

## Victorian Curriculum – Levels 9 and 10

### Introduction:

This document maps Education Perfect lessons to the Victorian Curriculum. A lesson may cover multiple standards, such as fulfilling both science as a human endeavour standards and other science understanding standards. In these cases, the lesson is found in both sections in the document.

### Contents:





#### Science Understanding

Science as a Human Endeavour	2
Biological Sciences	2
Chemical Sciences	5
Earth and Space Sciences	7
Physical Sciences	10

#### Science Inquiry Skills

Questioning and Predicting	15
Planning and Conducting	16
Recording and Processing	19
Analysing and Evaluating	23
Communicating	25

### 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.

# Science Understanding

## Science as a Human Endeavour

### Relevant section of the achievement standard:

By the end of Level 10, students analyse how models and theories have developed over time and discuss the factors that prompted their review. They predict how future applications of science and technology may affect people’s lives.

### Standards:

Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community. ([VCSSU114](#))

<a href="#">Predicting Population Changes</a>	How we can use food webs to predict how populations recover after a disaster, such as a bushfire.
<a href="#">Back to the Sea: Cetacean Evolution</a>	Cetaceans and their evolution from terrestrial four-legged mammals.
<a href="#">Feathery Dinosaurs</a>	The discovery of well-preserved feathers of a dinosaur trapped in amber.
<a href="#">Our Evolution</a>	Human evolution as an extension to the evolution topic.
<a href="#">Rewriting Human History</a>	The discovery of human remains in Morocco from 300,000 years ago, far earlier than the current theories suggest.
<a href="#">The History of Evolutionary Thought</a>	Overview on the history of evolutionary thought, from Lyell to Lamarck.
<a href="#">The Wallace Line</a>	The faunal boundary line between Asia and Australasia, and why it exists.
<a href="#">Discovering the Double Helix</a>	How the double helix was discovered. It explores the big names involved, including Watson, Crick and Franklin. Special emphasis is put on the ethical concerns around how Franklin's data was obtained and credited by Watson and Crick.
<a href="#">The History of Genetic Thought</a>	How society's understanding of genetics has grown over the past several centuries, and how it has contributed to the theory of evolution.
<a href="#">How are Diseases Spread?</a>	How diseases are spread.
<a href="#">Models of the Atom</a>	History of the different models of the atom and the experiments leading to new models.

<a href="#">A Day in the Life of an Industrial Chemist</a>	What industrial chemists do and what it takes to become one.
<a href="#">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.
<a href="#">Development of the Geological Timescale</a>	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>	Introduction to techniques used by scientists to probe the inner Earth.
<a href="#">Supercontinents</a>	How the ancient supercontinent of Pangea turned into the seven continents we know today.
<a href="#">End of the Universe</a>	Discussing how the expansion of the universe is increasing, not decreasing, and what this means for the future of the universe. It also includes how dark matter may explain this accelerated rate of expansion.
<a href="#">Life</a>	The conditions on early Earth, and the many theories for how life eventually appeared.
<a href="#">The Sixth Sense: Electroreception</a>	How some animals can detect electrical currents.
<a href="#">Steam Engines</a>	The energy transformations used to power steam engines.
<a href="#">Sports Science</a>	How sports science is used to develop new techniques and materials, improving athletes' performances.
<a href="#">Earth's Magnetic Field</a>	Introduction to the Earth's magnetic field and compasses.

**Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries. ([VCSSU115](#))**

<a href="#">Genomics</a>	The human genome project, and the implications that genomic research has for treating diseases and researching evolution.
<a href="#">Disease Treatment</a>	Ways to treat or control the spread of infectious diseases, including vaccination, antibiotics, and good hygiene practices.
<a href="#">Starfish Nervous System</a>	Comparing the Starfish's unusual nervous system to that of humans.
<a href="#">Effects of Radiation on Humans</a>	The effects of ionising radiation on humans, and the importance of the dose.
<a href="#">Radioactivity in Industry</a>	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>	The uses of radioactivity in medicine, including nuclear imaging and radiotherapy.

<a href="#"><u>Spectroscopy</u></a>	How spectroscopy was developed, and what some different types of spectroscopy are.
<a href="#"><u>Analytical Chemistry</u></a>	What an analytical chemist does, including quality assurance and forensics and how to become one.
<a href="#"><u>Volcano Exploration Robots</u></a>	Exploring how small robots can be used to help explore and study volcanoes.
<a href="#"><u>Carbon Capture</u></a>	Introducing carbon capture as a way that humans may be able to reduce climate change. It explains why carbon capture is important and what important carbon sinks are.
<a href="#"><u>Computer Modelling and the Environment</u></a>	What computer modelling is, and how it can be used to study the weather, ocean conditions, pollution and climate change.
<a href="#"><u>Observing Space</u></a>	How we use radio telescopes and satellites to study and measure the stars.
<a href="#"><u>The Secret Lives of Ultra-Cool Dwarf Stars</u></a>	The discovery of a unique set of exoplanets in the far-off Trappist system that may be able to support life.
<a href="#"><u>War of the Currents</u></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>Electricity Generation</u></a>	Electricity and where it comes from in Australia
<a href="#"><u>Levitation at UChicago!</u></a>	The development of a technique for thermal levitation.
<a href="#"><u>Rockets</u></a>	Explanation of the forces acting on rockets during launch and of the Space Race.

**The values and needs of contemporary society can influence the focus of scientific research. [VCSSU116](#)**

<a href="#"><u>Human Impacts</u></a>	Introducing biodiversity, and the impacts of European farming, over cropping and pest control on it.
<a href="#"><u>Invasive Species</u></a>	Introducing the ideas about what makes an introduced species invasive and the impacts of invasive species on ecosystems including specific Australian examples.
<a href="#"><u>Oil Spills</u></a>	How oil spills affect ecosystems.
<a href="#"><u>Pesticides</u></a>	How pesticides affect ecosystems.
<a href="#"><u>Artificial Selection: The Good, The Bad and the Downright Strange</u></a>	Examples of good, bad, and strange artificial selection.
<a href="#"><u>The Ethics of Genetics</u></a>	Exploring ethical concerns and implications of genetic testing in embryos. It also explores the potential for genetically modifying embryos in the future, and whether this would be morally acceptable.
<a href="#"><u>Fermentation</u></a>	How fermentation can be used to make bread and other foods, drinks and fuels.
<a href="#"><u>Waste Management</u></a>	What waste products are and how, as a society, we can manage them. Emphasis on car exhaust and industrial waste.

<a href="#"><u>Chemicals: Friend or Foe?</u></a>	Introduces dangerous chemicals and explains proper handling and clean up procedures around them.
<a href="#"><u>Extracting Metals</u></a>	How metals are extracted from their ores.
<a href="#"><u>Fuels and Pharmaceuticals</u></a>	The chemistry behind fuels and pharmaceuticals.
<a href="#"><u>Polymers</u></a>	How chemistry can be used to make the useful material we all use every day, plastics!
<a href="#"><u>Acid Rain: Reactions Around Us</u></a>	The causes of acid rain and the effects it has on the environment.
<a href="#"><u>Combustion and the Environment</u></a>	The Greenhouse Effect and how human activities have contributed to it.
<a href="#"><u>Photosynthesis: Reactions Around Us</u></a>	Photosynthesis.
<a href="#"><u>Respiration: Reactions Around Us</u></a>	Respiration.
<a href="#"><u>Carbon Footprints</u></a>	What a carbon footprint is and how it can be measured and reduced.
<a href="#"><u>CFCs and the Ozone Layer</u></a>	How CFCs have led to the hole in the ozone layer resulting in the ban of certain chemicals. Discussion on how scientific research can have a positive and meaningful impact on society.
<a href="#"><u>Save the Great Barrier Reef!</u></a>	The bleaching of the Great Barrier Reef, and ways that scientists are hoping to save what is left.
<a href="#"><u>Energy in Food</u></a>	How our body transforms chemical potential energy in food into kinetic and heat energy.
<a href="#"><u>Car Safety Systems</u></a>	How seatbelts, head rests, crumple zones and airbags use the laws of physics to protect people during car crashes.
<a href="#"><u>How BB-8 Works</u></a>	Using the Star Wars character BB-8 to explain the difference between weight and mass, and also outlines a theory which explains how BB-8 can roll without anything pushing it.
<a href="#"><u>Bushfires</u></a>	Importance of heat and heat transfer during the Australian bushfires.
<a href="#"><u>Housing Insulation</u></a>	Explaining how insulation can be used to prevent heat from entering or exiting a house.
<a href="#"><u>Different Views</u></a>	Comparing different ethical values from around the world.
<a href="#"><u>The Ethics of Genetics</u></a>	Genetics and the associated ethical issues surrounding genetic research.












## Biological Sciences

### Relevant section of the achievement standard:

By the end of Level 10 students ... analyse how biological systems function and respond to external changes with reference to the interdependencies between individual components, energy transfers and flows of matter. They evaluate the evidence for scientific theories that explain the ... diversity of life on Earth. They explain the role of DNA and genes in cell division and genetic inheritance. They apply geological timescales to elaborate their explanations of both natural selection and evolution.







### Standards:

**Multicellular organisms rely on coordinated and interdependent internal systems to respond to changes to their environment. ([VCSSU117](#))**











 <a href="#">Basics of Homeostasis</a>	Homeostasis and why it is important.
 <a href="#">Homeostatic Terms</a>	What the terms variable, set point and reference range mean in the context of homeostasis.
 <a href="#">Stimulus-Response Model</a>	How the stimulus-response model helps the body maintain homeostasis.
 <a href="#">Negative and Positive Feedback</a>	What negative and positive feedback are.
 <a href="#">Control Systems</a>	Introducing the body's two control systems: the nervous system and endocrine system.
 <a href="#">The Endocrine System</a>	Introducing the endocrine system, including the main endocrine glands of the human body.
 <a href="#">Endocrine System in Action</a>	Introducing the pancreas and how the hormones it secretes control blood glucose levels.
 <a href="#">Immune System</a>	Introducing the immune system and the three lines of immune defence.
 <a href="#">First &amp; Second Lines of Defence</a>	Explaining the first and second lines of immune defence, the inflammatory response in particular.
 <a href="#">Third Line of Defence &amp; Lymphatic System</a>	Introducing the lymphatic system and the third line of defence.
 <a href="#">What are Diseases?</a>	Introducing diseases, different types of disease and the difference between infectious and non-infectious diseases.

