Education Perfect Science

VC 2.0 Curriculum Map

Levels 7 and 8 Curriculum Map

Biological Sciences			
Classification			
VC2S8U01 - there are similarities and differences within and between groups of organisms living on Earth; the development and use of classification tools, including dichotomous keys, help order and organise human understanding of the diversity of life			
considering the reasons for classifying organisms, such as for identification and communication	Why do we classify?	You might think it is easy to identify things as living and non-living, but if I asked you to describe what it is to be living, what would you say? In this lesson, we will learn about the characteristics of living things and how, as scientists, we can define things as living or non-living.	- Define classification - Discuss why it is important to classify organisms - Describe two reasons for classification (identification and communication); - Describe the characteristics of living things
identifying the differences in ways that selected organisms achieve the common requirements for life: movement, respiration, sensitivity, growth, reproduction, excretion and nutrition	Classification of Life	If we look at a rabbit and a fish, they are very different animals, not just in looks, but also in the way they survive in their environment. If you put a rabbit in the water, they would not be able to breathe and the same with a fish out of water. In this lesson, we will look at the similarities and differences in features of organisms that help them to move, breathe, grow and live.	- Identify key features that aid groups of organisms in surviving in their environment - Compare key features between groups of organisms that help them with movement, respiration, sensitivity, growth, reproduction, excretion and nutrition.
naming and classifying species using scientific conventions from the Linnaean hierarchical classification system, such as the levels of kingdom, phylum, class, order, family, genus and species	Linnaean Classification	Now that we can organise and order organisms around us, we must learn about how they are named so we can talk to other scientists about them. In this lesson, we will classify organisms based on scientific convention from the Linnaean hierarchical classification system.	- Explain the Linnaean hierarchical classification system - Identify seven scientific conventions that make up the Linnaean hierarchical classification system - Classify three species based on the Linnaean hierarchical classification system
investigating Aboriginal and/or Torres Strait Islander Peoples' systems of classifying organisms and how these systems differ from the Linnaean system of classification	How First Nations Australians Classify Organisms	In this lesson, we will investigate the classification system of Aboriginal and/or Torres Strait Islander People's systems for classifying organisms. We will also identify differences between this system and the Linnaean system of classification.	- Describe the Aboriginal and/or Torres Strait Islander system of classification - Compare the Aboriginal and/or Torres Strait system of classification and the Linnaean system of classification

using provided dichotomous keys to identify organisms surveyed on a field trip creating and modifying a dichotomous key to classify organisms into groups, and groups within groups	Introduction to Dichotomous Keys	In this lesson, we will explore dichotomous keys. These are one of the ways that scientists are able to classify things based on their characteristics.	- Define the term dichotomous key - Use a dichotomous key to identify an organism based on its characteristics - Explain how a dichotomous key can be used to classify organisms into groups
using provided dichotomous keys to identify organisms surveyed on a field trip creating and modifying a dichotomous key to classify organisms into groups, and groups within groups	Investigation: Building and Using Dichotomous Keys	We have spoken about how important it is to be able to classify organisms, now it's your turn. In this lesson, it's time for us to learn create and use a dichotomous key to identify different organisms.	- Identify the key features of a dichotomous key - Create a dichotomous key using everyday objects. - Use a dichotomous key to identify at least three species - Create a dichotomous key for an Australian habitat.
researching how biological classification has changed over time through improvements in microscopy	Research: Classification Through Time	Throughout this topic, we have looked at the reasons we classify organisms and the importance of classifying organisms in science. In this lesson, we will research how microscopy has improved biological classification	- Identify how microscopy has changed biological classification - Create a timeline of biological classification, including major changes
Extension	Adaptations of Australian Organisms	In this lesson, we will investigate the Australian habitat and observe and identify similarities and differences in structural features within and between groups of organisms.	- Identify key structural features that aid organism survival in an Australian habitat - Compare groups of organisms and their structural features that aid in their survival
Cells			
VC2S8U02 - cell theory describes cells as the basic units of life; organisms may be unicellular or multicellular and have specialised structures and organelles (including cell walls, cell membranes, cytoplasm, nuclei containing DNA, mitochondria, ribosomes, chloroplasts and vacuoles) that perform specific functions			
exploring an augmented or virtual reality tour of a plant, animal, bacterium and fungus to 'zoom in' and understand the scale of cells	Introduction to Cells	In this lesson, we will dive into the incredible world of cells and see how they play a key role in shaping the ultimate athlete. We'll explore how cells make up every part of your body and help athletes run faster, jump higher, and stay strong.	- Identify that cells are the basic units of life - Outline the cell theory - Define unicellular (single-celled) and multicellular organisms - Compare the size of cells to everyday objects

examining a variety of cells, including single-celled organisms, using a light microscope, a digital microscope, simulations and photomicrographs	Parts of a Cell	Although cells are tiny, they are actually made up of even tinier structures called organelles. In this lesson, we are going to explore some of these 'mini organs' that are found in cells and understand how they work together like a sports team.	- Define the term "organelle" - Identify key organelles found in cells - Describe the structure and function of organelles, including the nucleus, cell membrane, cell wall, cytoplasm, chloroplasts, mitochondria, and vacuoles
identifying how technological developments, such as those related to microscopes and medical imaging, have led to improved understanding of cells, tissues and organs	The Development of Microscopes	Without the invention of microscopes, we would never have been able to explore what lies inside these tiny structures called cells. In this lesson, we are going back in time to see how the invention of microscopes changed our understanding of cells.	- Outline the history of the microscope - Describe how the development of the microscope has led to improved understanding of cells
Skills	Skills: Using a Microscope	In this investigation, we are going to look a little closer... We will go through the steps of using a microscope and how to calculate magnification. You will then use these skills to observe some everyday objects under a microscope.	- Identify the parts of a light microscope and their functions - Describe how to correctly use a light microscope - Calculate the magnification of a microscope
	Skills: Drawing Scientific Cell Diagrams	When observing cells under the microscope, we want to document what we see! In this lesson, we will learn how to draw scientific diagrams to keep a record of what we have observed.	- Identify and calculate the total magnification of a microscope - Outline the requirements for drawing an accurate scientific cell diagram - Create accurate scientific cell diagrams of a range of cells
examining a variety of cells, including single-celled organisms, using a light microscope, a digital microscope, simulations and photomicrographs comparing the similarities and differences between cells in plants, animals, bacteria and fungi represented in digital or physical models comparing wet-mount slides of onion cells prepared by students	Observing Single-celled Organisms	Did you know there are millions of single-celled organisms surrounding you right this very minute? In this lesson, we are going to going to view and draw single-celled organisms as they are seen under a range of different microscopes.	- Observe single-celled organisms using a light microscope and photomicrographs - Create scientific drawings of single-celled organisms observed under the light microscope
	Comparing Plant and Animal Cells	Plants and animals are made up of different cells in order to help them carry out their specific needs. In this lesson, we are going to compare the similarities and differences between these two types of cells.	- Identify the organelles that are found in plant cells and relate this to their requirements - Identify the organelles that are found in animals cells and relate this to their requirements - Compare the similarities and differences between plant cells and animal cells
	Investigation: Observing Different Types of Cells	In this investigation, we are going to observe plant, animal, bacterial and fungi cells under the light microscope. To do this, we are going to look at	- Create and observe a wet mount slide of onion cells - Observe prepared slides of cells found in plants, animals, bacteria and fungi under the light microscope - Sketch accurate scientific cell diagrams

with purchased slides viewed under a light microscope		prepared slides of cells and prepare our own wet mount slide to observe onion cells.	- Compare the similarities and differences between the cells found in plants, animals, bacteria and fungi
	Specialised Cells	Just like plants and animal cells having slightly different organelles to help carry out their different functions, multicellular organisms have specialised cells to help them carry out specific jobs. In this lesson, we are going to explore what kind of specialised cells exist and why they are important.	- Define the term specialised cell - Identify specialised cells found in both plants and animals and describe their role - Outline the arrangement of specialised cells in tissues and organs - Explain the need for specialised cells in multicellular organisms and compare this with unicellular organisms
	Investigation: Observing Specialised Cells	Want to have a look at what cells help us move or what cells help a plant draw up water from the soil? In this investigation, we are going to observe specialised cells under a light microscope using prepared slides.	- Observe prepared slides of specialised cells - Compare the structures of specialised cells and relate this to their function
conducting and documenting a practical investigation to model a cell process related to a specific organelle or cellular structure, such as cellular respiration (facilitated by mitochondria), photosynthesis (facilitated by chloroplasts) or diffusion (occurring across cell membranes)	Mitochondria & Chloroplasts - Powerhouses of the Cell	Have you ever wondered how all cells get the energy they need to function? In this lesson we are going to explore the two organelles that provide organisms with energy — the mitochondria and chloroplast.	- Identify the mitochondria as the site of cellular respiration - Outline the role of cellular respiration and its importance - Identify the chloroplast as the site of photosynthesis - Outline the role of photosynthesis and its importance
	Investigation: Modelling Respiration with Yeast	There are many specialised organelles in cells that help us to perform really specific functions. In this lesson, we will investigate how cells get oxygen via respiration. We will learn to use a model to show how the mitochondria converts energy to oxygen to keep us alive.	- Recall the function of the mitochondria in respiration - Define respiration - Observe respiration in yeast - Explain the process of respiration in yeast
designing and constructing a physical or digital model of a cell and seeking peer feedback about the strengths and limitations of the model	Investigation: Make a Cell Model	In this lesson, we will be letting your creative juices flow! We are going to make a model of a cell using everyday items.	- Design and construct a model of a cell using everyday items - Explain how the items used in the model represent the organelles within the cell - Discuss the strengths and limitations of using models in science
Extension	Prokaryotic vs Eukaryotic Cells	Not all cells are the same. Organisms that evolved millions of years ago were much simpler than the organisms that roam the Earth today. In this lesson, we are going to compare the prokaryotic and eukaryotic cells by exploring their features.	- Define the terms prokaryotic and eukaryotic - Describe the features of prokaryotic cells - Describe the features of eukaryotic cells - Compare prokaryotic and eukaryotic cells and provide examples of each
Living Systems			
VC2S8U03 - the structure of cells, tissues and organs in a plant and an animal organ system are related to their function; plant and animal organ systems enable survival of the organism			

examining the specialised cells and tissues involved in the structure and function of particular organs in an organ system using two-dimensional and three-dimensional representations to locate and compare the structure and function of analogous systems in a plant and an animal describing the structure of each organ in a system and relating its function to the overall function of the system	The Interrelationship Among Cells, Tissues, and Organs	Cells are the basic building blocks of life, and they work together to form tissues and organs that perform specific functions. In this lesson, we will explore how cells, tissues, and organs are interrelated and how their structure supports their roles within living systems.	- Identify the hierarchical organisation of cells, tissues, and organs - Describe how specialised cells work together to form tissues and organs - Explain the interrelationship among cells, tissues, and organs in performing specific functions
	Specialised Cells and Tissues in Organ Systems	Specialised cells and tissues work together to enable organs to perform specific functions within an organ system. In this lesson, we will examine the structures of specialised cells and tissues, their roles in particular organs, and how these enable organ systems to carry out their functions.	- Identify the specialised cells and tissues in a selected organ - Describe the relationship between the structure of specialised cells and their function - Explain how tissues and cells contribute to the overall function of an organ
	Comparing Organ Systems in Plants and Animals	Plants and animals have organ systems that perform similar functions to sustain life. In this lesson, we will compare the structure and function of these systems and explore how organs are positioned within the body to carry out their processes.	- Identify the main organ systems in plants and animals - Draw or annotate representations of plant and animal organ systems - Compare the structure and function of similar systems in plants and animals - Explain how the positioning of organs within these systems supports their function
	The Digestive System	Each organ in a body system has a specific structure that enables it to perform its function. In this lesson, we will identify the major organs of the digestive system and explore how their structure contributes to their roles within the system and the overall functioning of the human body.	- Identify the organs of the digestive system - Describe the structure of each organ and how it enables its specific function - Explain the function of each organ
	The Circulatory System	Each organ in a body system has a specific structure that enables it to perform its function. In this lesson, we will identify the major organs of the circulatory system and explore how their structure contributes to their roles within the system and the overall functioning of the human body.	- Identify the organs of the circulatory system - Describe the structure of each organ and how it enables its specific function - Explain the function of each organ
	The Respiratory System	Each organ in a body system has a specific structure that enables it to perform its function. In this lesson, we will identify the major organs of the respiratory system	- Identify the organs of the respiratory system - Describe the structure of each organ and how it enables its specific function

		and explore how their structure contributes to their roles within the system and the overall functioning of the human body.	- Explain the function of each organ
	The Excretory System	Each organ in a body system has a specific structure that enables it to perform its function. In this lesson, we will identify the major organs of the excretory system and explore how their structure contributes to their roles within the system and the overall functioning of the human body.	- Identify the organs of the excretory system - Describe the structure of each organ and how it enables its specific function - Explain the function of each organ
	Interconnected Body Systems: How They Work Together	The components of body systems interact to ensure the efficient functioning of an organism. In this lesson, we will examine how different body systems work together, exploring their roles and interconnections to maintain overall health and balance.	- Describe the role of each body system in maintaining the efficient functioning of the organism - Explain how the components of body systems interact to support processes like energy production, waste removal, and movement - Use examples to illustrate the interdependence of body systems
researching how a disorder of cells or tissues can affect an organ's function, such as how hardening of the arteries can lead to poor circulation or heart disease	The Impact of Disorders on Organ and System Function	Disorders affecting cells or tissues can impair the function of an organ, impacting the entire body system and the organism as a whole. In this lesson, we will explore examples of disorders or diseases, such as hardening of the arteries, and investigate how they affect organ function and overall health.	- Identify disorders or diseases that affect specific organs and body systems - Describe how a disorder in cells or tissues impacts the function of an organ - Explain how the malfunctioning of one organ affects the overall functioning of a body system
researching and discussing ethical issues that arise from organ transplantation	Ethical Issues in Organ Transplantation	Organ transplantation saves lives, but it also raises complex ethical issues. In this lesson, we will explore the science of organ transplantation, research the ethical considerations involved, and discuss how society addresses these challenges.	- Describe the process of organ transplantation and its importance in medicine - Identify ethical issues related to organ transplantation - Discuss differing perspectives on these ethical issues - Explain how ethical frameworks guide decisions about organ transplantation
investigating how an artificial organ mimics or augments the functions of a real organ	Investigation: Mimicking the Function of Real Organs	Artificial organs are designed to mimic or enhance the functions of real organs, supporting or replacing the body's natural processes. In this lesson, we will explore examples of artificial organs, investigate how they work, and compare their functionality to real organs.	- Identify examples of artificial organs and their purposes - Describe how an artificial organ mimics or augments the function of a real organ - Compare the structure and function of artificial and natural organs - Evaluate the benefits and challenges of using artificial organs
relating the loss of a non-vital organ such as the tonsils,	The Effects of Losing Non-Vital	Some organs in the human body, while important, are considered non-vital because their loss does not	- Identify examples of non-vital organs in the human body - Describe the function of non-vital organs within their respective

appendix, spleen, gall bladder or a reproductive organ to effects on body systems	Organs on Body Systems	immediately affect survival. In this lesson, we will investigate the roles of non-vital organs and explore how their removal impacts body systems.	systems - Explain the effects of removing a non-vital organ on body systems and overall health
investigating relevant campaigns designed to increase community engagement, such as promoting increased rates of registration as an organ donor, debating nuclear power as an energy option and increasing recycling rates	Promoting Organ Donor Registration: Campaigns for Community Engagement	Organ donation campaigns aim to increase community awareness and encourage action. In this lesson, we will investigate campaigns that promote organ donor registration, analyse their strategies, and explore their effectiveness in engaging and influencing communities.	- Identify the purpose and importance of organ donation campaigns - Investigate strategies used in organ donation campaigns to increase community engagement - Analyse the effectiveness of a specific campaign based on its goals and outcomes - Evaluate the impact of these campaigns on attitudes and behaviours in the community
describing the structure of each organ in a system and relating its function to the overall function of the system	The Role of Xylem and Phloem in Plant Structure and Function	Plants are multicellular organisms that rely on specialised structures to transport water, nutrients, and food. In this lesson, we will investigate the structure and function of components of a plant, including the xylem and phloem, and explore how they work to maintain the plant's survival.	- Identify the main components of a plant that support its survival - Describe the structure and function of the xylem and phloem - Explain how the xylem and phloem transport water, nutrients, and sugars in a multicellular plant - Relate the role of these components to the overall functioning of plants as multicellular organisms
	Investigation: Observing Specialised Cells and Tissues in Plants	Plants contain specialised cells and tissues that support their structure and allow them to function. In this lesson, we will use scientific tools and instruments to observe plant tissues, such as xylem, phloem, and epidermal cells.	- Identify specialised plant cells and tissues, including xylem, phloem, and epidermis - Observe and draw various plant cells - Describe the structure and function of these specialised cells
Matter and Engery in Ecosystems			
VC2S8U04 - matter and energy flow through ecosystems and can be represented using models, including food webs and food pyramids; populations will be affected by changing biotic and abiotic factors in an ecosystem including habitat loss, climate change, seasonal migration and introduction or removal of species			
	Introduction to Ecosystems	There are many components that make up the ecosystem around us. In this lesson, we will learn about what makes up an ecosystem, including biotic and abiotic factors.	- Define the term ecosystem - Identify the components that make up an ecosystem; - Define biotic and abiotic factors - Describe the interaction between biotic and abiotic factors within an ecosystem

analysing food webs to show feeding relationships between organisms in an ecosystem and the role of microorganisms	Food Webs	Inside ecosystems, there are many organisms fighting for survival. We can use food webs and energy flow diagrams to show how an ecosystem sustains the life within it. In this lesson, we will create and analyse food webs and understand how energy is transferred from organism to organism to keep the ecosystem alive.	- Identify the components of a food web - Use a food web to describe feeding relationships between organisms in an ecosystem - Create a food web for an ecosystem
using food pyramids to represent the difference in the amount of energy at each trophic level in a food web, with primary producers forming the first trophic level	Ecological Energy Pyramids	In this lesson, we will learn how food pyramids can be used to show the amount of energy or matter at each trophic level, including producers and consumers.	- Define ecological energy pyramid - Identify the different trophic levels that make up a food pyramid - Identify how matter and energy move within an ecosystem by using an ecological energy pyramid. - Explain how food pyramids show the amount of energy or matter at each trophic level
predicting the effects on local ecosystems when organisms such as pollinators or predators are removed from or die out in an area	Populations	Imagine all the bees have disappeared from an ecosystem. This might not seem like a big thing, and in fact might seem like a good thing, as we won't get stung by bees, but there can be huge impacts on the ecosystem. In this lesson, we will predict what happens when organisms such as pollinators (bees) or predators are removed from an ecosystem due to seasonal changes, destruction of habitat and introduction of new species that change the ecosystem.	- Define pollinators and predators - Explain what can happen when they are removed from the ecosystem - Describe how pollinators and predators can be removed from ecosystems
	Using Science and Statistics to Track Ecosystem Changes	Scientists use data science to understand how ecosystems change over time. In this lesson, we will explore how data science combines statistics, scientific methods, and technology to analyse population changes, including the impact of introducing new species.	- Recognise data science as an interdisciplinary field that combines scientific methods, statistics, and algorithms. - Identify how data science is used to analyse population changes in ecosystems. - Examine secondary-source data to identify trends, patterns, and relationships in population changes. - Draw conclusions from data about the impact of introducing new species into an ecosystem.
examining how events such as seasonal changes, destruction of habitat and introduction of a species impact abiotic and biotic	Research: Impacts on Ecosystems	In this lesson, we will explore the factors that cause ecosystems to change. You will be researching a local ecosystem and applying what you have learned	- Identify factors (seasonal changes, destruction of habitat and introduction of a species) that can impact ecosystems

factors and cause changes to populations		about ecosystems to explain the changes and predict future changes.	- Research and examine one real-life example of changes to a local ecosystem and predict/explain what will/has happened to the ecosystem
investigating Aboriginal and/or Torres Strait Islander Peoples' responses to invasive species and their effect on food webs that many communities are a part of, and depend on, for produce and medicine, for example collaboration between the Traditional Owners (Kungarakan and Warai Peoples) of the Rum Jungle mine site near Darwin and the Australian Government to mitigate dispersal of gamba grass seeds by means of seed eradication and foliage spraying to control the spread of the gamba grass as well as reduce impacts on vulnerable ecosystems	First Nations Australians and Invasive Species	In this lesson, we will investigate how Aboriginal and/or Torres Strait Islander Peoples' respond to invasive species in their communities and the effect these have on food webs.	- Define the term invasive species - Explain the impact of invasive species on food webs in Aboriginal and/or Torres Strait Islander Peoples' - Describe management strategies used by Aboriginal and/or Torres Strait Islander Peoples to reduce the impact of invasive species on communities and food webs
considering how Aboriginal and/or Torres Strait Islander Peoples' fire management practices over tens of thousands of years have changed the distribution of flora and fauna in most regions of Australia, for example researching changed Australian landscapes over time from rainforest vegetation to sclerophyll vegetation, including the impact of Aboriginal cultural burning practices, and looking at the	First Nations Australians' Fire Management Practices	Bushfires are a natural disaster that occurs in the Australian summer. In this lesson, we will learn about fire management practices of the Aboriginal and/or Torres Strait Islander Peoples' that have changed the distribution of flora and fauna across most regions of Australia.	- Identify fire management practices used by Aboriginal and/or Torres Strait Islander Peoples' - Describe the changes in flora and fauna across regional Australia due to fire management - Explain the impact these fire management strategies have on local wildlife - Research one example of a local species affected by fire management practices

ecological effects of disruptions to long-held Aboriginal cultural burning practices, such as the wildfires that swept through the Leadbeater's possum habitat in the Central Highlands of Victoria and caused significant population decline in an already-endangered species			
Chemical Sciences			
Properties of Matter			
VC2S8U05 - the particle and kinetic theories of matter can be used to describe the arrangement and motion of particles in a substance, including the attraction between particles, and to explain the properties and behaviour of substances, including melting point, boiling point, density, compressibility, gas pressure, viscosity, diffusion, sublimation, and expansion and contraction			
using and constructing virtual simulations such as claymation videos, models or diagrams to represent changes in particle arrangement and properties as substances change state	States of Matter and Particle Theory	Matter exists in different states, and these states can change depending on various factors. In this lesson, we will explore the particle arrangement in solids, liquids, and gases, and how these arrangements change as substances change state. We will use models and simulations to represent these changes.	- Identify the three main states of matter: solid, liquid, and gas - Describe how particles are arranged and behave in each state of matter - Use models, diagrams, or simulations to represent changes in particle arrangement as substances change state - Construct a diagram or model to demonstrate the water cycle and the movement of water through its states on Earth
comparing attractive forces in the solid, liquid and gaseous states of the same substance and relating this to relative position and movement of particles	Forces and Energy in Changing States of Matter	The states of matter—solid, liquid, and gas—are influenced by the forces between particles and their energy. In this lesson, we will explore how heating or cooling affects particle motion and energy, and how these changes result in state transitions.	- Compare the attractive forces between particles in solids, liquids, and gases - Describe how heat energy affects the motion and energy of particles during state changes - Analyse temperature graphs to identify key changes in particle behaviour during transitions between states
	Investigation: Temperature Change During State Transitions	The changes in state of matter—melting, boiling, and evaporation—occur when particles gain or lose energy. In this investigation, we will measure how temperature changes over time as heat energy is absorbed or released during these transitions.	- Conduct an experiment to safely heat water and measure its temperature over time - Collect accurate temperature readings at regular times while water melts, boils, and evaporates - Create a graph to show how temperature changes when water moves between solid, liquid, and gas states

