Pearson Science 9: Sample teaching program

This sample teaching program maps the Australian Curriculum 9.0 outcomes and content to *Pearson Science 9* 3rd edition, *Pearson Digital Hub: Science 9* (AC) and the *Pearson Science 9 Student Companion*, as well as all student and teacher resources. Although this sample program suggests a teaching order, it is expected that teachers will modify it to suit their local environment and student cohort.

Pearson Science 7–10 delivers content in bite-sized, manageable chunks to enable clear learning progression and ease of assessment. Learning goals are established at the start, with each lesson addressing one learning intention and 1–3 success criteria.

Teacher planning and preparation: Full-year teacher planning and preparation resources can be accessed and downloaded from Pearson Digital Hub under 'Teacher Resources' at the start of each topic. These resources include this teaching program; practical work teaching notes, risk assessments, technician's checklists and recipes; and answers to all student worksheets.

Fully worked solutions for all student book activities can be accessed from the *Pearson Science 9 3rd edition eBook* in teacher view and answers to student companion activities are available on the Pearson Places Resource Page (accessed via free Pearson Places account).

Teaching guidance: Topic- and lesson-based teacher support is provided in the Teacher view of Pearson Digital Hub.

Topic-based guidance includes background information, expected student prior knowledge, key ideas from the curriculum, appropriate links to other Pearson Science topics and the common misconceptions and remediations related to the topic.

Lesson/activity guidance includes overviews and specific teaching notes for each activity, risk assessments where needed and solutions for any student online assessments.

Year 9 Suggested timing: approximately 38 teaching weeks

5 weeks: 1 Body systems: Control and coordination
6 weeks: 2 Reproduction and survival of species
6 weeks: 3 Wave and particle models of energy transfer
5 weeks: 4 Conservation of energy and efficiency in systems
4 weeks: 5 Atomic structure and radioactivity
6 weeks: 6 Chemical reactions: Rearranging atoms
6 weeks: 7 The carbon cycle and global systems

Science inquiry toolkit

The science inquiry toolkit includes instructions and examples to support students with their mastery of scientific inquiry. The sections in the toolkit target specific skills and are referenced at potential point of need throughout the Student Book topics, most commonly in practical investigations and inquiry activities.

The content of the *Pearson Science 9* 3rd edition Toolkit is shown below.

1 Questioning and predicting	**4 Evaluating**
1.1 Dependent and independent variables	4.1 Evaluating investigations
1.2 Writing a hypothesis	4.2 Evaluating secondary data
2 Planning and conducting	**5 Communicating**
2.1 Risk assessments	5.1 Using AI in science writing
2.2 Replicates	5.2 Scientific presentations
3 Processing, modelling and analysing	
3.1 Calculating averages (the mean)	
3.2 Range of data in experiments	
3.3 Identifying and describing trends in data	

Topic 3: Wave and particle models of energy transfer

(* = downloadable)

Pearson Science 9 3rd edition student book	Australian Curriculum Content Descriptions	Learning intentions (LI) and success criteria (SC)	*Pearson Digital Hub: Science 9* student resources	*Pearson Digital Hub: Science 9* teacher resources	*Pearson Science 9 Student Companion*
Prior knowledge (page 122)	**Content description for topic:** use wave and particle models to describe energy transfer through different mediums and examine the usefulness of each model for explaining phenomena (AC9S9U04)		**Spark activity**: How old are your ears? Check your prior knowledge	Topic introduction: Wave and particle models of energy transfer teaching notes Prior knowledge solutions	
3.1 Energy of particles and heat conduction (page 123)		**Learning intention:** To understand ways heat energy is conducted from particle to particle in solids, liquids and gases **Success criteria:** SC 1: I can explain that all matter is made up of particles. SC 2: I can explain how particles can pass on heat energy to nearby particles when they collide. SC 3: I can evaluate the usefulness of describing the conduction of heat in terms	**Spark activity**: Changing state Check your understanding Lesson review	Energy of particles and heat conduction fully worked solutions and teaching notes Spark activity teaching notes Check your understanding answers Lesson review answers	3.1 Energy of particles and heat conduction (page 68)