 <a href="#">What are Pathogens?</a>	Introducing different types of pathogens.
 <a href="#">Cancer</a>	Cancer, the effects it has on the body, and methods of prevention and treatment.
 <a href="#">Chickenpox</a>	Chickenpox, the effects it has on the body and methods of prevention and treatment.
 <a href="#">Malaria</a>	Malaria, the effects it has on the body and methods of prevention and treatment.
 <a href="#">Degenerative Diseases</a>	How degenerative diseases, such as Multiple Sclerosis and Parkinson's Disease, affect the nervous system.
 <a href="#">Endocrine Diseases</a>	What the endocrine system does and what happens when it does not function properly.
 <a href="#">Pathogens</a>	Various pathogens, including viruses, fungi, parasites and prions.
 <a href="#">Disease Treatment</a>	Ways to treat or control the spread of infectious diseases, including vaccination, antibiotics, and good hygiene practices.
 <a href="#">How are Diseases Spread?</a>	How diseases are spread.
 <a href="#">Eye Dissection</a>	Investigation dissecting a cow eye and identify the key structures.
 <a href="#">Kidney Dissection</a>	Dissecting a kidney and identify the key structures.
 <a href="#">Testing Reflexes</a>	Exploring the knee-jerk reflex as an example of a reflex arc.
 <a href="#">The History of Disease</a>	Ways ancient humans thought diseases were caused, and how these ideas evolved over time.
 <a href="#">Body Temperature</a>	Interpreting data on human body temperature changes when exposed to different temperatures.
 <a href="#">Regulating Blood Glucose Levels</a>	Interpreting data on how blood glucose and insulin levels change throughout the day.
 <a href="#">The Nervous System</a>	Introducing the central and peripheral nervous systems.
















**An animal's response to a stimulus is coordinated by its central nervous system (brain and spinal cord); neurons transmit electrical impulses and are connected by synapses. ([VCSSU118](#))**










 <a href="#">The Neuron</a>	Introducing the different components and types of a neuron.
 <a href="#">Nerve Pathways</a>	Introducing voluntary and involuntary movements, reflexes and nerve pathways.
 <a href="#">Sensory Receptors and the Eye</a>	How the parts of the eye enable it to function.
 <a href="#">Components of Neural Pathways</a>	Neural pathways consist of cells that transport nerve impulses from sensory receptors to neurons and on to effectors.
 <a href="#">Passage of Nerve Impulses</a>	The passage of nerve impulses involves transmission of an action potential along a nerve axon and synaptic transmission by neurotransmitters.
 <a href="#">Starfish Nervous System</a>	Comparing the Starfish's unusual nervous system to that of humans.

The transmission of heritable characteristics from one generation to the next involves DNA and genes. ([VCSSU119](#))




 <a href="#">Basics of DNA</a>	Introduction to DNA suitable for complete beginners. It introduces what DNA, genes and chromosomes are and explains where DNA is located.
 <a href="#">Structure of DNA</a>	The key concepts about the structure of DNA. Including the double helix, sugar phosphate backbone and nucleotides. It also introduces nitrogenous bases.
 <a href="#">Nitrogenous Bases</a>	Expanding upon information from Structure of DNA. It explains the four types of nitrogenous bases and the complementary base pair rule.
 <a href="#">Genes and Genetic Information</a>	Explaining, in simple terms, the nucleotide sequence of a gene codes for a protein.
 <a href="#">Homologous Chromosomes</a>	Defines and explains the terms homologous chromosome, haploid and diploid.
 <a href="#">Sex Chromosomes</a>	Introduces the sex chromosomes and autosomes.
 <a href="#">DNA Replication</a>	The steps of DNA replication and key ideas around it. Why cells replicate their DNA before dividing, introducing mutations and defines sister chromatids.
 <a href="#">Mitosis</a>	The steps of mitosis.
 <a href="#">Gametes and Fertilisation</a>	What gametes are used for and how their genetic content differs from normal cells. It then explains the process of fertilization and why it is important that gametes are haploid.
 <a href="#">Meiosis</a>	The steps of meiosis.













 <a href="#">Mitosis vs. Meiosis</a>	Highlights key differences between mitosis and meiosis. It is a revision lesson that assumes prior knowledge of the steps of mitosis and meiosis, either from teaching in the classroom or from completing previous smart lessons.
 <a href="#">Mendel</a>	Mendel's experiments breeding peas. They learn what Mendel did during his experiments as well as what his key observations and conclusions were.
 <a href="#">Alleles</a>	What alleles are and how they are different from genes. It also explains why we have two alleles and the terms genotype, phenotype, heterozygous and homozygous.
 <a href="#">Inheriting Alleles and Punnett Squares</a>	How meiosis and fertilization act together to pass alleles from parent to offspring. It then teaches students how to read Punnett squares and calculate probabilities and ratios from them.
 <a href="#">Making Punnett Squares</a>	How to find the genotypes of the parents, make a Punnett square and then find probabilities and genotypic and phenotypic ratios.
 <a href="#">Allele Interactions</a>	The three types of allele interactions: dominant/recessive, incomplete dominance and codominance.
 <a href="#">Pedigrees</a>	How to make and read pedigrees. This lesson assumes a basic understanding of dominant and recessive alleles. It does not cover pedigrees of sex-linked genes.
 <a href="#">Sex Linkage</a>	The concept of sex linkage and that males are more likely to have recessive X-linked phenotypes than females.
 <a href="#">Sex Linkage, Punnett Squares and Pedigrees</a>	How to make Punnett squares for sex-linked genes, and how to read Punnett squares and pedigrees for sex-linked genes.
 <a href="#">Chromosomal Abnormalities</a>	How chromosomal abnormalities can arise from meiosis, and that these abnormalities can result in chromosomal disorders such as Down syndrome.
 <a href="#">Proteins</a>	Introduction to proteins. Students learn that proteins are made of amino acids and coded for by alleles. Students also learn about the roles of different types of proteins, including enzymes, antibodies, structural proteins and transport proteins.
 <a href="#">Discovering the Double Helix</a>	How the double helix was discovered. It explores the big names involved, including Watson, Crick and Franklin. Special emphasis is put on the ethical concerns around how Franklin's data was obtained and credited by Watson and Crick.
 <a href="#">Genomics</a>	The human genome project, and the implications that genomic research has for treating diseases and researching evolution.
 <a href="#">The Ethics of Genetics</a>	Exploring ethical concerns and implications of genetic testing in embryos. It also explores the potential for genetically modifying embryos in the future, and whether this would be morally acceptable.
 <a href="#">The History of Genetic Thought</a>	How society's understanding of genetics has grown over the past several centuries, and how it has contributed to the theory of evolution.

 <a href="#">Extracting DNA</a>	Extracting DNA from plant or animal tissue samples.
 <a href="#">Modelling Inheritance of Alleles</a>	In this investigation, students are given cards that represent the alleles of two parents across five genes. By randomly selecting and combining alleles, students can explore the processes of meiosis and fertilisation. From this, they can observe how siblings can end up looking different, even when they have the same parents.
 <a href="#">Observing Mitosis</a>	Observing cells from an onion root tip through a microscope and attempting to identify cells in different stages of mitosis.
 <a href="#">Research Project: Inbreeding in Dogs</a>	Students research inbreeding in purebred dogs and write an essay explaining their findings. More information on inbreeding can be found in the Smart Lesson "Background Information - The Consequences of Inbreeding".
 <a href="#">Background Information: The Consequences of Inbreeding</a>	Students will learn about how dog breeders use inbreeding to maintain purebred dog lineages, and what health consequences this can have for the animals. This provides background information for "Research Project - Researching Inbreeding in Dogs."
 <a href="#">Attraction: It's all in the Armpits</a>	A passage about the major histocompatibility complex (MHC) and the role it plays in human mate choice.
 <a href="#">Epigenetics: Inheritance is Strange</a>	A passage about epigenetics and the current thinking surrounding inheritance.
 <a href="#">DNA Fingerprinting: Thirsty Thievery</a>	Interpretation of DNA profiles.
 <a href="#">The Blue People of Troublesome Creek</a>	Interpretation of family pedigrees.







**The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence.**  
[\(VCSSU120\)](#)

 <a href="#">Geological Time</a>	The concept of deep time and the Geological Timescale.
 <a href="#">Overview: Evidence for Evolution</a>	Overview of all the types of evidence for evolution covered in the upcoming lessons. Included are brief overviews and introductions for the fossil record, comparative techniques in living species and geographical distributions.
 <a href="#">Fossils</a>	The fossil evidence in support of Darwin's theory of evolution, including the fossil record.