			- Interpret the graph to find when phase changes happen and explain how energy is involved in these changes
examining how the changing motion and energy of particles are affected by the amount of heat energy absorbed or released	Particle Motion, Energy, and Changes in State	The states of matter—solid, liquid, and gas—depend on how particles move, the energy they have, and the distances between them. In this lesson, we will examine how heat energy affects the motion and arrangement of particles, leading to changes in state.	- Describe how heat energy influences the motion and energy of particles during state changes - Represent the changes in particle arrangement and movement as substances change state using diagrams or models - Explain the relationship between heat energy absorption or release and the resulting changes in particle behaviour
comparing the properties of different substances and explaining differences using particle theory	Comparing States of Matter Using Particle Theory	The properties of solids, liquids, and gases are determined by the strength of the attractive forces between particles and their arrangement and motion. In this lesson, we will compare the properties of substances in different states and explain these differences using particle theory.	- Compare the properties of solids, liquids, and gases, such as shape, volume, and compressibility - Describe the relative strength of attractive forces in solids, liquids, and gases and how this relates to particle behaviour - Explain the differences in the behaviours of substances in different states using particle theory
comparing the viscosity of different substances such as honey, treacle and oil, and developing representations to suggest an explanation for their different viscosities	Exploring the Physical Properties of Substances	Substances have unique physical properties such as viscosity, density, melting point, buoyancy and surface tension, which can be explained using particle theory. In this lesson, we will compare these properties and represent our findings with models and explanations.	- Define the terms viscosity, density, buoyancy and surface tension - Explain these physical properties of materials in terms of particle arrangement and behaviour - Describe how density, buoyancy, and surface tension relate to the behaviour of water particles
	Investigation: Comparing the Viscosity of Substances	Viscosity is the measure of a substance's resistance to flow and is influenced by the interactions and arrangement of its particles. In this investigation, we will measure and compare the viscosities of honey, treacle, and oil, and develop explanations for their differences.	- Compare the viscosity of substances like honey, treacle, and oil by observing how fast they flow and how much they resist movement - Create diagrams or graphs to show the differences in viscosity between these substances - Explain the differences in viscosity using particle theory, focusing on how strongly the particles stick together
	Investigation: Surface Tension	Different substances have unique physical properties that can be explored and explained using particle theory. In this investigation, we will measure and observe surface tension of selected materials to understand their behaviour.	- Observe the effects of surface tension in water and other liquids through simple experiments - Compare the surface tension of different liquids - Explain the results of these investigations using the arrangement of particles in different substances
constructing a density column using liquids of different densities	Exploring Density	Density is a property of matter that relates an object's mass to its volume. In this lesson, we will learn how to calculate the density of both regular-shaped and irregular-shaped objects using the formula Density =	- Define density and explain the relationship between mass, volume, and density - Calculate the density of regular-shaped objects using measured mass and volume

		Mass/Volume, and explore how differences in density affect how materials behave.	- Determine the volume of irregular-shaped objects using water displacement and calculate their density
	Investigation: Understanding Density (Creating a Density Column)	Liquids with different densities will naturally layer when combined, creating a density column. In this investigation, we will construct a density column by layering various liquids and observe how differences in density affect their arrangement.	- Construct a density column using liquids of varying densities - Determine the mass and volume of regular-shaped and irregular-shaped objects - Explain how differences in density relate to the behaviour of liquids and objects in the density column
Extension	Understanding Diffusion	Diffusion is the process where particles spread out from areas of high concentration to areas of low concentration. In this lesson, we will explore how diffusion occurs in liquids and gases and explain the process using particle theory.	- Describe the process of diffusion in liquids and gases - Explain diffusion in terms of particle motion - Explain diffusion in terms of interactions
	Investigation: Diffusion in Liquids and Gases	Diffusion is the movement of particles from areas of high concentration to areas of low concentration. In this investigation, we will observe diffusion in liquids and gases, analyse how particles behave during the process, and compare the rates of diffusion in different states of matter.	- Observe diffusion in liquids and gases through experiments - Relate experimental observations to the arrangement and behaviour of particles during diffusion - Compare the rates of diffusion in liquids and gases and explain the differences based on particle theory
Mixtures and Separation			
VC2S8U06 - matter can be classified as pure substances such as elements and compounds or impure substances such as mixtures (including solutions), and can be modelled using the particle model; mixtures may have a uniform (homogeneous) or non-uniform (heterogeneous) composition and can be separated based on the properties of their components using techniques including filtration, decantation, evaporation, crystallisation, magnetic separation, distillation and chromatography			
using representations of particles to show the difference between samples of pure substances and mixtures, and identifying examples of each	Pure Substances vs Mixtures	All matter is made up of particles, and these particles form either pure substances or mixtures. In this lesson, we will use particle representations to understand the difference between pure substances and mixtures, identify examples of each, and classify matter based on its composition.	- Distinguish between atoms, mixtures, and compounds using particle theory - Classify matter as pure substances (elements and compounds) and impure substances (mixtures) based on their particle composition - Identify examples of pure substances and mixtures in everyday life - Use particle diagrams to represent and explain the differences between pure substances and mixtures
using coloured beads or buttons to represent different substances,	Exploring Mixtures and Solutions	Mixtures can be uniform (homogeneous) or non-uniform (heterogeneous), and solutions are a	- Classify mixtures as homogeneous or heterogeneous - Identify the solvent and solute in various solutions

and then mixing these 'particles' in different containers to demonstrate both uniform (homogeneous) and non-uniform (heterogeneous) mixtures, and to demonstrate the difference between dilute, concentrated, saturated and supersaturated solutions		specific type of mixture. In this lesson, we will use models to represent mixtures and solutions, identify solutes and solvents, and compare the properties of solutions such as dilute, concentrated, saturated, and supersaturated.	- Compare the properties of dilute, concentrated, saturated, and supersaturated solutions using particle theory and models
	Investigation: Measuring Solubility of Different Substances in Water	Solubility is the ability of a substance to dissolve in a solvent, forming a solution. In this investigation, we will test the solubility of various solutes in water, measure the amount that dissolves, and document the results to better understand how solubility varies between substances.	- Conduct an investigation on the solubility of different substances in water - Create a table and a graph of solubility by incorporating observations and measurements
	Investigation: The Effect of Temperature on Solubility	The solubility of a substance in water can change with temperature. In this investigation, we will explore how heating water impacts the amount of solute that dissolves.	- Conduct an investigation to observe how temperature affects solubility - Compare solubility patterns for substances dissolved in cold, warm, and hot water - Explain how temperature influences the dissolving process using particle theory
analysing how the physical properties of substances in mixtures, such as particle size, density and volatility, determine the separation technique used	Physical Properties and Separation Techniques	The physical properties of substances in mixtures—such as particle size, density, and volatility—play a key role in determining how they can be separated. In this lesson, we will analyse these properties and explore how they influence the choice of separation techniques.	- Identify key physical properties of substances in mixtures, including particle size, density, and volatility - Explain how these physical properties influence the selection of separation techniques - Analyse examples of mixtures and determine suitable separation methods based on their physical properties
	Investigation: Filtration and Evaporation	Different physical separation techniques can be used to separate mixtures based on the properties of their components. In this investigation, we will use filtration to separate sand from a saltwater mixture and evaporation to recover the dissolved salt, exploring how these techniques work in real-world applications.	- Conduct an investigation to use filtration and evaporation techniques to separate a mixture - Describe how the properties of different substances determine the most effective separation techniques - Draw a labelled diagram to represent the steps of the separation process
	Investigation: Candy Crystals	Crystallisation is a physical separation technique that allows dissolved substances to form solid structures as a solution cools or evaporates. In this hands-on investigation, we will create candy crystals to observe	- Describe how crystallisation separates a dissolved substance from a solution - Investigate the factors that affect crystal formation, such as temperature and evaporation rate

		how crystallisation works and explore its applications in real-world separation processes.	- Observe and record the growth of crystals over time, noting their shape and structure
	Investigation: Exploring Paper Chromatography	Paper chromatography is a powerful technique used to separate the components of mixtures, such as inks and food dyes. In this lesson, we will explore how this method works and use it to separate the components of different coloured mixtures.	- Conduct a paper chromatography experiment to separate the components of coloured inks or food dyes - Explain the separation process to the solubility and movement of particles in the solvent
investigating separation techniques used by Aboriginal and/or Torres Strait Islander Peoples, such as hand-picking, sieving, winnowing, yandying, filtering, cold-pressing and steam distilling, for example in the extraction of oils from plants	Traditional Separation Techniques of First Nations Australians	For thousands of years, Aboriginal and Torres Strait Islander Peoples have used separation techniques to process natural resources for food, medicine, and materials. In this lesson, we will investigate and understand how different techniques like are used to separate mixtures and extract valuable substances.	- Identify traditional methods used by Aboriginal and Torres Strait Islander Peoples to separate different substances - Investigate how these methods are used to separate mixtures or collect materials, like plant oils or seeds - Describe how each method works by using properties like particle size, density, or solubility - Describe why these techniques are important culturally, environmentally, and in everyday life
designing, making, testing and refining a 'separating machine' to separate the components of a mixture	Investigation: Designing and Testing Separation Solutions	Mixtures often need to be separated to remove unwanted materials or pollutants. In this lesson, we will design and test a 'separating machine' to remove components from a mixture and investigate how pollutants can be removed from a body of water.	- Model how a body of water becomes polluted and observe the effects of different pollutants - Design a separating machine or system to separate components of a mixture, considering the physical properties of the materials, to remove the pollutants
exploring and comparing separation methods used in a variety of situations such as in homes, recycling industries and for purifying water, or viewing simulations or videos showing the separation of crude oil into its components, including the isolation of contaminants	Separation Techniques in Everyday Life and Industry	Separation methods are used in a variety of contexts, from everyday tasks at home to large-scale industrial processes. In this lesson, we will explore and compare separation techniques used in different situations, such as recycling, water purification, and refining crude oil, and investigate how these methods work.	- Identify separation techniques used in homes, recycling industries, and water purification processes - Compare how these techniques work and the properties they rely on (e.g., density, solubility, boiling point) - Investigate an industrial separation technique and explain its purpose and process - Discuss the effectiveness of separation methods and relate effectiveness to the physical properties of the materials being separated
Elements and Compounds			
VC2S8U07 - the atomic theory of matter can be used to model and explain the difference between elements, compounds and mixtures; elements, compounds and mixtures can be represented as two-dimensional and three-dimensional models, elements can be represented by symbols, and molecules and compounds can be represented by chemical formulas			

using virtual and physical models to distinguish between elements and compounds in terms of types of atoms	Distinguishing Between Elements and Compounds	Matter is made up of tiny particles called atoms. In this lesson, we will explore the differences between elements and compounds based on the types of atoms they contain and how they are arranged.	- Identify elements and compounds as different types of matter - Describe the difference between elements and compounds in terms of the types of atoms - Compare the arrangement of atoms in elements and compounds
	The History of Elements: From Democritus to John Dalton	The understanding of elements has changed over time as scientists developed new ideas and evidence. In this lesson, we will create a timeline or models to explore how the concept of an element evolved from Democritus' early ideas of atoms to John Dalton's atomic theory.	- Identify key scientists who contributed to the understanding of elements and atoms - Describe how the concept of an element has changed over time - Create a timeline showing the historical development of atomic theory - Explain the significance of each major discovery in the timeline
explaining why elements are represented by symbols, why compounds and molecules are represented by chemical formulas, and why mixtures are represented by percentages	Representing Matter: Symbols, Formulas, and Percentages	Elements, compounds, and mixtures are represented in different ways to make scientific communication clear and consistent. In this lesson, we will explain why elements use symbols, compounds and molecules use formulas, and mixtures use percentages to describe their composition.	- Describe how elements, compounds, and mixtures are represented in science - Explain why elements are given symbols and compounds are represented by formulas - Use chemical symbols and formulas to identify elements and compounds - Interpret percentages to describe the composition of mixtures
using representations to show the classification of matter as elements, compounds and different types of mixtures such as solutions, suspensions and colloids	Investigation: Classifying Matter	Matter can be classified into elements, compounds, and mixtures. In this lesson, we will explore these classifications and identify different types of mixtures, including solutions, suspensions, and colloids.	- Describe the characteristics of solutions, suspensions, and colloids - Use models to represent elements, compounds, and mixtures - Compare the properties of different types of mixtures
examining the information conveyed by different types of representations of elements and compounds, and identifying where and why these different representations are used	Investigation: Understanding Representations of Elements and Compounds	Different types of representations, such as symbols, formulas, diagrams, and models, are used to communicate information about elements and compounds. In this lesson, we will examine what these representations convey and explore where and why they are used in science and everyday life.	- Identify different types of representations used to show elements and compounds - Describe the information conveyed by each type of representation - Explain where and why these representations are used - Compare the strengths and limitations of different representations
examining how Dmitri Mendeleev arranged the elements in the first version of the periodic table and comparing his arrangement with the current version	Dmitri Mendeleev and the Evolution of the Periodic Table	Dmitri Mendeleev's periodic table was a major breakthrough in the classification of elements. In this lesson, we will examine how Mendeleev arranged the elements in his first periodic table and compare it to the modern version we use today.	- Describe how Dmitri Mendeleev arranged elements in the first periodic table - Identify the key differences between Mendeleev's periodic table and the current version - Explain the role of patterns and predictions in Mendeleev's work - Compare the organisation of elements in Mendeleev's table with

			the modern periodic table
researching reasons for different forms of the periodic table	Why Are There Different Forms of the Periodic Table?	The periodic table is one of the most important tools in science, but it exists in different forms to suit various purposes. In this lesson, we will research the reasons for these different forms and explore how each version helps scientists in unique ways.	- Identify different forms of the periodic table (e.g., standard, long form, circular, spiral) - Describe the purpose of each form and the information it conveys - Explain why different versions of the periodic table exist - Compare the strengths and uses of different forms of the periodic table
Chemical Reactions			
VC2S8U08 - physical changes can be distinguished from chemical changes; a chemical change can be identified by a colour change, a temperature change, the production of a gas (including laboratory preparation and testing of oxygen, carbon dioxide and hydrogen gases) or the formation of a precipitate			
performing simple chemical reactions to identify the indicators of chemical change, such as gas production, solid production, colour change and temperature change	What's the Difference Between Physical and Chemical Changes?	Not all changes result in new substances. In this lesson, we will compare physical changes and chemical changes to understand their differences.	- Define physical and chemical changes - Compare physical changes and chemical changes - Classify examples of changes as physical or chemical - Explain how indicators help identify chemical changes
	Investigation: Signs of a Chemical Change	When a chemical change occurs, certain indicators can tell us that a new substance has formed. In this lesson, we will conduct experiments to observe and identify the signs of chemical change.	- Identify the key indicators of chemical change: gas production, solid formation, colour change, and temperature change - Conduct simple chemical reactions to observe these indicators - State observations from chemical reactions clearly and accurately - Explain why these indicators suggest a chemical change
analysing and interpreting data on the properties of substances before and after the substances interact to determine if a chemical or physical change has occurred	Analysing Changes: Physical or Chemical?	Substances can change in many ways when they interact, but not all changes result in new substances. In this lesson, we will analyse and interpret data to determine whether changes are physical or chemical based on the properties of the substances before and after interaction.	- Classify the changes as physical or chemical based on evidence - Explain how the evidence supports the classification
examining how the physical and chemical properties of a substance will affect its production or use	How Energy Changes in Chemistry	Chemical reactions can release or absorb energy, causing temperature changes. In this lesson, we will explore the concepts of exothermic and endothermic reactions and understand how energy is transferred during these changes.	- Define exothermic and endothermic reactions - Describe how energy is transferred during chemical reactions - Identify examples of exothermic and endothermic reactions in everyday life - Interpret energy diagrams that show energy changes in reactions
	Investigation:	Chemical reactions can release or absorb energy,	- Identify energy changes (e.g., heat release or absorption) in

