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

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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. We address inclusion by clearly indicating the additional content which enables flexibility to determine the approach, as well as the added bonus of an option to engage with **extension** and **revision** opportunities.

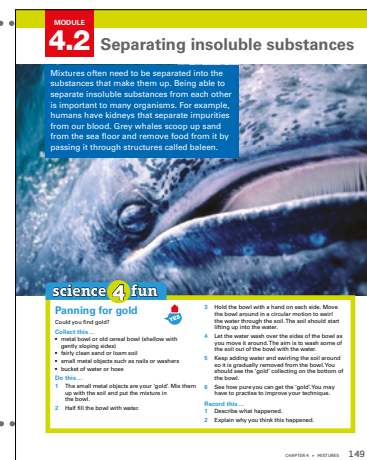
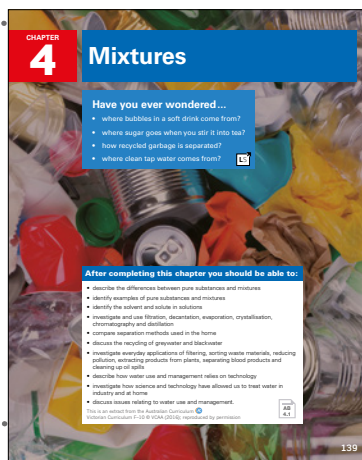
All aspects of the student books have been thoroughly reviewed by our **Literacy Consultant Dr Trish Weekes** and the result is **more accessible** content, **enhanced scaffolding** and **strengthened question and instructions sets**. The design is updated to improve the readability and navigation of 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 developments. 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.

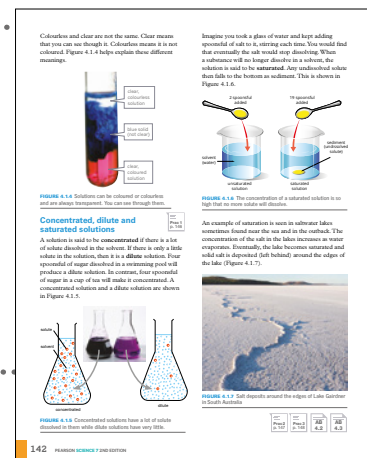
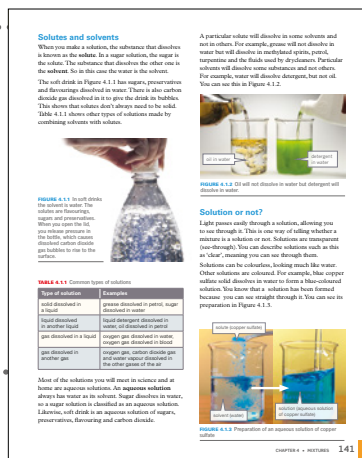
Be set

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.



How to use this book *continued*

Be confident

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

Module 4.1 Review questions

Remembering

- 1 Define the terms:
 - a) *substance*
 - b) *disinfect*
 - c) *disinfectant*
 - d) *antiseptic*
 - e) *antibiotic*
- 2 What term best describes each of the following?
 - a) a substance that has disinfectant or biocidal activity in solution or as a substance
 - b) a substance that has a toxic or antiseptic effect
 - c) a substance that causes disease after more of a substance is taken
 - d) a substance in which the powder does not break down by exposure on use for a short time
 - e) a liquid sample which is a solution, a solvent and a solute
- 3 What are four types of disinfectant? Give an example of each.
- 4 What are four types of suppositories and give an example of each.
- 5 Name a chemical used as a disinfectant.
 - a) *mercur*
 - b) *mercuric iodine*

Understanding

- 1 Explain the benefits from the use of small droplets when creating a disinfectant, such as *Disinfectant* when added to disinfectant. Explain why.
- 2 Methicillin is an antiseptic which is used to reduce bacteria. How do you think the label tells you to use the bottle and how would you use it?
- 3 Outline how you could show that a water solution is not saturated.
- 4 What types of antiseptics might be present in a personal hygiene sample such as the one used for the STD/HIV activity on page 140?

Applying

- 1 A hot disinfectant can be boiling water that has been given time to cool down. Identify whether the water, or only water in water, is:
 - a) *solvent*
 - b) *solutes*
 - c) *aqueous solution*.