 <a href="#">Living Species</a>	The similarities among living species which provide evidence for evolution. These similarities can be examined through comparative anatomy, comparative embryology, and chemical comparisons.
 <a href="#">Geographical Distribution</a>	This topic examines the geographical distribution of species and how this provides evidence for evolution.
 <a href="#">Biodiversity</a>	The concept of biodiversity and its importance.
 <a href="#">Extinction</a>	What extinction is and how it comes about.
 <a href="#">Darwin's Theory of Evolution</a>	Describes how Darwin came to propose his Theory of Evolution.
 <a href="#">Mechanisms of Evolution</a>	Describes the mechanisms of evolutionary change. These include mutations, gene flow, genetic drift and natural selection.
 <a href="#">Natural Selection</a>	Natural selection, and the processes required for it to occur.
 <a href="#">Artificial Selection</a>	What artificial selection is, how it relates to genetic diversity and how it provides a model for evolution.
 <a href="#">Bacterial Resistance</a>	Bacteria and how they evolve antibiotic resistance.
 <a href="#">Coevolution</a>	How two species influence each other's evolution.
 <a href="#">Mimicry</a>	The different forms of mimicry: Mullerian, Batesian and Aggressive.
 <a href="#">Sexual Selection</a>	How and why male competition and female choice can influence the evolution of species.
 <a href="#">Artificial Selection: The Good, the Bad and the Downright Strange</a>	Examples of good, bad, and strange artificial selection.
 <a href="#">Back to the Sea: Cetacean Evolution</a>	Cetaceans and their evolution from terrestrial four-legged mammals.
 <a href="#">Feathery Dinosaurs</a>	The discovery of well-preserved feathers of a dinosaur trapped in amber.
 <a href="#">Our Evolution</a>	Human evolution as an extension to the evolution topic.
 <a href="#">Rewriting Human History</a>	The discovery of human remains in Morocco from 300,000 years ago, far earlier than the current theories suggest.
 <a href="#">The History of Evolutionary Thought</a>	Overview on the history of evolutionary thought, from Lyell to Lamarck.

 <a href="#">The Wallace Line</a>	The faunal boundary line between Asia and Australasia, and why it exists.
 <a href="#">Assessing Biodiversity</a>	Making pitfall traps and identify the invertebrates caught in them.
 <a href="#">Building an Evolutionary Timeline</a>	Creating and interpreting a timeline with a list of major dates in the evolution of life on Earth.
 <a href="#">Great Ape Genealogy</a>	Using coloured paperclips to model nucleotide sequences from human, chimp and gorilla DNA. Comparing the nucleotide sequences of the three different species and from this infer how they are related.
 <a href="#">Survival of the Mutants</a>	Groups of students compete to collect and store the most candy. Different groups have different traits, such as being blind or having their hands tied together. Through this exercise, students explore how different traits can affect an organism's foraging ability and overall fitness.
 <a href="#">Evolution and Extinction</a>	How human actions are causing rapid changes in the environment. These changes are typically too fast for species to adapt to and, as a result, many species are going extinct.
 <a href="#">The Ancestor of All Things</a>	The Last Universal Common Ancestor (LUCA).
 <a href="#">Natural Selection in Action!</a>	The interpretation of column graphs, pie graphs and line graphs.
 <a href="#">The Biodiversity Gradient</a>	Interpretation of scatterplots, pie graphs and line graphs.

Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems. ([VCSSU121](#))

 <a href="#">Introduction to Ecology</a>	Introducing ecology and ecosystems.
 <a href="#">The Biosphere and Biomes</a>	Describing the biosphere and its division into biomes.
 <a href="#">Species and Organisms</a>	Organisms, species and hybrids.
 <a href="#">Parts of an Ecosystem</a>	Introduction to abiotic and biotic factors.
 <a href="#">Abiotic Factors</a>	The important abiotic factors that impact on ecosystems.
 <a href="#">Biotic Factors and Competition</a>	Biotic factors in ecosystems, with a focus on competition between and within species.

 <a href="#">Symbiosis</a>	Three types of symbiosis: mutualism, commensalism and parasitism.
 <a href="#">Adaptations</a>	The three main types of adaptations, with specific examples relating to ectothermy and endothermy in animals.
 <a href="#">Producers</a>	Producers, and how they use photosynthesis to make energy.
 <a href="#">Consumers and Decomposers</a>	Consumers, decomposers and detritivores.
 <a href="#">Food Chains and Food Webs</a>	Food chains and food webs.
 <a href="#">Trophic Levels</a>	Introducing the concepts of trophic levels and energy pyramids.
 <a href="#">The Carbon Cycle</a>	The importance of carbon in ecosystems and how it is recycled.
 <a href="#">Biodiversity</a>	The meaning and significance of biodiversity.
 <a href="#">Bushfires</a>	The causes and consequences of bushfires in Australia.
 <a href="#">Drought</a>	The causes and consequences of droughts, and how species have adapted to deal with them.
 <a href="#">Flooding</a>	The consequences of flooding, both positive and negative.
 <a href="#">The Greenhouse Effect</a>	Chemical compounds used by humans that have substantial impacts on ecosystems, including oil, pesticides and greenhouse gas emissions.
 <a href="#">The Nitrogen Cycle</a>	Importance of nitrogen in ecosystems and how it is recycled.
 <a href="#">Human Impacts</a>	Introducing biodiversity, and the impacts of European farming, over cropping and pest control on it.
 <a href="#">Invasive Species</a>	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>	How oil spills affect ecosystems.
 <a href="#">Pesticides</a>	How pesticides affect ecosystems.
 <a href="#">Predicting Population Changes</a>	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>	Planning 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](#) Extracting starch - a product of photosynthesis - from leaves.
-  [Research Project: 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.
-  [Background Information: Different Perspectives on Mining](#) 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".
-  [Sampling a Leaf Litter Ecosystem](#) Collecting samples of leaf litter at different depths and identify the invertebrates present. Also measuring the abiotic factors temperature and humidity at each depth. Using this information, students propose explanations for why the invertebrate community changes as one moves deeper into the leaf litter.
-  [Adapting for Survival](#) Some examples of adaptations for survival in the animal kingdom. This lesson can be used to improve reading comprehension in students.
-  [Predator-Prey Dynamics](#) Data is presented on predator-prey relationships in order to understand the flow of energy in an ecosystem.











## Chemical Sciences














### Relevant section of the achievement standard:

By the end of Level 10 students ... explain how similarities in the chemical behaviour of elements and their compounds and their atomic structures are represented in the way the periodic table has been constructed. They compare the properties of a range of elements representative of the major groups and periods in the periodic table. They use atomic symbols and balanced chemical equations to summarise chemical reactions, including neutralisation and combustion. They explain natural radioactivity in terms of atoms and energy change. They explain how different factors influence the rate of reactions.





### Standards:

**All matter is made of atoms which are composed of protons, neutrons and electrons; natural radioactivity arises from the decay of nuclei in atoms. ([VCSSU122](#))**








 <a href="#">Review: Matter</a>	Review of Year 8 concepts of atoms, elements, and compounds for Australian Year 9 students.
 <a href="#">Atomic Structure</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>	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="#">Introduction to Ions</a>	Introduction to ions including what they are, how they form, and how to name them.
 <a href="#">Ionic Compounds</a>	Ionic bonds and the structure and properties of ionic compounds.
 <a href="#">Ions in Solution</a>	How ions behave in solution, including solubility, recrystallisation and electrical conductivity.
 <a href="#">Naming Ionic Compounds</a>	How to name ionic compounds and write ionic formulae.
 <a href="#">Introduction to Radioactivity</a>	Introduction to radioactivity and radioisotopes.

 <a href="#">Types of Radiation</a>	Describing alpha, beta and gamma radiation.
 <a href="#">Half-Lives</a>	How to calculate half-lives and how carbon dating works.
 <a href="#">Nuclear Bombs</a>	Explanation of nuclear bombs with a focus on Hiroshima.
 <a href="#">Nuclear Fission</a>	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</a>	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="#">Effects of Radiation on Humans</a>	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>	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>	The uses of radioactivity in medicine, including nuclear imaging and radiotherapy.
 <a href="#">Build an Atom</a>	Build a model of an atom 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.

The atomic structure and properties of elements are used to organise them in the periodic table. [\(VCSSU123\)](#)















 <a href="#">History of the Atomic Model</a>	The model of the atom, and the models that came before it.
 <a href="#">Electron Configuration</a>	How electrons are configured in an atom.
 <a href="#">The Periodic Table</a>	Introduction to the periodic table.
 <a href="#">Trends in the Periodic Table</a>	The trends in the periodic table.



















 <a href="#">Introduction to Bonding</a>	The concept of chemical bonding.
 <a href="#">Metallic Bonding</a>	Metallic bonding.
 <a href="#">Ionic Bonding</a>	Ionic bonding.
 <a href="#">Covalent Bonding</a>	Covalent bonding.
 <a href="#">Groups 1 and 2</a>	The properties of group 1 and 2 metals in the periodic table.
 <a href="#">Group 14</a>	The properties of group 14 elements in the periodic table.
 <a href="#">Group 17</a>	The properties of group 17 elements in the periodic table.
 <a href="#">Group 18</a>	The properties of group 18 elements in the periodic table.
 <a href="#">Other Groups</a>	The groups 15, 16 and the transition metals, and introduces the lanthanides and actinides.
 <a href="#">Chemicals: Friend or Foe?</a>	Introduces dangerous chemicals and explains proper handling and clean up procedures around them.
 <a href="#">Spectroscopy</a>	How spectroscopy was developed, and what some different types of spectroscopy are.
 <a href="#">Ionic Bonding Card Game</a>	In this investigation, students have cards that represent different cations and anions. They must match the cards in their hand in order to make balanced ionic compounds. The more cards in a compound, the more points.
 <a href="#">Modelling Bonding using Tennis Balls</a>	Tennis balls are used to represent electrons, while students represent atoms. To model metallic, ionic and covalent bonding, students must obtain or get rid of tennis balls in various ways.
 <a href="#">Helium: More Than a Bit of Squeaky Fun</a>	The global helium shortage and how people are looking into finding more.
 <a href="#">Metallic Hydrogen or: How I Learned to Stop Worrying and Love the Scientific Process</a>	The recent discovery of metallic hydrogen, including the criticisms of how the discovery was carried out.
 <a href="#">Understanding the Periodic Table</a>	Using the periodic table to look up information about specific elements.











Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed.

[\(VCSSU124\)](#)






 <a href="#">Introduction to Chemical Reactions</a>	What chemical reactions are. Including how to identify chemical reactions and what happens during a chemical reaction.
 <a href="#">Reactants and Products</a>	The differences between reactants and products using everyday examples. Investigation using baking soda and vinegar.
 <a href="#">Writing Chemical Equations 1</a>	Introduction 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>	The concept of the Conservation of Mass.
 <a href="#">Balancing Equations</a>	Practice balancing equations.
 <a href="#">A Day in the Life of an Industrial Chemist</a>	What industrial chemists do and what it takes to become one.
 <a href="#">Fermentation</a>	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>	What waste products are and how, as a society, we can manage them. Emphasis 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.











Different types of chemical reactions are used to produce a range of products and can occur at different rates; chemical reactions may be represented by balanced chemical equations. ([VCSSU125](#))

 <a href="#">Chemical vs. Physical</a>	Learn to identify whether a chemical or physical reaction has taken place.
 <a href="#">Chemical Reactions</a>	Chemical reactions.
 <a href="#">Combination and Decomposition Reactions</a>	Combination and decomposition reactions.
 <a href="#">Acid Reactions</a>	Acid reactions.
 <a href="#">Precipitation Reactions</a>	Precipitation reactions.
 <a href="#">Oxidation and Reduction</a>	Oxidation and reduction reactions.
 <a href="#">Rate of Reaction</a>	The different ways to control the rate of a reaction.
 <a href="#">Agitation, Concentration and Surface Area</a>	How agitation, concentration and surface area can affect the rate of a reaction.
 <a href="#">Activation Energy, Temperature and Catalysts</a>	How temperature and catalysts relate to activation energy, and how this affects the rate of a reaction.
 <a href="#">Collision Theory</a>	Reactions occur when molecules collide with the right orientation and with sufficient energy.
 <a href="#">Collision Theory and Rate of Reaction</a>	Explains that, according to collision theory, the rate of reaction will be proportional with the number of effective collisions.
 <a href="#">Rate of Reaction Equations</a>	Calculating the rate of reactions using the concentrations of its reactants and products.
 <a href="#">Factors Affecting Reaction Rates</a>	Exploring factors that affect the rate of reaction, including surface area, concentration, temperature and the presence of catalysts.
 <a href="#">Reaction Equations</a>	Writing chemical equations. Including the phase (solid, aqueous or gaseous) of the different reactants and products.
 <a href="#">The Mole</a>	What a mole is. Students perform various calculations, including finding a molar mass, number of atoms or number of moles.
 <a href="#">Empirical and Molecular Formulae</a>	The difference between empirical and molecular formulae, and how to convert from one to the other using molecular mass.

 <a href="#">Moles and Equations</a>	How to find moles and masses of products and reactants based on their relative abundance in chemical equations.
 <a href="#">Analytical Chemistry</a>	What an analytical chemist does, including quality assurance and forensics and how to become one.
 <a href="#">Extracting Metals</a>	How metals are extracted from their ores.
 <a href="#">Fuels and Pharmaceuticals</a>	The chemistry behind fuels and pharmaceuticals.
 <a href="#">Polymers</a>	How chemistry can be used to make the useful material we all use every day, plastics!
 <a href="#">Milk Plastic</a>	Making plastic out of milk.
 <a href="#">Modelling Rate of Reaction: Concentration</a>	Using a tennis racket, students bat different numbers of tennis balls at a target. This simulates molecules colliding and reacting. They then measure the number of collisions made per minute, and from this infer how changing the number of tennis balls would change the rate of reaction.
 <a href="#">Modelling Rate of Reaction: Temperature</a>	Students throw tennis balls at a target to simulate molecules colliding and reacting. They repeat the experiment, throwing the tennis balls more and less often in order to simulate higher and lower temperatures. During this, they measure the number of collisions per minute.
 <a href="#">Chemical Clocks</a>	How the rate of reaction can be manipulated to produce unusual results, such as a solution that flickers between colourless and purple!
 <a href="#">Graphing Rate of Reaction</a>	Interpreting graphs of reactant concentration over time.

**Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer. ([VCSSU126](#))**

 <a href="#">Acids</a>	Concept of acids, and how they dissolve, plus their strength.
 <a href="#">Bases</a>	Concept of bases, and how they dissolve, plus their strength.
 <a href="#">Indicators</a>	The pH scale, indicators, and how they are used to identify whether a substance is acidic or basic.
 <a href="#">Acid-Metal Reactions</a>	Reactions between acid and metals. Also introduces concept of salts.
 <a href="#">Neutralisation Reactions</a>	Neutralisation reactions and how to name the salts produced in this reaction

 <a href="#">Endothermic and Exothermic Reactions</a>	The difference between endothermic and exothermic reactions, and which types of reaction respiration and photosynthesis are.
 <a href="#">Combustion Reactions</a>	How combustion works. Including an explanation of incomplete combustion.
 <a href="#">Oxidation Reactions</a>	What oxidation reactions are.
 <a href="#">Types of Chemical Reactions</a>	Decomposition, synthesis and single and double displacement reactions.
 <a href="#">Acid Rain: Reactions Around Us</a>	The causes of acid rain and the effects it has on the environment.
 <a href="#">Combustion and the Environment</a>	The Greenhouse Effect and how human activities have contributed to it.
 <a href="#">Photosynthesis: Reactions Around Us</a>	Photosynthesis.
 <a href="#">Respiration: Reactions Around Us</a>	Respiration.
 <a href="#">Acids and Metals</a>	Observing how hydrochloric acid can react with magnesium.
 <a href="#">Acids and Bases</a>	Acids and bases and their uses. This lesson can be used to improve reading comprehension.


## Earth and Space Sciences

### Relevant section of the achievement standard:








By the end of Level 10 students ... evaluate the evidence for scientific theories that explain the origin of the Universe ... They explain global features and events in terms of geological processes and timescales, and describe and analyse interactions and cycles within and between Earth's spheres.

### Standards:










The theory of plate tectonics explains global patterns of geological activity and continental movement. ([VCSSU127](#))



















 <a href="#">Igneous Rocks</a>	Recap of igneous rocks and the processes that form them.
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 <a href="#">Metamorphic Rocks</a>	Recap of metamorphic rocks and the processes that form them.
 <a href="#">Sedimentary Rocks</a>	Recap of sedimentary rocks and the processes that form them.
 <a href="#">Compositional Layers of the Earth</a>	The Earth's layers.
 <a href="#">Wegener's Theory of Continental Drift</a>	The theory proposed by Alfred Wegener.
 <a href="#">Seafloor Spreading and Hess' Theory</a>	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>	Divergent plate boundaries, seafloor spreading and magnetic striping.
 <a href="#">Convergent Plate Boundaries</a>	Convergent plate boundaries, subduction zones and mountain building.
 <a href="#">Transform Boundaries and Faults</a>	Types of fault lines and the landforms they produce.
 <a href="#">Formation of Volcanoes</a>	Types of volcanoes and the tectonic processes that form them.
 <a href="#">Types of Lava</a>	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>	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>	Recent earthquakes in Japan and New Zealand, with a focus on tsunamis, liquefaction and other associated hazards.
 <a href="#">Earth's Magnetic Field</a>	The Earth's magnetic field.
 <a href="#">Development of the Geological Timescale</a>	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>	Introduction to techniques used by scientists to probe the inner Earth.
 <a href="#">Supercontinents</a>	How the ancient supercontinent of Pangea turned into the seven continents we know today.




	<a href="#">Volcano Exploration Robots</a>	Exploring how small robots can be used to help explore and study volcanoes.
	<a href="#">Build a Seismometer</a>	Investigation learning 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="#">The Hotspot Debate</a>	Researching the debate over geological hotspots, and preparing a debate over this topic.
	<a href="#">Ice Tectonics on Europa</a>	Tectonic processes on the moon Europa.
	<a href="#">Subduction Zones and Ophiolite Belts</a>	Ophiolite: a product of some subduction zones.
	<a href="#">Understanding Megaquakes</a>	Interpreting data on the largest earthquakes in recorded history.

**Global systems, including the carbon cycle, rely on interactions involving the atmosphere, biosphere, hydrosphere and lithosphere.**  
[\(VCSSU128\)](#)













	<a href="#">Spheres</a>	Defining and explaining the four biospheres of earth: biosphere, lithosphere, atmosphere and hydrosphere.
	<a href="#">Water Cycle</a>	Explaining the steps of the water cycle, and how human activity has come to affect steps of the water cycle and the consequences of these impacts.
	<a href="#">Carbon Cycle</a>	The steps of the carbon cycle, and analyses how human activity has come to affect carbon levels in the atmosphere.
	<a href="#">Nitrogen Cycle</a>	The steps of the nitrogen cycle, and analyses how human activity has come to affect nitrogen levels in the four spheres of Earth and the consequences of these changes.
	<a href="#">Phosphorus Cycle</a>	The steps of the phosphorus cycle, how human activity has come to affect hydrospheric phosphorus levels and the consequences of this change in hydrospheric phosphorus.
	<a href="#">Climate and Weather</a>	The difference between weather and climate. Introducing the concept of climate change.
	<a href="#">Ocean Currents</a>	Ocean currents and their effect on the climate.
	<a href="#">El Niño and La Niña</a>	El Niña, La Niña and the Southern Oscillation.
	<a href="#">The Greenhouse Effect</a>	The natural process of the greenhouse effect and how it maintains a comfortable temperature on Earth.