	Energy Changes in Chemical Reactions	often causing temperature changes. In this lesson, we will investigate and identify energy changes in different chemical reactions, and observe how energy is transferred during these processes.	chemical reactions - Identify temperature changes during chemical reactions through simple experiments - Classify reactions as exothermic or endothermic based on energy changes
discussing where indicators of chemical change are used for identifying the presence of particular substances, such as in soil, water and medical testing kits	How Do Indicators Detect Substances?	Chemical indicators are substances that help identify the presence of other substances through observable changes, such as colour change or gas production. In this lesson, we will explore how indicators work and their importance in real-world contexts.	- Identify chemical indicators and what they are used to detect - Describe how indicators reveal the presence of specific substances through chemical changes - Discuss examples of indicators used in soil, water, and medical testing - Explain the importance of indicators in scientific and everyday applications
	Investigation: Using Indicators to Detect Substances	We can use chemical indicators to observe chemical changes and identify the presence of specific substances. In this lesson, we will perform tests using indicators to observe colour changes, gas production, and other signs of chemical reactions.	- Perform experiments using chemical indicators to detect specific substances - State and record changes such as colour or gas production - Interpret experimental results to identify whether a chemical change has occurred
applying knowledge of common chemical changes to identify a set of 'mystery' powders, for example using iodine solution, vinegar, water and universal indicator to distinguish between baking soda, cream of tartar, corn starch and baking powder	Investigation: Identifying Mystery Powders Through Chemical Tests	We can identify unknown substances by observing their chemical reactions with different indicators. In this lesson, we will conduct experiments to identify mystery powders.	- Conduct chemical tests using iodine solution, vinegar, water, and universal indicator - Compare test results to reference data to identify each mystery powder - Explain how the observed chemical changes helped identify the substances
analysing how worldviews relating to fairness in sport have led to the development of rapid chemical tests to identify performance-enhancing drugs	Fairness in Sport: How Worldviews Shape Drug Testing	Worldviews about fairness in sport influence how we develop tools to ensure a level playing field. In this lesson, we will explore how concerns about fairness have driven the development of rapid chemical tests for detecting performance-enhancing drugs.	- Identify examples of performance-enhancing drugs and their effects - Describe the role of fairness in sport and how it influences rules and regulations - Explain how worldviews about fairness have shaped the need for drug testing
	Investigation: Simulating Rapid Chemical Testing	Rapid chemical tests allow scientists to detect performance-enhancing drugs efficiently. In this lesson, we will simulate these tests to understand how	- Perform a simulated chemical test to detect substances - Explain how chemical tests can identify the presence of banned substances

		they work and the science behind them.	- Discuss the strengths and limitations of rapid testing methods
Extension	Chemical Reactions and Writing Word Equations	Chemical reactions involve changes that result in the formation of new substances. In this lesson, we will observe the initial and final changes during chemical reactions and represent them using word equations.	- Describe the observable changes that occur during a chemical reaction - Identify the reactants and products in a chemical reaction - Write word equations to represent chemical reactions accurately
	Investigation: Modelling Cellular Processes	Photosynthesis is the process that allows plants to convert light energy into chemical energy. In this hands-on investigation, we will model photosynthesis to observe how plants produce oxygen and store energy. We will document our findings and analyse how this process supports life on Earth.	- Conduct an investigation to model the process of photosynthesis - Observe and record evidence of photosynthesis, such as oxygen production or colour changes - Analyse results to identify evidence of photosynthesis
Earth and Space Sciences			
Earth's Resources			
VC2S8U09 - the sustainable use of Earth's resources is influenced by whether the resources are renewable or non-renewable; the processes involved in resource extraction and energy production come with both benefits and risks to sustainability			
considering what is meant by the term 'renewable' in relation to Earth's resources	What Are Renewable Resources?	Earth's resources can be classified as renewable or non-renewable. In this lesson, we will explore what the term "renewable" means, identify examples of renewable resources, and discuss why they are important for sustainability.	- Define the term "renewable resource." - Identify examples of renewable resources - Describe why renewable resources are important for sustainability - Compare renewable and non-renewable resources using examples
considering timescales for regeneration of resources	How Long Does It Take for Resources to Regenerate?	Earth's resources regenerate over different timescales. In this lesson, we will investigate the time it takes for renewable and non-renewable resources to regenerate and understand why this affects their sustainable use.	- Define regeneration as the process of resources being replenished - Compare the regeneration timescales for renewable and non-renewable resources - Identify examples of resources that regenerate quickly and those that take a long time - Explain why timescales for regeneration are important for sustainability
creating an infographic to illustrate the risks and benefits of different forms of energy production	Risks and Benefits of Energy Production	Energy production comes in many forms, each with its own risks and benefits. In this lesson, we will explore different types of energy production and create an infographic to illustrate their impacts on sustainability, the environment, and society.	- Identify different forms of energy production (e.g., renewable and non-renewable) - Describe the risks and benefits of each form of energy production - Organise information into a visually appealing and clear infographic - Present key facts about energy production, risks, and benefits

			using concise text and visuals
preparing a case study for the regeneration of an old mine	Regenerating Old Mines: A Case Study	Old mines can be regenerated to restore ecosystems, create new uses for land, and reduce environmental harm. In this lesson, we will investigate the regeneration of an old mine, exploring the processes involved, challenges, and benefits of regeneration.	- Identify the environmental impacts caused by old mines - Describe strategies used to regenerate old mines - Analyse a case study to understand the steps, challenges, and benefits of mine regeneration - Explain the importance of regeneration for environmental and community sustainability
examining how the use of desalination plants to produce fresh water has impacted marine ecosystems at desalination plant sites	The Impact of Desalination Plants on Marine Ecosystems	Desalination plants provide fresh water by removing salt from seawater, but they can have significant impacts on marine ecosystems. In this lesson, we will examine how desalination works and investigate its environmental impacts, particularly on marine life at desalination plant sites.	- Describe how desalination plants produce fresh water - Identify the environmental impacts of desalination plants on marine ecosystems - Examine case studies of marine ecosystem changes near desalination plants - Discuss potential solutions to reduce the environmental impacts of desalination
examining how the development of hybrid and solar, electric and hydrogen-powered vehicles are applications of contemporary science responses to the depletion of fossil fuels and the exploration of environmental considerations	Contemporary Science Responses to Fossil Fuel Depletion	Fossil fuel depletion and environmental concerns have led to the development of alternative vehicle technologies. In this lesson, we will examine how hybrid, electric, solar, and hydrogen-powered vehicles are examples of contemporary science responses to these challenges.	- Describe how fossil fuel depletion and environmental concerns have influenced the development of alternative vehicle technologies - Identify the key features of hybrid, electric, solar, and hydrogen-powered vehicles - Analyse the benefits and limitations of these vehicles in addressing environmental issues - Explain how these technologies represent scientific innovation and environmental responsibility
Earth's Tectonic Activity			
VC2S8U10 - Earth is a dynamic planet as demonstrated by tectonic activity, including the formation of geological features at divergent, convergent and transform plate boundaries; the theory of plate tectonics is supported by scientific evidence			
• exploring how geologist and oceanographic cartographer Marie Tharp's topographic maps of the Atlantic Ocean floor provided support for the acceptance of the theory of plate tectonics	The Theory of Plate Tectonics	The theory of plate tectonics explains how Earth's surface is shaped by the movement of large crustal plates. This theory was developed using multiple lines of evidence, including seafloor mapping, fossil distribution, and earthquake patterns. In this lesson, we will examine the evidence that led to the acceptance of plate tectonics, focusing on how Marie Tharp's topographic maps of the Atlantic Ocean floor	- Identify different types of evidence that contributed to the development of the theory of plate tectonics - Describe Marie Tharp's role in mapping the ocean floor and how her discoveries supported plate tectonic theory - Describe how mid-ocean ridges and deep-sea trenches provide evidence for the movement of tectonic plates

		provided key support for this theory.	
modelling interactions at plate boundaries and investigating the relative significance of different forces involved in tectonic plate movement including slab pull, ridge push and convection	Interactions at Plate Boundaries	Earth's surface is constantly moving because of interactions at plate boundaries. In this lesson, we will model these interactions to understand how they cause earthquakes, volcanic eruptions, and the formation of mountains.	- Identify the types of plate boundaries: convergent, divergent, and transform - Describe how different boundary interactions lead to specific geological features and events - Classify boundary interactions based on specific geological features and events
	Different Forces in Plate Movements	The movement of tectonic plates is driven by powerful forces beneath Earth's surface. In this lesson, we will investigate these forces—slab pull, ridge push, and convection—and evaluate how they contribute to plate movement.	- Define slab pull, ridge push, and convection and their roles in plate tectonics - Compare the relative contributions of slab pull, ridge push, and convection to plate motion - Explain how these forces interact to shape Earth's surface over time
	Investigation: Modelling Plate Interactions	Earth's surface is constantly changing due to the movement of tectonic plates. In this lesson, we will create a model to explain how plate interactions cause observable phenomena such as earthquakes, volcanoes, and mountain formation.	- Describe the different types of plate interactions (convergent, divergent, transform) - Identify real-world phenomena caused by plate movement - Create a model to demonstrate how tectonic plates interact - Explain how the model represents plate interactions and their effects
examining patterns of earthquake and volcanic activity over time and proposing explanations	Earthquake and Volcano Patterns	Earthquakes and volcanoes don't happen randomly—they follow patterns linked to Earth's structure. In this lesson, we will explore where and when earthquakes and volcanic eruptions happen and learn to propose explanations for these patterns based on scientific data.	- Describe the relationship between earthquakes, volcanoes, and tectonic plate boundaries - Analyse historical data to identify trends in earthquake and volcanic activity - Explain these patterns using evidence from maps and scientific research
evaluating the impact of tectonic events on human populations and examining engineering solutions designed to reduce the impact	Impacts of Tectonic Events	Tectonic events like earthquakes and volcanic eruptions can cause devastating effects on human lives and communities. In this lesson, we will evaluate how these events impact people and explore innovative engineering solutions designed to minimise damage and keep people safe.	- Identify the effects of tectonic events on human populations, such as damage to infrastructure and loss of life - Describe engineering solutions, such as earthquake-resistant buildings, that reduce the impact of tectonic events - Justify the use of specific engineering designs in reducing the effects of tectonic activity
	Solutions to Reduce the Impact of	To help reduce the damage caused by tectonic events, scientists and engineers have developed smart solutions like earthquake-resistant buildings	- Identify different engineering strategies used to reduce the damage from tectonic events - Explain how these solutions help protect people and communities

	Tectonic Events	and tsunami warning systems. In this lesson, we will explore different engineering designs and evaluate how effective they are at keeping people and communities safe.	- Evaluate the effectiveness of at least one solution using a real-world example
relating the extreme age and stability of a large part of the Australian continent to its plate tectonic history	Australia's Tectonic History	Australia's land is ancient and remarkably stable compared to many other parts of the world. In this lesson, we will explore how the extreme age and stability of the Australian continent are linked to its unique plate tectonic history.	- Describe the tectonic history of the Australian plate, including its location and movement over time - Explain how Australia's position within a tectonic plate contributes to its geological stability - Relate Australia's geological features, such as ancient rock formations, to its tectonic history
researching Aboriginal and/or Torres Strait Islander Peoples' cultural accounts that provide evidence of earthquakes and volcanoes, for example the oral records of the Bungandidj People that have preserved, for at least 4000 years, the knowledge of volcanic events that formed the crater lakes at Budj Bim National Park in south-western Victoria	First Nations Australians' Accounts of Tectonic Activity	First Nations Australians have preserved knowledge of Earth's geological history through cultural accounts. In this lesson, we will research how their oral records provide evidence of earthquakes and volcanic events, such as the volcanic activity at Budj Bim National Park.	- Identify First Nations Australians' cultural accounts related to earthquakes and volcanic events - Explain how these cultural accounts align with geological evidence of past tectonic events - Explore the significance of these accounts in understanding the long-term history of Australia's landscape
Rocks			
VC2S8U11 - key processes of the rock cycle occur over different timescales; the properties of sedimentary, igneous and metamorphic rocks not only reflect their formation but also impact their usefulness and determine the methods used when mined			
• comparing the observable properties of different types of rocks and identifying them using a provided dichotomous key	Types of Rocks	Rocks are all around us, and they tell the story of Earth's history. In this lesson, we will learn about the three main types of rocks—igneous, sedimentary, and metamorphic—and how to classify them based on their properties.	- Define the three main types of rocks: igneous, sedimentary, and metamorphic - Classify rocks as igneous, sedimentary, or metamorphic based on their observable properties - Provide examples of common rocks within each type and their uses
	Investigation:	Rocks may look similar at first glance, but their unique	- Describe the physical properties of rocks, such as color, texture,

	Observing Rocks	properties tell us a lot about their formation and classification. In this lesson, we will compare the observable properties of different types of rocks and learn to identify them using a dichotomous key.	and hardness - Use a dichotomous key to identify specific types of rocks - Compare the physical properties between different types of rocks
• exploring the major processes of the rock cycle including weathering, erosion, deposition, melting, crystallisation, uplift, heat and pressure in the formation of different types of rocks	The Rock Cycle	The rock cycle is a continuous journey where rocks are transformed through natural processes over time. In this lesson, we will explore the major processes of the rock cycle, including weathering, erosion, deposition, melting, crystallisation, uplift, heat, and pressure, and how they form different types of rocks.	- Identify the major processes of the rock cycle - Describe how these processes contribute to the formation of different rocks - Explain the connections between processes in the rock cycle, such as how weathering leads to erosion and deposition - Create a rock cycle through diagrams or flowcharts to demonstrate the transformation of rocks over time
• analysing the role of forces and heat energy in the formation of different types of rocks and comparing how quickly or slowly different processes can occur	The Role of Forces and Heat on Rock Formation	Forces and heat energy play a crucial role in shaping the rocks we see today. In this lesson, we will explore how these factors contribute to the formation of different types of rocks and compare how quickly or slowly these processes occur.	- Describe the role of forces, such as pressure and tectonic activity, in the formation of igneous, sedimentary, and metamorphic rocks - Explain how heat energy contributes to processes like melting, crystallisation, and metamorphism - Compare how quickly or slowly different rock-forming processes occur
	Investigation: Fast and Slow Cooling Crystals	Crystals form in fascinating ways depending on how quickly or slowly they cool. In this investigation, we will explore how cooling rates affect the size and structure of crystals and relate this to real-world examples of rock formation.	- Conduct an investigation to observe how crystals form under different cooling conditions - Compare the size and structure of crystals formed when cooled quickly versus slowly - Identify examples of rocks formed through rapid processes (e.g., volcanic eruptions) and slow processes (e.g., sedimentation and metamorphism)
• examining fossil evidence, such as that found in body, trace and opalised fossils, to predict how and when a rock was formed	Examining Fossil Evidence	Fossils provide important clues about Earth's past, helping scientists determine the age of rocks and ancient environments. In this lesson, we will explore different types of fossils and how they can be used to predict when and how rock layers formed. We will also examine how the law of superposition helps scientists determine the relative age of rock strata.	- Identify different types of fossils, including body, trace, and opalised fossils - Explain how fossils can be used to determine the age and formation of rock layers - Describe how the law of superposition helps scientists determine the relative age of rock strata

	Investigation: Modelling Fossil Formation	Fossils are like nature's time capsules, preserving evidence of life from long ago. In this lesson, we will model how fossils form and learn how they provide evidence of different organisms that lived at various times in Earth's history.	- Create a model of the process of fossil formation, including the roles of burial, sedimentation, and mineralisation - Describe the different conditions required for the formation of different fossils - Use examples of fossils to demonstrate how they reveal changes in Earth's environments and ecosystems over time
• investigating how Aboriginal and/or Torres Strait Islander Peoples have used quarrying to access rocks for use as or production of everyday objects such as grindstones, hammerstones, anvils and cutting tools, for example stone hatchets sourced at the Mount William Stone Hatchet Quarry National Heritage Place in Central Victoria and used for food-gathering, construction, canoe-building and the manufacture of shields, clubs and spears	Uses of Rocks	Different types of rocks have unique properties that make them useful for various purposes. In this lesson, we will explore how the properties and formation of rocks determine their uses in construction, art, industry, and everyday life.	- Explain how the properties of rocks influence their uses - Describe the connection between a rock's formation process and its suitability for specific applications - Identify real-world examples of how different rocks are used in construction, decoration, and industry
	First Nations Australians' Use of Rocks	Aboriginal and/or Torres Strait Islander Peoples have a deep understanding of the land and its resources. In this lesson, we will investigate how quarrying has been used to access rocks for creating everyday tools and objects, and the significance of these practices in their culture and daily life.	- Identify examples of tools and objects made by Aboriginal and Torres Strait Islander Peoples using quarried rocks, such as grindstones, hammerstones, and stone hatchets - Describe the process of quarrying and how specific rocks were chosen based on their properties - Investigate how these tools were used for food gathering, construction, canoe building, and the manufacture of items like shields, clubs, and spears
• exploring how the mining of ores and minerals impacts on local environments, and examining environmental rehabilitation initiatives	Impact of Mining on the Environment	Mining is essential for obtaining the ores and minerals we use in everyday life, but it also impacts local environments. In this lesson, we will explore these impacts and investigate how environmental rehabilitation helps restore mined areas.	- Describe the environmental impacts of mining on local ecosystems, including habitat destruction and pollution - Identify examples of ores and minerals commonly mined and their uses - Examine environmental rehabilitation initiatives, such as revegetation and soil restoration, used in mining areas
	Investigation: Exploring the Impacts of Mining	Mining methods like open-cut and surface mining are used to extract valuable resources, but they have different impacts on the environment. In this investigation, we will model these methods using chocolate chip cookies to explore their effects and	- Create a model of an open-cut and surface mining techniques using chocolate chip cookies - Compare the efficiency of resource extraction between the two methods - Analyse the environmental impact of each mining method

		compare their efficiency.	- Propose strategies for restoring the "cookie ecosystem."
Extension	The Elemental Composition of Planets	Earth and other planets are made up of unique combinations of elements that influence their structure and characteristics. In this lesson, we will describe the elemental composition of Earth and compare it to that of another planet.	- Identify the major elements that make up Earth's crust, mantle, and core - Describe the elemental composition of Mars and compare the similiarities and differences with Earth - Explain how the elemental composition of a planet affects its surface features and atmosphere
Earth, Moon and Sun			
VC2S8U12 - cyclic changes in the relative positions of Earth, the Sun and the Moon can be modelled to show how these cycles cause eclipses and influence predictable phenomena on Earth, including seasons and tides			
using physical models or virtual simulations to explain how Earth's tilt and position relative to the Sun cause differences in light intensity on Earth's surface, resulting in seasons	The Earth's Tilt and Seasons	Seasons occur because of Earth's axial tilt and its position in orbit around the Sun. These factors change the angle and intensity of sunlight reaching different parts of the Earth throughout the year. In this lesson, we will explore how these predictable changes create seasonal variations in temperature and daylight hours.	- Explain how Earth's tilt affects the amount of sunlight received at different times of the year - Describe how Earth's orbit around the Sun results in changing seasons - Interpret diagrams and data to describe how daylight hours and temperatures vary across seasons
	Investigation: Modelling Earth's Tilt and Orbit	Seasons change because of Earth's tilt and movement around the Sun. In this lesson, we will create a model to explain how Earth's axial tilt and orbit cause seasonal changes.	- Describe how Earth's tilt and orbit affect the seasons. - Identify the relationship between the Sun's position and seasonal changes - Create a model demonstrating how the tilt of Earth affects sunlight distribution - Explain how the model represents the cause of the seasons and its limitations
using physical models or virtual simulations to explain the cyclic patterns of lunar phases and eclipses of the Moon and Sun	Lunar Phases and Eclipses: Cyclic Patterns in the Sun-Earth-Moon System	The cyclic patterns of lunar phases and eclipses occur due to the positions and movements of the Earth, Moon, and Sun. In this lesson, we will explore and explain these predictable phenomena.	- Describe the cyclic patterns of lunar phases and their causes - Explain how the positions of the Sun, Earth, and Moon result in solar and lunar eclipses - Create a model showing the phases of the Moon and eclipses
examining the effect of the gravitational attraction of the Moon and Sun on Earth's oceans and describing how	Understanding Tides: The Role of the Moon and Sun	The gravitational attraction of the Moon and the Sun influences Earth's oceans, creating tides. In this lesson, we will explore how the relative positions of the Moon, Sun, and Earth result in tidal variations and	- Describe how the gravitational forces of the Moon and the Sun affect Earth's oceans - Explain how the relative positions of the Moon, Sun, and Earth create different types of tides (e.g., spring and neap tides)

the positions of the Moon and Sun in relation to Earth result in tidal variations		understand the relationship between gravitational forces and tidal patterns.	- Use diagrams or models to demonstrate how tidal variations occur - Analyse the connection between the phases of the Moon and tidal patterns
researching knowledges held by Aboriginal and/or Torres Strait Islander Peoples about the phases of the Moon and the connection between the lunar cycle and ocean tides; for example, understanding by Torres Strait Islander Peoples of the relationship between lunar cycles and neap tides enables prediction of the safest periods to reef-dive for lobster	Indigenous Knowledge of Lunar Phases and Tides	First Nations Australians hold rich cultural knowledge about the relationship between the phases of the Moon and ocean tides. In this lesson, we will explore these understandings, compare them with mainstream scientific explanations, and learn how they are used to predict and navigate environmental conditions.	- Describe the connection between lunar phases and tides from both Indigenous and scientific perspectives - Identify similarities and differences between scientific and Aboriginal and Torres Strait Islander knowledge of lunar cycles and phases and their impact on tides - Explain how these understandings are applied in practices such as reef-diving, fishing, and navigation
researching Aboriginal and/or Torres Strait Islander Peoples' oral traditions and cultural recordings of solar and lunar eclipses, and investigating similarities and differences with contemporary understandings of these celestial phenomena	Understanding Solar and Lunar Eclipses: Indigenous Knowledge and Contemporary Science	Aboriginal and Torres Strait Islander Peoples have long observed and recorded solar and lunar eclipses through oral traditions and cultural practices. In this lesson, we will explore these understandings, compare them with contemporary scientific explanations, and appreciate the cultural significance of these celestial events.	- Describe how Aboriginal and Torres Strait Islander Peoples share stories and records about solar and lunar eclipses - Explain what scientists know today about solar and lunar eclipses - Compare Indigenous knowledge with modern science to find what is similar and different
	From Myth to Model: How Science Explains the Solar System	Scientific understanding evolves as new evidence is discovered. In this lesson, we will compare scientific and non-scientific approaches to explaining natural phenomena and examine how historical and current models of the Solar System have changed with new evidence.	- Identify differences between scientific and non-scientific approaches to understanding natural phenomena - Compare historical and current models of the Solar System - Explain how new scientific evidence leads to modifications or rejections of models - Evaluate why scientific inquiry is more reliable than non-scientific explanations
	Seasonal Calendars and Celestial	Aboriginal and Torres Strait Islander Peoples have developed sophisticated seasonal calendars and observations of the stars, Moon, and natural	- Describe how Aboriginal and Torres Strait Islander Peoples use the stars, the Moon, and nature to know when seasons are changing

