

# Australian Curriculum - Year 9

## Introduction:

This document maps Education Perfect lessons to the Australian Curriculum. When a lesson covers both science understanding standards and science as a human endeavour or science inquiry skills standards, it will be listed in both sections.

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# Science Understanding

## Key:

-  Lessons that address the science understanding standard.
-  Lessons that elaborate or extend above and beyond the curriculum.
-  Lessons that also fulfil science as a human endeavour standards.
-  Lessons that also fulfil science inquiry skills standards.









## Biological Sciences

### Relevant section of the science achievement standard:

By the end of Year 9, students ... analyse how biological systems function and respond to external changes with reference to interdependencies, energy transfers and flows of matter.

### Standards:

**Multi-cellular organisms rely on coordinated and interdependent internal systems to respond to changes to their environment. ([ACSSU175](#))**

 <a href="#">Basics of Homeostasis</a>	A Smart Lesson explaining what homeostasis is and why it is important.
 <a href="#">Homeostatic Terms</a>	A Smart Lesson explaining what the terms variable, set point and reference range mean in the context of homeostasis.
 <a href="#">Stimulus-Response Model</a>	A Smart Lesson detailing how the stimulus-response model helps the body maintain homeostasis.
 <a href="#">Negative and Positive Feedback</a>	A Smart Lesson explaining what negative and positive feedback are.
 <a href="#">Control Systems</a>	A Smart Lesson introducing the body's two control systems: the nervous system and endocrine system.
 <a href="#">The Nervous System</a>	A Smart Lesson introducing the central and peripheral nervous systems.
 <a href="#">The Neuron</a>	A Smart Lesson introducing the different components and types of a neuron.
 <a href="#">Nerve Pathways</a>	A Smart Lesson introducing voluntary and involuntary movements, reflexes and nerve pathways.

	<a href="#"><u>Sensory Receptors and the Eye</u></a>	A Smart Lesson explaining how the parts of the eye enable it to function.
	<a href="#"><u>The Endocrine System</u></a>	A Smart Lesson introducing the endocrine system, including the main endocrine glands of the human body.
	<a href="#"><u>Endocrine System in Action</u></a>	A Smart Lesson introducing the pancreas and how the hormones it secretes control blood glucose levels.
	<a href="#"><u>Immune System</u></a>	A Smart Lesson introducing the immune system and the three lines of immune defence.
	<a href="#"><u>First &amp; Second Lines of Defence</u></a>	A Smart Lesson explaining the first and second lines of immune defence, the inflammatory response in particular.
	<a href="#"><u>Third Line of Defence &amp; Lymphatic System</u></a>	A Smart Lesson introducing the lymphatic system and the third line of defence.
	<a href="#"><u>What are Diseases?</u></a>	A Smart Lesson introducing diseases, different types of disease and the difference between infectious and non-infectious diseases.
	<a href="#"><u>What are Pathogens?</u></a>	A Smart Lesson introducing different types of pathogens.
	<a href="#"><u>Cancer</u></a>	A Smart Lesson on cancer, the effects it has on the body and methods of prevention and treatment.
	<a href="#"><u>Chickenpox</u></a>	A Smart Lesson on chickenpox, the effects it has on the body and methods of prevention and treatment.
	<a href="#"><u>Malaria</u></a>	A Smart Lesson on malaria, the effects it has on the body and methods of prevention and treatment.
	<a href="#"><u>Degenerative Diseases</u></a>	A Smart Lesson teaching how degenerative diseases, such as Multiple Sclerosis and Parkinson's Disease, affect the nervous system.
	<a href="#"><u>Endocrine Diseases</u></a>	A Smart Lesson teaching what the endocrine system does and what happens when it does not function properly.
	<a href="#"><u>Pathogens</u></a>	A Smart Lesson teaching about various pathogens, including viruses, fungi, parasites and prions.
	<a href="#"><u>Starfish Nervous System</u></a>	A Smart Lesson comparing the Starfish's unusual nervous system to that of humans.
	<a href="#"><u>Disease Treatment</u></a>	Smart Lesson about ways to treat or control the spread of infectious diseases, including vaccination, antibiotics, and good hygiene practices.
	<a href="#"><u>How are Diseases Spread?</u></a>	A Smart Lesson explaining how diseases are spread.
	<a href="#"><u>Eye Dissection</u></a>	An investigation where students dissect a cow eye and identify the key structures.
	<a href="#"><u>Kidney Dissection</u></a>	An investigation where students dissect a kidney and identify the key structures.
	<a href="#"><u>Testing Reflexes</u></a>	An investigation where students explore the knee-jerk reflex as an example of a reflex arc.
	<a href="#"><u>The History of Disease</u></a>	A history lesson describing some of the ways ancient humans thought diseases were caused, and how these ideas evolved over time. This lesson can be used to improve students' reading comprehension.


[Body Temperature](#)

Lesson presents data on human body temperature changes when exposed to different temperatures for students to interpret.


[Regulating Blood Glucose Levels](#)

Lesson presents data on how blood glucose and insulin levels change throughout the day for students to interpret.

**Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these system. ([ACSSU176](#))**


[Introduction to Ecology](#)

A smart lesson introducing ecology and ecosystems.


[The Biosphere and Biomes](#)

Smart Lesson describing the biosphere and its division into biomes.


[Species and Organisms](#)

Smart Lesson on organisms, species and hybrids.


[Parts of an Ecosystem](#)


An introduction to abiotic and biotic factors.


[Abiotic Factors](#)

Smart Lesson describing the important abiotic factors that impact on ecosystems.


[Biotic Factors and Competition](#)

Biotic factors in ecosystems, with a focus on competition between and within species.


[Symbiosis](#)

Three types of symbiosis: mutualism, commensalism and parasitism.


[Adaptations](#)

Smart Lesson on the three main types of adaptations, with specific examples relating to ectothermy and endothermy in animals.


[Producers](#)

Smart Lesson on producers, and how they use photosynthesis to make energy.


[Consumers and Decomposers](#)

Smart Lesson on consumers, decomposers and detritivores.


[Food Chains and Food Webs](#)

A Smart Lesson explaining food chains and food webs.


[Trophic Levels](#)

Smart Lesson introducing the concepts of trophic levels and energy pyramids.


[The Carbon Cycle](#)

Smart Lesson on the importance of carbon in ecosystems and how it is recycled.


[Biodiversity](#)

Smart Lesson on the meaning and significance of biodiversity.


[Bushfires](#)

Smart Lesson describing the causes and consequences of bushfires in Australia.


[Drought](#)















Smart Lesson describing the causes and consequences of droughts, and how species have adapted to deal with them.


[Flooding](#)

Smart Lesson describing the consequences of flooding, both positive and negative.


[The Greenhouse Effect](#)

Smart Lesson on chemical compounds used by humans that have substantial impacts on ecosystems, including oil, pesticides and greenhouse gas emissions.

 <a href="#">The Nitrogen Cycle</a>	Smart Lesson on the importance of nitrogen in ecosystems and how it is recycled.
 <a href="#">Human Impacts</a>	Smart Lesson introducing biodiversity, and the impacts of European farming, over cropping and pest control on it.
 <a href="#">Invasive Species</a>	Smart Lesson introducing the ideas about what makes an introduced species invasive and the impacts of invasive species on ecosystems including specific Australian examples.
 <a href="#">Oil Spills</a>	Smart Lesson on how oil spills affect ecosystems.
 <a href="#">Pesticides</a>	Smart Lesson on how pesticides affect ecosystems.
 <a href="#">Predicting Population Changes</a>	Smart Lesson on how we can use food webs to predict how populations recover after a disaster, such as a bushfire.
 <a href="#">Designing Experiments on Pollution</a>	In this lesson, students plan an experiment to study the effects of pollution on plants. After this lesson, students should move on to the lesson Writing a Scientific Report.
 <a href="#">Writing a Scientific Report</a>	This lesson follows on from the lesson Designing Experiments on Pollution. In this lesson, students will carry out their previously planned experiment and write a scientific report on it.
 <a href="#">Photosynthesis and Starch</a>	In this lesson, students extract starch - a product of photosynthesis - from leaves.
 <a href="#">Different Perspectives on Mining</a>	This lesson explains what mining is and how it influences the Australian economy and ecosystems. It is intended this lesson will be completed before starting the lesson "Research Project - The Carmichael Coal Mine".
 <a href="#">Researching the Carmichael Coal Mine</a>	In this lesson, students research the controversial Carmichael coal mine and write a report supporting or condemning it. The smart lesson "Different Perspectives on Mining" can be assigned to give students an introduction to mining in Australia.
 <a href="#">Sampling a Leaf Litter Ecosystem</a>	Students collect leaf litter samples and compare the invertebrates present at different depths. They measure the temperature and humidity at each depth, and use these abiotic factors to propose explanations for changes in the invertebrate community.
 <a href="#">Adapting for Survival</a>	Smart Lesson introduces some examples of adaptations for survival in the animal kingdom. This lesson can be used to improve reading comprehension in students.
 <a href="#">Predator-Prey Dynamics</a>	Data is presented on predator-prey relationships in order to understand the flow of population in an ecosystem.
