 <a href="#">The Enhanced Greenhouse Effect</a>	The enhanced greenhouse effect and how human activity is intensifying the natural warming process.
 <a href="#">Human Influences on Climate</a>	Ways humans influence the climate, including deforestation, agriculture, burning fossil fuels and using fertilisers.
 <a href="#">Climate Change and Biodiversity</a>	The concept of biodiversity, its importance and how it is affected by climate change.
 <a href="#">It's Getting Hot in Here</a>	The effect of the greenhouse effect on global temperatures and permafrosts.
 <a href="#">Disappearing Polar Ice</a>	The effects of the enhanced greenhouse effect on land and sea ice in polar regions.
 <a href="#">Pollution</a>	The different types of pollution, including air, land, light, noise and water pollution.
 <a href="#">Where Have all the Turtles Gone?</a>	Ways that climate change is threatening sea turtles, including producing a skewed sex ratio and killing eggs.
 <a href="#">Carbon Capture</a>	Introducing carbon capture as a way that humans may be able to reduce climate change. It explains why carbon capture is important and what important carbon sinks are.
 <a href="#">Carbon Footprints</a>	What a carbon footprint is and how it can be measured and reduced.
 <a href="#">CFCs and the Ozone Layer</a>	How CFCs have led to the hole in the ozone layer resulting in the ban of certain chemicals. Discussion on how scientific research can have a positive and meaningful impact on society.
 <a href="#">Computer Modelling and the Environment</a>	What computer modelling is, and how it can be used to study the weather, ocean conditions, pollution and climate change.
 <a href="#">Save the Great Barrier Reef?</a>	The bleaching of the Great Barrier Reef, and ways that scientists are hoping to save what is left.
 <a href="#">Climate Change</a>	A research based investigation on the effects of the enhanced greenhouse effect on the climate.
 <a href="#">Convection Currents</a>	Creating an observable convection current in the lab to better understand the nature of convection currents in the environment.
 <a href="#">Polar Ice</a>	Investigation into the effects of land ice and sea ice on sea levels.
 <a href="#">The Greenhouse Effect</a>	The factors that contribute to the greenhouse effect in different model environments.
 <a href="#">If Climate Change is Real, How Come...?</a>	Arguments against climate change, and explains why each argument fails to grasp what is occurring under climate change.
 <a href="#">Troubled Waters</a>	How climate change is affecting marine habitats, including coral reefs.



-  [Examining Past Climate](#) Presents temperature and greenhouse gas composition data from ice cores for students to interpret.
-  [Reading a Weather Map](#) How to identify key features on weather maps, including pressure and temperature.
-  [The Southern Oscillation Index](#) Interpreting data on La Niña and El Niño conditions using the Southern Oscillation Index.

**The Universe contains features including galaxies, stars and solar systems; the Big Bang theory can be used to explain the origin of the Universe. (VCSSU129)**

-  [Universe Introduction](#) Introduction to the main components of the universe, including stars and the planets surrounding our sun.
-  [Scientific Theory](#) Introduction to what scientific theories are and how, unlike hypotheses, they are heavily supported by evidence.
-  [Scientific Notation](#) How to perform scientific notation on both very large and very small numbers.
-  [Gravity](#) The effect gravity has on the universe, and the cosmological principle.
-  [Light and Light Speed](#) The speed of light and light years.
-  [Radar Ranging](#) How we can measure distances in space using radar.
-  [The Life Cycle of Stars](#) How stars are formed, and the various stages they go through as they die. The lesson also introduces supernovae and black holes.
-  [Distances between Stars, Parallax and Parsecs](#) How the parallax phenomenon can be used to measure how far stars are from Earth.
-  [Properties of Stars](#) How a star's brightness and colour can be used to determine its distance from Earth, when it is too far to use the parallax method.
-  [Hertzsprung-Russell Diagrams](#) How Hertzsprung-Russell diagrams can be used to find the absolute magnitude of a star's brightness when its distance from Earth is unknown, and how this can be used to calculate how far away the star is.
-  [The Big Bang Theory](#) Introduction to what The Big Bang Theory is, and how The Big Bang would have progressed.
-  [Cosmic Background Radiation](#) The alternate theory of the original of the universe, the Steady State Theory, and how it was disproved by the discovery of cosmic microwave background radiation.

 <a href="#">Red Shift</a>	What the Doppler effect and red shift are, and how red shift provides evidence that the universe is expanding.
 <a href="#">Relativity</a>	Introduction to Einstein's theory of relativity, and some of the mind-boggling conclusions that can be drawn from it.
 <a href="#">End of the Universe</a>	Discussing how the expansion of the universe is increasing, not decreasing, and what this means for the future of the universe. It also includes how dark matter may explain this accelerated rate of expansion.
 <a href="#">Life</a>	The conditions on early Earth, and the many theories for how life eventually appeared.
 <a href="#">Observing Space</a>	How we use radio telescopes and satellites to study and measure the stars.
 <a href="#">The Secret Lives of Ultra-Cool Dwarf Stars</a>	The discovery of a unique set of exoplanets in the far-off Trappist system that may be able to support life.
 <a href="#">Flame Tests</a>	An investigation burning different substances to see what colour flame they produce.
 <a href="#">Measuring Parallax</a>	Investigation using parallax to measure the distance of far-away objects.


## Physical Sciences

### Relevant section of the achievement standard:

By the end of Level 10 students ... explain the concept of energy conservation and model energy transfer and transformation within systems. They give both qualitative and quantitative explanations of the relationships between distance, speed, acceleration, mass and force to predict and explain motion. They use the concepts of voltage and current to explain the operation of electric circuits and use a field model to explain interactions between magnets.














### Standards:

**Electric circuits can be designed for diverse purposes using different components; the operation of circuits can be explained by the concepts of voltage and current. ([VCSSU130](#))**



 <a href="#">Electricity</a>	Overview of electricity, covering: current, resistance and voltage, as well as series and parallel circuits.
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 <a href="#">Electric Circuits</a>	Introduction to energy transfer in electric circuits and symbols of common circuit components.
 <a href="#">Current</a>	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>	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>	Comparing series and parallel circuits with a focus on lightbulb brightness and switch usage.
 <a href="#">Calculating Using Ohm's Law</a>	Practice calculating voltage, current and resistance using Ohm's Law.
 <a href="#">The Sixth Sense: Electroreception</a>	How some animals can detect electrical currents.
 <a href="#">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.
 <a href="#">Battery Voltages</a>	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>	Comparing the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
 <a href="#">Static Electricity</a>	Investigation into static electricity and how it can be used to levitate objects.
 <a href="#">Development of Light Bulbs</a>	The development of light bulbs as a passage with which improve reading comprehension.








The interaction of magnets can be explained by a field model; magnets are used in the generation of electricity and the operation of motors. ([VCSSU131](#))

 <a href="#">Magnetism</a>	An introduction to magnets and magnetic fields.
 <a href="#">Magnetic Fields</a>	Explanation of magnetic fields and magnetic flux lines, using permanent bar magnets as an example.
 <a href="#">Examples of Magnetic Fields</a>	Explanation of the magnetic fields produced by current carrying wires and solenoids.
 <a href="#">Magnetic Force on a Wire</a>	Explanation of the magnetic forces acting on current carrying wire in magnetic fields and how to use the right-hand slap rule.
 <a href="#">Magnetic Force on a Charged Particle</a>	Explanation of the magnetic forces acting on charged particles in magnetic fields and how to use the right-hand slap rule.
 <a href="#">Electromagnetic Induction</a>	Explanation of how electromagnetic induction causes a current to be generated in wires due to their interaction with magnetic fields.
 <a href="#">Generators</a>	Explanation of how electromagnetic induction is used in generators to produce electricity.
 <a href="#">Motors</a>	Explanation of how magnets are used in DC motors to produce motion.
 <a href="#">Maglev Trains</a>	Explaining how maglev trains use electromagnets to levitate.
 <a href="#">Earth's Magnetic Field</a>	Introduction to the Earth's magnetic field and compasses.
 <a href="#">Mapping Magnetic Fields</a>	Investigation into the shapes of magnetic fields and the nature of magnetic forces.
 <a href="#">Magnetic Navigation</a>	Video comprehension on how animals use magnetic fields to navigate.
 <a href="#">Flipping Poles</a>	Understanding how poles can flip, and how they have done so in the Earth's past.










Energy flow in Earth's atmosphere can be explained by the processes of heat transfer. ([VCSSU132](#))



 <a href="#">Types of Energy</a>	Recap on the most common types of kinetic and potential energy.
 <a href="#">Conservation of Energy</a>	The Law of Conservation of Energy.

 <a href="#">Energy Transfer</a>	Energy transfer, with a focus on the transfer of heat.
 <a href="#">Energy Transformations</a>	Energy transformations.
 <a href="#">Useful and Wasted Energy</a>	Introduction to the concepts of useful energy, wasted energy and efficiency.
 <a href="#">Work and Power</a>	The concepts of work and power, with calculations.
 <a href="#">Energy Efficiency</a>	Energy efficiency, with calculations.
 <a href="#">Energy Calculations</a>	Practice using the energy, work and power formula.
 <a href="#">Heat Transfer</a>	Overview of conduction, convection, and radiation. All concepts are explained in detail in the other lessons in this folder.
 <a href="#">Conduction</a>	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="#">Electricity Generation</a>	Electricity and where it comes from in Australia
 <a href="#">Energy in Food</a>	How our body transforms the chemical potential energy in food into kinetic and heat energy.
 <a href="#">Levitation at UChicago!</a>	The development of a technique for thermal levitation.
 <a href="#">Steam Engines</a>	The energy transformations used to power steam engines.
 <a href="#">Bushfires</a>	Importance of heat and heat transfer during the Australian bushfires.
 <a href="#">Housing Insulation</a>	Explaining how insulation can be used to prevent heat from entering or exiting a house.
 <a href="#">Building an Electromagnet</a>	Investigations into electromagnets and how electrical currents can induce magnetic fields.
 <a href="#">Energy Efficiency of Bouncy Balls</a>	Investigation into the energy efficiency of bouncy balls.