Analysing

- 1 Compare a concentrated glass of coffee with a glass glass of coffee.
- 2 Compare the two solutions given in question 1.
- 3 Compare a sugar syrup with a concentrated glass of water.
- 4 Identify each of the following as a solution or a suspension.
 - a) *solid in water*
 - b) *solid in solid*
 - c) *solid in solid* given in a homogene
 - d) *solid in solid* given in a heterogene
 - e) *solid in solid* given in a heterogene
 - f) *solid in solid* given in a heterogene
 - g) *solid in solid* given in a heterogene
 - h) *solid in solid* given in a heterogene

Evaluating

- 1 Explain the effect of a 10% increase in the amount of water on the amount of 10% solution. Explain the effect of a 10% increase in the amount of 10% solution on the amount of 10% solution.
- 2 Explain the effect of a 10% increase in the amount of water on the amount of 10% solution. Explain the effect of a 10% increase in the amount of 10% solution on the amount of 10% solution.
- 3 Identify which substance is the solute.
 - a) *solid in water*
 - b) *solid in solid*

FIGURE 4.1.1

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PRINCIPLES OF CHEMISTRY & PHYSICS

4.6 Review questions

Remembering

- 1 Define the terms:
 - a) protons
 - b) neutrons
 - c) electrons
- 2 What is the structure of an atom?
- 3 What does the following mean:
 - a) water from Athens and Asia has not risen
 - b) the current that runs average over time
 - c) the current of the moving river in the sea
- 4 What is the chemical formula for pure water?
- 5 Explain the difference between a chemical element and a chemical compound.
- 6 Explain the steps to measure temperature.
- 7 Name the substances that cause heat to be transferred.
- 8 Name the substances that cause heat to be transferred.

Understanding

- 1 Explain why the use of water around you is a disaster and why not.
- 2 Describe two separation methods used in a water supply.
- 3 Name the pure, water desegregated compounds.
- 4 Explain the difference between the use of water for the environment protection they caused.
- 5 Explain the difference in the desegregation of water.
- 6 Name the substances that cause heat to be transferred.
- 7 Explain the steps to measure temperature.
- 8 Name the substances that cause heat to be transferred.

Applying

- 1 Identify the steps to separate the method used in the water treatment plant in Figure 4.6.6
- 2 Explain how the separation of different particles and small particles and small particles in the sedimentation on page 166 can be done.
- 3 Identify the separation techniques being used in the water treatment plant.

Analysing

- 1 Classify the water treatment from the following generation of the treatment:
 - a) water from Athens
 - b) water from Asia
 - c) water from the sea
- 2 Explain the steps to measure temperature.
- 3 Explain the difference between the use of water for the environment protection they caused.
- 4 Explain the difference in the desegregation of water.
- 5 Name the substances that cause heat to be transferred.
- 6 Name the substances that cause heat to be transferred.

Evaluating

- 1 Propose a new system of water supply and how to use it.
- 2 Explain the difference between the use of water for the environment protection they caused.
- 3 Explain the difference between the use of water for the environment protection they caused.
- 4 Explain the difference between the use of water for the environment protection they caused.
- 5 Explain the difference between the use of water for the environment protection they caused.
- 6 Explain the difference between the use of water for the environment protection they caused.

Creating

- 1 Classify the water treatment from the following generation of the treatment:
 - a) water from Athens
 - b) water from Asia
 - c) water from the sea
- 2 Explain the steps to measure temperature.
- 3 Explain the difference between the use of water for the environment protection they caused.
- 4 Explain the difference between the use of water for the environment protection they caused.
- 5 Name the substances that cause heat to be transferred.
- 6 Name the substances that cause heat to be transferred.




Figure 4.6.6

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SCIENCE

7.020120

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 are provided via ProductLink and eBooks.

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

[illegible]

4.2 Practical investigations

Stones and beans don't mix

STEM INQUIRY

Investigate
Evaluate

Background

Scientists have discovered that life should contain hydrogen. There are a great source of proteins, amino acids, energy, they are in various chemical forms. Many hydrogen goes into the ground and include plants such as chocolate, two beans (large) and corned beef, beans, peas and pecans (all are not used for food).