Pearson

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		of particles.			
3.2 Practical investigation: Heat conduction in materials (page 126)	**Science inquiry:** develop reasoned predictions and hypotheses (AC9S9I01) conduct valid investigations to test hypotheses (AC9S9I02)	**Learning intention:** To be able to develop and test a hypothesis and prediction related to heat transfer **Success criteria:** SC 1: I can identify the dependent and independent variables of an investigation. SC 2: I can develop a hypothesis and write a prediction that can be tested. SC 3: I can use data to evaluate whether a hypothesis is supported.	***Practical investigation** and **SPARKlab**: Heat conduction in materials	**Practical investigation** and **SPARKlab**: Heat conduction in materials fully worked solutions, teaching notes, risk assessment, and technician's checklist and recipes	3.2 Practical investigation: Heat conduction in materials (page 71)
3.3 Heat convection (page 128)		**Learning intention:** To understand that heat energy can move through fluids (gases and liquids) by convection **Success criteria:** SC 1: I can explain how temperature affects the density of gases and liquids.	**Spark activity**: Boiling water **SkillBuilder**: Calculating density Check your understanding Lesson review	Heat convection fully worked solutions and teaching notes Spark activity teaching notes Check your understanding answers Lesson review answers	3.3 Heat convection (page 74)

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		SC 2: I can describe how warmer fluids rise and cooler fluids sink to create convection currents. SC 3: I can describe examples of heat convection in the environment.			
3.4 Transfer of electrical energy (page 133)		**Learning intention:** To understand how electrical energy is transferred around a circuit **Success criteria:** SC 1: I can describe an electric current through a metal wire as a flow of electrons powered by a voltage. SC 2: I can describe electric current as a measure of the flow of electrons. SC 3: I can explain how electrical energy can travel through a circuit much faster than the drift velocity of electrons in the conductor.	**Spark activity:** Sparks on opening **SkillBuilder**: Connecting an ammeter Check your understanding Lesson review	Spark activity teaching notes Transfer of electrical energy fully worked solutions and teaching notes Check your understanding answers Lesson review answers	3.4 Transfer of electrical energy (page 78)
3.5 Practical investigation:	**Science inquiry:**	**Learning intention:**	***Practical investigation**: Using resistance to control	**Practical investigation**: Using resistance to	3.5 Practical investigation:

Pearson

Topic 3: Wave and particle models of energy transfer

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Using resistance to control electric current (page 137)	select and use equipment to generate and record data (AC9S9I03)	To be able to use a variation of resistance to change the current in an electrical circuit **Success criteria:** SC 1: I can set up a safe electrical circuit in which resistance can be altered. SC 2: I can use electrical circuit symbols to represent a simple electrical circuit. SC 3: I can explain, with evidence, how variation in resistance controls an output from the circuit.	electric current	control electric current fully worked solutions, teaching notes, risk assessment	Using resistance to control electric current (page 81)
3.6 Longitudinal and transverse waves (page 139)		**Learning intention:** To understand how waves can transfer energy from one place to another **Success criteria:** SC 1: I can explain, using diagrams, how particles move in relation to the direction of transfer of energy in longitudinal waves and transverse waves.	***Worksheet**: The wave equation Check your understanding Lesson review **SkillBuilder**: The wave equation	Longitudinal and transverse waves fully worked solutions and teaching notes The wave equation worksheet fully worked solutions Check your understanding answers Lesson review answers	3.6 Longitudinal and transverse waves (page 84)

Topic 3: Wave and particle models of energy transfer

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		SC 2: I can describe examples of longitudinal and transverse waves. SC 3: I can use the wave equation to relate the speed, wavelength and frequency of a wave.			
3.7 Practical investigation: Investigating sound waves (page 145)	**Science inquiry:** select and use equipment to generate and record data (AC9S9I03) identify and explain patterns and relationships (AC9S9I05)	**Learning intention:** To be able to investigate the behaviour of sound as a type of energy transferred via longitudinal waves **Success criteria:** SC 1: I can use an oscilloscope or oscilloscope app to convert an audible sound wave to a visual transverse wave. SC 2: I can describe the relationship between loudness and the amplitude of the sound wave. SC 3: I can describe the relationship between pitch and the frequency of the sound wave.	***Practical investigation**: Investigating sound waves	**Practical investigation**: Investigating sound waves fully worked solutions, teaching notes, risk assessment	
3.8 Practical investigation:	**Science inquiry:**	**Learning intention:**	***Practical investigation**: Modelling waves	**Practical investigation**: Modelling waves fully	