 <a href="#">Energy in Food</a>	Investigation into the amount of chemical potential energy stored in food.
 <a href="#">Energy in Skate Parks</a>	Investigation into energy transformations and waste energy using a PhET Skate Park simulation.
 <a href="#">Roller Coasters</a>	Investigation into the energy transformations in a roller coaster.
 <a href="#">Convection in Liquids</a>	Investigation into convection of water as it is heated.
 <a href="#">Heat Conduction</a>	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>	Investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.

The description and explanation of the motion of objects involves the interaction of forces and the exchange of energy and can be described and predicted using the laws of physics. ([VCSSU133](#))

 <a href="#">Distance and Time</a>	Introduction to two key ideas in physics: distance and time.
 <a href="#">Displacement</a>	Explanation of distance and displacement, with calculations involving addition, subtraction and the use of Pythagoras' Theorem.
 <a href="#">Speed</a>	Explanation of speed and velocity, with calculation questions.
 <a href="#">Acceleration</a>	Explanation of acceleration with calculations.
 <a href="#">Using the Acceleration Formula</a>	Practice rearranging the formula for acceleration to find the formulae for final velocity, initial velocity and time.
 <a href="#">Distance-Time and Displacement-Time Graphs</a>	Explanation of distance-time graphs and displacement-time graphs, and how to calculate speed and velocity from them.
 <a href="#">Velocity-Time Graphs</a>	Velocity-time graphs including how to use them to find acceleration and distance travelled.
 <a href="#">Acceleration-Time Graphs</a>	Acceleration-time graphs and how we can use them to find the change in velocity of an object.
 <a href="#">Summary of Motion Graphs</a>	Revision of displacement-time graphs, velocity-time graphs and acceleration-time graphs.

 <a href="#">Introduction to Forces</a>	Recap of the concepts learnt in Year 7 forces, including how objects are affected by forces and the difference between balanced and unbalanced forces.
 <a href="#">Types of Forces</a>	Recap of the difference between contact and non-contact forces and some common forces, focussing on gravity, magnetism and friction.
 <a href="#">Weight and Mass</a>	Introduction to gravity and the difference between weight and mass.
 <a href="#">Newton's First Law</a>	Introduction to Newton's First Law of Motion and the concept of inertia.
 <a href="#">Newton's Second Law</a>	An explanation of Newton's Second Law and how the $F=ma$ law can be used to find force, acceleration, and mass of an object.
 <a href="#">Newton's Third Law</a>	Introduction to Newton's Third Law of Motion.
 <a href="#">Car Safety Systems Investigation</a>	Investigation into a car safety system.
 <a href="#">Planetary Motion</a>	How gravity causes planets to orbit the Sun.
 <a href="#">Tides</a>	Smart Lesson on how the tides are caused by the gravitational forces of the Sun and the Moon.
 <a href="#">Car Safety Systems</a>	Smart Lesson on how seatbelts, head rests, crumple zones and airbags use the laws of physics to protect people during car crashes.
 <a href="#">How BB-8 Works</a>	Smart Lesson which uses BB-8 to explain the difference between weight and mass, and also outlines a theory which explains how BB-8 can roll without anything pushing it.
 <a href="#">Rockets</a>	Explanation of the forces acting on rockets during launch and of the Space Race.
 <a href="#">Sports Science</a>	How sports science is used to develop new techniques and materials, improving athletes' performances.
 <a href="#">Balloon Rocket</a>	Investigation into Newton's Third Law using a balloon rocket.
 <a href="#">Egg Drop</a>	Investigation into Newton's First Law.
 <a href="#">Gravity</a>	Investigation into the effects of gravity and air resistance on falling objects.
 <a href="#">Reaction Times</a>	Investigation into reaction times and how they change when you're distracted.
 <a href="#">Ticker Timers</a>	Investigation that uses ticker timers to gather data on the motion of a toy car.

[Truckapults](#)

Investigation into Newton's Second Law using trucks of varying masses.

[Crashing Drones](#)

How scientists are studying animals to help make drones safer for everyone.

[History of Rockets](#)

The history of rockets, used to improve reading comprehension.

[Graphing and Analysing Motion](#)

Learning how to turn raw data into graphs, and how to read the motion graphs that are created.

## Science Inquiry Skills

### Relevant section of the achievement standard:

By the end of Level 10 students ... develop questions and hypotheses that can be investigated using a range of inquiry skills. They independently design and improve appropriate methods of investigation including the control and accurate measurement of variables and systematic collection of data. They explain how they have considered reliability, precision, safety, fairness and ethics in their methods and identify where digital technologies can be used to enhance the quality of data. They analyse trends in data, explain relationships between variables and identify sources of uncertainty. When selecting evidence and developing and justifying conclusions, they account for inconsistencies in results and identify alternative explanations for findings. Students evaluate the validity and reliability of claims made in secondary sources with reference to currently held scientific views, the quality of the methodology and the evidence cited. They construct evidence-based arguments and use appropriate scientific language, representations and balanced chemical equations when communicating their findings and ideas for specific purposes.

### Questioning and Predicting

**Formulate questions or hypotheses that can be investigated scientifically, including identification of independent, dependent and controlled variables. ([VCSIS134](#))**

[Designing Experiments on Pollution](#)

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



[Modelling Rate of Reaction: Concentration](#)

Using a tennis racket, students bat different numbers of tennis balls at a target. This simulates molecules colliding and reacting. They then measure the number of collisions made per minute, and from this infer how changing the number of tennis balls would change the rate of reaction.

[Modelling Rate of Reaction: Temperature](#)

Students throw tennis balls at a target to simulate molecules colliding and reacting. They repeat the experiment, throwing the tennis balls more and less often in order to simulate higher and lower temperatures. During this, they measure the number of collisions per minute.

[Building Circuits](#)

Investigation into lightbulbs in series and parallel circuits.

[Ohm's Law](#)

Investigation into Ohm's Law in a simple circuit.

[Energy Efficiency of Bouncy Balls](#)

Investigation into the energy efficiency of bouncy balls.

[Energy in Food](#)

Investigation into the amount of chemical potential energy stored in food.

[Energy in Skate Parks](#)

Investigation into energy transformations and waste energy using a PhET Skate Park simulation.

[Truckapults](#)

Investigation into Newton's Second Law using trucks of varying masses.

[Heat Conduction](#)

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.

[Radiation](#)

Investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.

[Variables](#)

Independent variables, dependent variables and control variables.

[Control Variables and Control Groups](#)

The importance of control variables and control groups, and the importance of using these for results to be meaningful.

[Scientific Method](#)

The scientific method and how to write a scientific report.

[Hypothesising and Predicting](#)

How to make a scientific hypothesis and predicting results of experiments.

## Planning and Conducting

**Independently plan, select and use appropriate investigation types, including fieldwork and laboratory experimentation, to collect reliable data, assess risk and address ethical issues associated with these investigation types. ([VCSIS135](#))**

[Designing Experiments on Pollution](#)

Planning 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>Photosynthesis and Starch</u></a>	Extracting starch - a product of photosynthesis - from leaves.
<a href="#"><u>Sampling a Leaf Litter Ecosystem</u></a>	Collecting samples of leaf litter at different depths and identify the invertebrates present. Also measuring the abiotic factors temperature and humidity at each depth. Using this information, students propose explanations for why the invertebrate community changes as one moves deeper into the leaf litter.
<a href="#"><u>Assessing Biodiversity</u></a>	Making pitfall traps and identify the invertebrates caught in them.
<a href="#"><u>Great Ape Genealogy</u></a>	Using coloured paperclips to model nucleotide sequences from human, chimp and gorilla DNA. Comparing the nucleotide sequences of the three different species and from this infer how they are related.
<a href="#"><u>Survival of the Mutants</u></a>	Groups of students compete to collect and store the most candy. Different groups have different traits, such as being blind or having their hands tied together. Through this exercise, students explore how different traits can affect an organism's foraging ability and overall fitness.
<a href="#"><u>Extracting DNA</u></a>	Extracting DNA from plant or animal tissue samples.
<a href="#"><u>Modelling Inheritance of Alleles</u></a>	In this investigation, students are given cards that represent the alleles of two parents across five genes. By randomly selecting and combining alleles, students can explore the processes of meiosis and fertilisation. From this, they can observe how siblings can end up looking different, even when they have the same parents.
<a href="#"><u>Observing Mitosis</u></a>	Observing cells from an onion root tip through a microscope and attempting to identify cells in different stages of mitosis.
<a href="#"><u>Eye Dissection</u></a>	Investigation dissecting a cow eye and identify the key structures.
<a href="#"><u>Kidney Dissection</u></a>	Dissecting a kidney and identify the key structures.
<a href="#"><u>Testing Reflexes</u></a>	Exploring the knee-jerk reflex as an example of a reflex arc.
<a href="#"><u>Build an Atom</u></a>	Investigation where students building a model of an atom and explaining how the relative sizes and charges of the subatomic particles are represented.
<a href="#"><u>Skittle Half Lives</u></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="#"><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>Identifying Chemical Reactions</u></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>Modelling Bonding using Tennis Balls</u></a>	Tennis balls are used to represent electrons, while students represent atoms. To model metallic, ionic and covalent bonding, students must obtain or get rid of tennis balls in various ways.
<a href="#"><u>Milk Plastic</u></a>	Making plastic out of milk.
<a href="#"><u>Modelling Rate of Reaction: Concentration</u></a>	Using a tennis racket, students bat different numbers of tennis balls at a target. This simulates molecules colliding and reacting. They then measure the number of collisions made per minute, and from this infer how changing the number of tennis balls would change the rate of reaction.
<a href="#"><u>Modelling Rate of Reaction: Temperature</u></a>	Students throw tennis balls at a target to simulate molecules colliding and reacting. They repeat the experiment, throwing the tennis balls more and less often in order to simulate higher and lower temperatures. During this, they measure the number of collisions per minute.
<a href="#"><u>Acids and Metals</u></a>	Observing how hydrochloric acid can react with magnesium.
<a href="#"><u>Build a Seismometer</u></a>	Investigation learning 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>Convection Currents</u></a>	Creating an observable convection current in the lab to better understand the nature of convection currents in the environment.
<a href="#"><u>Polar Ice</u></a>	Investigation into the effects of land ice and sea ice on sea levels.
<a href="#"><u>The Greenhouse Effect</u></a>	The factors that contribute to the greenhouse effect in different model environments.
<a href="#"><u>Flame Tests</u></a>	An investigation burning different substances to see what colour flame they produce.
<a href="#"><u>Measuring Parallax</u></a>	Investigation using parallax to measure the distance of far-away objects.
<a href="#"><u>Battery Voltages</u></a>	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>	Comparing the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
<a href="#"><u>Static Electricity</u></a>	Investigation into static electricity and how it can be used to levitate objects.
<a href="#"><u>Building an Electromagnet</u></a>	Investigations into electromagnets and how electrical currents can induce magnetic fields.
<a href="#"><u>Energy Efficiency of Bouncy Balls</u></a>	Investigation into the energy efficiency of bouncy balls.
<a href="#"><u>Energy in Food</u></a>	Investigation into the amount of chemical potential energy stored in food.

