the terms:
 - soluble
 - insoluble
 - solvent
 - solutes
- What term best describes each of the following?
 - a substance that will not dissolve in a liquid
 - a clear mixture in which a substance dissolves in water
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- Figure 4.1.10 shows milk being poured into milk. Identify which substance is the solute, and justify your answer.

Creating

- Design a separation method to separate a mixture of sand, sugar and water.

Be investigative

Practical investigations are placed at the end of each module. New student-designed investigations and STEM inquiry tasks provide students with opportunities to plan investigations, design and trial their plans, to seek answers and solve problems. A timing suggestion assists with planning, whilst safety boxes highlight significant hazards. Full risk assessments, safety notes and technician's checklist and recipes provided via ProductLink and eBooks support investigations.

Practical investigation icons appear throughout the modules. An icon will also appear to indicate where a SPARKlab alternative is available.

Prac 1
p. 175

4.1 Practical investigations

1 • Soluble and insoluble substances

Background

To investigate what substances will dissolve in water and kerosene.

Timing 45 minutes

Materials

- 100 mL beakers
- 100 mL graduated cylinders
- 100 mL measuring spoons
- 100 mL water
- 100 mL kerosene
- 100 mL sugar
- 100 mL oil
- 100 mL sand
- 100 mL salt
- 100 mL cornstarch
- 100 mL flour
- 100 mL baking powder
- 100 mL yeast
- 100 mL vinegar
- 100 mL lemon juice
- 100 mL orange juice
- 100 mL apple juice
- 100 mL grape juice
- 100 mL cranberry juice
- 100 mL tomato juice
- 100 mL soy sauce
- 100 mL Worcestershire sauce
- 100 mL ketchup
- 100 mL mayonnaise
- 100 mL salad dressing
- 100 mL hand soap
- 100 mL dish soap
- 100 mL laundry detergent
- 100 mL car wash soap
- 100 mL floor polish
- 100 mL furniture polish
- 100 mL window cleaner
- 100 mL glass cleaner
- 100 mL all-purpose cleaner
- 100 mL disinfectant
- 100 mL antiseptic
- 100 mL mouthwash
- 100 mL hair conditioner
- 100 mL hair gel
- 100 mL hair spray
- 100 mL deodorant
- 100 mL body lotion
- 100 mL body cream
- 100 mL body powder
- 100 mL body spray
- 100 mL body oil
- 100 mL body butter
- 100 mL body cream
- 100 mL body lotion
- 100 mL body powder
- 100 mL body spray
- 100 mL body oil
- 100 mL body butter

Procedures

- Copy the table into your notebook.
- Place the substances in the table. Use the following key to identify the substances:
 - 1. water
 - 2. oil
 - 3. sugar
 - 4. salt
 - 5. sand
 - 6. cornstarch
 - 7. flour
 - 8. baking powder
 - 9. yeast
 - 10. vinegar
 - 11. lemon juice
 - 12. orange juice
 - 13. apple juice
 - 14. grape juice
 - 15. cranberry juice
 - 16. tomato juice
 - 17. soy sauce
 - 18. Worcestershire sauce
 - 19. ketchup
 - 20. mayonnaise
 - 21. salad dressing
 - 22. hand soap
 - 23. dish soap
 - 24. laundry detergent
 - 25. car wash soap
 - 26. floor polish
 - 27. furniture polish
 - 28. window cleaner
 - 29. glass cleaner
 - 30. all-purpose cleaner
 - 31. disinfectant
 - 32. antiseptic
 - 33. mouthwash
 - 34. hair conditioner
 - 35. hair gel
 - 36. hair spray
 - 37. deodorant
 - 38. body lotion
 - 39. body cream
 - 40. body powder
 - 41. body spray
 - 42. body oil
 - 43. body butter
- Observe the substances in the table. Record what you see.
- Record your observations in the following table.