## Chemical Sciences









### Relevant section of the science achievement standard:

By the end of Year 9, students explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions.










### Standards:






All matter is made of atoms that are composed of protons, neutrons and electrons; natural radioactivity arises from the decay of nuclei in atoms. ([ACSSU177](#))

 <a href="#">What are Atoms, Elements and Compounds?</a>	A review of Year 8 concepts of atoms, elements, and compounds for Australian Year 9 students.
 <a href="#">The Structure of an Atom</a>	Introduction to the structure of atoms and properties of subatomic particles for Year 9 Australian students.
 <a href="#">Atomic Symbols</a>	How to determine the number of each subatomic particle in an atom by using atomic and mass numbers.
 <a href="#">What are Isotopes?</a>	An introduction to isotopes (what they are and how to name them) and relative atomic mass.
 <a href="#">The Periodic Table</a>	Introduction to how elements are grouped in the Periodic Table.
 <a href="#">What are Ions?</a>	Introduction to ions including what they are, how they form, and how to name them.
 <a href="#">Ionic Compounds</a>	Smart Lesson introducing ionic bonds and the structure and properties of ionic compounds.
 <a href="#">Ions in Solution</a>	Smart Lesson on how ions behave in solution, including solubility, recrystallisation and electrical conductivity.
 <a href="#">Naming Ionic Compounds</a>	Smart Lesson on how to name ionic compounds and write ionic formulae.
 <a href="#">What is Radioactivity?</a>	An introduction to radioactivity and radioisotopes.
 <a href="#">Half-Lives</a>	Smart Lesson on how to calculate half-lives and how carbon dating works.
 <a href="#">Nuclear Bombs</a>	An explanation of nuclear bombs with a focus on Hiroshima.
 <a href="#">Nuclear Fission</a>	Smart Lesson on nuclear fission and the difference between controlled and uncontrolled chain reactions.
 <a href="#">Nuclear Power</a>	Introduction to nuclear power plants with a focus on the Chernobyl disaster.
 <a href="#">Types of Radiation 1</a>	Smart Lesson describing alpha, beta and gamma radiation.














 <a href="#">Types of Radiation 2</a>	Smart Lesson looking at the properties of each of the three types of radiation, specifically their penetrating abilities and ionising abilities.
 <a href="#">Writing Nuclear Equations</a>	How to write nuclear equations for alpha and beta decay reactions.
 <a href="#">Effect of Radiation on Humans</a>	Smart Lesson about the effects of ionising radiation on humans, and the importance of the dose.
 <a href="#">Models of the Atom</a>	History of the different models of the atom and the experiments leading to new models.
 <a href="#">Radioactivity in Industry</a>	Smart Lesson on some of the uses of radioactivity in industry, including smoke alarms, detecting the thickness of materials, irradiation and detecting leaks in underground pipes.
 <a href="#">Radioactivity in Medicine</a>	Smart Lesson on the uses of radioactivity in medicine, including nuclear imaging and radiotherapy.
 <a href="#">Build an Atom</a>	Investigation where students build a model of an atom out of lollies and explain how the relative sizes and charges of the subatomic particles are represented.
 <a href="#">Skittle Half Lives</a>	Investigation where students shake a bag of skittles, dump it out and remove the skittles that land face up. This is repeated in order to model a half-life.

**Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed.**  
**[\(ACSSU178\)](#)**

 <a href="#">Introduction to Chemical Reactions</a>	A lesson that introduces what chemical reactions are. Includes how to identify chemical reactions, a recap from year 8 Australia, and what happens during a chemical reaction.
 <a href="#">Reactants and Products</a>	Smart Lesson explaining the differences between reactants and products using everyday examples. Investigation using baking soda and vinegar.
 <a href="#">Writing Chemical Equations 1</a>	A basic intro lesson on how to write chemical equations, focusing on how to write word equations. Includes exercise of writing equations from videos of exciting chemical reactions.
 <a href="#">Writing Chemical Equations 2</a>	How to write formula equations: recap chemical symbols learn how to write chemical formula and formula equations. Some extension information on structural formula.
 <a href="#">Conservation of Mass</a>	Smart Lesson on the concept of the Conservation of Mass.
 <a href="#">Balancing Equations</a>	Smart Lesson in which students can practice balancing equations.
 <a href="#">A Day in the Life of an Industrial Chemist</a>	Smart Lesson explaining what industrial chemists do and what it takes to become one.
 <a href="#">Fermentation</a>	Smart Lesson explaining how fermentation can be used to make bread and other foods, drinks and fuels.
 <a href="#">The Father of Modern Chemistry</a>	A biography on Antoine Lavoisier, explaining who he was and his contribution to chemistry: precise laboratory techniques and the law of conservation of mass.

 <a href="#">Waste Management</a>	Smart Lesson explaining what waste products are and how, as a society, we can manage them. Emphasis is put on car exhaust and industrial waste.
 <a href="#">Conservation of Mass</a>	Students perform three reactions. In each reaction, they weight the reactants and products to find that mass has been conserved.
 <a href="#">Identifying Chemical Reactions</a>	Students carry out a number of physical and chemical changes. Among these, they must identify which are chemical reactions.
 <a href="#">Make Your Own Forge</a>	Students use a Bunsen burner to anneal and temper paperclips. They then compare their durability to unmodified paperclips.
 <a href="#">Marshmolecules</a>	Students build models of molecules using marshmallows, then modify these molecules to represent chemical reactions. This helps students visualise how the same atoms are present in the reactants as in the products.

**Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer. ([ACSSU179](#))**

 <a href="#">Acids</a>	Smart Lesson introducing the concept of acids, and how they dissolve, plus their strength.
 <a href="#">Bases</a>	Smart Lesson introducing the concept of bases, and how they dissolve, plus their strength.
 <a href="#">Indicators</a>	Smart Lesson on the pH scale, indicators, and how they are used to identify whether a substance is acidic or basic.
 <a href="#">Acid-Metal Reactions</a>	Smart lesson on the reactions between acid and metals. Also introduces concept of salts.
 <a href="#">Neutralisation Reactions</a>	Smart lesson on neutralisation reactions and how to name the salts produced in this reaction
 <a href="#">Endothermic and Exothermic Reactions</a>	Smart lesson on the difference between endothermic and exothermic reactions, and which types of reaction respiration and photosynthesis are.
 <a href="#">Combustion Reactions</a>	Smart lesson explaining how combustion works. It includes an explanation of incomplete combustion.
 <a href="#">Oxidation Reactions</a>	Smart Lesson explaining what oxidation reactions are with examples.
 <a href="#">Types of Chemical Reactions</a>	Smart Lesson introducing decomposition, synthesis and single and double displacement reactions.
 <a href="#">Acid Rain: Reactions Around Us</a>	Smart lesson on the causes of acid rain and the effects it has on the environment.
 <a href="#">Combustion and the Environment</a>	Smart lesson on the Greenhouse Effect and how human activities have contributed to it.
 <a href="#">Photosynthesis: Reactions Around Us</a>	Smart lesson on photosynthesis.
 <a href="#">Respiration: Reactions Around Us</a>	Smart lesson on respiration.



 [Acids and Metals](#)

In this investigation, students observe how hydrochloric acid can react with magnesium.

 [Acids and Bases](#)

Smart Lesson on acids and bases and their uses. This lesson can be used to improve reading comprehension.













## Earth and Space Sciences
















### Relevant section of the science achievement standard:

By the end of Year 9, students ... explain global features and events in terms of geological processes and timescales.

