

## Stage 04

### Physical World

PW1 Change to an object's motion is caused by unbalanced forces acting on the object (ACSSU117)

Content Descriptor	Lesson Names
identify changes that take place when particular forces are acting b. predict the effect of unbalanced forces acting in everyday situations c. describe some examples of technological developments that have contributed to finding solutions to reduce the impact of forces in everyday life, eg car safety equipment and footwear design d. analyse some everyday common situations where friction operates to oppose motion and produce heat e. investigate factors that influence the size and effect of frictional forces	<i>Introduction to Forces</i> <ul style="list-style-type: none"> <li>• What are Forces?</li> <li>• Drawing Forces</li> <li>• Balanced and Unbalanced Forces</li> <li>• Calculating Net Force</li> <li>• Newton's First Law</li> <li>• Newton's Second Law</li> <li>• Newton's Third Law</li> </ul> <i>Forces in Everyday Life</i> <ul style="list-style-type: none"> <li>• Friction</li> <li>• Ancient Tools and Weapons</li> <li>• Comparing Robots</li> <li>• Extension: Earth's Magnetic Field</li> <li>• Fact or Friction?</li> <li>• How Planes Stay Up</li> <li>• Maglev Trains</li> <li>• Planetary Motion</li> <li>• Safety Systems</li> <li>• Sports Science</li> <li>• Tides</li> </ul>

PW2 The action of forces that act at a distance may be observed and related to everyday situations

Content Descriptor	Lesson Names
a. use the term 'field' in describing forces acting at a distance b. identify ways in which objects acquire electrostatic charge c. describe the behaviour of charged objects when they are brought close to each other d. investigate everyday situations where the effects of	<i>Types of Forces</i> <ul style="list-style-type: none"> <li>• Contact and Non-Contact Forces</li> <li>• Gravity</li> <li>• Magnetism</li> <li>• Weight and Mass</li> <li>• Electrostatic Force</li> <li>• Forces</li> </ul>

electrostatic forces can be observed, eg lightning strikes during severe weather and dust storms  
 e. identify that the Earth's gravity pulls objects towards the centre of the Earth (ACSSU118)  
 f. describe everyday situations where gravity acts as an unbalanced force  
 g. distinguish between the terms 'mass' and 'weight'  
 h. describe the behaviour of magnetic poles when they are brought close together  
 i. investigate how magnets and electromagnets are used in some everyday devices or technologies used in everyday life

- Space Travel: The Weight Loss Sensation!

**PW3 Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems (ACSSU155)**

Content Descriptor	Lesson Names
a. identify objects that possess energy because of their motion (kinetic) or because of other properties (potential) b. describe the transfer of heat energy by conduction, convection and radiation, including situations in which each occurs c. relate electricity with energy transfer in a simple circuit d. construct and draw circuits containing a number of components to show a transfer of electricity e. investigate some everyday energy transformations that cause change within systems, including motion, electricity, heat, sound and light	<p><i>Introduction to Energy and Units of Energy</i></p> <ul style="list-style-type: none"> <li>• Units of Energy</li> <li>• What is Energy?</li> <li>• Converting between Joules (J) &amp; Kilojoules (kJ)</li> <li>• Kinetic Energy</li> <li>• Converting between Kilojoules (kJ) &amp; Megajoules (MJ)</li> <li>• Energy Calculations</li> <li>• Qualitative and Quantitative Data</li> </ul> <p><i>Energy Transfer and Transformation</i></p> <ul style="list-style-type: none"> <li>• Energy Transformation and Food</li> <li>• Energy Transformations</li> <li>• Displaying Energy Transformations</li> <li>• Cars of the Future</li> <li>• Law of Conservation of Energy</li> <li>• Types of Energy</li> </ul> <p><i>Heat Transfer</i></p> <ul style="list-style-type: none"> <li>• Conduction</li> <li>• Convection</li> <li>• Radiation</li> <li>• Introduction to Heat Transfer</li> <li>• Conductors and Insulators</li> <li>• Heat Transfer</li> <li>• Conductors and Insulators</li> </ul> <p><i>Electrical Energy</i></p> <ul style="list-style-type: none"> <li>• Electricity</li> </ul>