Substance	Water	Oil	Observations
1. water			
2. oil			
3. sugar			
4. salt			
5. sand			
6. cornstarch			
7. flour			
8. baking powder			
9. yeast			
10. vinegar			
11. lemon juice			
12. orange juice			
13. apple juice			
14. grape juice			
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17. soy sauce			
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33. mouthwash			
34. hair conditioner			
35. hair gel			
36. hair spray			
37. deodorant			
38. body lotion			
39. body cream			
40. body powder			
41. body spray			
42. body oil			
43. body butter			

Review

- What did you find out about solubility? What signs did you look for?
- In which water did a solution form?
- Name the substances that were insoluble in:
 - water
 - kerosene
- Identify the substances that:
 - a solvent of oil but not of oil
 - a solvent of oil but not of oil

4.2 Practical investigations

Stones and beans don't mix

Background

Many people assume that all stones are made of the same material. However, stones are made of different materials and have different properties. Some stones are hard and some are soft. Some stones are smooth and some are rough. Some stones are light and some are heavy. Some stones are porous and some are non-porous. Some stones are soluble and some are insoluble. Some stones are flammable and some are non-flammable. Some stones are toxic and some are non-toxic. Some stones are radioactive and some are non-radioactive. Some stones are magnetic and some are non-magnetic. Some stones are conductive and some are non-conductive. Some stones are insulating and some are non-insulating. Some stones are transparent and some are non-transparent. Some stones are opaque and some are non-opaque. Some stones are translucent and some are non-translucent. Some stones are reflective and some are non-reflective. Some stones are absorptive and some are non-absorptive. Some stones are emissive and some are non-emissive. Some stones are conductive and some are non-conductive. Some stones are insulating and some are non-insulating. Some stones are transparent and some are non-transparent. Some stones are opaque and some are non-opaque. Some stones are translucent and some are non-translucent. Some stones are reflective and some are non-reflective. Some stones are absorptive and some are non-absorptive. Some stones are emissive and some are non-emissive.

Equipment

- 100 mL beakers
- 100 mL graduated cylinders
- 100 mL measuring spoons
- 100 mL water
- 100 mL kerosene
- 100 mL sugar
- 100 mL oil
- 100 mL sand
- 100 mL salt
- 100 mL cornstarch
- 100 mL flour
- 100 mL baking powder
- 100 mL yeast
- 100 mL vinegar
- 100 mL lemon juice
- 100 mL orange juice
- 100 mL apple juice
- 100 mL grape juice
- 100 mL cranberry juice
- 100 mL tomato juice
- 100 mL soy sauce
- 100 mL Worcestershire sauce
- 100 mL ketchup
- 100 mL mayonnaise
- 100 mL salad dressing
- 100 mL hand soap
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- 100 mL window cleaner
- 100 mL glass cleaner
- 100 mL all-purpose cleaner
- 100 mL disinfectant
- 100 mL antiseptic
- 100 mL mouthwash
- 100 mL hair conditioner
- 100 mL hair gel
- 100 mL hair spray
- 100 mL deodorant
- 100 mL body lotion
- 100 mL body cream
- 100 mL body powder
- 100 mL body spray
- 100 mL body oil
- 100 mL body butter

Procedures

- Copy the table into your notebook.
- Place the substances in the table. Use the following key to identify the substances:
 - 1. water
 - 2. oil
 - 3. sugar
 - 4. salt
 - 5. sand
 - 6. cornstarch
 - 7. flour
 - 8. baking powder
 - 9. yeast
 - 10. vinegar
 - 11. lemon juice
 - 12. orange juice
 - 13. apple juice
 - 14. grape juice
 - 15. cranberry juice
 - 16. tomato juice
 - 17. soy sauce
 - 18. Worcestershire sauce
 - 19. ketchup
 - 20. mayonnaise
 - 21. salad dressing
 - 22. hand soap
 - 23. dish soap
 - 24. laundry detergent
 - 25. car wash soap
 - 26. floor polish
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 - 29. glass cleaner
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 - 31. disinfectant
 - 32. antiseptic
 - 33. mouthwash
 - 34. hair conditioner
 - 35. hair gel
 - 36. hair spray
 - 37. deodorant
 - 38. body lotion
 - 39. body cream
 - 40. body powder
 - 41. body spray
 - 42. body oil
 - 43. body butter
- Observe the substances in the table. Record what you see.
- Record your observations in the following table.