### Standards:

The theory of plate tectonics explains global patterns of geological activity and continental movement. ([ACSSU180](#))

 <a href="#">Igneous Rocks</a>	A recap of igneous rocks and the processes that form them.
 <a href="#">Metamorphic Rocks</a>	A recap of metamorphic rocks and the processes that form them.
 <a href="#">Sedimentary Rocks</a>	A recap of sedimentary rocks and the processes that form them.
 <a href="#">Compositional Layers of the Earth</a>	Smart Lesson on the Earth's layers.
 <a href="#">Wegener's Theory of Continental Drift</a>	Smart Lesson on the theory proposed by Alfred Wegener.
 <a href="#">Seafloor Spreading and Hess' Theory</a>	Smart Lesson on how Hess and colleagues used magnetic striping to support the theory of seafloor spreading.
 <a href="#">Plate Tectonics</a>	Mechanical layers of the Earth and how they interact in plate tectonics.
 <a href="#">Divergent Plate Boundaries</a>	Smart Lesson on divergent plate boundaries, seafloor spreading and magnetic striping.
 <a href="#">Convergent Plate Boundaries</a>	Smart Lesson on convergent plate boundaries, subduction zones and mountain building.
 <a href="#">Transform Boundaries and Faults</a>	Smart Lesson on types of fault lines and the landforms they produce.
 <a href="#">Formation of Volcanoes</a>	Smart Lesson on types of volcanoes and the tectonic processes that form them.
 <a href="#">Types of Lava</a>	Smart Lesson on types of lava and their effects on volcanic eruptions.

	<a href="#">Volcanic Hazards</a>	Effects of volcanic eruptions on people, the environment and global climate.
	<a href="#">Earthquakes</a>	Smart Lesson on earthquakes and seismic waves, and how they are formed.
	<a href="#">Measuring Earthquakes</a>	How seismographs work; magnitude and intensity of earthquakes.
	<a href="#">Seismic Hazards</a>	Smart Lesson on the recent earthquakes in Japan and New Zealand, with a focus on tsunamis, liquefaction and other associated hazards.
	<a href="#">Earth's Magnetic Field</a>	Short Smart Lesson on the Earth's magnetic field.
	<a href="#">Geological Time</a>	The concept of deep time and the Geological Timescale.
	<a href="#">Development of the Geological Timescale</a>	A history lesson on how humanity came to understand how old the Earth is, and why our modern geological timescale is organised the way it is.
	<a href="#">Evidence of the Earth's Structure</a>	An introduction to techniques used by scientists to probe the inner Earth.
	<a href="#">Supercontinents</a>	A Smart Lesson on how the ancient supercontinent of Pangea turned into the seven continents we know today.
	<a href="#">Volcano Exploration Robots</a>	A Smart Lesson exploring how small robots can be used to help explore and study volcanoes.
	<a href="#">Build a Seismometer</a>	An investigation where students learn what a seismometer is and how to make one from household materials.
	<a href="#">Deep Time and Plate Tectonics</a>	In this investigation, students research how the Earth's tectonic plates have moved over time, and from this make a timeline.
	<a href="#">Ice Tectonics of Europa</a>	A Smart Lesson on tectonic processes on the moon Europa. This lesson can be used to improve reading comprehension in students.
	<a href="#">Subduction Zones and Ophiolite Belts</a>	A Smart Lesson on ophiolite: a product of some subduction zones. This lesson can be used to improve reading comprehension in students.
	<a href="#">Understanding Megaquakes</a>	Lesson provides data on the largest earthquakes in recorded history for students to interpret.
















## Physical Sciences

### Relevant section of the science achievement standard:






By the end of Year 9, students ... describe models of energy transfer and apply these to explain phenomena.














### Standards:

Energy transfer through different mediums can be explained using wave and particle models. ([ACSSU182](#))

 <a href="#">Heat Transfer</a>	Overview of conduction, convection, and radiation. All concepts covered in this Smart Lesson are explained in detail in the other lessons in this folder.
 <a href="#">Conduction</a>	Smart lesson on heat transfer via conduction with a focus on how this relates to the particle model.
 <a href="#">Convection</a>	Explanation of convection as a method of heat transfer.
 <a href="#">Radiation</a>	Explanation of radiation as a method of heat transfer and how different coloured objects absorb different amounts of radiation.
 <a href="#">Conductors and Insulators</a>	Introduction to conductors and insulators with some common examples.
 <a href="#">Bushfires</a>	Putting the importance of heat and heat transfer into context using Australian bushfires.
 <a href="#">Housing Insulation</a>	Explaining how insulation can be used to prevent heat from entering or exiting a house, keeping it a comfortable temperature year-round.
 <a href="#">Convection in Liquids</a>	An investigation into convection of water as it is heated.
 <a href="#">Heat Conduction</a>	An investigation into heat conduction that also illustrates that different materials conduct heat at different rates.
 <a href="#">Insulators</a>	Investigation into the insulating properties of different materials and an everyday use of insulators.
 <a href="#">Radiation</a>	An investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.
 <a href="#">Sound</a>	An overview of sound waves including how they are formed, pitch, and loudness.
 <a href="#">Sound Formation</a>	Introduction to how sound waves are formed and why they must travel through a medium.
 <a href="#">Pitch and Loudness</a>	Explanation of how the pitch and loudness of a sound wave are determined by its frequency and amplitude.
 <a href="#">Hearing Sound</a>	Explanation of how our ears enable us to interpret vibrations in the ear as sound.

 <a href="#">Australian Aboriginal Music</a>	Explanation of how traditional Aboriginal instruments produce sound.
 <a href="#">Bionic Ears</a>	Explanation of how cochlear implants can restore hearing.
 <a href="#">Turned Down for What: Workplace Noise</a>	Overview of why it is important to maintain safe noise levels in the workplace, in order to prevent hearing loss.
 <a href="#">Musical Bottles</a>	An investigation in which students make musical instruments out of glass bottles.
 <a href="#">Slinky Waves</a>	An investigation in which students use a slinky to explore the difference between longitudinal and transverse waves.
 <a href="#">Speed of Sound</a>	An investigation in which students measure the speed of sound.
 <a href="#">Straw Instruments</a>	An investigation into the importance of resonance frequency in music.
 <a href="#">Ultrasound</a>	Reading comprehension lesson on ultrasound and its uses.
 <a href="#">Light as a Wave</a>	Introduction to light as a transverse wave with a frequency and wavelength.
 <a href="#">Colour</a>	Smart Lesson on how different frequencies of light are different colours, white light, and how we see light.
 <a href="#">Materials</a>	Introduction to transparent, translucent, and opaque materials.
 <a href="#">Reflection</a>	Smart Lesson on the Law of Reflection and how images form in plane mirrors.
 <a href="#">Refraction</a>	Introduction to refraction and refractive indices.
 <a href="#">Total Internal Reflection</a>	Introduction to total internal reflection.
 <a href="#">Lenses</a>	Comprehensive lesson on lenses which includes the nature of images and practice drawing ray diagrams.
 <a href="#">Light: Summary</a>	Summary of light. All concepts mentioned here are covered in greater detail in the other Smart Lessons in this folder.
 <a href="#">Curved Mirrors</a>	Reflection of light by concave and convex mirrors.
 <a href="#">Plane Mirrors and Reflection</a>	Reflection of light and plane mirrors.
 <a href="#">Snell's Law</a>	Introduction to how to use Snell's Law to calculate the critical angle.
 <a href="#">The Electromagnetic Spectrum</a>	In this Smart Lesson, students what the electromagnetic spectrum. They learn how wavelength affects the qualities and visibility of waves on this spectrum, and how forms of electromagnetic radiation have different applications.
 <a href="#">Bionic Eye</a>	Explaining how an artificial eye could work, and what research is being done into the concept.
 <a href="#">Electromagnetic Radiation and Medicine</a>	Explanation of how electromagnetic radiation can be used to detect and treat cancer.

 <a href="#">The History of Lenses</a>	Explanation of the development of lenses and how they are used in telescopes, microscopes and cameras.
 <a href="#">You, Me and UV</a>	Explanation of how UV can result in skin cancer and why it is important to practice good sun protection.
 <a href="#">Build a Periscope</a>	A practical investigation into the uses of reflection where students build a working periscope.
 <a href="#">Colourful Candy</a>	An investigation into why we see colour and the interaction of coloured light with coloured objects.
 <a href="#">Law of Reflection</a>	An investigation into the Law of Reflection and reflection from plane mirrors.
 <a href="#">Lenses</a>	Investigation into concave and convex lenses.
 <a href="#">Refraction</a>	An investigation into how the refraction of light and refractive indices can be used to determine the material that a transparent block is made out of.
 <a href="#">Electricity</a>	An overview of electricity. This Smart Lesson covers current, resistance and voltage, as well as series and parallel circuits.
 <a href="#">Electric Circuits</a>	Introduction to energy transfer in electric circuits and symbols of common circuit components.
 <a href="#">Current</a>	An explanation of electrical current and ammeters.
 <a href="#">Resistance</a>	Introduction to resistance in circuit components and wires.
 <a href="#">Voltage</a>	Introduction to voltage, voltmeters and voltage drops.
 <a href="#">Introduction to Ohm's Law</a>	Introduction to how current, resistance and voltage are related through Ohm's Law.
 <a href="#">Batteries</a>	Introduction to batteries with a focus on the difference between wet cell and dry cell batteries.
 <a href="#">Conductors and Insulators</a>	An explanation of conductors and insulators, and how they are used in circuits.
 <a href="#">Circuits in Series</a>	Introduction to series circuits with a focus on current and voltage across circuit components.
 <a href="#">Circuits in Parallel</a>	Introduction to parallel circuits with an explanation of how current and voltage act in these circuits.
 <a href="#">Circuits Comparison</a>	Smart Lesson comparing series and parallel circuits with a focus on lightbulb brightness and switch usage.
 <a href="#">Calculations Using Ohm's Law</a>	Practice calculating voltage, current and resistance using Ohm's Law.
 <a href="#">The Sixth Sense: Electoreception</a>	A Smart Lesson on how some animals can detect electrical currents.
 <a href="#">War of the Currents</a>	A history lesson on how Edison and Tesla competed with each other to dominate the newly emerged electrical market in 19 <sup>th</sup> century America.
 <a href="#">Battery Voltages</a>	An investigation where students measure the voltages on a range of batteries and compare this to the advertised voltages.
 <a href="#">Building Circuits</a>	Investigation into lightbulbs in series and parallel circuits.
 <a href="#">Ohm's Law</a>	Investigation into Ohm's Law in a simple circuit.