	<ul style="list-style-type: none"> <li>• Circuits in Parallel</li> <li>• Comparing Circuits</li> <li>• Electric Circuits</li> <li>• Current</li> <li>• Voltage</li> <li>• Resistance</li> <li>• Introduction to Ohm's Law</li> <li>• Batteries</li> <li>• Electrical Conductors and Insulators</li> <li>• Circuits in Series</li> </ul>
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PW4 Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations (ACSHE120, ACSHE135)

Content Descriptor	Lesson Names
<p>a. identify that most energy conversions are inefficient and lead to the production of heat energy, eg in light bulbs</p> <p>b. research ways in which scientific knowledge and technological developments have led to finding a solution to a contemporary issue, eg improvements in devices to increase the efficiency of energy transfers or conversions</p> <p>c. discuss the implications for society and the environment of some solutions to increase the efficiency of energy conversions by reducing the production of heat energy</p>	<p><i>Energy Efficiency</i></p> <ul style="list-style-type: none"> <li>• Cogeneration and Engines</li> <li>• Energy Efficiency</li> <li>• Energy Efficient Houses</li> <li>• The Development of Flight</li> <li>• The Power Grid and You</li> <li>• Useful and Wasted Energy</li> </ul> <p><i>Electrical Energy</i></p> <ul style="list-style-type: none"> <li>• A Bright Idea</li> </ul>

## Additional Content

Content Descriptor	Lesson Names
<p>investigate characteristics of specific forces in terms of size and direction</p> <p>investigate some simple machines, eg levers, pulleys, gears or inclined planes</p> <p>trace the history of the development of particular devices or technologies, eg circuitry through to microcircuitry</p> <p>describe the scientific principles used in some traditional technologies used and developed by Aboriginal and Torres Strait Islander Peoples</p> <p>trace the history of pendulum-motion studies and its</p>	<p><i>Simple Machines</i></p> <ul style="list-style-type: none"> <li>• Levers</li> <li>• Wheels, Axles and Pulleys</li> <li>• Inclined Planes</li> <li>• Gears</li> <li>• Bicycle Investigation</li> <li>• Gear Ratio</li> </ul>

connection with timekeeping and setting standards of length  
debate intergenerational implications of the use of non-renewable energy resources  
research current ideas about the Earth's magnetic field and its effects

## Earth and Space

ES1 Sedimentary, igneous and metamorphic rocks contain minerals and are formed by processes that occur within Earth over a variety of timescales. (ACSSU153)

Content Descriptor	Lesson Names
<p>a. describe the structure of the Earth in terms of core, mantle, crust and lithosphere</p> <p>b. relate the formation of a range of landforms to physical and chemical weathering, erosion and deposition</p> <p>c. outline the origins of and relationships between sedimentary, igneous and metamorphic rocks</p> <p>d. identify that sedimentary, igneous and metamorphic rocks contain minerals</p> <p>e. classify a variety of common rocks and minerals into groups according to their observable properties</p> <p>f. describe the conditions under which fossils form</p> <p>g. outline how geological history can be interpreted in a sequence of horizontal sedimentary layers, in which the oldest are at the base and the youngest at the top</p> <p>h. describe examples to show how people use understanding and skills from across the disciplines of science in occupations related to the exploration, mining or processing of minerals in Australia (ACSHE224, ACSHE227)</p>	<p><i>Earth's Processes</i></p> <ul style="list-style-type: none"> <li>• Deep Time, Temperature and Pressure</li> <li>• Australian Landforms formed by Physical Weathering, Erosion and Sedimentation</li> <li>• Australian Landforms formed by Volcanism and Chemical Weathering</li> <li>• Developing the Geological Timescale</li> <li>• Earth Processes</li> <li>• Geological Time</li> <li>• Hot Rocks of the Cosgrove Hotspot Track</li> </ul> <p><i>Minerals</i></p> <ul style="list-style-type: none"> <li>• Comparing Minerals</li> <li>• Identifying Minerals</li> <li>• Introduction to Minerals</li> <li>• Zircons are Forever</li> </ul> <p><i>Rock Types</i></p> <ul style="list-style-type: none"> <li>• Metamorphic Rocks</li> <li>• Australian Fossils</li> <li>• Baked Rocks in the Lachlan Fold Belt</li> <li>• Erosion and Sedimentation</li> <li>• Feathery Dinosaurs</li> <li>• Fossils</li> <li>• Igneous Rocks</li> <li>• Minerals and Rocks</li> <li>• Rock Density</li> <li>• Sedimentary Rocks</li> <li>• The Rock Cycle</li> <li>• Weathering</li> </ul>

ES2 Scientific knowledge changes as new evidence becomes available. Some technological developments and scientific discoveries have significantly changed people's understanding of the solar system.