Substance	Water	Oil	Observations
1. water			
2. oil			
3. sugar			
4. salt			
5. sand			
6. cornstarch			
7. flour			
8. baking powder			
9. yeast			
10. vinegar			
11. lemon juice			
12. orange juice			
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42. body oil			
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Review

- What did you find out about solubility? What signs did you look for?
- In which water did a solution form?
- Name the substances that were insoluble in:
 - water
 - kerosene
- Identify the substances that:
 - a solvent of oil but not of oil
 - a solvent of oil but not of oil

Be extended

Each chapter concludes with an improved and richer assortment of questions organised within the Bloom's structure, that bring together the learning of concepts from across a chapter. Students must apply knowledge and skills to answer questions, and students engage in fresh new opportunities for **inquiry** and **research** to take their learning to a new level with the enhanced **chapter review**.

4 Chapter review

Remembering

- Define the terms:
 - a mixture
 - soluble
 - insoluble
 - solvent
 - solutes
- What term best describes each of the following?
 - a substance that will not dissolve in a liquid
 - a clear mixture in which a substance dissolves in water
 - a mixture that has a lot of substance dissolved in it
 - a mixture that cannot dissolve any more of a substance
 - a mixture in which a fine powder does not dissolve but separates out to form a sediment
- List two examples each of a solvent, a solute and a solution.
- What are four types of separation? Give an example of each.
- List three types of separation and give an example of each.
- Name a solvent that will dissolve:
 - sugar
 - oil

Understanding

- Coating oil breaks into lots of small droplets when added to water, but seems to disappear when added to detergent. Explain why.
- Hydrox is an unusual liquid used to replace kerosene. Why do you think the label only says to 'dilute to benzene' before using it?
- Outline how you could show that a sugar solution is not saturated.
- What types of mixtures might be present in a rubbing alcohol sample such as that used in the STEAM activity on page 140?

Applying

- A child dissolved salt in boiling water that he was going to use to cook pasta. Identify whether the salt, water or salty water was the:
 - a solvent
 - a solute
 - a suspension
 - a solution
- Compare a concentrated glass of cordial with a dilute glass of cordial.
- Compare a sugar solution with a suspension of sand in water.

Analysing

- Classify each of the following as a solution or a suspension:
 - a solid in water
 - carbon dioxide gas in kerosene
 - clouds
 - food colouring in water
 - clay in oil
 - smoke from a car exhaust

Evaluating

- Place about 10 mL of water mixed with an amount of sugar that makes 5 teaspoons or 10 teaspoons of sugar into the liquid. Prepare an explanation for this.
- Figure 4.1.10 shows milk being poured into milk. Identify which substance is the solute, and justify your answer.

Creating

- Design a separation method to separate a mixture of sand, sugar and water.

Be a thinker

In addition to the chapter review, there is a set of **thinking questions** relevant to the chapter. These test students' science and interpretive skills.

4 Inquiry skills

Thinking scientifically

Background

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- 100 mL hair spray
- 100 mL deodorant
- 100 mL body lotion
- 100 mL body cream
- 100 mL body powder
- 100 mL body spray
- 100 mL body oil
- 100 mL body butter

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 - a solvent of oil but not of oil

How to use this book *continued*

Be supported

Every chapter concludes with an illustrated **glossary** that is an easy reference for additional support in comprehension of key terms. All key terms are bolded throughout the chapter.



Be reinforced

The **Activity Book** provides a set of worksheets for every Student Book chapter, giving lots of opportunities for practice, application and extension. **Activity Book icons** in the Student Book indicate when the best time is to engage with a particular worksheet.