 <a href="#">Resistance</a>	An investigation where students compare the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
 <a href="#">Static Electricity</a>	An investigation into static electricity and how it can be used to levitate objects.
 <a href="#">Development of Lightbulbs</a>	A Smart Lesson on the development of light bulbs to improve reading comprehension.
 <a href="#">Cell Phones</a>	Explanation of how microwaves are used to transmit calls made on cell phones.
 <a href="#">Internet</a>	Explanation of how analogue and digital signals are used to transmit information and connect to the internet.
 <a href="#">Radio Waves</a>	Explanation of radio waves and the difference between AM and FM signals.
 <a href="#">X-rays</a>	Explanation of how we can use x-rays, how they can harm us and how radiographers protect themselves from x-rays.
 <a href="#">Radar</a>	Explanation of how radar works and why it is useful.
 <a href="#">Working in Physics</a>	Introduction into different jobs related to physics and how to become a physicist.
 <a href="#">Energy in Classrooms</a>	Research investigation into how light, heat, sound, wifi and devices impact on the classroom environment.
 <a href="#">Optical Fibres</a>	Investigation into how optical fibres are used to communicate.
 <a href="#">Radio Wave Blockers</a>	Investigation into whether radio waves can be blocked by various materials.
 <a href="#">History of Radio Communication</a>	A Smart Lesson on the history of radio communication. This lesson is designed to improve reading comprehension.

# Science as a Human Endeavour

## Relevant section of the science achievement standard:

By the end of Year 9, students ... describe social and technological factors that have influenced scientific developments and predict how future applications of science and technology may affect people's lives.

## Nature and Development of Science

Scientific understanding, including models and theories, is contestable and is refined over time through a process of review by the scientific community. ([ACSHE157](#))

<a href="#">The History of Disease</a>	A history lesson describing some of the ways ancient humans thought diseases were caused, and how these ideas evolved over time. This lesson can be used to improve students' reading comprehension.
<a href="#">Predicting Population Changes</a>	Smart Lesson on how we can use food webs to predict how populations recover after a disaster, such as a bushfire.
<a href="#">Models of the Atom</a>	History of the different models of the atom and the experiments leading to new models.
<a href="#">The Father of Modern Chemistry</a>	A biography on Antoine Lavoisier, explaining who he was and his contribution to chemistry: precise laboratory techniques and the law of conservation of mass.
<a href="#">Development of the Geological Timescale</a>	A history lesson on how humanity came to understand how old the Earth is, and why our modern geological timescale is organised the way it is.
<a href="#">Evidence of the Earth's Structure</a>	An introduction to techniques used by scientists to probe the inner Earth.
<a href="#">Supercontinents</a>	A Smart Lesson on how the ancient supercontinent of Pangea turned into the seven continents we know today.
<a href="#">Ice Tectonics of Europa</a>	A Smart Lesson on tectonic processes on the moon Europa. This lesson can be used to improve reading comprehension in students.
<a href="#">Subduction Zones and Ophiolite Belts</a>	A Smart Lesson on ophiolite: a product of some subduction zones. This lesson can be used to improve reading comprehension in students.
<a href="#">Bushfires</a>	Putting the importance of heat and heat transfer into context using Australian bushfires.
<a href="#">The History of Lenses</a>	Explanation of the development of lenses and how they are used in telescopes, microscopes and cameras.

[War of the Currents](#)

A history lesson on how Edison and Tesla competed with each other to dominate the newly emerged electrical market in 19th century America.

[Development of Lightbulbs](#)

A Smart Lesson on the development of light bulbs to improve reading comprehension.

[History of Radio Communication](#)

A Smart Lesson on the history of radio communication. This lesson is designed to improve reading comprehension.

[What is Science?](#)

Smart lesson introducing science and the related sub-fields.

**Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries. (ACSHE158)**

[Radioactivity in Industry](#)

Smart Lesson on some of the uses of radioactivity in industry, including smoke alarms, detecting the thickness of materials, irradiation and detecting leaks in underground pipes.

[Radioactivity in Medicine](#)

Smart Lesson on the uses of radioactivity in medicine, including nuclear imaging and radiotherapy.

[The Father of Modern Chemistry](#)

A biography on Antoine Lavoisier, explaining who he was and his contribution to chemistry: precise laboratory techniques and the law of conservation of mass.

[Development of the Geological Timescale](#)

A history lesson on how humanity came to understand how old the Earth is, and why our modern geological timescale is organised the way it is.

[Evidence of the Earth's Structure](#)

An introduction to techniques used by scientists to probe the inner Earth.

[Supercontinents](#)

A Smart Lesson on how the ancient supercontinent of Pangea turned into the seven continents we know today.

[Volcano Exploration Robots](#)

A Smart Lesson exploring how small robots can be used to help explore and study volcanoes.

[Ice Tectonics of Europa](#)

A Smart Lesson on tectonic processes on the moon Europa. This lesson can be used to improve reading comprehension in students.

[Subduction Zones and Ophiolite Belts](#)

A Smart Lesson on ophiolite: a product of some subduction zones. This lesson can be used to improve reading comprehension in students.

[The History of Lenses](#)

Explanation of the development of lenses and how they are used in telescopes, microscopes and cameras.

[War of the Currents](#)

A history lesson on how Edison and Tesla competed with each other to dominate the newly emerged electrical market in 19th century America.

[Development of Lightbulbs](#)

A Smart Lesson on the development of light bulbs to improve reading comprehension.

[Radar](#)

Explanation of how radar works and why it is useful.



[History of Radio Communication](#)

A Smart Lesson on the history of radio communication. This lesson is designed to improve reading comprehension.

## Use and Influence of Science

People use scientific knowledge to evaluate whether they accept claims, explanations or predictions, and advances in science can affect people's lives, including generating new career opportunities. (ACSH160)

<u><a href="#">Disease Treatment</a></u>	Smart Lesson about ways to treat or control the spread of infectious diseases, including vaccination, antibiotics, and good hygiene practices.
<u><a href="#">The History of Disease</a></u>	A history lesson describing some of the ways ancient humans thought diseases were caused, and how these ideas evolved over time. This lesson can be used to improve students' reading comprehension.
<u><a href="#">Human Impacts</a></u>	Smart Lesson introducing biodiversity, and the impacts of European farming, over cropping and pest control on it.
<u><a href="#">Invasive Species</a></u>	Smart Lesson introducing the ideas about what makes an introduced species invasive and the impacts of invasive species on ecosystems including specific Australian examples.
<u><a href="#">Oil Spills</a></u>	Smart Lesson on how oil spills affect ecosystems.
<u><a href="#">Pesticides</a></u>	Smart Lesson on how pesticides affect ecosystems.
<u><a href="#">Predicting Population Changes</a></u>	Smart Lesson on how we can use food webs to predict how populations recover after a disaster, such as a bushfire.
<u><a href="#">Different Perspectives on Mining</a></u>	This lesson explains what mining is and how it influences the Australian economy and ecosystems. It is intended this lesson will be completed before starting the lesson "Research Project - The Carmichael Coal Mine".
<u><a href="#">Effect of Radiation on Humans</a></u>	Smart Lesson about the effects of ionising radiation on humans, and the importance of the dose.
<u><a href="#">Radioactivity in Industry</a></u>	Smart Lesson on some of the uses of radioactivity in industry, including smoke alarms, detecting the thickness of materials, irradiation and detecting leaks in underground pipes.
<u><a href="#">Radioactivity in Medicine</a></u>	Smart Lesson on the uses of radioactivity in medicine, including nuclear imaging and radiotherapy.
<u><a href="#">A Day in the Life of an Industrial Chemist</a></u>	Smart Lesson explaining what industrial chemists do and what it takes to become one.
<u><a href="#">Fermentation</a></u>	Smart Lesson explaining how fermentation can be used to make bread and other foods, drinks and fuels.

