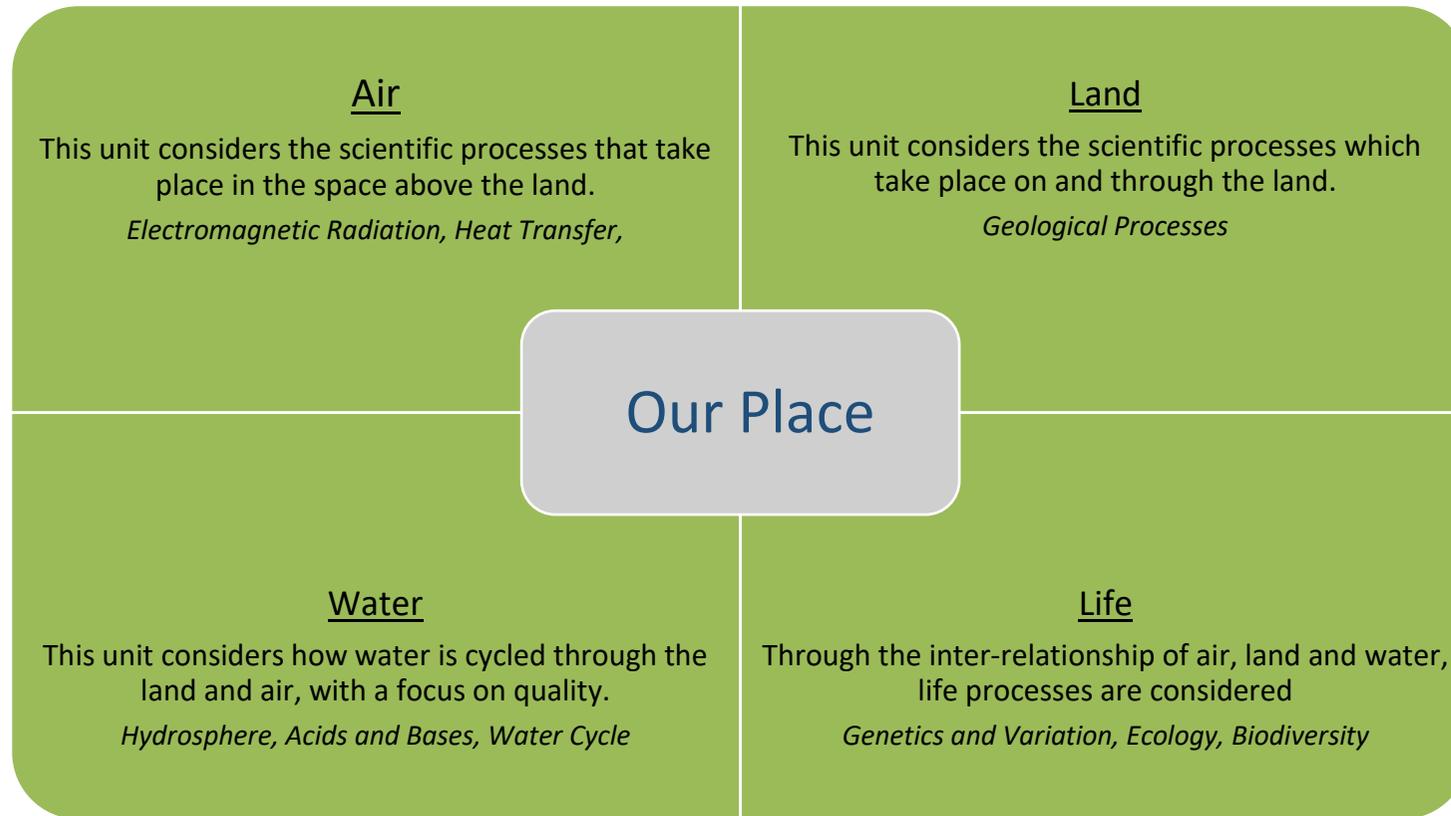


## Science NCEA Level 1 Sample Course Outline 1 - guide to aid teacher planning

### Introduction to this teaching and learning programme

This place-based programme is focused around the local context of Matamata-Piako and Waikato Districts. By developing a closer relationship with the community, students, teachers and schools will connect to the real world applications of science in everyday settings.



		<b>Learning Focus</b> For example theme, unit, topic, big idea	<b>Significant learning comes by weaving together the ways of working and the “content” ideas (the Big ideas about and of Science)</b>		<b>Throughout the year assessment for learning happens often and evidence may be collated for summative assessment.</b>	
			<b>Working scientifically</b>	<b>Knowledge ideas</b>	<b>Learning Activity</b>	<b>Suggested Assessment Opportunities</b>
<b>Term 1</b>	X week	<b>TOPIC: Our Land and Life</b>  Geological Processes: <ul style="list-style-type: none"> <li>• Surface Features</li> <li>• Tectonic Plate Theory</li> <li>• Rocks and Minerals</li> <li>• Mechanical Processes (weathering and erosion)</li> </ul>	Exploring the development of the science ideas we use to understand our land, its formation and its continuously changing surface features. Students learn and apply the attributes of science.  Different investigation approaches are appropriate for answering different questions: in this case classification of rock samples.	Interacting processes within...the geosphere shape and affect the surface and life on Earth.	<u>Explore Case studies:</u>  Wegener – continental drift (preparation for AS 1.3 external)  Joan Wiffen – dinosaur fossils (preparation for AS 1.3 external)  Rock cycle activities	<u>Investigations:</u>  AS 1.1 Rock Samples (Using a classifying approach to investigate)