Content Descriptor	Lesson Names
<p>a. explain that predictable phenomena on the Earth, including day and night, seasons and eclipses are caused by the relative positions of the sun, the Earth and the moon (ACSSU115)</p> <p>b. demonstrate, using examples, how ideas by people from different cultures have contributed to the current understanding of the solar system</p> <p>c. compare historical and current models of the solar system to show how models are modified or rejected as a result of new scientific evidence</p> <p>d. describe some examples of how technological advances have led to discoveries and increased scientific understanding of the solar system</p>	<p><i>Sun</i></p> <ul style="list-style-type: none"> <li>• Earth, Moon and Sun</li> <li>• Day and Night</li> <li>• Day and Night</li> <li>• Seasons</li> <li>• Time Zones</li> <li>• Days, Seasons and Time</li> </ul> <p><i>Moon and Eclipses</i></p> <ul style="list-style-type: none"> <li>• Lunar Eclipse</li> <li>• Phases of the Moon</li> <li>• Tides</li> <li>• Solar Eclipse</li> <li>• Tides and the Moon</li> </ul> <p><i>Astronomy</i></p> <ul style="list-style-type: none"> <li>• Extension: Earth's Magnetic Field</li> <li>• Calendars and the Solar Year</li> <li>• Changing Seasons</li> <li>• Earth's Structure</li> <li>• Exploring Space</li> <li>• Exploring the Moon, Mars and Beyond</li> <li>• Indigenous Constellations</li> <li>• Models of the Solar System</li> <li>• Pluto - The Big Little Planet</li> <li>• Satellites</li> <li>• Telescopes</li> </ul>

ES3 Scientific knowledge influences the choices people make in regard to the use and management of the Earth's resources.

Content Descriptor	Lesson Names
<p>a. classify a range of the Earth's resources as renewable or non-renewable (ACSSU116)</p> <p>b. outline features of some non-renewable resources, including metal ores and fossil fuels</p> <p>c. describe uses of a variety of natural and made resources extracted from the biosphere, atmosphere, lithosphere and hydrosphere</p> <p>d. investigate some strategies used by people to</p>	<p><i>Introduction to Earth's Resources</i></p> <ul style="list-style-type: none"> <li>• Introduction to Earth's Resources</li> <li>• Renewable and Non-Renewable Energy Sources</li> </ul> <p><i>Non-Renewable Resources</i></p> <ul style="list-style-type: none"> <li>• Fossil Fuels as a Resource</li> <li>• Soil as a Resource</li> <li>• Minerals and Ores as Resources</li> </ul>

<p>conserve and manage non-renewable resources, eg recycling and the alternative use of natural and made resources</p> <p>e. discuss different viewpoints people may use to weight criteria in making decisions about the use of a major non-renewable resource found in Australia</p> <p>f. outline the choices that need to be made when considering whether to use scientific and technological advances to obtain a resource from Earth's spheres</p>	<ul style="list-style-type: none"> <li>• Mining</li> <li>• Nuclear Fuel as a Resource</li> </ul> <p><i>Renewable Resources</i></p> <ul style="list-style-type: none"> <li>• Living Things as a Resource</li> <li>• Air as a Resource</li> <li>• Wind as a Resource</li> <li>• Wind Turbines</li> <li>• Solar Energy</li> <li>• Water Power</li> <li>• Geothermal Energy</li> <li>• A Limitless Source Of Energy</li> <li>• Choosing Renewables</li> <li>• The Power of Sunshine</li> <li>• Types of Resources</li> </ul>
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ES4 Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management. (ACSHE121, ACSHE136)

Content Descriptor	Lesson Names
<p>a. identify that water is an important resource that cycles through the environment (ACSSU222)</p> <p>b. explain the water cycle in terms of the physical processes involved</p> <p>c. demonstrate how scientific knowledge of the water cycle has influenced the development of household, industrial and agricultural water management practices</p> <p>d. research how Aboriginal and Torres Strait Islander Peoples' knowledge is being used in decisions to care for country and place, eg terrestrial and aquatic resource management</p>	<ul style="list-style-type: none"> <li>• Water on Earth</li> <li>• Water Cycle</li> <li>• States of Water</li> <li>• The Water Cycle as a Closed System</li> <li>• Influences on the Water Cycle</li> <li>• Cloudy with a Chance of Hamburgers</li> <li>• Reading a Weather Map</li> <li>• The Water Cycle</li> </ul>