<a href="#"><u>Waste Management</u></a>	Smart Lesson explaining what waste products are and how, as a society, we can manage them. Emphasis is put on car exhaust and industrial waste.
<a href="#"><u>Acid Rain: Reactions Around Us</u></a>	Smart lesson on the causes of acid rain and the effects it has on the environment.
<a href="#"><u>Combustion and the Environment</u></a>	Smart lesson on the Greenhouse Effect and how human activities have contributed to it.
<a href="#"><u>Photosynthesis: Reactions Around Us</u></a>	Smart lesson on photosynthesis.
<a href="#"><u>Respiration: Reactions Around Us</u></a>	Smart lesson on respiration.
<a href="#"><u>Acids and Bases</u></a>	Smart Lesson on acids and bases and their uses. This lesson can be used to improve reading comprehension.
<a href="#"><u>Bushfires</u></a>	Putting the importance of heat and heat transfer into context using Australian bushfires.
<a href="#"><u>Housing Insulation</u></a>	Explaining how insulation can be used to prevent heat from entering or exiting a house, keeping it a comfortable temperature year-round.
<a href="#"><u>Australian Aboriginal Music</u></a>	Explanation of how traditional Aboriginal instruments produce sound.
<a href="#"><u>Bionic Ears</u></a>	Explanation of how cochlear implants can restore hearing.
<a href="#"><u>Ultrasound</u></a>	Reading comprehension lesson on ultrasound and its uses.
<a href="#"><u>Bionic Eye</u></a>	Explaining how an artificial eye could work, and what research is being done into the concept.
<a href="#"><u>Electromagnetic Radiation and Medicine</u></a>	Explanation of how electromagnetic radiation can be used to detect and treat cancer.
<a href="#"><u>The History of Lenses</u></a>	Explanation of the development of lenses and how they are used in telescopes, microscopes and cameras.
<a href="#"><u>You, Me and UV</u></a>	Explanation of how UV can result in skin cancer and why it is important to practice good sun protection.
<a href="#"><u>War of the Currents</u></a>	A history lesson on how Edison and Tesla competed with each other to dominate the newly emerged electrical market in 19th century America.
<a href="#"><u>Development of Lightbulbs</u></a>	A Smart Lesson on the development of light bulbs to improve reading comprehension.
<a href="#"><u>Radar</u></a>	Explanation of how radar works and why it is useful.
<a href="#"><u>Working in Physics</u></a>	Introduction into different jobs related to physics and how to become a physicist.
<a href="#"><u>History of Radio Communication</u></a>	A Smart Lesson on the history of radio communication. This lesson is designed to improve reading comprehension.
<a href="#"><u>Careers in Science</u></a>	Smart lesson detailing the variety of careers that use science.

**Values and needs of contemporary society can influence the focus of scientific research. ([ACSHE228](#))**

<a href="#">Pesticides</a>	Smart Lesson on how pesticides affect ecosystems.
<a href="#">Different Perspectives on Mining</a>	This lesson explains what mining is and how it influences the Australian economy and ecosystems. It is intended this lesson will be completed before starting the lesson "Research Project - The Carmichael Coal Mine".
<a href="#">A Day in the Life of an Industrial Chemist</a>	Smart Lesson explaining what industrial chemists do and what it takes to become one.
<a href="#">Waste Management</a>	Smart Lesson explaining what waste products are and how, as a society, we can manage them. Emphasis is put on car exhaust and industrial waste.
<a href="#">Combustion and the Environment</a>	Smart lesson on the Greenhouse Effect and how human activities have contributed to it.
<a href="#">Acids and Bases</a>	Smart Lesson on acids and bases and their uses. This lesson can be used to improve reading comprehension.
<a href="#">Volcano Exploration Robots</a>	A Smart Lesson exploring how small robots can be used to help explore and study volcanoes.
<a href="#">Housing Insulation</a>	Explaining how insulation can be used to prevent heat from entering or exiting a house, keeping it a comfortable temperature year-round.
<a href="#">Australian Aboriginal Music</a>	Explanation of how traditional Aboriginal instruments produce sound.
<a href="#">Turned Down for What: Workplace Noise</a>	Overview of why it is important to maintain safe noise levels in the workplace, in order to prevent hearing loss.
<a href="#">Ultrasound</a>	Reading comprehension lesson on ultrasound and its uses.
<a href="#">Bionic Eye</a>	Explaining how an artificial eye could work, and what research is being done into the concept.
<a href="#">Electromagnetic Radiation and Medicine</a>	Explanation of how electromagnetic radiation can be used to detect and treat cancer.
<a href="#">You, Me and UV</a>	Explanation of how UV can result in skin cancer and why it is important to practice good sun protection.
<a href="#">War of the Currents</a>	A history lesson on how Edison and Tesla competed with each other to dominate the newly emerged electrical market in 19th century America.
<a href="#">Development of Lightbulbs</a>	A Smart Lesson on the development of light bulbs to improve reading comprehension.
<a href="#">Radar</a>	Explanation of how radar works and why it is useful.
<a href="#">History of Radio Communication</a>	A Smart Lesson on the history of radio communication. This lesson is designed to improve reading comprehension.

# Science Inquiry Skills

## Relevant section of the science achievement standard:

By the end of Year 9, students ... design questions that can be investigated using a range of inquiry skills. They design methods that include the control and accurate measurement of variables and systematic collection of data and describe how they considered ethics and safety. They analyse trends in data, identify relationships between variables and reveal inconsistencies in results. They analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence. They evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.

## Questioning and Predicting

Formulate questions or hypotheses that can be investigated scientifically. ([AC SIS164](#))

<a href="#">Body Temperature</a>	Lesson presents data on human body temperature changes when exposed to different temperatures for students to interpret.
<a href="#">Regulating Blood Glucose Levels</a>	Lesson presents data on how blood glucose and insulin levels change throughout the day for students to interpret.
<a href="#">Designing Experiments on Pollution</a>	In this lesson, students plan an experiment to study the effects of pollution on plants. After this lesson, students should move on to the lesson Writing a Scientific Report.
<a href="#">Writing a Scientific Report</a>	This lesson follows on from the lesson Designing Experiments on Pollution. In this lesson, students will carry out their previously planned experiment and write a scientific report on it.
<a href="#">Conservation of Mass</a>	Students perform three reactions. In each reaction, they weight the reactants and products to find that mass has been conserved.
<a href="#">Identifying Chemical Reactions</a>	Students carry out a number of physical and chemical changes. Among these, they must identify which are chemical reactions.
<a href="#">Make Your Own Forge</a>	Students use a Bunsen burner to anneal and temper paperclips. They then compare their durability to unmodified paperclips.
<a href="#">Deep Time and Plate Tectonics</a>	In this investigation, students research how the Earth's tectonic plates have moved over time, and from this make a timeline.

<a href="#"><u>Heat Conduction</u></a>	An investigation into heat conduction that also illustrates that different materials conduct heat at different rates.
<a href="#"><u>Insulators</u></a>	Investigation into the insulating properties of different materials and an everyday use of insulators.
<a href="#"><u>Radiation</u></a>	An investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.
<a href="#"><u>Speed of Sound</u></a>	An investigation in which students measure the speed of sound.
<a href="#"><u>Straw Instruments</u></a>	An investigation into the importance of resonance frequency in music.
<a href="#"><u>Colourful Candy</u></a>	An investigation into why we see colour and the interaction of coloured light with coloured objects.
<a href="#"><u>Lenses</u></a>	Investigation into concave and convex lenses.
<a href="#"><u>Refraction</u></a>	An investigation into how the refraction of light and refractive indices can be used to determine the material that a transparent block is made out of.
<a href="#"><u>Battery Voltages</u></a>	An investigation where students measure the voltages on a range of batteries and compare this to the advertised voltages.
<a href="#"><u>Building Circuits</u></a>	Investigation into lightbulbs in series and parallel circuits.
<a href="#"><u>Resistance</u></a>	An investigation where students compare the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
<a href="#"><u>Energy in Classrooms</u></a>	Research investigation into how light, heat, sound, wifi and devices impact on the classroom environment.
<a href="#"><u>Radio Wave Blockers</u></a>	Investigation into whether radio waves can be blocked by various materials.
<a href="#"><u>Scientific Method</u></a>	Smart Lesson on the scientific method and how to write a scientific report.
<a href="#"><u>Hypothesising and Predicting</u></a>	A lesson on how to make a scientific hypothesis and predicting results of experiments.