	X weeks	<p>Nutrient Cycles:</p> <ul style="list-style-type: none"> <li>• Soil Structure</li> <li>• Decomposition of organic material</li> <li>• Carbon and Nitrogen Cycling</li> </ul>	<p>Investigations are used to generate and evaluate knowledge both in science and in mātauranga Pūtaiao (to answer questions). There is no one scientific method. Different investigation approaches are appropriate for answering different questions in this case, how different soils are structured and how they behave in relation to liquids.</p>	<p>Survival of individuals is dependent on interconnected processes ... and on other members of ecosystems.</p> <p>Ecosystems with more biological diversity are more likely to survive environmental changes which can be human induced.</p>	<p>Organic Decomposition - The role of microorganisms and life processes in soil quality.</p> <p>Soil Structures - investigate how our soils are different across the region through water filtration</p>	<p><u>Investigations:</u></p> <p>AS 1.1 Organic Decomposition (Using pattern seeking, observing and exploring)</p> <p>AS 1.1 Powerade through soil (fair test)</p> <p>AS 1.1 Nitrogen Cycling (modelling)</p>
	X weeks	<p>Genetics Structure</p> <ul style="list-style-type: none"> <li>• Structure of DNA</li> <li>• Genetic Inheritance</li> </ul> <p>Biodiversity and Variation</p> <ul style="list-style-type: none"> <li>• Natural selection</li> <li>• Diversity in the environment</li> </ul>	<p>Exploring the development of the science ideas we use to understand DNA and genetic variation. Students learn and apply the attributes of science.</p> <p>Understanding of the language, conventions and processes of DNA and genetic variation provides students with tools to interrogate scientific claims, to evaluate the robustness of science, and to recognise pseudo-science.</p>	<p>DNA is the unit of inheritance and it carries information in a chemical code. Mātauranga pūtaiao recognises the interconnectedness of all life and the importance of life processes.</p> <p>Ecosystems with more biological diversity are more likely to survive environmental changes which can be human induced.</p>	<p><u>Case Studies:</u></p> <p>Discovery of DNA (AS 1.3 ext prep)</p> <p>Human Genome project (AS 1.3 ext prep)</p> <p>Scientific claims about Genetic Modification (AS 1.4 ext prep)</p>	<p><u>Investigations:</u></p> <p>AS 1.1: Light on seedling height and leaf thickness (pattern seeking)</p> <p><u>Engaging:</u></p> <p>AS 1.2: A local issue: Bush Reserve Project</p>

<b>Term 2</b>	X weeks	<p><b>TOPIC: Our Air and Life</b></p> <p>Atmosphere:</p> <ul style="list-style-type: none"> <li>Atomic Structure</li> <li>Bonding and Molecules</li> <li>Nature of matter - gases, diffusion, density,</li> </ul>	<p>By understanding how scientific knowledge has developed, extended, and changed over time, learners can appreciate how science and mātauranga Pūtaiao operate and can use appropriate tools in their own science practice.</p>	<p>Properties of substances observable at the macroscopic level can be explained by, but are different from, the structures of atoms and molecules and the interactions between them.</p> <p>Rearrangements of matter (chemical reactions) can be observed at the macroscopic level and involve changes at the atomic and sub-atomic level.</p>	<p><u>Case Studies:</u></p> <p>Development of atomic structure (AS 1.3 ext prep)</p>	<p><u>Investigations:</u></p> <p>AS 1.1 Chemical Reactions (pattern seeking)</p>
	X weeks	<p>Energy</p> <ul style="list-style-type: none"> <li>The nature of heat and heat transfer; conduction, convection, radiation</li> </ul>	<p>Science offers a way for students to interpret representations, critique evidence, and communicate knowledge, thus enabling their active participation in society</p>	<p>Heat energy transfers from regions of relative warmth to colder regions.</p> <p>Wave motion transfers energy without transferring matter.</p>	<p><u>Case Studies:</u></p> <p>Scientific claim: Global Warming (AS 1.4 ext prep)</p> <p>How do we make food safe through heat transfer (AS 1.3 prep)</p> <p>Scientific claim: Insulation in our home (AS 1.4 ext prep)</p>	<p><u>Investigations:</u></p> <p>AS 1.1 Heat Capacity of different substances (fair test)</p>
	X weeks	<p>Sound Waves</p> <p>Electromagnetic Spectrum</p> <ul style="list-style-type: none"> <li>Nature of fields</li> <li>Propagation of Energy (waves and light)</li> </ul>	<p>Developments in culture, history, technology, and philosophical viewpoints have changed what science can explain.</p>	<p>Wave motion transfers energy without transferring matter.</p>	<p><u>Case Studies:</u></p> <p>Science Claim: Cell tower radiation ( AS 1.4 ext prep)</p> <p>Animals and Sonar (AS 1.3 ext prep)</p> <p>Development of telecommunications (AS 1.3 ext prep)</p>	<p><u>Investigations:</u></p> <p>AS 1.1 Interference of Wifi signals (pattern seeking)</p> <p><b><i>External Assessment</i></b></p> <p><b><i>AS 1.3 – Describe attributes of Science that contribute to the development of scientific ideas and processes, 5cr</i></b></p>