<a href="#"><u>Balloon Rocket</u></a>	Investigation into Newton's Third Law using a balloon rocket.
<a href="#"><u>Egg Drop</u></a>	Investigation into Newton's First Law.
<a href="#"><u>Gravity</u></a>	Investigation into the effects of gravity and air resistance on falling objects.
<a href="#"><u>Reaction Times</u></a>	Investigation into reaction times and how they change when you're distracted.
<a href="#"><u>Ticker Timers</u></a>	Investigation that uses ticker timers to gather data on the motion of a toy car.
<a href="#"><u>Truckapults</u></a>	Investigation into Newton's Second Law using trucks of varying masses.
<a href="#"><u>Convection in Liquids</u></a>	Investigation into convection of water as it is heated.
<a href="#"><u>Heat Conduction</u></a>	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>	Investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.
<a href="#"><u>Mapping Magnetic Fields</u></a>	Investigation into the shapes of magnetic fields and the nature of magnetic forces.
<a href="#"><u>Safety Equipment</u></a>	The different types of safety equipment and when to use them.
<a href="#"><u>Safety Guidelines</u></a>	Discussing safety instructions for the lab, including what to wear and what to do when things go wrong.
<a href="#"><u>Accuracy</u></a>	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>	Validity when performing an experiment, and how changing variables can invalidate an experiment.
<a href="#"><u>Fair Tests</u></a>	Fair tests and how to control variables.
<a href="#"><u>Sample Size</u></a>	The importance of large sample sizes in collecting accurate results.
<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="#"><u>Units of Volume</u></a>	Introduction to the SI units used to measure volume, and how to convert between the units.

Select and use appropriate equipment and technologies to systematically collect and record accurate and reliable data, and use repeat trials to improve accuracy, precision and reliability. ([VCSIS136](#))

<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="#">Sampling a Leaf Litter Ecosystem</a>	Collecting samples of leaf litter at different depths and identify the invertebrates present. Also measuring the abiotic factors temperature and humidity at each depth. Using this information, students propose explanations for why the invertebrate community changes as one moves deeper into the leaf litter.
<a href="#">Assessing Biodiversity</a>	Making pitfall traps and identify the invertebrates caught in them.
<a href="#">Great Ape Genealogy</a>	Using coloured paperclips to model nucleotide sequences from human, chimp and gorilla DNA. Comparing the nucleotide sequences of the three different species and from this infer how they are related.
<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="#">Modelling Rate of Reaction: Concentration</a>	Using a tennis racket, students bat different numbers of tennis balls at a target. This simulates molecules colliding and reacting. They then measure the number of collisions made per minute, and from this infer how changing the number of tennis balls would change the rate of reaction.
<a href="#">Modelling Rate of Reaction: Temperature</a>	Students throw tennis balls at a target to simulate molecules colliding and reacting. They repeat the experiment, throwing the tennis balls more and less often in order to simulate higher and lower temperatures. During this, they measure the number of collisions per minute.
<a href="#">Polar Ice</a>	Investigation into the effects of land ice and sea ice on sea levels.
<a href="#">Measuring Parallax</a>	Investigation using parallax to measure the distance of far-away objects.
<a href="#">Battery Voltages</a>	Investigation where students measure the voltages on a range of batteries and compare this to the advertised voltages.
<a href="#">Ohm's Law</a>	Investigation into Ohm's Law in a simple circuit.
<a href="#">Resistance</a>	Comparing the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
<a href="#">Energy Efficiency of Bouncy Balls</a>	Investigation into the energy efficiency of bouncy balls.
<a href="#">Energy in Food</a>	Investigation into the amount of chemical potential energy stored in food.
<a href="#">Energy in Skate Parks</a>	Investigation into energy transformations and waste energy using a PhET Skate Park simulation.
<a href="#">Balloon Rocket</a>	Investigation into Newton's Third Law using a balloon rocket.
<a href="#">Egg Drop</a>	Investigation into Newton's First Law.

<a href="#"><u>Reaction Times</u></a>	Investigation into reaction times and how they change when you're distracted.
<a href="#"><u>Ticker Timers</u></a>	Investigation that uses ticker timers to gather data on the motion of a toy car.
<a href="#"><u>Truckapults</u></a>	Investigation into Newton's Second Law using trucks of varying masses.
<a href="#"><u>Heat Conduction</u></a>	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>	Investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.
<a href="#"><u>Equipment Types</u></a>	Basic laboratory equipment and its uses.
<a href="#"><u>Bunsen Burner</u></a>	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>Measuring in Science</u></a>	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>	The way to read a measurement from a fluid that has a meniscus.
<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>	How to interpret data tables, and the difference between directly proportional and inversely proportional relationships.
<a href="#"><u>Measuring Electricity</u></a>	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>	How optical microscopes work and what they are.
<a href="#"><u>Types of Microscopes</u></a>	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>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>Scientific Notation</u></a>	How to write large and small numbers in scientific notation.

**Significant Figures**

How to write numbers to significant figures, and how to identify significant figures.

## Recording and Processing

Construct and use a range of representations, including graphs, keys, models and formulas, to record and summarise data from students' own investigations and secondary sources, to represent qualitative and quantitative patterns or relationships, and distinguish between discrete and continuous data. ([VCSIS137](#))

**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.

**Sampling a Leaf Litter Ecosystem**

Collecting samples of leaf litter at different depths and identify the invertebrates present. Also measuring the abiotic factors temperature and humidity at each depth. Using this information, students propose explanations for why the invertebrate community changes as one moves deeper into the leaf litter.

**Building an Evolutionary Timeline**

Creating and interpreting a timeline with a list of major dates in the evolution of life on Earth.

**Eye Dissection**

Investigation dissecting a cow eye and identify the key structures.

**Kidney Dissection**

Dissecting a kidney and identify the key structures.

**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.

**Modelling Bonding using Tennis Balls**

Tennis balls are used to represent electrons, while students represent atoms. To model metallic, ionic and covalent bonding, students must obtain or get rid of tennis balls in various ways.

**Ohm's Law**

Investigation into Ohm's Law in a simple circuit.

**Building an Electromagnet**

Investigations into electromagnets and how electrical currents can induce magnetic fields.

**Energy in Food**

Investigation into the amount of chemical potential energy stored in food.

**Energy in Skate Parks**

Investigation into energy transformations and waste energy using a PhET Skate Park simulation.

**Truckapults**

Investigation into Newton's Second Law using trucks of varying masses.

**Insulators**

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

**Radiation**

Investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.

**Mapping Magnetic Fields**

Investigation into the shapes of magnetic fields and the nature of magnetic forces.

<a href="#">Graphs in Science</a>	How graphs are used in science.
<a href="#">Bar Graphs</a>	Bar graphs, and what type of information is best represented in bar graphs.
<a href="#">Line Graphs</a>	How to make and read a line graph.
<a href="#">Matching Tables to Graphs</a>	Whether data should be presented in a table or a graph.
<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="#">A Guide for Making Graphs in Excel (Mac Version)</a>	How to make scatter plots, histograms and column graphs in Excel, when using a Mac computer.
<a href="#">A Guide for Making Graphs in Excel (Windows Version)</a>	How to make scatter plots, histograms and column graphs in Excel, when using a Windows computer.
<a href="#">Scatter Graphs</a>	Explanation of scatter graphs and lines of best fit.

## Analysing and Evaluating

Analyse patterns and trends in data, including describing relationships between variables, identifying inconsistencies in data and sources of uncertainty, and drawing conclusions that are consistent with evidence. ([VCSIS138](#))

<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="#">Sampling a Leaf Litter Ecosystem</a>	Collecting samples of leaf litter at different depths and identify the invertebrates present. Also measuring the abiotic factors temperature and humidity at each depth. Using this information, students propose explanations for why the invertebrate community changes as one moves deeper into the leaf litter.
<a href="#">Assessing Biodiversity</a>	Making pitfall traps and identify the invertebrates caught in them.
<a href="#">Building an Evolutionary Timeline</a>	Creating and interpreting a timeline with a list of major dates in the evolution of life on Earth.
<a href="#">Great Ape Genealogy</a>	Using coloured paperclips to model nucleotide sequences from human, chimp and gorilla DNA. Comparing the nucleotide sequences of the three different species and from this infer how they are related.