## Planning and Conducting

Plan, select and use appropriate investigation types, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods. [\(AC SIS165\)](#)

<a href="#"><u>Eye Dissection</u></a>	An investigation where students dissect a cow eye and identify the key structures.
<a href="#"><u>Kidney Dissection</u></a>	An investigation where students dissect a kidney and identify the key structures.
<a href="#"><u>Testing Reflexes</u></a>	An investigation where students explore the knee-jerk reflex as an example of a reflex arc.

[Designing Experiments on Pollution](#)

In this lesson, students plan an experiment to study the effects of pollution on plants. After this lesson, students should move on to the lesson Writing a Scientific Report.

[Writing a Scientific Report](#)

This lesson follows on from the lesson Designing Experiments on Pollution. In this lesson, students will carry out their previously planned experiment and write a scientific report on it.

[Photosynthesis and Starch](#)

In this lesson, students extract starch - a product of photosynthesis - from leaves.

[Researching the Carmichael Coal Mine](#)

In this lesson, students research the controversial Carmichael coal mine and write a report supporting or condemning it. The smart lesson "Different Perspectives on Mining" can be assigned to give students an introduction to mining in Australia.

[Sampling a Leaf Litter Ecosystem](#)

Students collect leaf litter samples and compare the invertebrates present at different depths. They measure the temperature and humidity at each depth, and use these abiotic factors to propose explanations for changes in the invertebrate community.

[Build an Atom](#)

Investigation where students build a model of an atom out of lollies and explain how the relative sizes and charges of the subatomic particles are represented.

[Skittle Half Lives](#)

Investigation where students shake a bag of skittles, dump it out and remove the skittles that land face up. This is repeated in order to model a half-life.

[Conservation of Mass](#)

Students perform three reactions. In each reaction, they weight the reactants and products to find that mass has been conserved.

[Identifying Chemical Reactions](#)

Students carry out a number of physical and chemical changes. Among these, they must identify which are chemical reactions.

[Make Your Own Forge](#)

Students use a Bunsen burner to anneal and temper paperclips. They then compare their durability to unmodified paperclips.

[Marshmolecules](#)

Students build models of molecules using marshmallows, then modify these molecules to represent chemical reactions. This helps students visualise how the same atoms are present in the reactants as in the products.

[Acids and Metals](#)

In this investigation, students observe how hydrochloric acid can react with magnesium.

[Build a Seismometer](#)

An investigation where students learn what a seismometer is and how to make one from household materials.

[Deep Time and Plate Tectonics](#)

In this investigation, students research how the Earth's tectonic plates have moved over time, and from this make a timeline.

[Convection in Liquids](#)

An investigation into convection of water as it is heated.

[Heat Conduction](#)

An investigation into heat conduction that also illustrates that different materials conduct heat at different rates.

[Insulators](#)

Investigation into the insulating properties of different materials and an everyday use of insulators.

<a href="#"><u>Radiation</u></a>	An investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.
<a href="#"><u>Musical Bottles</u></a>	An investigation in which students make musical instruments out of glass bottles.
<a href="#"><u>Slinky Waves</u></a>	An investigation in which students use a slinky to explore the difference between longitudinal and transverse waves.
<a href="#"><u>Speed of Sound</u></a>	An investigation in which students measure the speed of sound.
<a href="#"><u>Build a Periscope</u></a>	A practical investigation into the uses of reflection where students build a working periscope.
<a href="#"><u>Colourful Candy</u></a>	An investigation into why we see colour and the interaction of coloured light with coloured objects.
<a href="#"><u>Law of Reflection</u></a>	An investigation into the Law of Reflection and reflection from plane mirrors.
<a href="#"><u>Lenses</u></a>	Investigation into concave and convex lenses.
<a href="#"><u>Refraction</u></a>	An investigation into how the refraction of light and refractive indices can be used to determine the material that a transparent block is made out of.
<a href="#"><u>Battery Voltages</u></a>	An investigation where students measure the voltages on a range of batteries and compare this to the advertised voltages.
<a href="#"><u>Building Circuits</u></a>	Investigation into lightbulbs in series and parallel circuits.
<a href="#"><u>Ohm's Law</u></a>	Investigation into Ohm's Law in a simple circuit.
<a href="#"><u>Resistance</u></a>	An investigation where students compare the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
<a href="#"><u>Static Electricity</u></a>	An investigation into static electricity and how it can be used to levitate objects.
<a href="#"><u>Energy in Classrooms</u></a>	Research investigation into how light, heat, sound, wifi and devices impact on the classroom environment.
<a href="#"><u>Optical Fibres</u></a>	Investigation into how optical fibres are used to communicate.
<a href="#"><u>Radio Wave Blockers</u></a>	Investigation into whether radio waves can be blocked by various materials.
<a href="#"><u>Safety Equipment</u></a>	Smart Lesson about the different types of safety equipment and when to use them.
<a href="#"><u>Safety Guidelines</u></a>	Smart lesson discussing safety instructions for the lab, including what to wear and what to do when things go wrong.
<a href="#"><u>Equipment Types</u></a>	A Smart Lesson going through basic laboratory equipment and its uses.
<a href="#"><u>Bunsen Burner</u></a>	A Smart Lesson instructing students on the design and makeup of the Bunsen burner.
<a href="#"><u>Separating Substances and Other Equipment</u></a>	Introduction to some important pieces of scientific equipment and their uses with a focus on equipment needed to separate mixtures.
<a href="#"><u>Equipment Quiz</u></a>	A quiz testing the ability of students to name scientific equipment.
<a href="#"><u>Reading the Meniscus</u></a>	Smart Lesson on the way to read a measurement from a fluid which has a meniscus.



<a href="#"><u>Magnification</u></a>	How magnification can be calculated and changed and how this relates to the field of view and resolution.
<a href="#"><u>Parts and Function of a Microscope</u></a>	A Smart Lesson explaining how optical microscopes work and what they are.
<a href="#"><u>Types of Microscopes</u></a>	A lesson on the different types of microscopes that can be used.
<a href="#"><u>Using a Microscope</u></a>	How to prepare wet mounts and use a microscope.
<a href="#"><u>Variables</u></a>	Smart Lesson about independent variables, dependent variables and control variables.
<a href="#"><u>Control Variables and Control Groups</u></a>	A Smart Lesson on the importance of control variables and control groups, and the importance of using these for results to be meaningful.
<a href="#"><u>Accuracy</u></a>	Smart Lesson on accuracy and selecting measuring equipment which will give a more accurate result.
<a href="#"><u>Repeatability and Reliability</u></a>	An introduction to repeatability and reliability and their importance when carrying out experiments.
<a href="#"><u>Validity</u></a>	Smart Lesson on validity when performing an experiment, and how changing variables can invalidate an experiment.
<a href="#"><u>Fair Tests</u></a>	Smart Lesson on fair tests and how to control variables.
<a href="#"><u>Sample Size</u></a>	A Smart Lesson on the importance of large sample sizes in collecting accurate results.
<a href="#"><u>Scientific Method</u></a>	Smart Lesson on the scientific method and how to write a scientific report.
<a href="#"><u>Observations and Inferences</u></a>	How to make observations and inferences using qualitative and quantitative methods.
<a href="#"><u>Introduction to Ethics</u></a>	A Smart Lesson explaining what ethics is, and how ethics can be influenced by a variety of cultural factors.
<a href="#"><u>Ethics Around the World</u></a>	Smart Lesson exploring the history of ethics in Europe, India, China, Japan and America.
<a href="#"><u>Different Views</u></a>	A Smart Lesson exploring how ethics is subjective, and how something can be considered ethical in one culture and unethical in another.
<a href="#"><u>Ethical Issues of Organ Transplants</u></a>	A Smart Lesson explaining what ethical dilemmas are using organ transplants as examples.
<a href="#"><u>The Ethics of Genetics</u></a>	A Smart Lesson exploring the ethical dilemma of genetic testing of embryos.

**Select and use appropriate equipment, including digital technologies, to collect and record data systematically and accurately. ([ACSI166](#))**

<a href="#"><u>Designing Experiments on Pollution</u></a>	In this lesson, students plan an experiment to study the effects of pollution on plants. After this lesson, students should move on to the lesson Writing a Scientific Report.
<a href="#"><u>Writing a Scientific Report</u></a>	This lesson follows on from the lesson Designing Experiments on Pollution. In this lesson, students will carry out their previously planned experiment and write a scientific report on it.
<a href="#"><u>Sampling a Leaf Litter Ecosystem</u></a>	Students collect leaf litter samples and compare the invertebrates present at different depths. They measure the temperature and humidity at each depth, and use these abiotic factors to propose explanations for changes in the invertebrate community.