Pearson

Topic 3: Wave and particle models of energy transfer

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Modelling waves (page 147)	develop hypotheses (AC9S9I01) evaluate the validity of conclusions (AC9S9I06)	To be able to model transverse and longitudinal waves **Success criteria:** SC 1: I can describe what may occur when a spring is stretched or lifted up and down to model waves. SC 2: I can develop investigable questions to explore using a spring to model waves. SC 3: I can evaluate the effectiveness of a spring to model waves.		worked solutions, and teaching notes	
3.9 Electromagnetic radiation (page 148)		**Learning intention:** To understand the nature of electromagnetic waves, including visible light **Success criteria:** SC 1: I can describe the properties of electromagnetic waves, including speed, wavelength and frequency. SC 2: I can describe how the concept of photons can be useful for explaining	**Spark activity**: Remote signals Check your understanding Lesson review	Electromagnetic radiation fully worked solutions and teaching notes Spark activity teaching notes Check your understanding answers Lesson review answers	3.7 Electromagnetic radiation (page 88)

Topic 3: Wave and particle models of energy transfer

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		properties of electromagnetic radiation. SC 3: I can compare different forms of electromagnetic waves in terms of wavelength, frequency or energy of photons.			
3.10 Inquiry activity: Energy transfer and wi-fi (page 153)	**Science as a human endeavour:** investigate how advances in technologies enable advances in science (AC9S9H02) **Science inquiry:** write and create texts to communicate ideas (AC9S9I08)	**Learning intention:** To be able to explore advances in energy transfer technologies such as CSIRO's invention of wi-fi **Success criteria:** SC 1: I can explore how science has contributed to advances in wi-fi technology. SC 2: I can examine ways that energy is transferred through wi-fi. SC 3: I can create an infographic explaining how wi-fi has enabled advances in science.	***Inquiry activity**: Energy transfer and wi-fi	**Inquiry activity**: Energy transfer and wi-fi fully worked solutions and teaching notes	
3.11 Practical investigation: Investigating protection from UV radiation	**Science inquiry:** plan and conduct investigations to test hypotheses	**Learning intention:** To be able to design a way to compare the	***Practical investigation** and **SPARKlab**: Investigating protection from UV radiation	**Practical investigation and SPARKlab**: Investigating protection from UV radiation fully worked solutions,	

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(page 155)	(AC9S9I02) evaluate the validity of claims (AC9S9I06)	effectiveness of ultraviolet (UV) radiation blockers **Success criteria:** SC 1: I can write a conclusion from an investigation that answers questions about the effectiveness of materials in blocking UV radiation. SC 2: I can construct arguments that support or reject claims about the effectiveness of products in blocking UV radiation. SC 3: I can identify possible sources of error in an investigation.		teaching notes, risk assessment, and technician's checklist and recipes	
3.12 Practical investigation: Investigating heat radiation (page 157)	**Science inquiry:** develop hypotheses (AC9S9I01) plan and conduct valid, investigations including identifying and controlling for possible sources of error (AC9S9I02) assess the validity of methods (AC9S9I06)	**Learning intention:** To be able to design a way to compare the ability of materials to radiate heat **Success criteria:** SC 1: I can identify variables that can impact results from an investigation. SC 2: I can design and conduct a safe and valid investigation to compare the	***Practical investigation** and **SPARKlab**: Investigating heat radiation	***Practical investigation** and **SPARKlab**: Investigating heat radiation fully worked solutions, teaching notes, and risk assessment	3.8 Practical investigation: Investigating heat radiation (page 91)

Topic 3: Wave and particle models of energy transfer

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		ability of materials to radiate heat. SC 3: I can assess the validity of a method in an investigation.			
Topic review (page 159)			Topic review: Wave and particle models of energy transfer assessment questions	Topic review: Wave and particle models of energy transfer assessment solutions	Topic review