

## Mapping tool – preamble for Science

This mapping tool matches essential content elements from two curriculum frameworks: *Every chance to learn* ELA 19, ELA 2 and ELA 20 to the Australian Curriculum (Science) V1.1. Teachers using this tool are reminded to consider the underlying principles and philosophy as well.

The **Overview** of each ELA in *Every chance to learn* discusses the scope, features, concepts, values and attitudes of

- ELA 19 *The student understands and applies scientific knowledge*
- ELA 2 *The student understands and applies the inquiry process*
- ELA 20 *The student acts for an environmentally sustainable future*

The **Rationale** of the Australian Curriculum (Science) reminds readers that the interrelated strands have different intentions:

- The *Science Understanding* strand refers to *the facts, concepts, laws theories and models that have been established by scientists over time.*
- The *Science as a Human Endeavour* strand *highlights the development of science as a unique way of knowing and doing, and the role of science in contemporary decision making and problem solving.*
- The *Science Inquiry Skills* strand outlines the process of working scientifically.

As Sustainability is a cross-curriculum priority, the elaborations of all phase 1 learning areas provide examples of how sustainability may be embedded within content.

Given that the documents are differently organised, the similarity of some essential content in both documents may appear superficial. These types of matches have been identified using a paler font colour.

Further information can be inferred from

- **strand** and **sub-stand** headings
- opening **hyperlinked codes** to the Australian Curriculum, and pasting them into the 'search' function to identify content elaborations, general capabilities and links to cross-curriculum priorities.

## Science – Later Adolescence

| Every chance to learn  |  | Australian Curriculum  |  |
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| 19. The student understands and applies scientific knowledge |  | AC Strand/s  |  |
|  |  | SU = science understanding SHE = Science as a Human Endeavour SIS = Science Inquiry Skills   |  |
|  |  | Year 9   | Year 10  |
| <b>19.LA.1</b>   | current issues that involve implications of research or applications of science (e.g. Human Genome project)  | •  | •  |
| <b>19.LA.2</b>   | instances in which progress in science can be affected by and influence social issues and priorities (e.g. water purification, alternative energy sources, space exploration, ethics of biotechnology) | <ul style="list-style-type: none"> <li>• <b>Use and influence of science</b><br/>(ACSHE228)<br/>The values and needs of contemporary society can influence the focus of scientific research</li> </ul>   | <ul style="list-style-type: none"> <li>• <b>Use and influence of science</b><br/>(ACSHE230)<br/>The values and needs of contemporary society can influence the focus of scientific research</li> </ul>   |
| <b>19.LA.3</b>   | scientific advances that challenged understandings and practices in science and everyday life (e.g. causes of disease)   | <ul style="list-style-type: none"> <li>• <b>Nature and development of science</b><br/>(ACSHE157)<br/>Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Nature and development of science</b><br/>(ACSHE191)<br/>Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community</li> </ul> |

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| <p><b>19.LA.4</b></p> | <p>how contemporary scientists often draw on concepts and processes across scientific disciplines in multi-disciplinary teams and how science can provide rewarding careers</p>          | <ul style="list-style-type: none"> <li>• <b>Use and influence of science</b></li> </ul> <p>(ACSHE158)<br/> Advances in science and emerging sciences and technologies can significantly affect people's lives including generating new career opportunities</p> | <ul style="list-style-type: none"> <li>• <b>Use and influence of science</b></li> </ul> <p>(ACSHE195)<br/> Advances in science and emerging sciences and technologies can significantly affect people's lives including generating new career opportunities</p> |
| <p><b>19.LA.5</b></p> | <p>how people of diverse cultures have contributed to and shaped the development of science</p>  | <ul style="list-style-type: none"> <li>•</li> </ul>   | <ul style="list-style-type: none"> <li>•</li> </ul>   |
| <p><b>19.LA.6</b></p> | <p>effects of several forces on the motion and energy of objects</p>   |   | <ul style="list-style-type: none"> <li>• <b>Physical sciences</b></li> </ul> <p>(ACSSU229)<br/> The motion of objects can be described and predicted using the laws of physics</p>  |
| <p><b>19.LA.7</b></p> | <p>how and why the movement of energy (e.g. light and sound) varies according to the medium through which it moves and conservation of energy when it is transformed and transferred</p> | <ul style="list-style-type: none"> <li>• <b>Physical sciences</b></li> </ul> <p>(ACSSU182)<br/> Forms of energy can be transferred in a variety of ways through different mediums</p>   | <ul style="list-style-type: none"> <li>• <b>Physical sciences</b></li> </ul> <p>(ACSSU190)<br/> Energy conservation in a system can be explained by describing energy transfers and transformations</p>   |