## Additional Content

Content Descriptor	Lesson Names
<p>investigate examples of how scientific knowledge has developed through collaboration of experts from across the disciplines of Science, eg space exploration and resource management</p> <p>describe the effect of the forces of the sun and moon on the hydrosphere</p>	<ul style="list-style-type: none"> <li>• Exploring Earth and Beyond</li> <li>• Martian Geology</li> <li>• Minerals and Rocks as Resources</li> <li>• Mining and Mineral Exploration</li> <li>• Volcanology</li> </ul>

investigate the role of forces and energy in the formation of different types of rocks and minerals  
describe some methods used by scientists to determine the relative age of rock layers  
debate the economic and environmental impacts of mining and resource exploration  
describe ways in which technology has increased the variety of made resources

## Living World

LW1 There are differences within and between groups of organisms; classification helps organise this diversity (ACSSU111)

Content Descriptor	Lesson Names
<p>a. identify reasons for classifying living things</p> <p>b. classify a variety of living things based on similarities and differences in structural features</p> <p>c. use simple keys to identify a range of plants and animals</p> <p>d. identify some examples of groups of micro-organisms</p> <p>e. outline the structural features used to group living things, including plants, animals, fungi and bacteria</p> <p>f. explain how the features of some Australian plants and animals are adaptations for survival and reproduction in their environment</p>	<p><i>What is Classification?</i></p> <ul style="list-style-type: none"> <li>• Living or Non-Living?</li> <li>• MRS GREN</li> <li>• Introduction to Classification</li> </ul> <p><i>Dichotomous Keys</i></p> <ul style="list-style-type: none"> <li>• Introduction to Dichotomous Keys</li> <li>• How Does a Jellyfish Sting?</li> </ul> <p><i>Linnaean Classification</i></p> <ul style="list-style-type: none"> <li>• Dragons in the Deep</li> <li>• Linnaean Classification</li> <li>• Binomial Nomenclature</li> <li>• Identifying Species</li> <li>• Introduction to Plant Classification</li> <li>• Species and Hybrids</li> <li>• Carl Linnaeus</li> <li>• Tardigrades in Parking Lots</li> <li>• The Platypus</li> <li>• Animal Phyla</li> <li>• Classification of Life</li> <li>• Classifying Dinosaurs</li> <li>• Guess Who: Animal Edition</li> <li>• Kangaroo Counter</li> <li>• Linnaean Classification</li> <li>• Tiny, Tubby, Tenacious Tardigrades</li> <li>• Vertebrates</li> </ul> <p><i>Adaptations for Survival</i></p>

	<ul style="list-style-type: none"> <li>• Introduction to Adaptations</li> <li>• Adaptations in Shape or Form</li> <li>• Adaptations Inside the Body</li> <li>• Adaptations in Behaviour</li> <li>• Nocturnal Activity</li> <li>• Dune Plants</li> <li>• Camouflage</li> </ul>
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LW2 Cells are the basic units of living things and have specialised structures and functions (ACSSU149)

Content Descriptor	Lesson Names
<p>a. identify that living things are made of cells</p> <p>b. identify structures within cells, including the nucleus, cytoplasm, cell membrane, cell wall and chloroplast, and describe their functions</p> <p>c. outline the role of respiration in providing energy for the activities of cells</p> <p>d. identify that new cells are produced by cell division</p> <p>e. distinguish between unicellular and multicellular organisms</p> <p>f. identify that different types of cells make up the tissues, organs and organ systems of multicellular organisms</p>	<p><i>Introduction to Cells</i></p> <ul style="list-style-type: none"> <li>• Size of Cells</li> <li>• The Size of Cells</li> <li>• What is a Cell?</li> </ul> <p><i>Microscopes</i></p> <ul style="list-style-type: none"> <li>• Magnification</li> <li>• Parts and Function of a Microscope</li> <li>• Types of Microscopes</li> <li>• Using a Microscope</li> </ul> <p><i>Types of Cells</i></p> <ul style="list-style-type: none"> <li>• Introduction to Types of Cells: Pond Water Investigation</li> <li>• Bacterial Cell Structure</li> <li>• Eukaryotic Cells</li> <li>• Prokaryotic Cells</li> <li>• Animal Cell Structure</li> <li>• Plant Cell Structure</li> <li>• Fungal Cell Structure</li> <li>• Animal and Plant Cells</li> <li>• Animal vs. Plant Cells</li> <li>• Preparing Plant and Animal Cells</li> <li>• Prokaryotic vs. Eukaryotic</li> <li>• The Origin of Mitochondria</li> </ul> <p><i>Cell Division</i></p> <ul style="list-style-type: none"> <li>• Cell Division in Bacteria</li> <li>• Cell Division in Humans - Mitosis</li> <li>• Cell Division in Humans - Meiosis</li> </ul> <p><i>Levels of Organisation</i></p> <ul style="list-style-type: none"> <li>• Specialised Animal Cells I</li> <li>• Specialised Animal Cells II</li> </ul>