When hydrogen is harvested, scientists discovered that hydrogen is not as accurate as they thought. This is a big problem for companies that package beans in a vacuum for a long time. It is not clear if it is something taking a long time.

Problem

An organic food store wants you to design a device that is able to separate small stones from beans. This is a problem for the store because they are using a vacuum to separate the beans from the stones. The stones get lost and should not be used in the beans. This is a problem for the store.

Procedure

1. Design a device that is able to separate small stones from beans.
2. Write a procedure for your work and have it approved by the teacher. Then prepare the device and collect your equipment and carry out the experiment.

Hints

- Think to make intelligent of the materials, consider the equipment.
- What are the properties of the materials and stones?
- What happens if you put a magnet in a stone or a steel? (Magnet)
- What equipment and materials do you have in the lab?

Use a SPS and SPS system for your efforts to collect beans and stones for your investigation.

Materials

- 250 g of one type of bean (large)
- 25 g of small or mixed stones

Equipment

- scales
- magnets
- weighing balances
- sieves
- rulers
- and equipment that you use in your science laboratory with all items, measuring cylinders and beakers.

Engineering design process

Identify the problem

Brainstorm solutions

Evaluate solutions

Design and build a solution

Test and evaluate your solution

Communicate your solution

Be extended

Each chapter concludes with an improved and richer assortment of questions organised within the Blooms structure, that bring together the learning of concepts from across a chapter. Apply knowledge and skills to answer questions, engage in fresh new opportunities for **inquiry** and extend into **research** to take your learning to a new level with the enhanced **Chapter Review**.

4 Writing review

Remembering

- 1 What are some of the following devices?
 - a) a cassette
 - b) a remote control
 - c) a video
 - d) a personal computer
 - e) a washing machine
 - f) a light detector
 - g) a tape drive
 - h) a laser
 - i) a gas pressure recording system in a house

Understanding

- 1 Choose how you could separate the following.
 - a) a mixture of sand and water
 - b) a mixture of oil and water
 - c) a mixture of alcohol and water
 - d) a mixture of petrol and water
 - e) a mixture of oil and water
 - f) a mixture of petrol and water
 - g) a mixture of petrol and water
 - h) a mixture of petrol and water
 - i) a mixture of petrol and water
 - j) a mixture of petrol and water
 - k) a mixture of petrol and water
 - l) a mixture of petrol and water
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 - r) a mixture of petrol and water
 - s) a mixture of petrol and water
 - t) a mixture of petrol and water
 - u) a mixture of petrol and water
 - v) a mixture of petrol and water
 - w) a mixture of petrol and water
 - x) a mixture of petrol and water
 - y) a mixture of petrol and water
 - z) a mixture of petrol and water

Applying

- 1 Identify a method you could use to separate:
 - a) a mixture of sand and water
 - b) a mixture of oil and water
 - c) a mixture of alcohol and water
 - d) a mixture of petrol and water
 - e) a mixture of petrol and water
 - f) a mixture of petrol and water
 - g) a mixture of petrol and water
 - h) a mixture of petrol and water
 - i) a mixture of petrol and water
 - j) a mixture of petrol and water
 - k) a mixture of petrol and water
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 - s) a mixture of petrol and water
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 - u) a mixture of petrol and water
 - v) a mixture of petrol and water
 - w) a mixture of petrol and water
 - x) a mixture of petrol and water
 - y) a mixture of petrol and water
 - z) a mixture of petrol and water

Evaluating

Use the questions to justify this statement:

The physical properties of a mixture influence the type of separation method used.

- 1 Which of the following would be the best way to separate 50 ml of cooking oil from 50 ml of water?
 - a) Pour it down the sink.
 - b) Heat it down the sink.
 - c) Filter it with a funnel and put it in a beaker.
 - d) Shake it with a paper towel and put it in a beaker.
 - e) Add a little water and shake it.
 - f) Add a little water and shake it.
 - g) Add a little water and shake it.
 - h) Add a little water and shake it.
 - i) Add a little water and shake it.
 - j) Add a little water and shake it.
 - k) Add a little water and shake it.
 - l) Add a little water and shake it.
 - m) Add a little water and shake it.
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 - s) Add a little water and shake it.
 - t) Add a little water and shake it.
 - u) Add a little water and shake it.
 - v) Add a little water and shake it.
 - w) Add a little water and shake it.
 - x) Add a little water and shake it.
 - y) Add a little water and shake it.
 - z) Add a little water and shake it.