Be progressed

Lightbook Starter contains **complementary sets of questions** for the module and chapter review questions from the **Student Book**. This serves as an alternate or additional assessment opportunity for students who enjoy the benefit of **instant feedback, hints** and **auto-correction** when engaging with this cutting-edge digital **formative** and **summative assessment** platform. Questions are all **tracked** against curriculum learning outcomes, making **progress** monitoring simple. Icons in the Student Book indicate the best time to engage with Lightbook Starter.



Be prepared

Focused on supporting the greater **diversity of learners and pathways**, a 'step-up' program has been developed to launch students into senior sciences, in addition to the 'core' science program. A series of **step-up chapters**, written by experienced senior science teachers, have been developed with the view to providing all students with the best chance of success in senior sciences.

The **Year 9 Student Book** features a step-up chapter on **Psychology**. The **Year 10 Student Book** includes step-up chapters for **Biology, Chemistry** and **Physics**. These chapters are referenced from the print text and are provided in full via the **eBook**. The eBook also contains **worksheets** specific to supporting the application and development of skills and knowledge for the step-up chapters. All Year 10 Student Book chapters include a new series of **exam-style questions** to provide students with practice and exposure in preparation for examinations.

Pearson Science Lightbook Starter

Lightbook Starter offers a **digital formative and summative assessment tool** with **hints**, **instant feedback** and **auto-correction** of responses. Students and teachers also enjoy the visibility of learning through a **progress tracker** which

shows student achievement against curriculum learning outcomes. Lightbook Starter provides questions with the most sophisticated auto-correction of answers.

Be ready

Commence each chapter with questions to establish a baseline for each student around prior knowledge. The **'before you begin'** section includes useful preparatory material with **interactive** resources to **activate prior knowledge** and **reteach key concepts**.

Be assisted

Module review questions (with **hints** and **solutions**), help students **check for understanding** of learning, revise and provide useful **formative assessment** to help teachers identify areas of weakness, and are great for lesson planning. These serve as a touchpoint throughout the chapter and students benefit from auto-corrected responses which provide **instant feedback** and support.

Be reflective

An integrated **reflection** set of questions supports students in considering their progress and future areas for focus.

Be tracked

Enjoy seeing progress through the learning outcomes updated instantly in the **progress tracker**.

Be in control

Lightbook starter is written to enable teachers and students to use this digital assessment tool as an **alternative** (or additional practice) **to Student Book questions**. The Lightbook Starter structure mirrors the Student Book question set, thereby providing a complimentary alternative to the Student Book questions. This supports a fully integrated approach to digital assessment and feedback.

Be assessed

The **chapter review** in the Student Book has a complimentary **assessment** set of questions in Lightbook Starter. Use this as an alternative to a class test at the end of a topic.

LightbookStarter 

Pearson Science eBook

Pearson eBook enables viewing and interaction with the student book online or offline on any device: PC or Mac, Android tablet or iPad and interactive whiteboard. This eBook retains the integrity of the printed page whilst offering easy to access resources, support and linked activities that will engage students at school and at home.

The eBooks provide a fully integrated, digital learning platform. Enjoy the benefits of having the following digital assets and interactive resources at your fingertips:

- * new interactive activities and lessons
- * new Untamed Science videos
- * web destinations
- * student investigation templates and teacher support
- * new STEP-UP student book and activity book chapters with answers at Years 9 & 10
- * full answers to all Student Book and Activity Book questions
- * SPARKlabs
- * risk assessments
- * full teaching programs and curriculum mapping audits
- * chapter tests with answers



Pearson Science ProductLink

Additional student and teacher resources are available free when you purchase **Pearson Science 2nd Edition**. To access, visit **www.pearsonplaces.com.au** and log in. Click on 'Toolkit' then select 'ProductLink' and browse for the title.

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Did you know that Pearson also offers teachers a diverse range of training and development product-linked learning programs? We are dedicated to supporting your implementation of the Australian Curriculum: Science and the Victorian Curriculum: Science but it doesn't stop here.

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