	Knowledge of First Nations Australians	phenomena to predict weather, animal behaviours, and plant cycles. In this lesson, we will investigate examples of these calendars and explore how they connect the environment and the skies to seasonal changes and resource management.	- Investigate seasonal calendars, like the D'harawal seasonal calendar, and how they are linked to changes in the environment - Explain how watching the stars, Moon, and nature helps predict plant growth, animal behavior, and ocean tides
Extension	The Work of Wang Zhenyi: Understanding Lunar Eclipses	In the 10th century, Al-Battani made groundbreaking contributions to astronomy, including accurate predictions of eclipses and calculations of the solar year's length. In this lesson, we will explore his achievements and understand how his work advanced our knowledge of astronomy and influenced later scientific developments.	- Describe what Wang Zhenyi discovered about science, especially her work on lunar eclipses - Explain how lunar eclipses happen using scientific ideas - Use models to recreate Wang Zhenyi's experiments and see how lunar eclipses work - Explain why Wang Zhenyi's work was important in 18th-century China and why it still matters today
	The Contributions of Al-Battani: Advancements in Astronomy	In the 10th century, Al-Battani made groundbreaking contributions to astronomy, including accurate predictions of eclipses and calculations of the solar year's length. In this lesson, we will explore his achievements and understand how his work advanced our knowledge of astronomy and influenced later scientific developments.	- Describe what Al-Battani discovered in astronomy, including how he predicted eclipses and measured the length of a year - Explain why Al-Battani's methods were important and how they helped people understand space better. - Investigate the tools and techniques he used to make his calculations - Discuss how Al-Battani's work influenced later discoveries in astronomy and its impact on modern science
Physical Sciences			
Forces and Simple Machines			
VC2S8U14 - balanced and unbalanced forces acting on objects, including gravitational force, may be investigated and represented using force diagrams; changes in an object's motion can be related to its mass and the magnitude and direction of the forces acting on it **VC2S8U13 - simple machines, including the lever, inclined plane, wedge, pulley, screw, and wheel and axle, alter the direction and magnitude of forces**			
investigating the effects of applying different forces to familiar objects of the same mass and different masses	Understanding Forces	Forces are pushes or pulls that can cause objects to move, stop, or change direction. In this lesson, we will explore the different types of forces and explain how they can be categorised as either direct (contact) forces or indirect (non-contact) forces.	- Define forces as push or pull that can act on objects - Classify forces into contact (direct) and non-contact (indirect) types - Identify examples of contact and non-contact forces in everyday situations - Explain how contact forces require physical interaction, while non-contact forces act at a distance

	Investigation: The Effects of Forces on Objects	Forces can cause objects to move, stop, or change direction. The effects of these forces depend on the size of the force and the mass of the object. In this lesson, we will investigate how applying different forces affects objects of the same and different masses, including both direct and indirect forces.	- Describe how forces affect the motion of objects - Investigate the effects of applying forces of different sizes to objects of the same and different masses - Identify the effects of direct and indirect forces - Explain how the mass of an object influences the effect of a force
analysing the effect of balanced and unbalanced forces on an object's motion, such as starting, stopping and changing direction	Balanced and Unbalanced Forces	The motion of an object depends on whether the forces acting on it are balanced or unbalanced. In this lesson, we will explore how balanced and unbalanced forces affect the motion of objects, such as starting, stopping, and changing direction, and use force diagrams to represent these forces.	- Define balanced and unbalanced forces and describe their effects on motion - Analyse how balanced and unbalanced forces cause objects to start, stop, or change direction - Use force diagrams to model balanced and unbalanced forces acting on objects - Explain real-life examples of balanced and unbalanced forces and their effects on motion
measuring the magnitude of a force using a force meter, and representing the magnitude and direction of forces acting on an object using force diagrams	Investigation: Measuring and Representing Forces	Forces have both magnitude and direction, and we can measure and represent them to predict their effects on an object's motion. In this lesson, we will use a force meter to measure the magnitude of forces, represent them with force diagrams, and analyse the diagrams to make predictions.	- Measure the magnitude of forces acting on objects using a force meter - Create a force diagram with arrows showing the magnitude and direction of forces acting on an object - Analyse force diagrams to predict how forces will affect an object's motion - Explain the relationship between the size and direction of forces and their effects
investigating how Earth's gravitational force is the attractive force that pulls objects towards the centre of Earth and how its magnitude is related to the mass of an object	Understanding Gravitational Forces	Gravitational force is the attractive force that pulls objects toward the center of Earth and acts between all objects with mass. In this lesson, we will investigate how Earth's gravitational force works, describe how it affects objects, and understand how its magnitude is related to mass.	- Describe the gravitational forces exerted between objects with mass - Describe how Earth's gravitational force pulls objects toward its center - Investigate how the magnitude of gravitational force is related to the mass of an object
examining how gravity affects objects in space, including moons, planets, stars, galaxies and black holes	Gravity and Motion in Space	Gravity is a fundamental force that governs the motion of objects in space, from moons and planets to stars, galaxies, and black holes. In this lesson, we will explore how gravity affects objects in space and use	- Describe how gravity affects the motion of objects in space, including moons, planets, stars, galaxies, and black holes - Explain how gravitational forces cause objects to orbit larger masses

		the concept of forces to describe their motion, including orbits and interactions.	- Use the concept of forces to analyse and describe the motion of objects in orbit
analysing the forces acting on boomerangs and how early Aboriginal and/or Torres Strait Islander Peoples designed an air-foil profile that could be varied and had several applications	The Science of Boomerangs: Forces and Airfoil Design	Boomerangs are ingenious tools designed by Aboriginal and Torres Strait Islander Peoples that rely on an understanding of forces and airfoil profiles. In this lesson, we will analyse the forces acting on boomerangs, explore their airfoil design, and understand how variations in shape and profile allowed for multiple applications.	- Describe the forces that affect a boomerang when it flies, including lift, drag, and gravity - Explain how the shape of a boomerang (airfoil) helps it fly the way it does - Analyse how Aboriginal and Torres Strait Islander Peoples designed different boomerangs for hunting, sport, and other uses - Investigate how changing the shape or design of a boomerang affects how well it flies
designing a series of simple machines that take a specified time to move an object a specific height	Investigation: Designing and Investigating Simple Machines	Simple machines can be designed to perform tasks with precision and efficiency by modifying the action of forces. In this lesson, we will design a series of simple machines to move an object to a specified height within a set time and investigate the action of forces involved in these processes.	- Design a series of simple machines to perform a task within specific parameters (e.g., height and time) - Investigate the action of forces in levers, pulleys and other simple machines - Evaluate the performance of the machines based on their effectiveness and efficiency - Explain how the action of forces affects the motion of objects in simple machines
investigating how simple machines such as levers and pulleys are used to change the magnitude of force needed to perform a task evaluating different simple machines for their mechanical advantage	Simple Machines: Force, Mechanical Advantage, and Everyday Applications	Simple machines, such as levers and pulleys, help us perform tasks by reducing the force needed. In this lesson, we will investigate how these machines work, evaluate their mechanical advantage, and explore their role in solving everyday problems, both historically and in the modern world.	- Describe how levers and pulleys change the magnitude of force needed to perform a task - Investigate the mechanical advantage of levers and pulleys - Evaluate different simple machines based on their mechanical advantage and effectiveness - Explain how simple machines have been used in the past and how they are still relevant today
investigating the effect of forces through the application of simple machines, for example the spearthrowers used by Aboriginal and/or Torres Strait Islander Peoples	Forces in Action: Simple Machines in Aboriginal and Torres Strait Islander Technologies	Aboriginal and Torres Strait Islander Peoples have ingeniously applied knowledge of forces and simple machines to design tools that enhance their capabilities. In this lesson, we will investigate how forces are applied through traditional technologies, such as spearthrowers and bows and arrows, and	- Identify examples of Aboriginal and Torres Strait Islander Peoples' knowledge and application of forces in tool design - Describe how forces are applied through tools such as spearthrowers, and bows and arrows - Explain how the spearthrower functions as a lever and how it enhances the force applied to a projectile

as examples of levers that operate as an extension of the arm; and the bows and arrows used by Torres Strait Islander Peoples, with the bow acting as a flexible lever and the arrow as a projectile (rather than a simple machine)		analyze their effectiveness as tools that utilize principles of levers and projectiles.	
researching how David Unaipon, a Ngarrindjeri man from the Coorong region of South Australia, used his cultural knowledge and understanding of the aerodynamic properties of boomerangs to conceptualise a vertical lift flying machine in 1914	David Unaipon and the Vertical Lift Flying Machine	David Unaipon, a Ngarrindjeri man from South Australia, applied his cultural knowledge of boomerangs and their aerodynamic properties to conceptualise a vertical lift flying machine in 1914. In this lesson, we will explore how Unaipon's understanding of forces and flight informed his invention and examine the significance of his contribution to aerodynamics and engineering.	- Describe how David Unaipon used his cultural knowledge to design a flying machine with vertical lift - Explain the science behind vertical lift and how it connects to Unaipon's ideas - Explain why Unaipon's work was important in engineering and how it shows the innovation in Aboriginal knowledge systems
investigating how aeronautical engineers' understanding of the nature of the forces acting in flight has led to changes in the design of aircraft	Forces in Flight: How Engineers Shape Aircraft Design	The forces acting on an aircraft—lift, weight, thrust, and drag—are crucial to flight. Aeronautical engineers use their understanding of these forces to improve aircraft design for efficiency, safety, and performance. In this lesson, we will investigate how the understanding of these forces has influenced changes in the design of aircraft over time.	- Describe the forces acting on an aircraft in flight (lift, weight, thrust, and drag) - Explain how changes in aircraft design minimise or optimise these forces - Explore key advancements in aeronautical engineering that have improved flight
identifying the simple machines in a complex machine such as a Rube Goldberg machine designing and constructing Rube Goldberg machines that	Investigation: Exploring Simple Machines in Complex Systems: Building a Rube Goldberg Machine	Complex machines, like Rube Goldberg machines, are made up of multiple simple machines working together to perform a task. In this lesson, we will identify the simple machines within complex systems, then design and construct a Rube Goldberg machine using at least three different simple machines to achieve a specified goal.	- Identify the simple machines used in a complex system, such as a Rube Goldberg machine - Explain how simple machines work together to perform tasks in a complex system - Design a Rube Goldberg machine that incorporates at least three different simple machines - Construct and test a Rube Goldberg machine to successfully perform a specified task

use at least 3 different simple machines to perform a specified task			
Extension	Exploring the Relationship Between Force and Energy	Force and energy are closely related concepts in physics. In this lesson, we will explore how forces transfer or transform energy, analsze how energy changes during motion, and examine real-world examples where force and energy interact.	- Describe the relationship between force and energy in terms of motion and work - Explain how forces transfer energy between objects or transform it from one form to another - Apply the concepts of force and energy to real-world scenarios
	Understanding Electrostatic Forces	Electrostatic forces are forces exerted between objects due to their electric charges. In this lesson, we will explore how these forces work, describe the interactions between charged objects, and understand how these forces can attract or repel objects.	- Describe how charged objects interact, including attraction and repulsion - Explain what electrostatic forces are and how they arise from electric charges - Investigate examples of electrostatic forces in everyday situations
	Introduction to Magnets: Understanding Polarity	Magnets interact with each other through forces of attraction and repulsion, depending on their polarity. In this lesson, we will explore how magnets work, identify their poles, and describe how they attract or repel each other based on their polarity.	- Identify the poles of a magnet (north and south) - Describe how magnets attract or repel each other based on their polarity - Investigate the forces of attraction and repulsion between magnets
	Investigation: How Distance Affects a Magnet's Strength	Scientific investigations rely on careful planning, data collection, and analysis. In this lesson, we will formulate and investigate a scientific question about magnets, conduct repeated trials to test the effect of distance on a magnet's strength, and analyse our results to determine accuracy and reliability.	- Formulate a testable scientific question about the effect of distance on magnet strength - Conduct a practical investigation using repeated trials - Calculate the mean and range of collected data to analyse trends - Discuss the accuracy and reliability of results
	Investigation: Mapping Magnetic Fields	Magnets create invisible magnetic fields that can be observed and mapped to understand their strength and direction. In this lesson, we will visualise and map the magnetic fields of magnets.	- Describe what a magnetic field is and how it surrounds a magnet - Observe the magnetic field of a magnet using iron filings and a compass - Create a map of the magnetic field lines of a magnet, including the direction from the north and south pole
	Investigation: Building and	Electromagnets are temporary magnets created by passing an electric current through a coil of wire. In this lesson, we will construct electromagnets, test their	- Construct an electromagnet using basic materials - Compare the strength of electromagnets under different conditions

	Investigating Electromagnets	strength, and compare how the number of coils affect their magnetic force.	- Investigate how the number of coils affects the strength of an electromagnet
Energy			
VC2S8U15 - energy exists in different forms, including thermal, chemical, gravitational and elastic, and may be classified as kinetic or potential; energy transfers (conduction, convection and radiation) and transformations occur in simple systems and can be analysed in terms of energy efficiency			
investigating relationships between kinetic and potential energy in a simple system such as a roller-coaster or Newton's cradle, or in devices such as a catapult or a water wheel, and using representations such as flow diagrams to illustrate changes between different forms of energy in these systems and devices	Introduction to Energy	In this first lesson, we'll explore energy, how we measure it, and the two main types of energy, potential and kinetic energy.	- Define the term energy - Identify the units (joules and kilojoules) used to measure energy - Calculate conversions between joules and kilojoules. Identify the two types of energy (potential and kinetic energy)
	Potential and Kinetic Energy	In this lesson, we will learn about potential and kinetic energy, where they occur and be able to state if an example is potential or kinetic energy.	- Define the terms potential and kinetic energy - Identify examples of each type of energy - Classify a situation as an example of potential or kinetic energy
comparing energy changes in physical events such as car accidents, motion of pendulums, and lifting and dropping of objects using Sankey diagrams to show energy inputs, changes and outputs in a system	Energy Transfers and Transformations	In this lesson, we'll explore how energy moves and changes, focusing on two key ideas: the law of conservation of energy and energy transformations. These concepts are essential to understanding how rollercoasters work — and much more!	- Identify the key concept in the law of conservation of energy (energy is not created nor destroyed, it is only transformed) - Identify similarities and differences in energy transfer and energy transformation - Identify three common examples of energy transfer and transformation - Create energy flow diagrams to represent examples of energy transfer and transformation
	Investigation: Energy Transformations	In this investigation, we'll observe several energy transformations in the lab and discuss what happens in each scenario using our understanding of energy transformations.	- Identify energy transformations that take place in four different scenarios - Discuss these energy transformations in terms of energy stored, used and produced - Draw a flow diagram to demonstrate an energy transformation
	Energy Efficiency	In this lesson, we will examine the energy efficiency of rollercoasters and other appliances and the amounts of useful and waste energy produced.	- Distinguish between useful and waste energy - Discuss the importance of energy efficiency - Calculate the efficiency of common appliances and a rollercoaster - Calculate the amount of useful energy that they produce

	Investigation: Energy Efficiency	In this lesson, you will determine the efficiency of different bouncy balls by analysing the energy transformations that take place.	- Define the term energy efficiency - Conduct an investigation to determine the energy efficiency of different bouncy balls - Calculate the energy efficiency of bouncy balls - Explain the energy transformations that occur when bouncing a ball using the law of conservation of energy
identifying where heat energy is produced as a by-product of energy transfer, such as filament light globes, exercise, and battery charging and use	Heat Transfer	In this lesson, we will compare heat and temperature and learn to describe the different mechanisms for heat transfer.	- Identify one similarity and one difference between heat and temperature. - Identify where heat energy is produced as a by-product of energy transfer. - Describe three mechanisms for heat transfer (conduction, convection and radiation) using examples. - Describe how energy is transferred into and out of open and closed systems and how it cycles within a system.
using electrical circuits and components to demonstrate electrical energy transfer and its transformation into heat, light and sound	Energy Transformations with Electricity	In this lesson, we will learn to define electricity and explain what electricity is used for in our daily lives.	- Define electricity using keywords such as electrons and flow - Identify the role of electrons in electricity flow - Describe how electrical energy is transformed into other forms of energy
observing or constructing a Rube Goldberg machine and identifying the energy transfers and transformations involved	Investigation: Rube Goldberg Machines	In this investigation, you will use your understanding of energy transformations, energy transfers and the law of conservation of energy to create a Rube Goldberg machine.	- Create a working Rube Goldberg machine to carry out a simple task - Explain the energy transfers and energy transformations that take place in the Rube Goldberg machine - Explain how you could reduce the amount of waste energy produced by your Rube Goldberg machine to make it more efficient
Electricity and Household Energy Consumption			
VC2S8U16 -household energy consumption can be analysed using an energy audit and is affected by appliance choice, building design, season and climate VC2S8U17 - electrical circuits transfer energy when current flows and can be designed for diverse purposes using different components; the operation of circuits can be explained using the concepts of voltage and current			
investigating parallel and series circuits and measuring voltage drops across and currents through various components	Investigation: Voltage & Current in Series and Parallel Circuits	Electrical circuits transfer energy through the flow of current, and their design impacts how energy is distributed. In this lesson, we will investigate series and parallel circuits, measure voltage drops, and observe how current behaves	- Identify the difference between series and parallel circuits - Measure voltage and current in series and parallel circuits using a multimeter - Explain how voltage and current behave in series and parallel circuits

		in different circuit components.	- Compare the advantages and disadvantages of series and parallel circuits
investigating the properties of components such as LEDs (light-emitting diodes), and temperature and light sensors	Investigation: Properties of Components	Different components in electrical circuits have unique properties and functions. In this lesson, we will investigate how LEDs (light-emitting diodes), temperature sensors, and light sensors work, and explore their practical applications in circuits.	- Identify the properties and functions of LEDs, temperature sensors, and light sensors - Conduct an experiment or simulation to test how these components respond in simple electrical circuits - Describe changes in current, voltage, or output caused by variations in temperature or light - Explain how these components are used in real-world applications
comparing electrical circuit design to household wiring, for example identifying common components used in both electrical circuit design and household wiring (such as resistors, switches and power sources), considering the arrangement of electrical components within devices, considering how voltage and current are managed in both electrical circuits and household wiring, or analysing the safety features and precautions in circuits and household wiring, recognising the importance of circuit protection devices such as fuses and circuit breakers in preventing electrical hazards	Comparing Electrical Circuit Design to Household Wiring	Electrical circuits and household wiring share common components and principles, but their designs have unique features to ensure safety and efficiency. In this lesson, we will compare circuit design and household wiring, identify common components, and explore safety features like fuses and circuit breakers.	- Identify common components in electrical circuit design and household wiring (e.g., resistors, switches, power sources) - Describe the arrangement of electrical components in circuits and household wiring - Explain how voltage and current are managed in circuits and household wiring - Analyse the role of safety features, including fuses, circuit breakers, and other precautions, in preventing electrical hazards

exploring the use of sensors in robotics and control devices	Sensors in Robotics and Control Devices	Sensors play a critical role in robotics and control devices by allowing machines to detect changes in their environment and respond accordingly. In this lesson, we will explore different types of sensors, how they work, and their applications in robotics and automated systems.	- Identify different types of sensors used in robotics and control devices - Describe how sensors work to detect changes in the environment - Investigate how sensors are integrated into devices for specific functions (e.g., motion detection, temperature control)
conducting an energy audit to determine the energy efficiency of a particular household	Investigation: Conducting an Energy Audit to Analyse Household Energy Efficiency	Energy consumption in a household can be analysed through an energy audit. In this lesson, we will explore how to measure and analyse household energy use to determine energy efficiency and identify ways to reduce energy consumption.	- Identify energy-consuming appliances and systems in a household - Conduct an energy audit to measure and record household energy consumption - Analyse the energy efficiency of appliances and identify areas for improvement - Suggest practical strategies to reduce household energy use and improve efficiency
examining the meaning of energy star ratings given to appliances such as refrigerators and washing machines, and criteria used to determine these ratings	Understanding Energy Star Ratings and Their Importance	Energy Star ratings help us understand how energy-efficient appliances like refrigerators and washing machines are. In this lesson, we will examine what Energy Star ratings mean, how they are determined, and why choosing energy-efficient appliances is important for households and the environment.	- Identify what Energy Star ratings represent and where to find them on appliances - Describe the criteria used to determine Energy Star ratings for appliances - Analyse the energy efficiency of different appliances based on their Energy Star ratings - Explain the benefits of using Energy Star-rated appliances, including cost savings and environmental impact
exploring the principles of passive solar building design and constructing a model of a building that includes these principles	Exploring Passive Solar Design Principles	Passive solar design uses the Sun's energy to naturally heat, cool, and light buildings, reducing energy use. In this lesson, we will explore the principles of passive solar design and construct a model building that demonstrates these principles.	- Identify the key principles of passive solar building design - Explain how passive solar design reduces energy consumption - Design and construct a model building that incorporates passive solar principles - Evaluate the effectiveness of the model in maximising heat and light efficiency
investigating how building	Investigating	Building designs vary based on climate to	- Identify key features of climate-adapted house designs

designs in different climates affect the energy efficiency of houses, such as the 'Queenslander' house design	How Building Designs Adapt to Different Climates to Improve Energy Efficiency	maximise energy efficiency. In this lesson, we will explore how building designs, like the 'Queenslander' house, are adapted to different climates to manage temperature, airflow, and energy use.	(e.g., Queenslander houses) - Describe how these features improve energy efficiency in specific climates - Compare building designs in different climates to explain their energy efficiency strategies - Explain how design choices like ventilation, insulation, shading, and materials affect energy use
investigating how different building materials, such as mudbrick, polystyrene panels and insulation, affect the energy efficiency of a particular building design	Investigation: How Different Building Materials Affect Energy Efficiency	The materials used in building construction play an important role in energy efficiency. In this lesson, we will investigate how materials like mudbrick, polystyrene panels, and insulation impact the temperature regulation and overall energy efficiency of a building design.	- Identify different building materials, including mudbrick, polystyrene panels, and insulation - Describe the properties of these materials that influence energy efficiency - Investigate how each material affects temperature regulation in a building - Analyse which materials are most energy-efficient for different climate conditions
investigating how household energy usage varies with time of day and/or time of year and how this relates to needs for energy storage or generation	Investigation: How Household Energy Usage Varies with Time	Household energy usage changes throughout the day and year, depending on factors like temperature, lighting, and appliance use. In this lesson, we will investigate these variations and explore the need for energy storage and generation to meet demand.	- Identify factors that cause variations in energy usage during the day and year - Analyse household energy consumption patterns over time - Explain how energy storage and generation systems help meet fluctuating energy demands - Evaluate strategies to manage energy usage efficiently at home