	<ul style="list-style-type: none"> <li>• Specialised Plant Cells - Photosynthetic and Guard Cells</li> <li>• Specialised Plant Cells - Root Hairs and Conducting Cells</li> <li>• Types of Tissue</li> <li>• Levels of Organisation</li> <li>• Diffusion</li> <li>• Diffusion and Cell Size</li> </ul>
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**LW3 Multicellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce (ACSSU150)**

Content Descriptor	Lesson Names
<p>a. identify the materials required by multicellular organisms for the processes of respiration and photosynthesis</p> <p>b. explain that the systems in multicellular organisms work together to provide cell requirements, including gases, nutrients and water, and to remove cell wastes</p> <p>c. outline the role of cell division in growth, repair and reproduction in multicellular organisms</p> <p>d. describe the role of the flower, root, stem and leaf in maintaining flowering plants as functioning organisms</p> <p>e. describe the role of the digestive, circulatory, excretory, skeletal/muscular and respiratory systems in maintaining a human as a functioning multicellular organism</p> <p>f. outline the role of the reproductive system in humans</p>	<p><i>Introduction to Body Systems</i></p> <ul style="list-style-type: none"> <li>• Exercise and the Body</li> <li>• Extension: Adapting to Extreme Climates</li> <li>• Introduction to Body Systems</li> <li>• Organ Systems</li> </ul> <p><i>Digestive System</i></p> <ul style="list-style-type: none"> <li>• Digestive System As A Whole</li> <li>• Food Groups</li> <li>• Mouth and Oesophagus</li> <li>• Stomach and Small Intestine</li> <li>• Large Intestine and Rectum</li> <li>• Comparing Digestion in Other Animals</li> <li>• The Microbes That Control What We Do</li> </ul> <p><i>Respiratory System</i></p> <ul style="list-style-type: none"> <li>• Introduction to Respiration</li> <li>• Breathing</li> <li>• Gas Exchange</li> <li>• Comparing Respiration</li> <li>• Diffusion</li> <li>• Diffusion and Body Systems</li> <li>• Respiration in Cells</li> </ul> <p><i>Circulatory System</i></p> <ul style="list-style-type: none"> <li>• Introduction to the Circulatory System</li> <li>• Heart</li> <li>• Blood Vessels</li> <li>• Blood</li> <li>• Ancient Anatomy</li> <li>• Relative Heart Size</li> </ul> <p><i>Excretory System</i></p>

	<ul style="list-style-type: none"> <li>• Introduction to Excretory System</li> <li>• Excretory Organs</li> <li>• Kidney Disease</li> <li>• The Kidneys &amp; Urine Production</li> </ul> <p><i>Musculoskeletal System</i></p> <ul style="list-style-type: none"> <li>• Musculoskeletal System</li> <li>• Bones &amp; Joints</li> <li>• Muscles</li> <li>• Injuries</li> <li>• Stress Effects on the Body</li> <li>• Trapped in a Cave</li> </ul> <p><i>Reproductive System</i></p> <ul style="list-style-type: none"> <li>• Puberty</li> <li>• Sexual Reproduction in Animals</li> </ul>
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LW4 Scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people's understanding of the world. (ACSHE119, ACSHE134)