Creating

Use the questions to separate a mixture containing sand, oil, and water.

- 1 Use the following list to name the contents to create a small quantity of the mixture prepared in the chapter.
 - a) sand
 - b) oil
 - c) water
 - d) sand
 - e) oil
 - f) water
 - g) sand
 - h) oil
 - i) water
 - j) sand
 - k) oil
 - l) water
 - m) sand
 - n) oil
 - o) water
 - p) sand
 - q) oil
 - r) water
 - s) sand
 - t) oil
 - u) water
 - v) sand
 - w) oil
 - x) water
 - y) sand
 - z) oil

Analysing

Use the words in a Venn diagram to compare:

- a) a mixture with a compound
- b) a mixture with a compound
- c) a mixture with a compound
- d) a mixture with a compound
- e) a mixture with a compound
- f) a mixture with a compound
- g) a mixture with a compound
- h) a mixture with a compound
- i) a mixture with a compound
- j) a mixture with a compound
- k) a mixture with a compound
- l) a mixture with a compound
- m) a mixture with a compound
- n) a mixture with a compound
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- p) a mixture with a compound
- q) a mixture with a compound
- r) a mixture with a compound
- s) a mixture with a compound
- t) a mixture with a compound
- u) a mixture with a compound
- v) a mixture with a compound
- w) a mixture with a compound
- x) a mixture with a compound
- y) a mixture with a compound
- z) a mixture with a compound

Problem Solving

Use the questions to separate a mixture containing sand, oil, and water.

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 - a) sand
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 - d) sand
 - e) oil
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 - g) sand
 - h) oil
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 - o) water
 - p) sand
 - q) oil
 - r) water
 - s) sand
 - t) oil
 - u) water
 - v) sand
 - w) oil
 - x) water
 - y) sand
 - z) oil

Reflecting

Use the questions to separate a mixture containing sand, oil, and water.

- 1 Use the following list to name the contents to create a small quantity of the mixture prepared in the chapter.
 - a) sand
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 - p) sand
 - q) oil
 - r) water
 - s) sand
 - t) oil
 - u) water
 - v) sand
 - w) oil
 - x) water
 - y) sand
 - z) oil

Transferring

Use the questions to separate a mixture containing sand, oil, and water.

- 1 Use the following list to name the contents to create a small quantity of the mixture prepared in the chapter.
 - a) sand
 - b) oil
 - c) water
 - d) sand
 - e) oil
 - f) water
 - g) sand
 - h) oil
 - i) water
 - j) sand
 - k) oil
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 - o) water
 - p) sand
 - q) oil
 - r) water
 - s) sand
 - t) oil
 - u) water
 - v) sand
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 - x) water
 - y) sand
 - z) oil

Investigating

Use the questions to separate a mixture containing sand, oil, and water.

- 1 Use the following list to name the contents to create a small quantity of the mixture prepared in the chapter.
 - a) sand
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 - q) oil
 - r) water
 - s) sand
 - t) oil
 - u) water
 - v) sand
 - w) oil
 - x) water
 - y) sand
 - z) oil

Applying

Use the questions to separate a mixture containing sand, oil, and water.

- 1 Use the following list to name the contents to create a small quantity of the mixture prepared in the chapter.
 - a) sand
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 - v) sand
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 - z) oil

Evaluating

Use the questions to separate a mixture containing sand, oil, and water.

- 1 Use the following list to name the contents to create a small quantity of the mixture prepared in the chapter.
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 - c) water
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 - q) oil
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 - x) water
 - y) sand
 - z) oil

Creating

Use the questions to separate a mixture containing sand, oil, and water.

- 1 Use the following list to name the contents to create a small quantity of the mixture prepared in the chapter.
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 - r) water
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 - u) water
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 - x) water
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 - z) oil

Analysing

Use the questions to separate a mixture containing sand, oil, and water.