Levels 9 and 10 Curriculum Map

Biological Sciences			
Reproduction			
VC2S10U01 - the structures of reproductive cells and organs in plants and animals are related to their functions; processes of sexual and asexual reproduction enable survival of a species			
examining how the reproductive organ structures work collectively in males and females as systems	Male and Female Reproductive Systems	The male and female reproductive systems are made up of specialised organs that work together to produce reproductive cells and enable reproduction. In this lesson, we will explore the structure and function of these organs and understand how they work as systems.	- Identify the main organs of the male and female reproductive systems - Describe the structure and function of reproductive organs - Explain how the organs in the male and female reproductive systems work collectively as systems - Analyse the importance of these systems for reproduction and survival of species
explaining how the forms of male and female gametes relate to their specific functions	Male and Female Gametes	Male and female gametes (sperm and egg cells) are specialised for reproduction. In this lesson, we will explore the structure (form) of these gametes and explain how their unique features help them perform their specific roles in reproduction.	- Identify the male and female gametes (sperm and egg cells) and describe their key features - Explain how the form (structure) of sperm cells enables them to reach and fertilise the egg - Explain how the form (structure) of egg cells supports fertilisation and early development - Compare the structure and function of male and female gametes
exploring how sexual reproduction produces a greater rate of variation among offspring compared with asexual reproduction	Why Does Sexual Reproduction Create More Variation?	Sexual reproduction and asexual reproduction produce offspring, but the level of variation among those offspring is different. In this lesson, we'll explore how sexual reproduction leads to greater variation and why this is important for the survival of species.	- Describe how asexual reproduction results in genetically identical offspring - Explain how genetic material is combined during sexual reproduction to create variation - Compare the levels of diversity in offspring produced through sexual and asexual reproduction - Identify examples of how variation from sexual reproduction benefits a species' ability to adapt and survive
examining how the	Reproductive	Animals use different reproductive strategies	- Identify examples of reproductive strategies in multicellular

reproductive strategies of multicellular animals are related to their environments and the complexity of the organisms	Strategies of Multicellular Animals	that are closely linked to their environment and their level of complexity. In this lesson, we will examine how these strategies help multicellular animals survive and reproduce successfully.	animals and explain how these strategies are influenced by environmental factors - Describe how the complexity of an organism affects its reproductive methods, such as parental care or offspring development - Compare reproductive strategies of different animals and their adaptations to specific environments
examining how the number of offspring produced by animals is related to the amount of parental care	Offspring and Care	The number of offspring animals produce is often connected to how much care they provide. In this lesson, we will examine the relationship between the number of offspring and the level of parental care in different animals.	- Identify examples of animals with high or low numbers of offspring - Describe the relationship between the number of offspring and parental care - Explain how the number of offspring is related to the survival strategies of a species - Compare the advantages and disadvantages of producing many offspring versus providing high levels of parental care
identifying and comparing sexual and asexual reproductive strategies in plants	Plant Reproductive Strategies	Plants reproduce in fascinating ways, using both sexual and asexual strategies. In this lesson, we will identify and compare these methods to understand how plants ensure their survival and growth.	- Identify the differences between sexual and asexual reproduction in plants - Describe examples of plants that use sexual or asexual reproductive strategies - Compare the advantages and disadvantages of sexual and asexual reproduction - Explain how these strategies help plants survive in different environments
The nervous and endocrine systems			
VC2S10U02 - the nervous and endocrine systems work together to regulate and coordinate the body's response to stimuli, ensuring homeostasis, including through negative feedback mechanisms			
exploring the body's observable responses to external stimuli (such as changes in light or	How Does Your Body Respond to Stimuli?	Your body needs to respond to changes in the environment to stay alive and healthy. In this lesson, we'll explore how the body reacts to external and internal stimuli and why	- Identify examples of external and internal stimuli that trigger responses in the body - Explain the importance of maintaining stable internal conditions (homeostasis)

temperature, and presence of danger or pathogens) or internal stimuli (such as dehydration and hunger)		maintaining stable internal conditions (homeostasis) is important.	- Describe observable responses of the body to specific stimuli (e.g., light, temperature, dehydration)
using models, flow diagrams and virtual simulations to investigate and represent the relationships between body systems that are necessary to coordinate a response to a stimulus	From Response to Stimuli	Your body systems don't work alone—they coordinate and communicate to respond to changes in the environment. In this lesson, we will use models, flow diagrams, and virtual simulations to explore how body systems interact to coordinate responses to stimuli.	- Identify the body systems involved in responding to a stimulus - Use (models, flow diagrams, or simulations) to represent the relationships between body systems - Explain how the body systems ensure the response maintains balance (homeostasis)
comparing the roles and functions of electrical impulses and hormones in the body's responses to external stimuli	How Does Your Body Respond to Stimuli? Nervous System vs. Endocrine System	The nervous and endocrine systems both help your body respond to changes in the environment, but they work in different ways. In this lesson, we'll compare how the nervous and endocrine systems coordinate your body's response to external stimuli.	- Identify the role of the nervous system and endocrine system in responding to stimuli - Describe how electrical impulses and hormones carry signals in the body - Compare the speed, duration, and functions of responses in the nervous and endocrine systems - Explain how the two systems work together to maintain balance (homeostasis)
modelling how the process of regulation is monitored and adjusted by connections between the receptor, command centre and effector	Feedback Loops and Homeostasis	Your body uses feedback loops to monitor and adjust internal conditions, keeping everything in balance. In this lesson, we will model how receptors, command centres, and effectors work together to regulate processes and maintain homeostasis.	- Identify the roles of receptors, command centres, and effectors in maintaining homeostasis - Model how feedback loops regulate processes in the body - Analyse examples of feedback loops (e.g., body temperature regulation) to understand their role in homeostasis
examining how negative feedback mechanisms serve to maintain balance in internal systems, such as those for body temperature, blood sugar, iron levels and	How Negative Feedback Maintains Balance in the Body	Your body uses negative feedback mechanisms to keep internal systems in balance, like body temperature, blood sugar, iron levels, and pH. In this lesson, we'll examine how these systems work to maintain homeostasis and why they are critical for survival.	- Identify examples of internal systems regulated by negative feedback (e.g., body temperature, blood sugar, iron levels, and pH) - Describe the role of negative feedback in maintaining balance in these systems - Explain why negative feedback is essential for maintaining

extracellular pH, and			homeostasis
how an understanding of feedback mechanisms has enabled the development of pharmaceuticals (such as insulin for type 1 diabetes) and products to maintain or enhance performance (such as electrolyte solutions)	How Understanding Feedback Mechanisms Helps Develop Life-Changing Products	Feedback mechanisms help the body maintain balance, and understanding how they work has allowed scientists to develop products like insulin for diabetes and electrolyte solutions to improve performance. In this lesson, we'll explore how these products address disruptions to homeostasis.	- Describe how insulin helps people with Type 1 diabetes regulate blood sugar levels - Analyse how electrolyte solutions support hydration and enhance performance - Evaluate the importance of feedback mechanisms in developing pharmaceuticals and other products
examining the effects of a condition such as diabetes-induced blindness or hypothermia on a feedback system	When Feedback Systems Fail	Feedback systems keep the body balanced, but when they fail, disorders can occur. In this lesson, we will examine how disruptions in feedback systems can lead to serious health conditions and what happens when balance is not restored.	- Explain how feedback system failure can lead to conditions like diabetes-induced blindness and hypothermia - Describe the effects of broken feedback systems on the body - Explain the consequences of failing to restore homeostasis
Disease			
VC2S10U03 - infectious and non-infectious diseases are caused by different organisms and agents; measures to control the transmission of infectious diseases include personal hygiene, quarantine protocols, medical treatment and public education programs			
differentiating between infectious diseases that are caused by different pathogens, such as tuberculosis (caused by bacteria), influenza (caused by viruses), candidiasis (caused by a fungus) and tapeworm infection (caused by a parasite)	Understanding Infectious Diseases and Their Causes	Infectious diseases are caused by pathogens such as bacteria, viruses, fungi, and parasites. In this lesson, we'll explore the differences between these pathogens, learn how they cause diseases, and distinguish between infectious and non-infectious diseases.	- Define infectious diseases and identify their causes - Distinguish between infectious and non-infectious diseases - Differentiate between pathogens such as bacteria, viruses, fungi, and parasites - Provide examples of diseases caused by each type of pathogen
	Investigation: How Do Infectious Diseases Spread?	Infectious diseases spread through various pathways, including direct contact, airborne transmission, and contaminated surfaces. In this lesson, we will use models to investigate how these diseases are transmitted and explore strategies to reduce their spread.	- Identify different modes of disease transmission - Use models to simulate how infectious diseases spread in a population - Describe factors that influence the spread of infectious diseases
	How the Body	Our body uses multiple strategies to prevent	- Identify the body's physical, chemical, and biological

	Defends Against Pathogens	pathogens from entering and responds with complex systems when they do. In this lesson, we will explore the body's defence mechanisms and its responses to pathogens.	barriers that prevent pathogen entry - Describe how the immune system responds to pathogens that enter the body - Create a model outlinging the steps of the body's defence and response to pathogens
exploring the data and rationale for different strategies to stop the spread of infectious diseases, such as handwashing, mask-wearing, isolation and surface disinfection	Strategies for Reducing the Spread of Infectious Diseases	Infectious diseases can spread rapidly through communities. In this lesson, we'll assess various strategies for reducing the incidence and spread of infectious diseases, focusing on public health measures, personal hygiene, and technological interventions.	- Identify strategies to reduce the spread of infectious diseases - Explain how personal hygiene, vaccination, and public health measures contribute to disease prevention - Assess the effectiveness of these strategies in controlling outbreaks - Propose a plan to minimise the spread of an infectious disease based on evidence
conducting an investigation to compare the effectiveness of handwashing by counting the number of bacterial colonies growing on agar plates	Investigation: How Effective Is Handwashing in Reducing Bacteria?	Handwashing is a key practice for preventing the spread of infectious diseases. In this lesson, we will conduct an investigation to compare the effectiveness of different handwashing methods by analysing the growth of bacterial colonies on agar plates.	- Design an investigation to test the effectiveness of handwashing - Collect and record data on bacterial growth from agar plates - Compare the effectiveness of different handwashing techniques or materials - Analyse results to draw conclusions about the role of hand hygiene in disease prevention
visualising biological processes associated with diseases, such as viewing an animation about how a vaccine works or constructing a model to simulate blood flow in an artery blocked by cholesterol	How Vaccines Work	Vaccines play a crucial role in protecting the body from infectious diseases. In this lesson, we will visualise and explain the biological processes behind vaccination and understand how it stimulates the production of antibodies to fight infections.	- Define vaccination and explain its purpose - Visualise the biological process of how a vaccine works - Describe how vaccination stimulates the immune system to produce antibodies - Outline the steps in the body's immune response to a vaccine
researching the impact of diseases introduced with the arrival of Europeans to	Understanding Epidemics, Endemics, and	Diseases can spread in different ways, leading to epidemics, endemics, or pandemics. In this lesson, we will compare their features, examine	- Define epidemics, endemics, and pandemics with key features - Identify examples of each type from history or current

Australia, for example the severity of the impact of smallpox was partly because this virus was new to Aboriginal communities and so they lacked an immune response to it	Pandemics	real-world examples, and understand the factors contributing to their occurrence.	events - Compare the differences in scale, spread, and duration of these disease classifications - Describe the factors that influence the incidence and spread of diseases
	The Impact of Diseases Introduced by Europeans to Australia	Diseases introduced by Europeans had a devastating impact on Aboriginal and Torres Strait Islander communities due to the lack of prior exposure and immunity. In this lesson, we will research the effects of diseases like smallpox and explore how they influenced Indigenous populations and cultures.	- Describe how diseases like smallpox were introduced to Australia - Explain why Aboriginal and Torres Strait Islander Peoples were particularly vulnerable to introduced diseases - Describe the social and cultural impacts of introduced diseases on Indigenous communities - Research and present information on the historical effects of disease introduction
researching how factors such as genetics, age, malnutrition, environment and lifestyle may cause non-infectious diseases such as cancer, asbestosis, Alzheimer's disease, diabetes and epilepsy	Understanding Non-Infectious Diseases	Non-infectious diseases are caused by factors other than pathogens, such as genetics, lifestyle, or environmental influences. In this lesson, we will explore the causes of non-infectious diseases and distinguish them from infectious diseases.	- Define what non-infectious diseases are and distinguish them from infectious diseases - Identify examples of non-infectious diseases and their causes - Explain how factors such as genetics, lifestyle, and the environment contribute to non-infectious diseases - Analyse the impact of non-infectious diseases on individuals and society
	Technological Advances in Australia for Addressing Diseases, Disorders, and Physical Trauma	Australia has been at the forefront of developing technologies to improve health outcomes. In this lesson, we will investigate examples of technological advances developed in Australia that address diseases, disorders, or physical trauma in the human body.	- Identify Australian-developed technologies that address diseases, disorders, or physical trauma - Explain how these technologies function and improve health outcomes - Research and document specific examples of Australian innovations in healthcare - Evaluate the impact of these technologies on individuals and society
storyboarding for a social media clip that explains how	Creating a Social Media Video on	Social media is a powerful tool for sharing health messages. In this lesson, we will create a	- Identify key healthy lifestyle factors that lower the risk of non-infectious diseases

healthy lifestyles may contribute to lower risk of non-infectious diseases	Healthy Lifestyles and Non-Infectious Diseases	storyboard for a social media clip to explain how healthy lifestyles can reduce the risk of non-infectious diseases.	- Explain the relationship between lifestyle choices and disease prevention - Design a storyboard for a social media clip with clear visuals, text, and audio cues - Propose engaging and memorable messaging suitable for a social media platform
Extension	Data Detectives: Analysing Non-Infectious Diseases in Australia	Immunisation programs help control the spread of infectious diseases, but how do we know they work? In this lesson, we will analyse data on immunisation rates and disease occurrence to identify trends, patterns, and relationships, and document conclusions in a scientific report.	- Analyse data about immunisation rates and infectious disease occurrence - Identify trends and patterns in the data - Draw conclusions about the effectiveness of immunisation programs using evidence - Document findings in a structured written text
	Aboriginal and Torres Strait Islander Peoples' Use of Plants to Prevent and Control Disease	For thousands of years, Aboriginal and Torres Strait Islander Peoples have used plants for medicinal purposes to prevent and control disease. In this lesson, we will investigate examples of these practices and understand the scientific basis behind them.	- Identify examples of plants used by Aboriginal and Torres Strait Islander Peoples for disease prevention and control - Explain the traditional methods of preparing and using these plants - Investigate the scientific properties of selected plants and their medicinal benefits - Discuss the importance of this knowledge for modern medicine and sustainability
Genetics			
VC2S10U04 - genetic inheritance involves the function of DNA, chromosomes, genes and alleles, and the roles of mitosis and meiosis in passing on genetic information to the next generation; the principles of Mendelian inheritance can be used to predict ratios of genotypes and phenotypes in monohybrid crosses involving dominant and recessive traits			
using models and diagrams to represent the relationship between genes, chromosomes and DNA of an organism's genome	The DNA Double Helix	In this lesson, we will look at the genetic material, DNA, that determines who we are. We will learn about the scientists who helped us to discover the structure of DNA and we will model the relationship between genes, chromosome and DNA to learn more about how they are related.	- Define genes, chromosomes and DNA - Describe the structure and function of the DNA double helix - Create a diagram to show the relationship between genes, chromosomes and DNA

	Investigation: Extracting DNA	DNA is the blueprint of life, containing the instructions for how organisms grow and function. In this investigation, we will extract DNA from a biological sample and use models and diagrams to represent the relationship between DNA, genes, and an organism's genome.	- Conduct an experiment to extract DNA from a biological sample using a step-by-step laboratory procedure - Describe how DNA is organised into genes, chromosomes, and the genome - Use models and diagrams to represent the relationships between DNA, genes, and chromosomes within an organism's genome
	The Scientists Behind the Double Helix	There are a number of scientists who played an influentual role in our understanding of DNA. In this lesson, we will explore the contributions of these key scientists, compare the impact of their work and discuss the nature of scientific discovery.	- Describe the evidence and techniques used to determine DNA's structure - Compare the contributions of different scientists, including Rosalind Franklin, James Watson, Francis Crick, and Maurice Wilkins - Discuss how scientific discoveries build on previous work and the ethical considerations related to recognition in science
explaining how genetic information passed on to offspring from both parents by meiosis and fertilisation increases the variation of a species	Passing on Genetic Information	We get our genes from our parents, but how does that happen? In this lesson, we will look at the process of meiosis (sex cell replication) and fertilisation to explain how genetic information is passed from parents to offspring.	- Outline meiosis - Define fertilisation - Explain how genetic material is passed from parent to offspring via meiosis and fertilisation
using the concept of Mendelian inheritance to predict the ratio of offspring genotypes and phenotypes in monohybrid crosses involving dominant and recessive alleles or in genes that are sex-linked	Autosomal Inheritance & Punnett Squares	In this lesson, we will learn about Mendelian inheritance and how this can be used to predict characteristics of offsprings.	- Define genotype, phenotype, automosal, dominant, recessive - Predict genotype and phenotype using Mendelian inheritance and punnet squares for one autosomal characteristic (monohybrid)
	Sex-linked Inheritance		- Define sex-linked characteristics - Predict genotype and phenotype using Mendelian inheritance and punnet squares for one sex-linked characteristic (monohybrid)

using pedigree diagrams to show patterns of inheritance of simple dominant and recessive characteristics through multigenerational families	Pedigrees and Punnett Squares	We know that we can predict offspring having a particular characteristic through Mendelian inheritance, but we can go on an even larger scale and use pedigree diagrams to look for patterns of inheritance within extended families. In this lesson, we will use a combination of Punnett squares and pedigrees to predict modes of inheritance across generations.	- Identify symbols used in a pedigree diagram - Create a pedigree diagram that span multiple generations; - Predict dominant and recessive characteristics using punnet squares and pedigree diagrams
exploring the role of DNA in cancer or genetic disorders such as haemochromatosis, sickle cell anaemia, cystic fibrosis and Klinefelter syndrome	Genetic Disorders	DNA mutations have a range of effects on the functioning of an organism, they can also result in genetic disorders. IN this lesson, we will explore the role of DNA in cancer and genetic disorders including haemochromatosis, sickle cell anaemia, cystic fibrosis and Klinefelter syndrome.	- Explain the role of DNA in cancer - Explain the role of DNA in genetic disorders - Identify changes in function in genetic disorders (haemochromatosis, sickle cell anaemia, cystic fibrosis and Klinefelter syndrome)
	Mutations	In this lesson, we will explore how the environment and other factors can change our DNA. We will learn about DNA mutations that can result in both positive, neutral and negative genetic variations.	- Identify environmental and other factors that can cause mutations in DNA - Explain how DNA mutations can result in genetic variation - Outline an example of genetic variations that are positive, neutral or harmful on the functioning of an organism
Extension	Genetic Technologies	Genetic technologies are evolving everyday! In this lesson, we will identify exmaple of genetic technologicals and discuss how these technologies are being used across a range of industries. We will also look at the ethical implications of using genetic technologies using examples.	- Identify examples of genetic technologies including genetic testing and technologies used in agriculture, industry and medicine - Discuss social, economic and ethical implications of using genetic testing - Discuss the ethical implications of the HeLa Stem cell line
	First Nations Australians Knowledges of Heredity	In this lesson, we will investigate First Nation Australians' knowledges of heredity and how this has led to kinship and family structures as well as marriage laws.	- Explain First Nation Australians' knowledge of heredity - Describe how these knowledges have changed kinship and family structures especially marriage laws