Content Descriptor	Lesson Names
<p>a. research an example of how changes in scientific knowledge have contributed to finding a solution to a human health issue</p> <p>b. recount how evidence from a scientific discovery has changed understanding and contributed to solving a real world problem, eg animal or plant disease, hygiene, food preservation, sewage treatment or biotechnology</p> <p>c. describe, using examples, how developments in technology have contributed to finding solutions to a contemporary issue, eg organ transplantation, artificial joints/limbs, treatment for diabetes, asthma, kidney or heart disease</p> <p>d. give examples to show that groups of people in society may use or weight criteria differently in making decisions about the application of a solution to a contemporary issue, eg organ transplantation, control and prevention of diseases and dietary deficiencies</p>	<p><i>How Cells Have Shaped Biology</i></p> <ul style="list-style-type: none"> <li>• Cell Theory</li> <li>• Stem Cells</li> <li>• Stem Cell Therapy</li> <li>• History of Microscopes</li> </ul> <p><i>Organ Transplants</i></p> <ul style="list-style-type: none"> <li>• Body Systems</li> <li>• Ctrl + X, Ctrl + V</li> <li>• Ethical Issues of Organ Transplants</li> <li>• Organ Transplants</li> </ul> <p><i>Treating and Preventing Disease</i></p> <ul style="list-style-type: none"> <li>• Antibiotics</li> <li>• Disease Treatment and Control</li> <li>• Food Safety and Salmonella</li> <li>• Vaccination</li> </ul>

LW5 Science and technology contribute to finding solutions to conserving and managing sustainable ecosystems.

Content Descriptor	Lesson Names
<p>a. construct and interpret food chains and food webs, including examples from Australian ecosystems</p> <p>b. describe interactions between organisms in food chains and food webs, including producers, consumers and decomposers (ACSSU112)</p> <p>c. describe examples of beneficial and harmful effects that micro-organisms can have on living things and the environment</p> <p>d. predict how human activities can affect interactions in food chains and food webs, including examples from Australian land or marine ecosystems (ACSSU112)</p> <p>e. explain, using examples, how scientific evidence and/or technological developments contribute to developing solutions to manage the impact of natural events on Australian ecosystems</p> <p>f. describe how scientific knowledge has influenced the development of practices in agriculture, eg animal husbandry or crop cultivation to improve yields and sustainability, or the effect of plant cloning techniques in horticulture</p>	<p><i>Ecosystems</i></p> <ul style="list-style-type: none"> <li>• Ecology</li> <li>• Species vs Organism</li> <li>• Ecosystems</li> <li>• Biotic and Abiotic Factors</li> <li>• Interdependent Relationships</li> <li>• Adaptations</li> <li>• Diurnal vs Nocturnal</li> <li>• Saving the Tasmanian Devil</li> </ul> <p><i>Food Chains and Food Webs</i></p> <ul style="list-style-type: none"> <li>• Food Chains</li> <li>• Predators, Prey and Competition</li> <li>• Food Webs</li> <li>• Decomposers</li> <li>• Consumers</li> <li>• Antarctica</li> </ul> <p><i>Changes in the Environment</i></p> <ul style="list-style-type: none"> <li>• Deforestation</li> <li>• Introduced Species</li> <li>• Cane Toads as an Introduced Species</li> <li>• An Agricultural Affair</li> <li>• Harnessing Fire in Australia</li> <li>• Oil Pollution and Industrial Waste</li> <li>• Pesticides</li> <li>• The Palm Oil Predicament</li> <li>• A Green Utopia</li> <li>• Vertical Garden</li> </ul> <p><i>Human Impacts on Ecosystems</i></p> <ul style="list-style-type: none"> <li>• Australian Bushfires</li> <li>• Climate Change</li> <li>• Ecosystem Conservation</li> <li>• Introduced and Invasive Species</li> <li>• Invasive Species in Australia</li> <li>• Marine Ecosystems and Overfishing</li> <li>• Pollution and Ecosystems</li> <li>• Scientific Methods of Conservation</li> <li>• Species Conservation in Australia</li> <li>• STEM: Alternate Fuels</li> <li>• Sustainable Bush Tucker</li> <li>• Water Pollution and Solutions</li> </ul>

- What is Pollution?