<a href="#"><u>Conservation of Mass</u></a>	Students perform three reactions. In each reaction, they weight the reactants and products to find that mass has been conserved.
<a href="#"><u>Heat Conduction</u></a>	An investigation into heat conduction that also illustrates that different materials conduct heat at different rates.
<a href="#"><u>Insulators</u></a>	Investigation into the insulating properties of different materials and an everyday use of insulators.
<a href="#"><u>Radiation</u></a>	An investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.
<a href="#"><u>Musical Bottles</u></a>	An investigation in which students make musical instruments out of glass bottles.
<a href="#"><u>Speed of Sound</u></a>	An investigation in which students measure the speed of sound.
<a href="#"><u>Law of Reflection</u></a>	An investigation into the Law of Reflection and reflection from plane mirrors.
<a href="#"><u>Lenses</u></a>	Investigation into concave and convex lenses.
<a href="#"><u>Refraction</u></a>	An investigation into how the refraction of light and refractive indices can be used to determine the material that a transparent block is made out of.
<a href="#"><u>Battery Voltages</u></a>	An investigation where students measure the voltages on a range of batteries and compare this to the advertised voltages.
<a href="#"><u>Ohm's Law</u></a>	Investigation into Ohm's Law in a simple circuit.
<a href="#"><u>Resistance</u></a>	An investigation where students compare the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
<a href="#"><u>Equipment Types</u></a>	A Smart Lesson going through basic laboratory equipment and its uses.
<a href="#"><u>Measuring in Science</u></a>	Smart Lesson on how to read different measuring tools. The tools discussed are rulers, measuring cylinders, protractors, thermometers and scales.
<a href="#"><u>Reading the Meniscus</u></a>	Smart Lesson on the way to read a measurement from a fluid which has a meniscus.
<a href="#"><u>Measuring Electricity</u></a>	A lesson describing how to measure voltage, current and resistance using ammeters, voltmeters and multimeters.
<a href="#"><u>Magnification</u></a>	How magnification can be calculated and changed and how this relates to the field of view and resolution.
<a href="#"><u>Parts and Function of a Microscope</u></a>	A Smart Lesson explaining how optical microscopes work and what they are.
<a href="#"><u>Types of Microscopes</u></a>	A lesson on the different types of microscopes that can be used.
<a href="#"><u>Using a Microscope</u></a>	How to prepare wet mounts and use a microscope.
<a href="#"><u>Accuracy</u></a>	Smart Lesson on accuracy and selecting measuring equipment which will give a more accurate result.
<a href="#"><u>Repeatability and Reliability</u></a>	An introduction to repeatability and reliability and their importance when carrying out experiments.
<a href="#"><u>Scientific Method</u></a>	Smart Lesson on the scientific method and how to write a scientific report.
<a href="#"><u>Observations and Inferences</u></a>	How to make observations and inferences using qualitative and quantitative methods.

[Organising Data into a Data Table from an Experiment](#)

How to format data tables using scientific conventions, and how to create and input data into data tables.

## Processing and Analysing Data and Information

Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies. [\(ACSI169\)](#)

<a href="#">Body Temperature</a>	Lesson presents data on human body temperature changes when exposed to different temperatures for students to interpret.
<a href="#">Regulating Blood Glucose Levels</a>	Lesson presents data on how blood glucose and insulin levels change throughout the day for students to interpret.
<a href="#">Designing Experiments on Pollution</a>	In this lesson, students plan an experiment to study the effects of pollution on plants. After this lesson, students should move on to the lesson Writing a Scientific Report.
<a href="#">Writing a Scientific Report</a>	This lesson follows on from the lesson Designing Experiments on Pollution. In this lesson, students will carry out their previously planned experiment and write a scientific report on it.
<a href="#">Predator-Prey Dynamics</a>	Data is presented on predator-prey relationships in order to understand the flow of population in an ecosystem.
<a href="#">Skittle Half Lives</a>	Investigation where students shake a bag of skittles, dump it out and remove the skittles that land face up. This is repeated in order to model a half-life.
<a href="#">Conservation of Mass</a>	Students perform three reactions. In each reaction, they weight the reactants and products to find that mass has been conserved.
<a href="#">Make Your Own Forge</a>	Students use a Bunsen burner to anneal and temper paperclips. They then compare their durability to unmodified paperclips.
<a href="#">Understanding Megaquakes</a>	Lesson provides data on the largest earthquakes in recorded history for students to interpret.
<a href="#">Heat Conduction</a>	An investigation into heat conduction that also illustrates that different materials conduct heat at different rates.
<a href="#">Insulators</a>	Investigation into the insulating properties of different materials and an everyday use of insulators.
<a href="#">Radiation</a>	An investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.
<a href="#">Musical Bottles</a>	An investigation in which students make musical instruments out of glass bottles.
<a href="#">Speed of Sound</a>	An investigation in which students measure the speed of sound.

<a href="#"><u>Colourful Candy</u></a>	An investigation into why we see colour and the interaction of coloured light with coloured objects.
<a href="#"><u>Law of Reflection</u></a>	An investigation into the Law of Reflection and reflection from plane mirrors.
<a href="#"><u>Lenses</u></a>	Investigation into concave and convex lenses.
<a href="#"><u>Refraction</u></a>	An investigation into how the refraction of light and refractive indices can be used to determine the material that a transparent block is made out of.
<a href="#"><u>Battery Voltages</u></a>	An investigation where students measure the voltages on a range of batteries and compare this to the advertised voltages.
<a href="#"><u>Building Circuits</u></a>	Investigation into lightbulbs in series and parallel circuits.
<a href="#"><u>Ohm's Law</u></a>	Investigation into Ohm's Law in a simple circuit.
<a href="#"><u>Resistance</u></a>	An investigation where students compare the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
<a href="#"><u>Scientific Method</u></a>	Smart Lesson on the scientific method and how to write a scientific report.
<a href="#"><u>Observations and Inferences</u></a>	How to make observations and inferences using qualitative and quantitative methods.
<a href="#"><u>Organising Data into a Data Table from an Experiment</u></a>	How to format data tables using scientific conventions, and how to create and input data into data tables.
<a href="#"><u>Interpreting Data Tables</u></a>	Smart Lesson on how to interpret data tables, and the difference between directly proportional and inversely proportional relationships.
<a href="#"><u>Graphs in Science</u></a>	Smart Lesson on how graphs are used in science.
<a href="#"><u>Bar Graphs</u></a>	Smart Lesson about bar graphs, and what type of information is best represented in bar graphs.
<a href="#"><u>Line Graphs</u></a>	Smart Lesson explaining how to make and read a line graph.
<a href="#"><u>Scatter Graphs</u></a>	Explanation of scatter graphs and lines of best fit.
<a href="#"><u>A Guide for Making Graphs in Excel (Mac Version)</u></a>	Smart Lesson describing how to make scatter plots, histograms and column graphs in Excel, when using a Mac computer.
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<a href="#"><u>Matching Tables to Graphs</u></a>	Smart Lesson on whether data should be presented in a table or a graph.
<a href="#"><u>Algebra in Science</u></a>	Introduction to how algebra is used in science with the examples of calculating net force and using Newton's Second Law.
<a href="#"><u>Rearranging Equations</u></a>	Introduction on how to rearrange simple algebraic equations.
<a href="#"><u>Choosing Appropriate Units</u></a>	Practice choosing appropriate units for volumes, distances, energies and speeds.
<a href="#"><u>Units of Distance</u></a>	Introduction to the SI units used to measure distance, and how to convert between the units.
<a href="#"><u>Units of Energy</u></a>	Introduction to the SI units used to measure energy, and how to convert between the units.
<a href="#"><u>Units of Speed</u></a>	Introduction to the SI units used to measure speed, and how to convert between the units.

<a href="#">Units of Volume</a>	Introduction to the SI units used to measure volume, and how to convert between the units.
<a href="#">Food Webs</a>	Interpreting food web diagrams to teach interpretation skills.
<a href="#">Interpreting Diagrams</a>	Exercises on interpreting food chains, flow charts, dichotomous keys and force diagrams.
<a href="#">Water Cycle</a>	Introduction to interpreting diagrams using the water cycle as an example.
<a href="#">Scientific Notation</a>	A Smart Lesson explaining how to write large and small numbers in scientific notation.
<a href="#">Scientific Figures</a>	Smart Lesson describing how to write numbers to significant figures, and how to identify significant figures.