- 1 Use the following list to name the contents to create a small quantity of the mixture prepared in the chapter.
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 - r) water
 - s) sand
 - t) oil
 - u) water
 - v) sand
 - w) oil
 - x) water
 - y) sand
 - z) oil

Problem Solving

Use the questions to separate a mixture containing sand, oil, and water.

- 1 Use the following list to name the contents to create a small quantity of the mixture prepared in the chapter.
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 - r) water
 - s) sand
 - t) oil
 - u) water
 - v) sand
 - w) oil
 - x) water
 - y) sand
 - z) oil

Reflecting

Be a thinker

Following the chapter review are **thinking questions** relevant to the chapter. These test students' science and interpretive skills.

chapter 4

4 Inquiry skills

Thinking scientifically

- 1 Refer to the following information and Table 4.1 to answer the questions below.

Air is a mixture of gases. The table shows the composition and proportion of gas in air where water vapour has been removed.

TABLE 4.1 Composition and proportion of gases in composition of air where the water vapour has been removed.

Constituent	Volume (litres)	Percentage (%)
oxygen	2.00	21.00
nitrogen	7.92	78.00
argon	0.08	0.99
carbon dioxide	0.01	0.01

- 2 Which graphs would be used to represent the composition of dry air?

A Composition of dry air (%)

Gas	Percentage (%)
nitrogen	78
oxygen	21
argon	1
carbon dioxide	1

B

Composition of dry air (%)

Gas	Percentage (%)
nitrogen	78
oxygen	21
argon	1
carbon dioxide	1

C

Composition of dry air (%)

Gas	Percentage (%)
nitrogen	78
oxygen	21
argon	1
carbon dioxide	1

D

Composition of dry air (%)

Gas	Percentage (%)
nitrogen	78
oxygen	21
argon	1
carbon dioxide	1

- 3 Which substance in air has the lowest boiling point?

- A argon
- B oxygen
- C nitrogen
- D carbon dioxide.

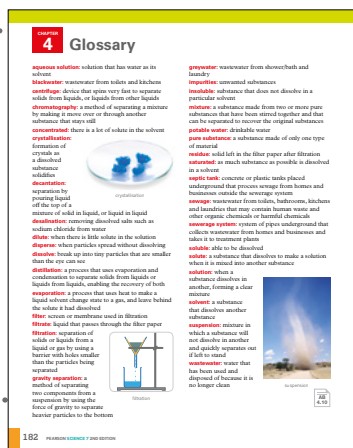
- 4 Which process would be used to separate the substances that make up air?

- A Distillation
- B decanting
- C crystallisation
- D Chromatography.

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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. Reference **Activity Book icons** 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 sets from within the **student book**. This serves as alternate or additional assessment opportunities 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. A handy icon indicates the best time to engage with Lightbook Starter.



Be prepared

Focussed 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 best chance of success.

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 from within the text. All Year 10 Student book chapters include a new series of **Exam Style questions** to provide students practice and exposure in preparation for examinations.

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** also has an indicator of the time allocation to complete the chapter.

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**
- **Differentiation Consultant: Anna Bennett**
- **School laboratory technicians: Penny Lee and Donna Chapman**

Be confident

All practical activities have been trialled, reviewed, amended and replaced as necessary to ensure teachers and students can undertake practical activities that are tested, work and will yield effective results. Suggested replacement materials and equipment provided to make science more accessible.

Full risk assessments, safety notes and technician's checklist and recipes provided. Pracs and risk assessments have been updated to reflect new regulations around safety and materials in school science classrooms.

Be informed

Full **answers** including suggested findings and possible answers to practical activities, fully worked solutions and support for open-ended research, inquiry and STEM activities.

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 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 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, 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 assessed

The **Chapter Review** in the student book has a complimentary **assessment** set in Lightbook Starter. Use this as an alternative to a class test at the end of a topic.

Be reflective

An integrated **reflection** set 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**.

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 your 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 your title.

Professional Learning, Training and Development

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 Pearson Science, but it doesn't stop here.

Our courses align closely with Pearson Science Second Edition and offer an in-depth learning experience, combining both practical and theoretical elements, enabling you to implement the resource effectively in your classroom.

Find out more about our product-linked learning, workshops, courses and conferences at **Pearson Academy www.pearsonacademy.com.au**