Term 3	X weeks	<p><b>TOPIC: Our Water and Life</b></p> <p>Water Cycle</p> <ul style="list-style-type: none"> <li>hydrological cycle</li> </ul>	<p>Different investigation approaches are appropriate for answering different questions.</p> <p>Science ideas are presented in different ways depending on whether they are communicated to other scientists or to the public.</p>	<p>Interacting processes within and between the hydrosphere, biosphere, atmosphere, and geosphere shape and affect the surface, the climate, and life on Earth.</p>	<p><u>Case Studies:</u></p> <p>Scientific Claim: Is bottled water better? (AS 1.4 ext prep)</p>	<p><u>Investigations:</u></p> <p>AS 1.1 What is left behind when I boil this water? (observing and exploration)</p>
	X weeks	<p>Acids and Bases</p> <ul style="list-style-type: none"> <li>pH and nature of acids and bases</li> <li>Neutralisation</li> </ul> <p>Chemical reactions</p> <ul style="list-style-type: none"> <li>formation of ionic compounds</li> </ul>	<p>Science and mātauranga Pūtaiao involve particular processes and ways of developing and organising knowledge, and these continue to evolve.</p>	<p>Rearrangements of matter (chemical reactions) can be observed at the macroscopic level and involve changes at the atomic and sub-atomic level.</p>	<p><u>Case Studies:</u></p> <p>Scientific claims: Does Neutral mean safe? (AS 1.4 ext prep)</p>	<p><u>Investigations:</u></p> <p>AS 1.1 Chemical Reactions (pattern seeking)</p>
	X weeks	<p>Fresh Water Quality in our region</p>	<p>Students will bring their own world view, experiences, and knowledge while building new capabilities such as disciplinary meaning making, perspective taking, and critical inquiry to develop evidence-based opinions, and respond to socio-scientific issues.</p>		<p><u>Case Study:</u></p> <p>A local issue: (for AS 1.2 int)</p>	<p><b><i>Submission AS 1.1 – Investigations (Internally assessed collection of work), 5cr</i></b></p> <p><b><i>Submission AS 1.2 – Engaging in a SSI (Internally assessed report), 5cr</i></b></p>
Term 4	3 weeks	<p><u>External Assessment</u></p> <p>Preparation for AS 1.4 External</p>				<p><b><i>External assessment</i></b></p> <p><b><i>AS 1.4 – Communicating (external exam), 5cr</i></b></p>

## Assessment Matrix

AS	Title	Int/Ext Credits	Assessment Type and Date	Assessment Elements
1.1	Use a range of scientific investigative approaches.	Int, 5cr	Collection of investigations and final comparison activity, End of Term 3	Choose 3 across the range from: 1. Rock Samples (classification) 2. Organic Decomposition (pattern seeking, observing and exploring) 3. Powerade through soil (fair test) 4. Nitrogen Cycling (modelling) 5. Light on seedling height and leaf thickness (pattern seeking) 6. Chemical Reactions (pattern seeking) 7. Heat Capacity of different substances (fair test) 8. Interference of Wifi signals (pattern seeking) 9. What is left behind when I boil this water? (observing and exploration)
1.2	Engage with a socio-scientific issue.	Int, 5cr	Report completed, Late Term 3	<u>Choose 1 from:</u> 1. Bush Reserve Project 2. Living next to a quarry 3. Can we swim in the creek?
1.3	Describe attributes of Science that contribute to the development of scientific ideas and processes.	Ext, 5cr	External - Common assessment Activity (NZQA) End of Term 2	<u>Formative Opportunities</u> <i>Wegener – continental drift</i> <i>Joan Wiffen – dinosaur fossils</i> <i>Discovery of DNA</i> <i>Human Genome project</i> <i>Development of atomic structure</i> <i>How do we make food safe through heat transfer</i> <i>Animals and Sonar</i> <i>Development of telecommunications</i>
1.4	Interpret scientific claims in communicated information.	Ext, 5cr	External - Common assessment activity (NZQA) Late Term 4	<u>Formative Opportunities</u> <i>Scientific claims about Genetic Modification</i> <i>Global Warming</i> <i>Insulation in our home</i> <i>Cell tower radiation</i> <i>Is bottled water better?</i> <i>Does neutral mean safe?</i>