## Additional Content

Content Descriptor	Lesson Names
<p>describe how people in occupations that involve the biological sciences use understanding and skills from across the disciplines of Science</p> <p>debate why society should support biological research</p> <p>design and construct simple keys to identify a range of living things</p> <p>classify, using a hierarchical system, a range of selected plants and animals to species level</p> <p>identify, using an example of an organism or group of organisms, where the classification has changed as a result of new evidence from technological developments, scientific discoveries and/or advances in scientific understanding</p> <p>research the contributions of Australian scientists to the study of human impact on environments and to local environmental management projects</p> <p>discuss how the observations and understanding of the structure, function and life cycles of native plants are used by Aboriginal and Torres Strait Islander Peoples</p>	<p><i>Further development planned</i></p>

## Chemical World

CW1 The properties of the different states of matter can be explained in terms of the motion and arrangement of particles. (ACSSU151)

Content Descriptor	Lesson Names
<p>a. describe the behaviour of matter in terms of particles that are continuously moving and interacting</p> <p>b. relate an increase or decrease in the amount of heat energy possessed by particles to changes in particle movement</p> <p>c. use a simple particle model to predict the effect of adding or removing heat on different states of matter</p> <p>d. relate changes in the physical properties of matter to heat energy and particle movement that occur during observations of evaporation, condensation,</p>	<p><i>Matter Basics and States of Matter</i></p> <ul style="list-style-type: none"> <li>• States of Matter</li> <li>• Particle Model of Matter</li> <li>• Solids</li> <li>• Liquids</li> <li>• Gases</li> <li>• Introduction to Particles</li> </ul> <p><i>Changing States</i></p> <ul style="list-style-type: none"> <li>• Changing States</li> <li>• Melting and Freezing</li> </ul>

boiling, melting and freezing e. explain density in terms of a simple particle model f. identify the benefits and limitations of using models to explain the properties of solids, liquids and gases	<ul style="list-style-type: none"> <li>Boiling, Evaporation and Condensation</li> <li>Sublimation and Deposition</li> <li>Heating and Cooling Curves</li> <li>Energy In Matter</li> <li>What is the Matter?</li> </ul> <p><i>Properties of Matter</i></p> <ul style="list-style-type: none"> <li>Density</li> <li>Mass and Volume</li> <li>Newtonian and Non-Newtonian Fluids</li> <li>Pressure</li> </ul> <p><i>Matter in Technology</i></p> <ul style="list-style-type: none"> <li>Air Conditioners</li> <li>Refrigerators and Refrigerants</li> </ul>
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## CW2 Scientific knowledge and developments in technology have changed our understanding of the structure and properties of matter

Content Descriptor	Lesson Names
a. describe the properties and uses of some common elements, including metals and non-metals b. identify how our understanding of the structure and properties of elements has changed as a result of some technological devices c. identify some examples of common compounds d. explain why internationally recognised symbols are used for common elements e. describe at a particle level the difference between elements, compounds and mixtures, including the type and arrangement of particles (ACSSU152) f. investigate how people in different cultures in the past have applied their knowledge of the properties of elements and compounds to their use in everyday life, eg utensils, weapons and tools	<p><i>Introduction to Elements, Compounds and Mixtures</i></p> <ul style="list-style-type: none"> <li>Introduction to Elements, Compounds and Mixtures</li> </ul> <p><i>Elements</i></p> <ul style="list-style-type: none"> <li>Atoms</li> <li>Elements</li> <li>Metals, Non-Metals and Metalloids</li> <li>First 10 Elements</li> <li>Quiz- First 10 Elements (Name to Symbol)</li> <li>Quiz- First 10 Elements (Symbol to Name)</li> <li>First 10 Elements</li> <li>Identifying Metals, Nonmetals and Metalloids</li> <li>The Periodic Table</li> </ul> <p><i>Compounds and Molecules</i></p> <ul style="list-style-type: none"> <li>Chemical Formulas</li> <li>Molecules</li> <li>Compounds</li> <li>Extension: Chemical Bonding</li> </ul> <p><i>Separating Solutions</i></p> <ul style="list-style-type: none"> <li>Evaporation</li> <li>Distillation</li> <li>Extension: Crystallisation</li> <li>Adsorption</li> </ul>