<a href="#"><u>Survival of the Mutants</u></a>	Groups of students compete to collect and store the most candy. Different groups have different traits, such as being blind or having their hands tied together. Through this exercise, students explore how different traits can affect an organism's foraging ability and overall fitness.
<a href="#"><u>Extracting DNA</u></a>	Extracting DNA from plant or animal tissue samples.
<a href="#"><u>Modelling Inheritance of Alleles</u></a>	In this investigation, students are given cards that represent the alleles of two parents across five genes. By randomly selecting and combining alleles, students can explore the processes of meiosis and fertilisation. From this, they can observe how siblings can end up looking different, even when they have the same parents.
<a href="#"><u>Observing Mitosis</u></a>	Observing cells from an onion root tip through a microscope and attempting to identify cells in different stages of mitosis.
<a href="#"><u>Eye Dissection</u></a>	Investigation dissecting a cow eye and identify the key structures.
<a href="#"><u>Kidney Dissection</u></a>	Dissecting a kidney and identify the key structures.
<a href="#"><u>Testing Reflexes</u></a>	Exploring the knee-jerk reflex as an example of a reflex arc.
<a href="#"><u>Skittle Half Lives</u></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="#"><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>Identifying Chemical Reactions</u></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>Ionic Bonding Card Game</u></a>	In this investigation, students have cards that represent different cations and anions. They must match the cards in their hand in order to make balanced ionic compounds. The more cards in a compound, the more points.
<a href="#"><u>Modelling Bonding using Tennis Balls</u></a>	Tennis balls are used to represent electrons, while students represent atoms. To model metallic, ionic and covalent bonding, students must obtain or get rid of tennis balls in various ways.
<a href="#"><u>Milk Plastic</u></a>	Making plastic out of milk.
<a href="#"><u>Modelling Rate of Reaction: Concentration</u></a>	Using a tennis racket, students bat different numbers of tennis balls at a target. This simulates molecules colliding and reacting. They then measure the number of collisions made per minute, and from this infer how changing the number of tennis balls would change the rate of reaction.

<a href="#"><u>Modelling Rate of Reaction: Temperature</u></a>	Students throw tennis balls at a target to simulate molecules colliding and reacting. They repeat the experiment, throwing the tennis balls more and less often in order to simulate higher and lower temperatures. During this, they measure the number of collisions per minute.
<a href="#"><u>Acids and Metals</u></a>	Observing how hydrochloric acid can react with magnesium.
<a href="#"><u>Build a Seismometer</u></a>	Investigation learning what a seismometer is and how to make one from household materials.
<a href="#"><u>The Hotspot Debate</u></a>	Researching the debate over geological hotspots, and preparing a debate over this topic.
<a href="#"><u>Climate Change</u></a>	A research based investigation on the effects of the enhanced greenhouse effect on the climate.
<a href="#"><u>Convection Currents</u></a>	Creating an observable convection current in the lab to better understand the nature of convection currents in the environment.
<a href="#"><u>Polar Ice</u></a>	Investigation into the effects of land ice and sea ice on sea levels.
<a href="#"><u>The Greenhouse Effect</u></a>	The factors that contribute to the greenhouse effect in different model environments.
<a href="#"><u>Flame Tests</u></a>	An investigation burning different substances to see what colour flame they produce.
<a href="#"><u>Measuring Parallax</u></a>	Investigation using parallax to measure the distance of far-away objects.
<a href="#"><u>Battery Voltages</u></a>	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>	Comparing the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
<a href="#"><u>Static Electricity</u></a>	Investigation into static electricity and how it can be used to levitate objects.
<a href="#"><u>Building an Electromagnet</u></a>	Investigations into electromagnets and how electrical currents can induce magnetic fields.
<a href="#"><u>Energy Efficiency of Bouncy Balls</u></a>	Investigation into the energy efficiency of bouncy balls.
<a href="#"><u>Energy in Food</u></a>	Investigation into the amount of chemical potential energy stored in food.
<a href="#"><u>Energy in Skate Parks</u></a>	Investigation into energy transformations and waste energy using a PhET Skate Park simulation.
<a href="#"><u>Roller Coasters</u></a>	Investigation into the energy transformations in a roller coaster.
<a href="#"><u>Balloon Rocket</u></a>	Investigation into Newton's Third Law using a balloon rocket.
<a href="#"><u>Egg Drop</u></a>	Investigation into Newton's First Law.
<a href="#"><u>Gravity</u></a>	Investigation into the effects of gravity and air resistance on falling objects.

<a href="#">Reaction Times</a>	Investigation into reaction times and how they change when you're distracted.
<a href="#">Ticker Timers</a>	Investigation that uses ticker timers to gather data on the motion of a toy car.
<a href="#">Truckapults</a>	Investigation into Newton's Second Law using trucks of varying masses.
<a href="#">Convection in Liquids</a>	Investigation into convection of water as it is heated.
<a href="#">Heat Conduction</a>	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>	Investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.
<a href="#">Mapping Magnetic Fields</a>	Investigation into the shapes of magnetic fields and the nature of magnetic forces.

Use knowledge of scientific concepts to evaluate investigation conclusions, including assessing the approaches used to solve problems, critically analysing the validity of information obtained from primary and secondary sources, suggesting possible alternative explanations and describing specific ways to improve the quality of data. [\(VCSIS139\)](#)

<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="#">Research Project: 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="#">Assessing Biodiversity</a>	Making pitfall traps and identify the invertebrates caught in them.
<a href="#">Survival of the Mutants</a>	Groups of students compete to collect and store the most candy. Different groups have different traits, such as being blind or having their hands tied together. Through this exercise, students explore how different traits can affect an organism's foraging ability and overall fitness.
<a href="#">Extracting DNA</a>	Extracting DNA from plant or animal tissue samples.
<a href="#">Research Project: Inbreeding in Dogs</a>	Students research inbreeding in purebred dogs and write an essay explaining their findings. More information on inbreeding can be found in the Smart Lesson "Background Information - The Consequences of Inbreeding".
<a href="#">Eye Dissection</a>	Investigation dissecting a cow eye and identify the key structures.
<a href="#">Kidney Dissection</a>	Dissecting a kidney and identify the key structures.
<a href="#">Testing Reflexes</a>	Exploring the knee-jerk reflex as an example of a reflex arc.

<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>Identifying Chemical Reactions</u></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>Ionic Bonding Card Game</u></a>	In this investigation, students have cards that represent different cations and anions. They must match the cards in their hand in order to make balanced ionic compounds. The more cards in a compound, the more points.
<a href="#"><u>Milk Plastic</u></a>	Making plastic out of milk.
<a href="#"><u>Modelling Rate of Reaction: Concentration</u></a>	Using a tennis racket, students bat different numbers of tennis balls at a target. This simulates molecules colliding and reacting. They then measure the number of collisions made per minute, and from this infer how changing the number of tennis balls would change the rate of reaction.
<a href="#"><u>Modelling Rate of Reaction: Temperature</u></a>	Students throw tennis balls at a target to simulate molecules colliding and reacting. They repeat the experiment, throwing the tennis balls more and less often in order to simulate higher and lower temperatures. During this, they measure the number of collisions per minute.
<a href="#"><u>Acids and Metals</u></a>	Observing how hydrochloric acid can react with magnesium.
<a href="#"><u>Build a Seismometer</u></a>	Investigation learning what a seismometer is and how to make one from household materials.
<a href="#"><u>The Hotspot Debate</u></a>	Researching the debate over geological hotspots, and preparing a debate over this topic.
<a href="#"><u>Climate Change</u></a>	A research based investigation on the effects of the enhanced greenhouse effect on the climate.
<a href="#"><u>Measuring Parallax</u></a>	Investigation using parallax to measure the distance of far-away objects.
<a href="#"><u>Battery Voltages</u></a>	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>	Comparing the measured resistance for a number of resistors to the resistance advertised by the resistors' coloured bands.
<a href="#"><u>Static Electricity</u></a>	Investigation into static electricity and how it can be used to levitate objects.
<a href="#"><u>Energy Efficiency of Bouncy Balls</u></a>	Investigation into the energy efficiency of bouncy balls.

<a href="#">Energy in Food</a>	Investigation into the amount of chemical potential energy stored in food.
<a href="#">Energy in Skate Parks</a>	Investigation into energy transformations and waste energy using a PhET Skate Park simulation.
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<a href="#">Radiation</a>	Investigation into heat transfer via radiation, and how the colour of objects impact the amount of heat that they radiate.
<a href="#">Mapping Magnetic Fields</a>	Investigation into the shapes of magnetic fields and the nature of magnetic forces.
<a href="#">Evaluating in Science</a>	How to evaluate experimental results.

## Communicating

Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations. ([VCSIS140](#))

<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="#">Research Project: 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="#">Research Project: Inbreeding in Dogs</a>	Students research inbreeding in purebred dogs and write an essay explaining their findings. More information on inbreeding can be found in the Smart Lesson "Background Information - The Consequences of Inbreeding".

<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>The Hotspot Debate</u></a>	Researching the debate over geological hotspots, and preparing a debate over this topic.
<a href="#"><u>Climate Change</u></a>	A research based investigation on the effects of the enhanced greenhouse effect on the climate.
<a href="#"><u>Static Electricity</u></a>	Investigation into static electricity and how it can be used to levitate objects.
<a href="#"><u>Building an Electromagnet</u></a>	Investigations into electromagnets and how electrical currents can induce magnetic fields.
<a href="#"><u>Roller Coasters</u></a>	Investigation into the energy transformations in a roller coaster.
<a href="#"><u>Balloon Rocket</u></a>	Investigation into Newton's Third Law using a balloon rocket.
<a href="#"><u>Egg Drop</u></a>	Investigation into Newton's First Law.