Evolution			
VC2S10U05 - the theory of evolution by natural selection includes the processes of variation, isolation and adaptation and is supported by evidence including the fossil record, biogeography and comparative embryology; the theory explains past and present biodiversity and demonstrates how all organisms have some degree of relatedness to each other			
outlining processes involved in natural selection including variation, isolation and selection	The Science of Evolution	Over time, scientific discoveries have refined our understanding of how species change and adapt. The theory of evolution explains how natural selection drives changes within and between species, shaping biodiversity. In this lesson, we will explore how scientists developed and refined the theory of evolution and why understanding the origins of species is important for modern science.	- Describe the contributions of key scientists, including Charles Darwin and Alfred Russel Wallace, to the theory of evolution - Explain how the theory of evolution has been refined over time with new scientific evidence - Discuss why understanding evolution is important in fields such as medicine, conservation, and genetics - Evaluate the impact of evolutionary theory on society and scientific research
	Natural Selection and Isolation	In this lesson, we will explain the process of natural selection and how variation, isolation and selection can lead to changes within and between species.	- Define species - Define natural selection, variation, isolation and selection - Explain the process of natural selection including variation, isolation and selection
analysing evidence for the theory of evolution by natural selection, including the fossil record, chemical and anatomical similarities, and geographical distribution of species	Evidence for Evolution	We can figure out when species evolved through studying natural records made my scientists. In this lesson, we will analyse evidence such as fossil record, chemical and anatomical similarities and geographical distribution of species to support the theory of evolution.	- Identify evidence for the theory of evolution - Explain using evidence, how the complexity and diversity of organisms can be tracked over time
	Investigation: Evidence for Evolution	Using real life evidence, such as fossils and looking at common anatomy between species, we can see if there was a common ancestor that link the two species. This provides us with evidence that evolution has occurred over time to create biodiversity. In this lesson, we will look at a range of evidence to support the theory of evolution.	- Analyse fossil evidence to determine if species may have come from a common ancestor - Investigate chemical and anatomical similarities in species to identify common lineage

examining biodiversity as a function of evolution	Biodiversity in Action	Natural selection leads to changes within and between species which increases biodiversity. This means there are more varieties of characteristics within one specific habitat or ecosystem. Overtime, this can lead to permanent changes. In this lesson, we will explore how biodiversity can lead to evolution of species over time.	- Define biodiversity - Describe how biodiversity can lead to evolution - Explain why biodiversity is important for the stability and resilience of ecosystems
investigating changes caused by natural selection in a particular population as a result of a specified selection pressure, such as artificial selection in breeding for desired characteristics	Artificial Selection	In recent years, the use of artifical selection, or human created selection pressures, has increased in creating special crops, breeding special meats and even in creating hypoallogenic dogs. In this lesson, we will investigate changes caused by natural selection in a particular population when there is a specific selection pressure introduced into the population, for example, with artifical selection.	- Define artificial selection - Identify two examples of artifical selection in breeding for desired characteristics - Evaluate the use of artifical selection in breeding for desired characteristics
relating genetic characteristics to survival and reproductive rates	Survival of the Fittest: How Genes Shape Life	Genetic characteristics influence an organism's ability to survive and reproduce in its environment. Traits that provide an advantage can increase in a population over time, while less beneficial traits may disappear. In this lesson, we will explore how genetic characteristics are linked to survival and reproductive success	- Identify examples of genetic characteristics that affect an organism's survival and reproduction - Describe how advantageous traits can increase in frequency over generations - Explain survival and reproductive success by linking to real-world examples, such as antibiotic resistance or camouflage in animals
investigating some of the structural and physiological adaptations of Aboriginal and/or Torres Strait Islander Peoples to the Australian environment	First Nations Australians and the Environment	Over thousands of years, First Nations Australians have developed structural and physiological adaptations that enable survival in diverse and often extreme Australian environments. In this lesson, we will investigate how these adaptations have supported their way of life and connection to Country.	- Identify structual and physiological adaptations of Aboriginal and/or Torres Strait Islander Peoples - Describe how these adaptations help survival in different Australian environments - Explain how over time, these characteristics would help the Aboriginal and/or Torres Strait Islander Peoples' survive the harsh Australian Environment

considering the debates and research regarding whether humans or climate change were causal factors in Australia's Pleistocene megafaunal extinction	Uncovering the Mystery of Australia's Megafauna	The extinction of Australia's Pleistocene megafauna remains a topic of scientific debate. Some researchers argue that climate change played a major role, while others suggest human activity was a key factor. Aboriginal and Torres Strait Islander Peoples' artwork provides important historical records of changes in plant and animal life, including megafauna. In this lesson, we will explore the evidence behind these theories and the cultural significance of Indigenous artwork in understanding Australia's past.	- Identify examples of megafauna and describe their key characteristics - Describe Aboriginal and Torres Strait Islander Peoples' artwork that depicts changes in plant and animal life over time - Compare scientific evidence of megafaunal extinction to that of Aboriginal and Torres Strait Islander Peoples' - Discuss how Indigenous knowledge and scientific research contribute to our understanding of Australia's environmental history
Chemical Sciences			
Atomic structure and radioactivity			
VC2S10U06 - the model of the atom changed following the discovery of electrons, protons and neutrons; natural radioactive decay results in a change from unstable to stable atoms			
comparing the masses and charges of protons, neutrons and electrons, and examining how the discovery of these particles resulted from experimental evidence and answered questions related to properties and behaviours of atoms	The Birth of Atoms and the Discovery of Subatomic Particles	In this lesson, we will be looking at the smallest particles on earth, the atom. We will learn about how they came about and also identify similarities and differences in the subatomic particles that make up elements.	- Outline how the first elements were formed after the Big Bang - Explain how electrons, protons and neutrons were discovered via experimental evidence - Compare the mass and charge of protons, neutrons and electons
explaining that differences in the number of neutrons in atoms of the same element results in isotopes and that naturally occurring isotopes of	Understanding Isotopes and Nuclear Stability	Naturally occurring elements, under some ideal conditions can change their number of neutrons. These are called Isotopes and in this lesson, we will learn about what isotopes are and how they are formed.	- Define an isotope - Explain that differences in number of neutrons in atoms of the same element results in isotopes - Describe the conditions that cause a nucleus to be unstable - Identify examples of stable and unstable isotopes

some elements are unstable			
describing in simple terms how different unstable isotopes decay, such as radon-222 emitting an alpha particle, iodine-131 emitting a beta particle and cobalt-60 emitting gamma radiation to form stable atoms	Understanding Radioactive Decay and Nuclear Reactions	There are ways unstable isotopes can become stable, but in doing so, they release radiation. In this lesson, we will learn about three specific examples of isotopes and how as they decay they release radiation in order to become stable.	- Define alpha, beta and gamma radiation - Describe the processes of alpha, beta, and gamma decay in simple terms - Describe how different unstable isotopes decay, specifically using examples of radon-222; iodine-131 and cobalt-60 - Explain how alpha and beta reactions are nuclear reactions
defining half-life, examining the timescales of decay of different elements such as carbon-14 and uranium-238, and simulating or using digital simulations to examine radioactive decay, including half-life	Investigation: Modelling Half-Life	A half-life is the time taken for half of the atoms in a sample to undergo radioactive decay. In this lesson, we will investigate the half-lifes of carbon-14 and uranium-238 to gather data and find the half-life of these radioactive isotopes.	- Define the term "half-life" and describe its significance in radioactive decay - Describe the timescales of decay for isotopes like carbon-14 and uranium-238 - Model the concept of half-life through a first-hand investigation - Analyse the results of the investigation to understand radioactive decay patterns
researching how radiocarbon and other dating methods including optically stimulated luminescence have been used to establish that Aboriginal and Torres Strait Islander Peoples have been present on the Australian continent for at least 65,000 years	Exploring Dating Methods to Establish Australia's Ancient History	In this lesson, we will investigate how radicarbon and other dating methods have been used to establish that Aboriginal and Torres Strait Islander Peoples' have been on the Australian continent for more than 60,000 years.	- Describe radiocarbon and other dating methods - Outline evidence from dating methods that show Aborginal and/or Torres Strait Islander Peoples' have been on Australian continent for over 60,000 years - Discuss the importance of these dating methods in understanding human history - Explain how dating methods contribute to recognising and preserving cultural heritage
identifying where applications of radioactivity are used in medicine and industry, such as in diagnosing and treating cancer, and when checking for	Applications of Radioactivity in Medicine and Industry	Although there are dangers in using radioisotopes, there are also benefits. In this lesson, we will learn about the societal benefits and considerations in using radioisotopes in medicine, industry and envrionmental	- Identify uses of radioisotopes in medicine, industry and environment monitoring - Evaluate the benefits and disadvantages of using radioisotopes in society - Explain how radioactivity is monitored to ensure safety in its

faults in materials used in aircraft and spacecraft		monitoring.	applications
	Environmental Impacts of Nuclear Reactions	Nuclear reactions have significant impacts on the environment. In this lesson, we will explore how the raw materials, stages of production, and disposal of nuclear waste affect ecosystems and the broader environment.	- Identify the raw materials used in nuclear reactions and their environmental impacts - Describe the environmental effects of the various stages of nuclear production - Explain the challenges associated with nuclear waste management - Evaluate the overall environmental impact of nuclear reactions compared to other energy sources
Extension			
The periodic table			
VC2S10U07 - the organisation of the elements in the periodic table is related to the structure and properties of atoms; patterns and trends include the significance of rows and periods, metallic and non-metallic properties, atomic size and reactivity			
examining the significance of groups and periods in the periodic table	The Blueprint of the Periodic Table	The periodic table organises elements based on atomic structure and properties. In this lesson, we will explore how groups and periods reflect the organisation of elements.	- Identify the purpose and layout of the periodic table, including groups and periods - Explain how atomic structure determines the position of an element in the periodic table - Describe the significance of rows and periods in understanding the properties of elements
analysing patterns in chemical reactivity of some elements in the periodic table by reacting them with oxygen, water and acids to discern that elements in the same group of the periodic table have similar properties	Uncovering Patterns in the Periodic Table	Elements within the same group or period show patterns in properties and reactivity. In this lesson, we will explore these patterns and trends.	- Describe the similarities in properties of elements within the same group or period - Identify trends in reactivity across periods and down groups in the periodic table - Explain how the position of an element in the periodic table predicts its reactivity and chemical properties - Compare the properties of selected elements from different groups to recognise periodic trends
investigating the physical properties of some metals and non-metals	Investigation: The Physical Properties of	Metals and non-metals have distinct physical properties that influence their uses. In this lesson, we will explore these properties and compare	- Describe the physical properties of metals and non-metals, such as conductivity, malleability, and lustre - Identify differences between the physical properties of

	Metals and Non-Metals	the characteristics of metals and non-metals.	metals and non-metals - Conduct tests to determine physical properties of materials such as conductivity, malleability, and lustre - Classify materials as metals or non-metals based on experimental results
using the Bohr model of the atom to describe the structure of atoms in terms of electron shells, and relating the electron arrangements in different atoms to the properties and positions of their elements in the periodic table	The Bohr Model of the Atom	The Bohr model explains the structure of atoms and their electron arrangements. In this lesson, we will use the Bohr model to understand how electron arrangements determine the properties of elements and their positions in the periodic table.	- Describe the Bohr model of the atom, including electron shells - Draw Bohr diagrams for selected elements - Explain how the arrangement of electrons relates to an element's properties and position in the periodic table
deducing that repeating patterns of the periodic table reflect patterns of electrons in outer electron shells	Electron Shells and Element Properties	The periodic table reveals repeating patterns in the properties of elements. In this lesson, we will deduce how these patterns reflect the arrangement of electrons in the outer electron shells of atoms.	- Identify the relationship between an element's group number and its outer electron shell configuration - Explain how repeating patterns in the periodic table relate to electron arrangements - Deduce trends in properties of elements based on their position in the periodic table
conducting flame tests for a selection of elements and examining emission spectra	Investigation: Flame Tests and Emission Spectra	Each element produces unique colours in a flame test due to its emission spectrum. In this lesson, we will conduct flame tests for a selection of elements and examine their emission spectra to identify the elements present.	- Conduct flame tests to observe the characteristic colours of selected elements - Identify observations accurately and match them to known emission spectra - Explain how emission spectra are produced by the movement of electrons in atoms
	The Spectroscope and the Evolution of the Atomic Model	The invention of the spectroscope revolutionised our understanding of atomic structure. In this lesson, we will examine how the spectroscope provided evidence for electron arrangements and contributed to the development of the modern atomic model.	- Describe how the spectroscope works and its role in scientific discovery - Outline how observations using the spectroscope provided evidence for the arrangement of electrons in atoms - Describe the connection between the spectroscope and advancements in atomic theory

Conservation of mass			
VC2S10U08 - chemical reactions are described by the Law of Conservation of Mass and involve the rearrangement of atoms; they can be modelled using a range of representations, including word and simple balanced chemical equations			
identifying reactants and products in chemical reactions	Reactants and Products in Chemical Reactions	Chemical reactions involve the transformation of reactants into products. In this lesson, we will identify the reactants and products in various chemical reactions and explore their roles.	- Define reactants and products in the context of chemical reactions - Identify the reactants and products in word equations and simple balanced equations - Describe the roles of reactants and products in chemical reactions
using models and representations to show the rearrangement of atoms in chemical reactions and to illustrate the Law of Conservation of Mass	Modelling Chemical Reactions: Rearrangement of Atoms and the Law of Conservation of Mass	Atoms are rearranged during chemical reactions, and the total mass remains constant, as described by the Law of Conservation of Mass. In this lesson, we will use models to visualise and represent the rearrangement of atoms in chemical reactions.	- Define the Law of Conservation of Mass - Model the rearrangement of atoms - Explain how mass is conserved during a chemical reaction
	Investigation: Demonstrating the Law of Conservation of Mass	The Law of Conservation of Mass states that mass is conserved during chemical reactions. In this lesson, we will conduct a practical investigation to observe and verify this principle.	- Conduct a chemical reaction while accurately measuring the mass of reactants and products - Compare the mass before and after the reaction to confirm the Law of Conservation of Mass - Explain how the results demonstrate the conservation of mass
investigating chemical reactions in closed and open systems and relating data obtained to the Law of Conservation of Mass	Investigation: Conservation of Mass in Closed and Open Systems	In this lesson, we will investigate how mass is conserved in closed systems and explore why it may appear to change in open systems. By conducting experiments, we will relate our observations to the Law of Conservation of Mass.	- Describe the difference between closed and open systems in chemical reactions - Conduct experiments to investigate the conservation of mass in closed and open systems - Record and analyse data from experiments to demonstrate mass conservation - Explain why mass may appear to change in an open system

writing symbol equations that are easy to balance and explaining the rationale for balancing chemical equations with reference to the Law of Conservation of Mass	Balancing Chemical Equations and the Law of Conservation of Mass	Chemical equations represent the rearrangement of atoms during reactions. In this lesson, we will learn to write and balance chemical equations, explain why balancing is necessary, and connect it to the Law of Conservation of Mass.	- Write word and symbolic equations to represent chemical reactions - Predict products of simple chemical reactions - Balance chemical equations to satisfy the Law of Conservation of Mass - Explain the rationale for balancing equations with reference to atom conservation
	Investigation: Features of Chemical Reactions	Chemical reactions can be classified into different types, including synthesis, decomposition, displacement, and neutralisation. In this lesson, we will conduct experiments to investigate the features of these reaction types and understand their characteristics.	- Define synthesis, decomposition, displacement, and neutralisation reactions - Conduct experiments to observe the features of each reaction type - Record and analyse observations from the experiments - Identify the products of each reaction and classify them accordingly
investigating why most elements are not found in their elemental state	Why Are Most Elements Not Found in Their Elemental State?	Most elements are not found in their pure elemental state in nature due to their chemical properties. In this lesson, we will explore why this is the case and investigate the processes used to obtain pure elements from compounds.	- Identify common elements and their natural forms in the environment - Explain why most elements are found as compounds rather than in their elemental state - Describe processes used to extract elements from compounds, such as electrolysis or smelting - Evaluate the challenges and importance of extracting elements for practical use
• explaining how implementing ideas related to green chemistry principles, such as minimising the amount of unusable waste products, energy use and using more environmentally friendly chemical processes, will affect the environment	Green Chemistry: Reducing Environmental Impact	Green chemistry focuses on minimising waste, reducing energy use, and implementing environmentally friendly processes. In this lesson, we will explore the principles of green chemistry and predict how their implementation can positively affect the environment.	- Define the principles of green chemistry - Explain how reducing waste and energy use benefits the environment - Predict the environmental impacts of using green chemistry principles - Evaluate the importance of green chemistry in sustainable practices

	Understanding pH	pH is a measure of how acidic or basic a substance is. In this lesson, we will learn to identify pH as a scale of acidity and alkalinity, and compare the pH of common substances to the neutral pH of pure water.	- Define pH as a measure of acidity or alkalinity - Identify pure water as having a neutral pH of 7 - Compare the pH of a range of common substances - Classify substances as acidic, basic, or neutral based on their pH
	Investigation: Measuring the pH of Substances	pH is a measure of how acidic or basic a substance is. In this lesson, we will learn to identify pH as a scale of acidity and alkalinity, and compare the pH of common substances to the neutral pH of pure water.	- Define pH as a measure of acidity or alkalinity - Identify pure water as having a neutral pH of 7 - Compare the pH of a range of common substances - Classify substances as acidic, basic, or neutral based on their pH
Chemical Reactions			
VC2S10U09 - chemical reactions include synthesis, decomposition and displacement reactions and can be classified as exothermic or endothermic; reaction rates are affected by factors including temperature, concentration, surface area of solid reactants, and catalysts			
defining and representing synthesis, decomposition and displacement reactions using a variety of formats such as molecular models, diagrams, and word and balanced symbol equations	Types of Chemical Reactions: Synthesis, Decomposition, and Displacement	Chemical reactions can be classified into synthesis, decomposition, and displacement reactions. In this lesson, we will define these reaction types and represent them using molecular models, diagrams, and chemical equations.	- Define synthesis, decomposition, and displacement reactions - Represent synthesis, decomposition, and displacement reactions using molecular models, diagrams, and word equations - Write balanced chemical equations for synthesis, decomposition, and displacement reactions
identifying reaction type and predicting the products of a reaction	Classifying Reactions and Predicting Products	Chemical reactions can be classified into different types, each with predictable products. In this lesson, we will identify reaction types and use patterns to predict the products of various reactions.	- Identify the type of chemical reaction from a given equation or description - Predict the products of chemical reactions based on the reaction type - Classify reactions into based on a written chemical equation
investigating synthesis reactions such as reaction of metals with oxygen, formation of water and sodium chloride;	Investigation: Synthesis Reactions	Synthesis reactions involve combining reactants to form a single product. In this investigation, we will conduct experiments to observe and understand synthesis reactions.	- Conduct experiments to observe synthesis reactions - Record evidence of chemical changes during synthesis reactions - Explain the features of synthesis reactions using chemical

decomposition reactions such as those used to extract metals; and displacement reactions such as metal and acid, neutralisation and precipitation			equations
	Investigation: Decomposition Reactions	Decomposition reactions involve breaking a single reactant into two or more products. In this investigation, we will observe examples of decomposition reactions and analyse their products.	- Conduct experiments to observe decomposition reactions - Identify products of decomposition reactions using observations - Write word and balanced chemical equations for decomposition reactions
	Investigation: Displacement Reactions	Displacement reactions occur when a more reactive element replaces a less reactive one in a compound. In this investigation, we will explore displacement and neutralisation reactions.	- Conduct experiments to observe displacement and neutralisation reactions - Classify reactions as displacement or neutralisation based on their features - Predict the products of displacement reactions
investigating how hot and cold packs work as applications of exothermic and endothermic reactions	Investigation: Exothermic and Endothermic Reactions	Chemical reactions can release or absorb energy. In this investigation, we will explore how exothermic and endothermic reactions are applied in hot and cold packs.	- Define exothermic and endothermic reactions with examples - Conduct experiments to observe exothermic and endothermic reactions - Explain how hot and cold packs work based on the energy changes in these reactions - Evaluate the effectiveness of these reactions for real-world applications
investigating the effect of a range of factors such as temperature, concentration, surface area and catalysts on the rates of chemical reactions	Investigation: Factors That Affect the Rate of Chemical Reactions	The rate of a chemical reaction can be affected by factors such as temperature, concentration, surface area, and catalysts. In this lesson, we will conduct experiments to observe and explain how these factors influence reaction rates.	- Identify the factors that affect the rate of chemical reactions - Explain the relationship between each factor and the reaction rate based on experimental evidence - Create a graph to demonstrate the relationship between factors and rate of reaction
	Investigating Reaction Rates: Testing a Hypothesis	The rate of a chemical reaction can be influenced by factors such as temperature, concentration, surface area, or catalysts. In this investigation, we will design and conduct an experiment to test a hypothesis about how one	- Design a hypothesis to investigate the effect of a factor on the rate of a chemical reaction - Conduct an experiment to test the hypothesis using proper scientific methods - Create a graph to analyse the relationship between the

		factor affects reaction rates.	factor and the reaction rate - Write a scientific report to communicate findings clearly
investigating chemical reactions employed by Aboriginal and/or Torres Strait Islander Peoples in the production of useful substances, for example fermentation to produce ethanol, pyrolysis to produce charcoal, and calcination to produce plaster and pigments such as iron oxide	Chemical Reactions in First Nations Australian Practices	First Nations Australians have used chemical reactions to produce useful substances for thousands of years. In this lesson, we will investigate how reactions such as fermentation, pyrolysis, and calcination are employed to create materials like ethanol, charcoal, plaster, and pigments.	- Describe chemical reactions used by First Nations Australians - Explain the processes and products of these reactions with reference to their practical uses - Investigate examples of how these substances are made and applied in traditional practices - Evaluate the scientific principles underlying these chemical reactions
investigating some of the chemical reactions and methods employed by Aboriginal and/or Torres Strait Islander Peoples to convert toxic plants into edible food products, for example the detoxification of cycad seeds by the Rainforest Aboriginal Peoples of North Queensland that involved speeding up the rate of reaction by increasing temperature and surface area	Chemical Reactions and Indigenous Knowledge: Detoxifying Toxic Plants	For thousands of years, Aboriginal and Torres Strait Islander Peoples have used chemical reactions and innovative techniques to detoxify plants and make them safe to eat. In this lesson, we will explore the chemical processes and methods employed, such as increasing temperature and surface area, to convert toxic plants like cycad seeds into edible food products.	- Describe the chemical reactions and methods used by Aboriginal and Torres Strait Islander Peoples to detoxify plants - Investigate the detoxification process of toxic plants through research or modelling - Evaluate the scientific and cultural significance of these methods
Extension	Chemical Reactions for Useful Products	Chemical reactions are used to produce a wide range of products that benefit society. In this lesson, we will examine how these reactions create useful products, such as fuels, pharmaceuticals, and construction materials.	- Describe examples of chemical reactions that are used to produce useful products - Explain the role of specific reactions in producing fuels, pharmaceuticals, and materials - Outline the benefits and limitations of the chemical