- Chromatography
- Open-Ended Separation Investigation
- Separating Mixtures

**CW3 Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques. (ACSSU113)**

Content Descriptor	Lesson Names
<p>a. describe the importance of water as a solvent in daily life, industries and the environment</p> <p>b. describe aqueous mixtures in terms of solute, solvent and solution</p> <p>c. relate a range of techniques used to separate the components of some common mixtures to the physical principles involved in each process, including filtration, decantation, evaporation, crystallisation, chromatography and distillation</p> <p>d. investigate the application of a physical separation technique used in everyday situations or industrial processes, eg water filtering, sorting waste materials, extracting pigments or oils from plants, separating blood products or cleaning up oil spills</p> <p>e. research how people in different occupations use understanding and skills from across the disciplines of Science in carrying out separation techniques</p>	<p><i>Mixtures and Substances</i></p> <ul style="list-style-type: none"> <li>• Introduction to Mixtures</li> <li>• Pure and Impure Substances</li> <li>• Graphs and Tables of Mixtures</li> <li>• Identifying Mixtures</li> </ul> <p><i>Solutions</i></p> <ul style="list-style-type: none"> <li>• Solute and Solvent</li> <li>• Concentration</li> <li>• Saturation and Line Graphs</li> </ul> <p><i>Suspensions</i></p> <ul style="list-style-type: none"> <li>• Colloids</li> <li>• Suspensions</li> <li>• Emulsions</li> </ul> <p><i>Separating Suspensions</i></p> <ul style="list-style-type: none"> <li>• Introduction to Separation</li> <li>• Filtration</li> <li>• Centrifuging</li> <li>• Magnetic and Electrostatic Separation</li> </ul>

**CW4 In a chemical change, new substances are formed, which may have specific properties related to their uses in everyday life.**

Content Descriptor	Lesson Names
<p>a. identify when a chemical change is taking place by observing a change in temperature, the appearance of new substances or the disappearance of an original substance</p> <p>b. demonstrate that a chemical change involves substances reacting to form new substances (ACSSU225)</p> <p>c. investigate some examples of chemical change that occur in everyday life, eg photosynthesis,</p>	<ul style="list-style-type: none"> <li>• Physical Properties and Physical Change</li> <li>• Physical Change</li> <li>• Physical Properties</li> <li>• Physical Properties of Metals and Non-Metals</li> </ul> <p><i>Chemical Reactions and Properties</i></p> <ul style="list-style-type: none"> <li>• Chemical Changes</li> <li>• Chemical Reactions</li> <li>• Writing Word Reactions</li> </ul>

<p>respiration and chemical weathering</p> <p>d. compare physical and chemical changes in terms of the arrangement of particles and reversibility of the process</p> <p>e. propose reasons why society should support scientific research, eg in the development of new pharmaceuticals and polymers</p> <p>f. describe, using examples, how science knowledge can develop through collaboration and connecting ideas across the disciplines of science, eg making or obtaining new substances from Earth's spheres (ACSHE223, ACSHE226)</p>	<ul style="list-style-type: none"> <li>• Chemical Properties</li> <li>• Physical and Chemical Changes</li> <li>• Turning Observations Into Facts</li> <li>• Writing Symbol Equations</li> </ul>
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## Additional Content

Content Descriptor	Lesson Names
<p>research how a knowledge of physical properties of natural materials is used by Aboriginal and Torres Strait Islander Peoples in everyday life, eg tools, weapons, utensils, shelter, housing or bush medicine</p> <p>discuss the cost and benefits to society of the development of new materials</p> <p>investigate the nature of mineral crystals</p> <p>outline how some historical developments have contributed to evidence that has advanced our understanding of the particle model of matter</p> <p>investigate how the chemical properties of a substance will affect its use, eg flammability and ability to corrode</p> <p>explain the changes in pressure of gases in terms of increases or decreases in the frequency of particle collisions</p>	<p><i>Mixtures Around Us</i></p> <ul style="list-style-type: none"> <li>• Blood as a Mixture</li> <li>• Indigenous Art using Mixtures</li> <li>• Recycling Sewage</li> <li>• Separation in Food</li> <li>• Separation in Industries</li> <li>• The Cave of the Crystals</li> <li>• The Mystery of Opals</li> <li>• The Zombie Apocalypse Water Shortage</li> <li>• Water Treatment</li> </ul> <p><i>Advances in Chemistry</i></p> <ul style="list-style-type: none"> <li>• Carbon Chemistry</li> <li>• Cosmetics and Chemistry: A Historical Perspective</li> <li>• Discovering Elements</li> <li>• Marie Curie and Radioactivity</li> <li>• Materials Science</li> </ul> <p><i>Chemical Compounds, Properties and Transformations</i></p> <ul style="list-style-type: none"> <li>• Alchemy</li> <li>• By Our Powers Combined</li> <li>• Recycling</li> <li>• Synthetic Materials</li> <li>• Using Substances Based on their Properties</li> <li>• Working In Chemistry</li> </ul>