**Use knowledge of scientific concepts to draw conclusions that are consistent with evidence. ([AC SIS170](#))**

<a href="#">Eye Dissection</a>	An investigation where students dissect a cow eye and identify the key structures.
<a href="#">Kidney Dissection</a>	An investigation where students dissect a kidney and identify the key structures.
<a href="#">Testing Reflexes</a>	An investigation where students explore the knee-jerk reflex as an example of a reflex arc.
<a href="#">Body Temperature</a>	Lesson presents data on human body temperature changes when exposed to different temperatures for students to interpret.
<a href="#">Regulating Blood Glucose Levels</a>	Lesson presents data on how blood glucose and insulin levels change throughout the day for students to interpret.
<a href="#">Writing a Scientific Report</a>	This lesson follows on from the lesson Designing Experiments on Pollution. In this lesson, students will carry out their previously planned experiment and write a scientific report on it.
<a href="#">Photosynthesis and Starch</a>	In this lesson, students extract starch - a product of photosynthesis - from leaves.
<a href="#">Researching the Carmichael Coal Mine</a>	In this lesson, students research the controversial Carmichael coal mine and write a report supporting or condemning it. The smart lesson "Different Perspectives on Mining" can be assigned to give students an introduction to mining in Australia.
<a href="#">Sampling a Leaf Litter Ecosystem</a>	Students collect leaf litter samples and compare the invertebrates present at different depths. They measure the temperature and humidity at each depth, and use these abiotic factors to propose explanations for changes in the invertebrate community.
<a href="#">Predator-Prey Dynamics</a>	Data is presented on predator-prey relationships in order to understand the flow of population in an ecosystem.
<a href="#">Conservation of Mass</a>	Students perform three reactions. In each reaction, they weight the reactants and products to find that mass has been conserved.
<a href="#">Identifying Chemical Reactions</a>	Students carry out a number of physical and chemical changes. Among these, they must identify which are chemical reactions.

<a href="#"><u>Make Your Own Forge</u></a>	Students use a Bunsen burner to anneal and temper paperclips. They then compare their durability to unmodified paperclips.
<a href="#"><u>Marshmolecules</u></a>	Students build models of molecules using marshmallows, then modify these molecules to represent chemical reactions. This helps students visualise how the same atoms are present in the reactants as in the products.
<a href="#"><u>Acids and Metals</u></a>	In this investigation, students observe how hydrochloric acid can react with magnesium.
<a href="#"><u>Build a Seismometer</u></a>	An investigation where students learn what a seismometer is and how to make one from household materials.
<a href="#"><u>Deep Time and Plate Tectonics</u></a>	In this investigation, students research how the Earth's tectonic plates have moved over time, and from this make a timeline.
<a href="#"><u>Understanding Megaquakes</u></a>	Lesson provides data on the largest earthquakes in recorded history for students to interpret.
<a href="#"><u>Convection in Liquids</u></a>	An investigation into convection of water as it is heated.
<a href="#"><u>Heat Conduction</u></a>	An investigation into heat conduction that also illustrates that different materials conduct heat at different rates.
<a href="#"><u>Insulators</u></a>	Investigation into the insulating properties of different materials and an everyday use of insulators.
<a href="#"><u>Radiation</u></a>	An investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.
<a href="#"><u>Musical Bottles</u></a>	An investigation in which students make musical instruments out of glass bottles.
<a href="#"><u>Slinky Waves</u></a>	An investigation in which students use a slinky to explore the difference between longitudinal and transverse waves.
<a href="#"><u>Speed of Sound</u></a>	An investigation in which students measure the speed of sound.
<a href="#"><u>Straw Instruments</u></a>	An investigation into the importance of resonance frequency in music.
<a href="#"><u>Build a Periscope</u></a>	A practical investigation into the uses of reflection where students build a working periscope.
<a href="#"><u>Colourful Candy</u></a>	An investigation into why we see colour and the interaction of coloured light with coloured objects.
<a href="#"><u>Law of Reflection</u></a>	An investigation into the Law of Reflection and reflection from plane mirrors.
<a href="#"><u>Lenses</u></a>	Investigation into concave and convex lenses.
<a href="#"><u>Refraction</u></a>	An investigation into how the refraction of light and refractive indices can be used to determine the material that a transparent block is made out of.
<a href="#"><u>Battery Voltages</u></a>	An investigation where students measure the voltages on a range of batteries and compare this to the advertised voltages.
<a href="#"><u>Building Circuits</u></a>	Investigation into lightbulbs in series and parallel circuits.
<a href="#"><u>Ohm's Law</u></a>	Investigation into Ohm's Law in a simple circuit.

<a href="#"><u>Resistance</u></a>	An investigation where students compare the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
<a href="#"><u>Static Electricity</u></a>	An investigation into static electricity and how it can be used to levitate objects.
<a href="#"><u>Energy in Classrooms</u></a>	Research investigation into how light, heat, sound, wifi and devices impact on the classroom environment.
<a href="#"><u>Optical Fibres</u></a>	Investigation into how optical fibres are used to communicate.
<a href="#"><u>Radio Wave Blockers</u></a>	Investigation into whether radio waves can be blocked by various materials.
<a href="#"><u>Scientific Method</u></a>	Smart Lesson on the scientific method and how to write a scientific report.
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<a href="#"><u>Water Cycle</u></a>	Introduction to interpreting diagrams using the water cycle as an example.
<a href="#"><u>Evaluating in Science</u></a>	A lesson explaining how to evaluate experimental results.

## Evaluating

Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data. ([ACSI171](#))

<a href="#">Body Temperature</a>	Lesson presents data on human body temperature changes when exposed to different temperatures for students to interpret.
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<a href="#">Insulators</a>	Investigation into the insulating properties of different materials and an everyday use of insulators.
<a href="#">Speed of Sound</a>	An investigation in which students measure the speed of sound.
<a href="#">Law of Reflection</a>	An investigation into the Law of Reflection and reflection from plane mirrors.



<a href="#"><u>Refraction</u></a>	An investigation into how the refraction of light and refractive indices can be used to determine the material that a transparent block is made out of.
<a href="#"><u>Battery Voltages</u></a>	An investigation where students measure the voltages on a range of batteries and compare this to the advertised voltages.
<a href="#"><u>Building Circuits</u></a>	Investigation into lightbulbs in series and parallel circuits.
<a href="#"><u>Ohm's Law</u></a>	Investigation into Ohm's Law in a simple circuit.
<a href="#"><u>Resistance</u></a>	An investigation where students compare the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
<a href="#"><u>Radio Wave Blockers</u></a>	Investigation into whether radio waves can be blocked by various materials.
<a href="#"><u>Measuring in Science</u></a>	Smart Lesson on how to read different measuring tools. The tools discussed are rulers, measuring cylinders, protractors, thermometers and scales.
<a href="#"><u>Reading the Meniscus</u></a>	Smart Lesson on the way to read a measurement from a fluid which has a meniscus.
<a href="#"><u>Variables</u></a>	Smart Lesson about independent variables, dependent variables and control variables.
<a href="#"><u>Control Variables and Control Groups</u></a>	A Smart Lesson on the importance of control variables and control groups, and the importance of using these for results to be meaningful.
<a href="#"><u>Accuracy</u></a>	Smart Lesson on accuracy and selecting measuring equipment which will give a more accurate result.
<a href="#"><u>Repeatability and Reliability</u></a>	An introduction to repeatability and reliability and their importance when carrying out experiments.
<a href="#"><u>Validity</u></a>	Smart Lesson on validity when performing an experiment, and how changing variables can invalidate an experiment.
<a href="#"><u>Fair Tests</u></a>	Smart Lesson on fair tests and how to control variables.
<a href="#"><u>Sample Size</u></a>	A Smart Lesson on the importance of large sample sizes in collecting accurate results.
<a href="#"><u>Scientific Method</u></a>	Smart Lesson on the scientific method and how to write a scientific report.
<a href="#"><u>Observations and Inferences</u></a>	How to make observations and inferences using qualitative and quantitative methods.
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**Critically analyse the validity of information in primary and secondary sources and evaluate the approaches used to solve problems.**

**[\(ACIS172\)](#)**

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<a href="#">Understanding Megaquakes</a>	Lesson provides data on the largest earthquakes in recorded history for students to interpret.
<a href="#">Control Variables and Control Groups</a>	A Smart Lesson on the importance of control variables and control groups, and the importance of using these for results to be meaningful.
<a href="#">Repeatability and Reliability</a>	An introduction to repeatability and reliability and their importance when carrying out experiments.
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## Communicating

Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations. [\(ACIS174\)](#)

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