			reactions used to produce them - Discuss the importance of these reactions for industry and everyday life
	Industrial Reactions: Investigating Chemical and Nuclear Processes	Industrial processes often rely on chemical or nuclear reactions to produce essential products. In this lesson, we will investigate the role of these reactions in producing key materials and energy sources.	- Identify a chemical or nuclear reaction used in industry - Explain the process and its role in producing an important product - Investigate the benefits and challenges of the reaction in terms of efficiency, safety, and environmental impact
Earth and Space Sciences			
The carbon cycle			
VC2S10U10 - carbon is cycled on Earth through key processes including photosynthesis, respiration, fire, weathering, vulcanism and the combustion of fossil fuels; these processes change the composition of Earth's interrelated systems (atmosphere, biosphere, hydrosphere and lithosphere) over time			
identifying Earth as a system, differentiating between Earth's 4 systems and discussing interactions between these systems, such as pesticides applied to soils (lithosphere) leaching into waterways (hydrosphere) and affecting organisms (biosphere)	How Do Earth's Spheres Interact?	Earth is a complex system made up of different spheres that interact to shape our planet. In this lesson, we will identify Earth's spheres and explore how they interact with one another in everyday examples.	- Identify Earth's spheres: the geosphere, hydrosphere, atmosphere, and biosphere - Describe the characteristics and components of each sphere - Discuss examples of interactions between different spheres and describe how understanding these interactions helps us study Earth as a system
examining the carbon cycle using diagrams, animations or simulations and explaining the role of photosynthesis and respiration in that cycle	The Carbon Cycle	The carbon cycle is essential for life on Earth, moving carbon through the atmosphere, land, and living organisms. In this lesson, we will explore the carbon cycle and understand the roles of photosynthesis and respiration.	- Identify the main components of the carbon cycle, including carbon sources, sinks, and processes - Describe the role of photosynthesis and respiration in the carbon cycle - Explain how carbon moves through Earth's systems using a carbon cycle diagram
investigating the greenhouse effect and relating it to the role	The Greenhouse	The greenhouse effect helps keep Earth warm enough to support life, but changes in carbon	- Identify what the greenhouse effect is and the role of greenhouse gases like carbon dioxide

of carbon dioxide in maintaining temperatures that support life on Earth	Effect	dioxide levels can affect this balance. In this lesson, we will investigate the greenhouse effect and understand the role of carbon dioxide in maintaining Earth's temperatures.	- Describe how the greenhouse effect maintains temperatures suitable for life on Earth - Explain how carbon dioxide traps heat energy in Earth's atmosphere - Relate the greenhouse effect to its importance in sustaining life on Earth and the potential consequences of an enhanced greenhouse effect
	Investigation: Investigating the Greenhouse Effect and the Role of Carbon Dioxide	The greenhouse effect is a natural process where carbon dioxide (CO_2) and other gases trap heat to maintain temperatures suitable for life on Earth. In this lesson, we will conduct a practical investigation to observe how CO_2 contributes to the greenhouse effect by trapping heat.	- Conduct an investigation to observe how carbon dioxide traps heat - Explain the role of carbon dioxide in trapping heat and regulating Earth's climate
	How Does Combustion Affect the Carbon Cycle?	Human activities, such as burning fossil fuels and deforestation, release carbon dioxide into the atmosphere through combustion reactions. In this lesson, we'll investigate how combustion impacts the carbon cycle and the balance of Earth's systems.	- Identify what combustion reactions are and where they occur in human activities - Describe how combustion releases carbon dioxide into the atmosphere - Explain the impact of combustion on the carbon cycle - Explain how increased carbon dioxide from human activities can affect Earth's systems
investigating how Aboriginal and/or Torres Strait Islander Peoples use fire-mediated chemical reactions to facilitate energy and nutrient transfer through the practice of cultural burning	First Nations Australians and Cultural Burning	First Nations Australians have used fire as a tool for thousands of years to manage the land and support ecosystems. In this lesson, we will investigate how cultural burning uses fire-mediated chemical reactions to transfer energy and nutrients, benefiting the environment.	- Identify fire as a chemical reaction that releases energy and changes the environment - Describe the practice of cultural burning and its significance in First Nations Australians' cultures - Explain the benefits of cultural burning for ecosystems
investigating how Aboriginal and/or Torres Strait Islander Peoples are reducing	Reinstating Fire Management Practices	First Nations Australians are leading the way in reducing greenhouse gas emissions by reinstating traditional fire management	- Describe cultural burning and how it differs from uncontrolled bushfires - Explain how cultural burning reduces greenhouse gas

Australia's greenhouse gas emissions by reinstating cultural burning practices		practices. In this lesson, we will investigate how these practices help to reduce emissions and protect the environment.	emissions - Investigate examples where traditional fire management practices have been reinstated in Australia - Discuss the environmental and social benefits of cultural burning for managing climate change
conducting a field investigation to evaluate carbon sequestration in an ecosystem, such as measuring tree biomass, deadwood, leaf litter and soil depth, and using formulas to calculate approximate carbon storage	Investigation: Investigating Carbon Sequestration	Ecosystems play a vital role in storing carbon and helping to mitigate climate change. In this lesson, we will conduct an investigation to measure and evaluate carbon sequestration in an ecosystem by assessing tree biomass, deadwood, leaf litter, and soil depth.	- Collect data from an ecosystem and use appropriate formulas to calculate the approximate carbon storage in each component of the ecosystem - Compare carbon storage across different parts of the ecosystem - Evaluate the importance of carbon sequestration in maintaining a balanced carbon cycle and mitigating climate change
identifying how carbon dioxide is captured and stored naturally or using technologies	Carbon Capture	Carbon dioxide can be captured and stored naturally or with the help of technologies to reduce its impact on the atmosphere. In this lesson, we will explore how these processes work and their role in addressing climate change.	- Identify natural processes that capture and store carbon dioxide - Describe technologies used to capture and store carbon dioxide - Explain how these methods help reduce atmospheric carbon dioxide levels and mitigate climate change - Compare the effectiveness of natural and technological carbon storage methods
	Calculating Our Carbon Footprint	Our daily activities contribute to carbon dioxide emissions, but we can take steps to reduce our impact. In this lesson, we will calculate an individual's carbon footprint, examine how human activities contribute to emissions, and suggest strategies to reduce them.	- Identify key human activities, such as transportation, energy use, and consumption, that contribute to carbon dioxide emissions - Calculate your individual carbon footprint using a carbon footprint calculator - Examine how specific human activities contribute to carbon dioxide emissions - Suggest practical strategies for reducing carbon dioxide emissions at an individual and community level
A changing climate			

VC2S10U11 - the dynamics of global climate change can be modelled and explained by examining the interactions between greenhouse gas emissions and energy exchanges within and between Earth's systems; mitigating human-induced climate change requires addressing various activities including power generation, deforestation, manufacturing, transportation, food production and resource consumption			
examining how interactions of radiation from the Sun with the atmosphere, ocean and land are the foundation for the global climate system	Radiation and the Global Climate System	The Sun's radiation interacts with the atmosphere, oceans, and land to create the global climate system. In this lesson, we will explore how these interactions serve as the foundation for global climate dynamics.	- Describe the role of solar radiation in Earth's climate system - Explain how the atmosphere, oceans, and land absorb and reflect solar radiation - Model the interactions between solar radiation and Earth's systems to understand the foundations of the global climate system
investigating indicators of climate change such as changes in ocean and atmospheric temperatures, sea levels, biodiversity, species distribution, permafrost and sea ice	Indicators of Climate Change	Climate change can be observed through key indicators, such as rising ocean and atmospheric temperatures, changes in sea levels, and shifts in biodiversity and species distribution. In this lesson, we will investigate these indicators to better understand the evidence for climate change.	- Identify key indicators of climate change, such as rising sea levels and changing species distribution - Describe how changes in ocean and atmospheric temperatures impact Earth's systems - Analyse data and evidence to explain the relationship between climate change and its indicators - Evaluate the significance of these indicators in understanding the effects of climate change
identifying changes in global climate over time, exploring visualisations and using simulations to investigate why energy balances have changed	Changes in Global Climate and Energy Balances	Global climate has changed significantly over time due to shifts in Earth's energy balance. In this lesson, we will explore visualisations and simulations to understand how and why these energy balances have changed.	- Describe changes in global climate over time using visualisations and data - Identify factors that influence Earth's energy balance and contribute to climate change - Analyse how shifts in energy balances impact global climate systems
examining the factors, including energy, that drive deep ocean currents, their role in regulating global climate and their effects on marine life	Deep Ocean Currents and Their Role in Climate Regulation	Deep ocean currents play a critical role in regulating global climate and supporting marine life. In this lesson, we will examine the factors that drive these currents, their impact on global climate, and their effects on marine ecosystems.	- Identify the factors that drive deep ocean currents, including energy inputs - Investigate models or simulations to understand how ocean currents operate - Explain the role of deep ocean currents in regulating global climate - Describe the effects of deep ocean currents on marine life and ecosystems

predicting changes to the Earth system and identifying strategies designed to reduce climate change or mitigate its effects	Predicting Climate Change and Mitigation Strategies	Earth's climate system is constantly changing, and human activity plays a key role in influencing these changes. In this lesson, we will predict changes to the Earth system and explore strategies to reduce climate change or mitigate its effects.	- Predict potential changes to Earth's systems caused by climate change - Identify strategies designed to reduce or mitigate the effects of climate change - Analyse the effectiveness of various climate change mitigation strategies - Propose innovative solutions to address climate change challenges
	Quantum Computing: Enhancing Climate Modelling	As technology advances, quantum computers are providing new ways to model complex systems like weather and climate. In this lesson, we will investigate how quantum computing enhances our ability to predict and understand global climate systems.	- Identify the basic principles of quantum computing and how they differ from classical computing - Describe how quantum computers are used to model weather and climate systems - Discuss the benefits of quantum computing in enhancing climate modelling - Evaluate the potential of quantum technology to address global challenges like climate change
Space exploration			
VC2S10U12 - space exploration seeks to expand knowledge of the origins and structure of the universe and to resolve the challenges of humans travelling and living away from Earth's surface			
creating a story about a day in the life of a person living on Mars	A Day in the Life on Mars	Space exploration helps us understand the challenges of living beyond Earth. In this lesson, we will imagine and describe a day in the life of a person living on Mars, exploring the challenges and solutions for surviving in a harsh extraterrestrial environment.	- Identify the challenges of living on Mars, including environmental and resource-related factors - Explain how humans could overcome these challenges using technology and innovation - Create a detailed and imaginative story about life on Mars, incorporating scientific concepts
designing and launching simple water or air rockets to understand the principles of rocket propulsion, using altimeters to measure the altitude reached by the rockets	Investigation: Rocket Propulsion	Rockets use propulsion to overcome Earth's gravity and explore space. In this lesson, we will design and launch water or air rockets to understand the principles of rocket propulsion, measure altitude using altimeters, and discuss the challenges of escaping Earth's gravitational	- Design and construct a simple water or air rocket - Use an altimeter to collect data - Explain the principles of rocket propulsion and how they relate to the forces acting on the rocket - Evaluate the challenges of escaping Earth's gravitational pull

and discussing the challenges of escaping Earth's gravitational pull		pull.	
researching and designing their own space suits, including creating scaled-down prototypes or artistic representations, following a discussion about the necessary features for survival in space, such as protection from radiation, temperature regulation and life support systems	Designing a Space Suit for Survival	Space suits are critical for human survival in the extreme environment of space. In this lesson, we will research the necessary features of space suits, design our own space suits, and create scaled-down prototypes or artistic representations to explore how these features ensure survival.	- Research and describe the essential features of a space suit for survival in space - Design a space suit incorporating features such as radiation protection, temperature regulation, and life support systems - Explain how the design addresses the challenges of the space environment
developing a report about the current research and inhabitants of the International Space Station	Life and Research on the International Space Station	The International Space Station (ISS) is a hub for cutting-edge research and international collaboration. In this lesson, we will explore the current research conducted on the ISS and the daily lives of its inhabitants, culminating in the development of a detailed report.	- Research the key areas of scientific investigation on the ISS - Describe the daily routines, challenges, and living conditions of astronauts aboard the ISS - Explain how research conducted on the ISS benefits life on Earth and future space exploration - Compile findings into a structured and informative report
exploring the effects of microgravity on the human body by simulating it in the laboratory using reduced-gravity aircraft simulations or creating simple experiments to demonstrate how fluids behave differently in microgravity	Investigation: Understanding Microgravity	Microgravity has profound effects on the human body and fluid behaviour. In this lesson, we will explore the effects of microgravity through simulations and experiments, investigating how it influences the human body and the behaviour of fluids.	- Explain how microgravity affects the human body and fluid dynamics - Simulate microgravity conditions using simple laboratory setups - Conduct experiments to observe and analyse how fluids behave differently in microgravity - Evaluate the implications of microgravity for space exploration and astronauts' health
researching items and technologies that are a result	From Space to Earth: The	Space research drives innovation, leading to the development of technologies and materials that	- Identify technologies and materials developed through space research

of space research or examining the link between scientific research and real-world applications such as in new materials development	Impact of Space Research on Everyday Life	improve life on Earth. In this lesson, we will research items and technologies developed as a result of space exploration and examine their real-world applications.	- Describe the link between space research and real-world applications - Evaluate how these innovations benefit society
The Universe			
VC2S10U13 - the universe contains features including galaxies, stars, solar systems and black holes; the big bang theory models the origin and evolution of the universe and is supported by evidence			
constructing a timeline to show major changes in the universe that are thought to have occurred from the big bang until the formation of the major components such as planets, stars and galaxies, and recognising that the age of the universe can be derived by applying knowledge of the big bang theory	The Evolution of the Universe: A Timeline from the Big Bang	The universe has undergone significant changes since the Big Bang, leading to the formation of stars, galaxies, and planets. In this lesson, we will construct a timeline to understand these major events and learn how the age of the universe is estimated.	- Identify key events in the evolution of the universe from the Big Bang to the formation of stars and galaxies - Construct a timeline showing major changes in the universe over billions of years - Explain how the age of the universe is estimated using the Big Bang theory
explaining how each different type of evidence, such as cosmic microwave background radiation, red shift or blue shift of galaxies, Edwin Hubble's observations and proportion of matter in the universe, supports the big bang theory	The Evidence for the Big Bang Theory	Scientific evidence supports the Big Bang theory, explaining the origins and evolution of the universe. In this lesson, we will explore key evidence, such as cosmic microwave background radiation and redshift, and understand how it supports the acceptance of this theory.	- Describe key evidence supporting the Big Bang theory, including cosmic microwave background radiation and red/blue shifts - Explain how Edwin Hubble's observations contribute to the theory's acceptance - Evaluate how the proportion of matter in the universe provides additional support for the Big Bang theory
researching Aboriginal and/or Torres Strait Islander Peoples'	First Nations Knowledge of	First Nations Australians hold rich knowledge about celestial bodies and the origins of the	- Research Aboriginal and Torres Strait Islander Peoples' knowledge of celestial bodies

knowledges of celestial bodies and explanations of the origin of the universe	Celestial Bodies and the Universe	universe. In this lesson, we will explore these perspectives and understand their significance in astronomy and cultural heritage.	- Describe traditional explanations of the origin of the universe from First Nations perspectives - Compare traditional knowledge systems with modern astronomical theories - Explain the importance of preserving First Nations astronomical knowledge
identifying the different technologies used to collect astronomical data and the types of data collected, and describing the major components of the universe using appropriate scientific terminology and units, including astronomical units, scientific notation and light-years	Exploring the Universe Through Astronomical Data	Our understanding of the universe comes from technologies that collect astronomical data, which we interpret using scientific terminology and units. This lesson will explore the tools used to gather data and the terms scientists use to describe the universe.	- Identify different technologies used to collect astronomical data and the types of data they produce - Describe the major components of the universe using appropriate scientific terminology - Use units such as astronomical units, light-years, and scientific notation to express astronomical measurements
examining how the light spectra and brightness of stars are used to identify compositional elements of stars, their movements and their distances from Earth	Understanding Stars Through Light	By examining the light spectra and brightness of stars, we can uncover valuable information about their composition, motion, and distance from Earth. This lesson explores how scientists analyse starlight to study the universe.	- Describe how light spectra reveal the compositional elements of stars - Explain how the brightness of stars relates to their distance and movement - Analyse spectral data to identify the properties of stars
exploring recent advances in astronomy, including the Australian Square Kilometre Array Pathfinder, and in astrophysics, such as the discovery of gravitational waves, dark matter and dark energy, and identifying new	Recent Advances in Astronomy and Astrophysics	Astronomy and astrophysics have seen remarkable advancements, providing new insights into the universe. In this lesson, we will explore recent discoveries, such as gravitational waves, dark matter, and dark energy, and learn about cutting-edge projects like the Australian Square Kilometre Array Pathfinder.	- Identify recent discoveries in astronomy and astrophysics, such as gravitational waves, dark matter, and dark energy - Describe the role of the Australian Square Kilometre Array Pathfinder in advancing astronomy - Evaluate how these advances have expanded our knowledge of the universe

knowledge that has emerged			
Physical Sciences			
Waves			
VC2S10U14 - wave and particle models can be used to describe energy transfer (conduction, convection and radiation) through different media; waves (electromagnetic and mechanical) have different properties, features (including amplitude, wavelength, frequency and speed) and applications			
	Comparing Transverse and Longitudinal Waves	Waves transfer energy in different ways. In this lesson, we'll use models to compare the features of transverse waves and longitudinal waves, and describe how each type of wave behaves in different scenarios.	- Identify the key components of transverse and longitudinal waves, such as crests, troughs, compressions, and rarefactions - Compare the similarities and differences between transverse and longitudinal waves - Describe real-world examples of each type of wave
	Exploring the Features of Waves	Waves have unique properties such as amplitude, frequency, speed, and wavelength. In this lesson, we will explore these features using different wave types and learn how to calculate a wave's wavelength using the formula: Wavelength = Velocity / Frequency	- Identify the key features of waves, including amplitude, frequency, speed, and wavelength - Create a model of different types of waves to observe their properties - Use the formula Wavelength = Velocity / Frequency to calculate wavelength - Explain the relationship between a wave's frequency, speed, and wavelength using data and observations
describing the processes underlying convection and conduction of heat in terms of the particle model	Heat Transfer Through Conduction and Convection	Heat energy moves through different materials by conduction and convection. In this lesson, we will use the particle model to describe how heat transfers in solids, liquids, and gases.	- Identify the processes of conduction and convection as methods of heat transfer - Describe how the particle model explains conduction in solids and convection in liquids and gases - Compare how conduction and convection differ in terms of particle movement
	Investigation: Heat Transfer	Heat transfer via conduction and convection allows us to stay warm and even helps us stay fed! In this lesson, we will investigate ways we can transfer heat from one material to another.	- Conduct an experiment on conduction as a method of heat transfer - Conduct an experiment to model convection as a method of heat transfer - Determine the changes in temperature and movement of

			particles during heat transfer
modelling the transfer of sound energy as waves using slinky springs and relating to the medium through which the sound is transferred	Investigation: How Does Sound Travel as Waves?	Sound energy travels in waves through a medium, such as air, liquids, or solids. In this lesson, we'll use slinky springs to model how sound travels as compressions and rarefactions, and explore the role of the medium in transferring sound.	- Identify sound as a form of energy that travels in longitudinal waves - Model the transfer of sound energy as compressions and rarefactions using a slinky spring - Describe how sound waves travel through different media (solids, liquids, gases) - Explain why sound requires a medium to transfer energy
investigating the relationship between the volume of a sound wave and the amplitude of the wave, or the relationship between the pitch or tone of a sound wave and its frequency	Investigation: How Do Amplitude and Frequency Affect the Pitch and Volume of Sound?	Sound waves have properties like amplitude and frequency that determine how loud or high-pitched a sound is. In this lesson, we'll investigate how the amplitude of a wave affects the volume of sound and how the frequency of a wave changes its pitch or tone.	- Identify that amplitude determines the volume (loudness) of sound, and frequency determines the pitch (high or low) - Model how amplitude and frequency affect sound waves using practical investigations - Describe the relationships between wave amplitude, frequency, pitch, and volume - Analyse data to explain changes in pitch and volume
investigating the impact of material selection on the transfer of sound energy in Aboriginal and/or Torres Strait Islander Peoples' traditional musical, hunting and communication instruments	How Does Material Selection Affect Sound in Aboriginal and Torres Strait Islander Instruments?	Aboriginal and Torres Strait Islander Peoples have used their knowledge of materials to create musical, hunting, and communication instruments that effectively transfer sound energy. In this lesson, we'll investigate how the choice of materials impacts the quality, volume, and type of sound produced by traditional instruments.	- Identify traditional musical, hunting, and communication instruments used by Aboriginal and Torres Strait Islander Peoples - Describe how materials influence the transfer of sound energy in these instruments - Compare the sound properties of different materials used in traditional instruments - Analyse the cultural significance of material selection for traditional practices
examining how the particle model of electricity explains static electricity and electrical current and relating this to voltage, conductors and insulators	Static Electricity and Electrical Current	Electricity involves the movement of charged particles. In this lesson, we will use the particle model to understand static electricity and electrical current, and explore how this relates to voltage, conductors, and insulators.	- Describe how the particle model explains static electricity and electrical current - Relate voltage to the movement of charged particles in a circuit - Investigate how conductors and insulators affect the flow of electrical current - Model the difference between static electricity and

			electrical current using practical examples
	Investigation: Conductors and Insulators	Electricity flows through some materials easily while others resist the movement of charge. The particle model of electricity helps explain how electrical current moves and why some materials act as conductors while others are insulators. In this investigation, we will test different materials to determine whether they are conductors or insulators and use models to explain how electricity moves through them.	- Investigate the ability of different materials to conduct or resist electrical current - Describe how the particle model of electricity explains the movement of charge in conductors and insulators - Use diagrams or models to represent how electrical current moves through different materials - Explain why conductors allow electricity to flow and why insulators prevent the movement of charge
discussing the wave and particle models of energy transfer, including the concept of photons, and how these models are useful for understanding aspects of light and other forms of electromagnetic radiation	Wave and Particle Models	Light and other forms of electromagnetic radiation can be described using wave and particle models. In this lesson, we'll explore how these models explain the transfer of energy and how the concept of photons helps us understand the dual nature of light.	- Describe the wave and particle models of energy transfer - Explain how the concept of photons is used to describe light as a particle - Compare the usefulness of wave and particle models for understanding electromagnetic radiation
	Investigation: Reflection and Refraction	Light interacts with materials in various ways. In this lesson, we'll investigate the properties of absorption, reflection, refraction, and scattering, and understand how these properties explain the behaviour of light in different situations.	- Identify and describe the properties of light: absorption, reflection, refraction, and scattering - Investigate how light interacts with different materials through experiments - Explain real-world examples of light behaviour using these properties
	Investigation: Absorption and Scattering	Light behaves differently when it interacts with materials. In this lesson, we will conduct hands-on experiments to explore how absorption, reflection, and refraction are applied in everyday life, from sunglasses and mirrors to lenses and solar panels.	- Investigate how light behaves in absorption, reflection, and refraction experiments - Relate the results of the experiments to real-world applications of light behaviour - Describe how everyday objects use absorption, reflection, and refraction to function effectively - Analyse the advantages of these properties in practical applications

	Comparing Mechanical and Electromagnetic Waves	Mechanical waves and electromagnetic (EM) waves transfer energy in different ways. In this lesson, we'll demonstrate how mechanical waves require a medium to travel, while electromagnetic waves do not, and use the wave model to explain how energy moves without transferring particles.	- Demonstrate how mechanical waves require a medium to travel - Explain why electromagnetic waves can travel through a vacuum - Model the transfer of energy in waves without the net transfer of particles - Compare the properties of mechanical and electromagnetic waves
examining how properties of electromagnetic radiation relate to the uses of this radiation, such as in radar, medicine, sanitation, mobile phone communications, remote sensing and microwave cooking	Applications of Electromagnetic Radiation	The properties of electromagnetic radiation determine how it is used in various technologies. In this lesson, we'll examine the different waveforms of the electromagnetic spectrum, compare their properties, and explore their applications in modern communication, medicine, and more.	- Identify the different types of electromagnetic waves and their properties - Compare how the properties of electromagnetic waves influence their uses - Analyse data to evaluate the advantages and limitations of different EM waves in specific applications - Explain how electromagnetic waves are applied in technologies such as radar, medicine, sanitation, and communication
	Using the Electromagnetic Spectrum to Learn About Stars	The electromagnetic spectrum helps us understand the composition, temperature, motion, and age of stars. In this lesson, we will explore how astronomers use different types of electromagnetic waves to gather information about stars and their behaviour.	- Identify the different parts of the electromagnetic spectrum and their uses in astronomy - Describe how visible light, infrared, ultraviolet, and other waves reveal information about stars - Explain how spectra are used to determine the composition and movement of stars - Explain how the Doppler effect helps astronomers study the motion of stars
Extension	First Nations Australians' Bedding and Clothing Design	First Nations Australians have developed ingenious designs for bedding and clothing that account for heat transfer and conservation across Australia's diverse climates. In this lesson, we'll investigate how these designs minimise heat loss in cold climates and promote cooling	- Identify the different climatic regions of Australia and their challenges for heat conservation or dissipation - Describe how principles of heat transfer (conduction, convection, radiation) are applied in traditional bedding and clothing - Investigate examples of First Nations Australians' bedding

		in hot climates using the principles of conduction, convection, and radiation.	and clothing designs - Explain how these designs maximise comfort and survival in varying climates
	How Does the Ear Respond to Sound Waves?	The human ear detects sound waves and converts them into electrical signals that the brain can interpret. In this lesson, we'll explore the structure of the ear, describe the process of hearing, and understand how sound waves are transformed into meaningful sounds.	- Identify the main structures of the ear and their functions - Describe the process of how the ear detects and responds to sound waves - Explain how sound waves are transformed into electrical signals - Create a model of the journey of sound through the ear using diagrams
	Using Sound Waves in Medical Diagnosis	Sound waves are a powerful tool in medical diagnosis. In this lesson, we'll explore how ultrasound technology uses sound waves to create images of the body and how these images are used by healthcare professionals to diagnose medical conditions.	- Describe how sound waves are used in medical imaging - Identify real-world applications of ultrasound in medical diagnosis - Explain how the properties of sound waves allow them to create images of internal structures
	Investigation: Doppler Effect	The Doppler Effect explains how the frequency and pitch of waves change when the source of the waves is moving relative to an observer. In this lesson, we'll investigate the Doppler Effect in sound and light waves and explore real-world applications like ambulance sirens and astronomy.	- Describe the Doppler Effect and how it affects sound and light waves - Explain how the frequency and pitch of waves change due to the motion of the source or observer - Apply the concept of the Doppler Effect to real-world examples, such as sirens or redshift in astronomy
	How Does the Eye Respond to Light?	The human eye detects light and converts it into signals that the brain can interpret as images. In this lesson, we will explore the structure of the eye, how it responds to light, and how the brain processes visual information.	- Identify the main parts of the eye and their functions - Describe how light enters the eye and is focused on the retina - Explain how light is converted into electrical signals and sent to the brain - Create a model of the process of vision
Law of Conservation of Energy			
VC2S10U15 - the Law of Conservation of Energy can be analysed in systems, including Earth systems, by assessing the efficiency of energy inputs, outputs, transfers and			

transformations			
recognising that the Law of Conservation of Energy explains that total energy is maintained in energy transfers and transformations	Understanding the Law of Conservation of Energy	The Law of Conservation of Energy states that energy cannot be created or destroyed but is transferred and transformed within a system. In this lesson, we will explore how energy behaves in closed systems and use calculations to demonstrate that total energy remains constant.	- Define the Law of Conservation of Energy - Explain how energy is transferred and transformed within a system - Apply calculations to show that total energy is conserved in a closed system - Create a model of energy transfers and transformations in a system diagram
recognising that energy transfers and transformations can have several steps and that systems are not 100% efficient, which means that usable energy is reduced	Understanding Energy Efficiency in Transfers and Transformations	Energy transfers and transformations involve multiple steps, and no system is 100% efficient. In this lesson, we will explore why energy efficiency is reduced, how to calculate efficiency, and identify ways to improve energy use in systems.	- Describe what energy efficiency is and why systems are not 100% efficient - Explain how energy is lost during transfers and transformations - Calculate energy efficiency using the efficiency formula - Propose strategies to improve energy efficiency in real-world systems
creating a Sankey diagram of the transformation of energy as light travels from the Sun to Earth	Using Sankey Diagrams to Represent Energy Transformations	Energy transformations can be represented visually to understand how energy inputs, outputs, and losses occur in a system. In this lesson, we will create and analyse Sankey diagrams to explore how energy from the Sun is transformed as it travels to Earth and is used by different systems.	- Define a Sankey diagram and its purpose in representing energy transformations - Create Sankey diagrams to show the transformation of energy, including from the Sun to Earth - Analyse Sankey diagrams to identify energy inputs, outputs, and losses - Critique the accuracy and usefulness of Sankey diagrams in representing energy changes
investigating the energy efficiency of ground ovens used by Aboriginal and/or Torres Strait Islander Peoples	Investigating the Energy Efficiency of Ground Ovens	Ground ovens used by Aboriginal and Torres Strait Islander Peoples demonstrate efficient energy use through traditional practices. In this lesson, we will explore how these ovens work, evaluate their energy efficiency, and discuss their importance in sustainable food preparation.	- Describe how ground ovens function and their traditional use by Aboriginal and Torres Strait Islander Peoples - Investigate the energy efficiency of ground ovens, considering heat transfer and retention - Evaluate the sustainability of ground ovens compared to modern cooking methods - Discuss the cultural and environmental significance of ground ovens in traditional practices

examining how improving efficiency in energy transfer and transformations in sporting activities such as pole-vaulting and archery improves athletic performance	Energy Efficiency in Sports: Improving Athletic Performance	Athletes rely on efficient energy transfers and transformations to optimise their performance. In this lesson, we will examine how improving energy efficiency in sports like pole vaulting and archery enhances athletic outcomes.	- Describe how energy transfers and transformations occur in sporting activities - Identify factors that influence energy efficiency in sports like pole vaulting and archery - Evaluate how improving energy efficiency enhances athletic performance - Analyse examples of energy efficiency in action within sporting contexts
comparing the efficiency of electricity generation from different sources, for example coal, nuclear, hydroelectricity, gas, solar and wind	Comparing the Efficiency of Electricity Generation	Electricity generation can vary significantly in efficiency depending on the energy source. In this lesson, we will compare the efficiency of electricity generation from various sources, and analyse their advantages and disadvantages.	- Define efficiency in the context of electricity generation - Describe how energy is transferred and transformed in different electricity generation methods - Compare the efficiency of coal, nuclear, hydroelectricity, gas, solar, and wind energy sources - Evaluate the advantages and disadvantages of each energy source
	Understanding Energy Star Ratings	Energy star ratings provide consumers with information about the energy efficiency of appliances. In this lesson, we will examine what energy star ratings mean, how they are determined, and why they are important for reducing energy consumption and environmental impact.	- Define what energy star ratings represent - Describe the criteria used to determine energy star ratings for appliances - Compare the energy efficiency of appliances based on their star ratings - Evaluate the benefits of choosing energy-efficient appliances
Electricity generation			
VC2S10U16 - electricity can be generated as alternating current (AC) using magnets (via turbines turned by wind, water, tides or steam that is generated by the combustion of oil, gas or coal or by nuclear energy) or as direct current (DC) using photovoltaic cells or batteries			
	Introduction to Generators	Generators convert mechanical energy into electrical energy. In this lesson, we will explore how electromagnetic induction allows generators to produce electricity using coils of wire and magnets.	- Explain what a generator is - Summarise how generators use electromagnetic induction - Outline some examples of systems that use generators
creating a Venn diagram that	AC Generators	Ever wondered how some outdoor theme parks	- Describe the key components involved in generating

compares the production of AC and DC power		or outdoor events get powered up without any fixed electrical supply? Or why some electrical appliances can still work even during power outages? Generators are important in helping to meet the electrical energy demand.	electricity (e.g. energy source, turbine, generator) - Distinguish between alternating current (AC) and direct current (DC) - Describe a simple form of an A.C. generator (rotating coil or rotating magnet) and the use of slip rings and brushes where needed.
building a simple AC generator	DC Motors	Most cars use motors that convert chemical energy (from fuel) into kinetic energy. However, electric motors can be used to produce kinetic energy from electrical energy using electromagnetic induction. In this lesson, we will look at how electric motors use electromagnetic induction to produce movement.	- Describe the structure of a DC motor - Explain how DC motors convert electrical energy into kinetic energy
investigating a power source used to turn a turbine	Comparing Electric Motors	Welcome to this lesson about electric motors. In this lesson we will look at the components making up AC and DC motors and the principles that they are based on. We will also cover the design and function of electric generators. Before starting this lesson, make sure you are confident with the concepts introduced in the lessons on electromagnetic induction and force on a current carrying wire.	- Describe how a current flowing in a coil will cause it to rotate in a uniform magnetic field - Explain how simple AC and DC motors function - Distinguish between a motor and a generator - Compare and contrast the current output from both DC and AC generators
	Sources of Energy	Welcome to this lesson on sources of energy! Every person, process and thing relies on some kind of fuel. In this lesson, we'll learn about fuels and other energy resources, and learn about their pros and cons.	- Identify the different types of energy resources and identify where their energy comes from - Describe how useful forms of energy are obtained from energy resources - Distinguish between renewable and non-renewable energy resources - List the advantages and disadvantages of different energy resources
	Harnessing		- Describe how useful energy may be obtained, or electrical

	Electrical Energy		power generated from fossil fuels, biofuel, hydropower, nuclear, solar, and wind energy. - Describe the advantages and disadvantages of each method in terms of renewability, availability, reliability, scale, and environmental impact. - Understand, qualitatively, the concept of efficiency of energy transfer.
researching the difference between fission and fusion as energy sources	Mass, Energy, and Nuclear Processes	Some countries use only nuclear energy! In this lesson, we will learn about how nuclear reactions work, including nuclear fission and fusion and outline potential impacts of using nuclear reactions.	- Describe nuclear fission and nuclear fusion - Discuss how mass and energy are connected in terms of atomic nuclei - Compare the energy released in fission and fusion reactions
building and investigating the power generated by a wind vane	Wind Turbines	Humans all over the world have used wind power for thousands of years. Propelling boats, grinding grain into flour and pumping water are some of the uses of wind power throughout history. Today, we can use wind power to charge our phones, watch TV, cook our food and do many other things. In this lesson, you will learn how wind turbines can generate electricity from wind power.	- Define what a wind farm is - Describe the parts of a wind turbine - Explain how the location of a wind farm is chosen
Newton's laws of motion			
VC2S10U17 - Newton's laws of motion can be used to quantitatively analyse the relationship between force, mass and acceleration of objects			
	An Introduction to Motion: Newton's Three Laws	Newton's three laws of motion form the foundation of our understanding of how objects move and interact. In this lesson, we will explore these laws and how they apply to everyday situations to set the stage for our study of motion.	- Describe Newton's three laws of motion and their significance - Identify examples of Newton's laws in real-world scenarios - Explain how Newton's laws apply to simple systems
investigating a moving object	Skills Lesson:	Mathematical formulas help us quantify the	- Identify the relevant formulas to solve problems involving

and using mathematical representations including graphs and algebraic formulas to quantitatively determine relationships between distance, time, speed, force, acceleration and mass	Solving Problems with Formulas	relationships between force, speed, acceleration, and mass. In this lesson, we will use algebraic equations to calculate motion parameters and understand their interactions.	force, speed, acceleration, and mass - Calculate values for force, speed, acceleration, and mass using mathematical formulas - Interpret the results of calculations to explain physical scenarios - Evaluate solutions for accuracy and reasonableness
	Skills Lesson: Understanding Motion Through Graphs	Graphs visually represent the relationships between motion variables, such as speed, distance, time, and acceleration. In this lesson, we will construct and interpret motion graphs to analyse motion data.	- Construct motion graphs, including displacement-time, velocity-time, and acceleration-time graphs - Interpret motion graphs to describe motion relationships - Calculate motion parameters, such as acceleration, from graphs - Evaluate graphical data to explain real-world motion scenarios
	Investigation: Newton's First Law	Objects do not change their motion unless acted upon by an external force. This principle, known as inertia, is the foundation of Newton's First Law. In this investigation, we will explore how an object at rest or in motion resists changes in its state. We will analyse and represent our observations using motion diagrams to better understand the forces involved.	- Investigate inertia using an experiment and record observations - Use model diagrapms to represent the motion of an object before and after an external force is applied - Explain how unbalanced forces are necessary to change the motion of an object
investigating a moving object and using mathematical representations including graphs and algebraic formulas to quantitatively determine relationships between distance, time, speed, force, acceleration and mass	An Introduction to Motion: Newton's Three Laws	An object's acceleration depends on the force applied and its mass. This relationship is described by Newton's Second Law of Motion. In this investigation, we will collect data to analyse how changes in force or mass affect acceleration. We will use mathematical calculations, including algebraic formulas and graphs, to represent these relationships.	- Measure and record time, distance, and speed to calculate acceleration - Use the equation F=ma to determine relationships between force, mass, and acceleration - Construct and interpret line graphs to analyze trends in motion data - Explain how increasing or decreasing force or mass affects acceleration
investigating a moving object and using mathematical	Skills Lesson: Solving Problems	For every action, there is an equal and opposite reaction. Newton's Third Law explains how forces	- Identify action-reaction force pairs and describe their effects on motion

representations including graphs and algebraic formulas to quantitatively determine relationships between distance, time, speed, force, acceleration and mass	with Formulas	always act in pairs. In this investigation, we will explore how action-reaction force pairs influence motion. We will analyse data on displacement, velocity, and force interactions to understand how these principles apply to real-world scenarios like rockets and propulsion.	- Conduct an experiment to observe action-reaction forces in a controlled setup - Analyse and compare displacement and velocity across different trials - Apply Newton's Third Law to real-world examples, such as rockets and propulsion systems
modelling how a change in net force acting on an object affects its motion, and relating this to the purpose of safety features such as seatbelts, airbags and crumple zones in vehicles	The Physics of Vehicle Safety Features	Vehicle safety features are designed to reduce the effects of forces during collisions. In this lesson, we will learn how seatbelts, airbags, and crumple zones use physics principles, including Newton's laws of motion, to protect passengers.	- Describe how seatbelts, airbags, and crumple zones work to minimise injury - Explain the connection between safety features and Newton's laws of motion - Identify the role of force, acceleration, and energy absorption in collision safety
	Investigation: Modelling Safety Features in Vehicles	Safety features like seatbelts, airbags, and crumple zones are crucial for passenger safety. In this lesson, we will model and test these features to observe how they reduce forces during collisions.	- Construct models of seatbelts, airbags, and crumple zones - Test how these safety features reduce impact forces during a simulated crash - Analyse the effectiveness of each feature in protecting a passenger - Explain the results using Newton's laws of motion
constructing an argument, supported by data, to support lower speed limits for vehicles near schools or for trucks in urban environments	Supporting Lower Speed Limits	Speed affects the forces involved in vehicle collisions, particularly near schools and in urban environments. In this lesson, we will analyse data on speed, force, and stopping distances to construct an argument supporting lower speed limits for vehicles in these areas.	- Interpret data on speed, stopping distances, and collision forces - Explain the relationship between speed, force, and stopping distance using Newton's laws of motion - Construct a persuasive argument, supported by data, for implementing lower speed limits near schools or for trucks in urban environments
investigating how driverless vehicles apply Newton's laws of motion to brake at the right times	Newton's Laws and Driverless Vehicles	Driverless vehicles rely on Newton's laws of motion to ensure safe and timely braking. In this lesson, we will investigate how these laws are applied in the design and function of autonomous braking systems.	- Describe how Newton's laws of motion are used to understand braking in vehicles - Explain the role of force, mass, and acceleration in calculating stopping distances - Investigate how driverless vehicles use sensors and algorithms to apply these principles for timely braking

			- Evaluate the effectiveness of autonomous braking systems in enhancing road safety
investigating the application of Newton's laws in sport and how these are applied to improve an athlete's performance or safety	Newton's Laws in Sport: Improving Performance and Safety	Newton's laws of motion play a crucial role in sports by improving athletic performance and safety. In this lesson, we will investigate how these laws are applied in various sports and examine their impact on athletes' techniques and equipment.	- Describe how Newton's laws of motion are demonstrated in different sports - Analyse the role of force, mass, and acceleration in athletic performance - Investigate how athletes and equipment use Newton's laws to enhance safety and performance - Explain how scientific understanding improves sports strategies and technology
investigating how Aboriginal and/or Torres Strait Islander Peoples achieved an increase in speed and subsequent impact force using spearthrowers and bows	The Physics of Spearthrowers and Bows	Newton's laws of motion explain how force, mass, and acceleration influence motion. In this lesson, we will investigate how Aboriginal and Torres Strait Islander Peoples used spearthrowers and bows to increase speed and impact force, demonstrating these physical principles.	- Describe how spearthrowers and bows increase speed and impact force using Newton's laws of motion - Investigate how changes in force and mass affect acceleration and velocity - Evaluate the scientific ingenuity of Aboriginal and Torres Strait Islander Peoples in designing these tools
Extension	Vector Analysis: Calculating Net Force in One Dimension	Understanding the net force acting on an object is key to predicting its motion. In this lesson, we will use vector analysis to determine the net force on an object moving in one dimension.	- Define force as a vector quantity with both magnitude and direction - Illustrate forces acting on an object using vector diagrams - Calculate the net force on an object moving in one dimension using vector addition - Apply the concept of net force to predict the object's motion