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| <p><b>19.LA.8</b></p>  | <p>scientific models and terms to explain the properties of materials, the changes materials undergo and the conservation of matter</p>           | <ul style="list-style-type: none"> <li>•</li> </ul>   | <ul style="list-style-type: none"> <li>•</li> </ul>   |
| <p><b>19.LA.9</b></p>  | <p>explanations of physical and chemical changes in terms of types and arrangements of particles (e.g. atoms, molecules, elements, compounds)</p> | <ul style="list-style-type: none"> <li>• <b>Chemical sciences</b></li> </ul> <p>(ACSSU177)<br/>All matter is made of atoms which are composed of protons, neutrons and electrons; natural radioactivity arises from the decay of nuclei in atoms</p> <p>(ACSSU178)<br/>Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed</p> | <ul style="list-style-type: none"> <li>• <b>Chemical sciences</b></li> </ul> <p>(ACSSU186)<br/>The atomic structure and properties of elements are used to organise them in the Periodic Table</p>                |
| <p><b>19.LA.10</b></p> | <p>factors that affect chemical changes (e.g. factors that affect rate) and applications in everyday situations</p>                               |   | <ul style="list-style-type: none"> <li>• <b>Chemical sciences</b></li> </ul> <p>(ACSSU187)<br/>Different types of chemical reactions are used to produce a range of products and can occur at different rates</p> |
| <p><b>19.LA.11</b></p> | <p>how an organism's body systems interact to meet its needs</p>  | <ul style="list-style-type: none"> <li>• <b>Biological sciences</b></li> </ul> <p>(ACSSU175)<br/>Multi-cellular organisms rely on coordinated and interdependent internal systems to respond to changes to their environment</p>  | <ul style="list-style-type: none"> <li>•</li> </ul>   |

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| <p><b>19.LA.12</b></p> | <p>the theory of evolution by natural selection to explain the diversity of living things and how inherited characteristics are passed from parent to offspring</p>              | <ul style="list-style-type: none"> <li>•</li> </ul>  | <ul style="list-style-type: none"> <li>• <b>Biological sciences</b></li> </ul> <p>(ACSSU184)<br/>The transmission of heritable characteristics from one generation to the next involves DNA and genes</p> <p>(ACSSU185)<br/>The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence</p> |
| <p><b>19.LA.13</b></p> | <p>scientific concepts and models to explain the interdependence of populations of organisms and the environment, and to predict the consequences of changes to an ecosystem</p> | <ul style="list-style-type: none"> <li>• <b>Biological sciences</b></li> </ul> <p>(ACSSU176)<br/>Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems</p> |   |
| <p><b>19.LA.14</b></p> | <p>scientific theories of the origin of the universe</p>   | <ul style="list-style-type: none"> <li>•</li> </ul>  | <ul style="list-style-type: none"> <li>• <b>Earth and space sciences</b></li> </ul> <p>(ACSSU188)<br/>The universe contains features including galaxies, stars and solar systems and the Big Bang theory can be used to explain the origin the universe</p>   |
| <p><b>19.LA.15</b></p> | <p>the theory of plate tectonics to explain global patterns of geological activity (e.g. earthquake and volcanic zones)</p>  | <ul style="list-style-type: none"> <li>• <b>Earth and space sciences</b></li> </ul> <p>(ACSSU180)<br/>The theory of plate tectonics explains global patterns of geological activity and continental movement</p>   |   |

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| <b>19.LA.16</b> | causes and consequences of global atmospheric changes resulting from natural and human activity (e.g. climate change)   | • | <ul style="list-style-type: none"> <li>• <b>Earth and space sciences</b></li> </ul> <p>(ACSSU189)<br/>Global systems, including the carbon cycle, rely on interactions involving the biosphere, lithosphere, hydrosphere and atmosphere</p> |
| <b>19.LA.17</b> | examine, question and consider scientific ideas, concepts and theories  | • | •   |
| <b>19.LA.18</b> | analyse and synthesise information, and use scientific models and terms to explain properties and interrelationships and to predict change in phenomena and systems   | • | •   |
| <b>19.LA.19</b> | apply scientific knowledge in exploring and constructing views around ethical and social issues relating to science (e.g. genetic modification, stem cell research, animal testing of products, nuclear energy) | • | •   |

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| <b>19.LA.20</b>  | select laboratory equipment appropriate to an investigation and use it safely and correctly  | <ul style="list-style-type: none"> <li><b>Planning and conducting</b></li> </ul> (AC SIS166)<br>Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data | <ul style="list-style-type: none"> <li><b>Planning and conducting</b></li> </ul> (AC SIS200)<br>Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data |
| NEW MATERIAL   | <ul style="list-style-type: none"> <li><b>Chemical sciences</b></li> </ul> (AC SSU179)<br>Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer | ]  |  |
| <b>Every chance to learn</b>                               | <b>Australian Curriculum</b>   |  |  |
| 2. The student understands and applies the inquiry process | <b>AC Strand/s</b>   |  |  |
|  | SU = science understanding SHE = Science as a Human Endeavour SIS = Science Inquiry Skills   |  |  |
|  | <b>Year 9</b>  | <b>Year 10</b>   |  |
| <b>2.LA.1</b>  | understand the possibility of multiple perspectives and partial explanations of phenomena being investigated   | <ul style="list-style-type: none"> <li><b>Use and influence of science</b></li> </ul> (AC SHE160)<br>People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions            | <ul style="list-style-type: none"> <li><b>Use and influence of science</b></li> </ul> (AC SHE194)<br>People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions            |
| <b>2.LA.2</b>  | understand the nature of a controlled experiment and when it might be necessary to conduct one   | <ul style="list-style-type: none"> <li></li> </ul>   | <ul style="list-style-type: none"> <li></li> </ul>   |

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| <p><b>2.LA.3</b></p> | <p>formulate questions, hypotheses, propositions and conjecture suitable for testing or investigation in relevant disciplines and frame these to clarify the purpose and scope of the inquiry</p>   | <ul style="list-style-type: none"> <li>• <b>Questioning and predicting</b></li> </ul> <p>(AC SIS164)<br/>Formulate questions or hypotheses that can be investigated scientifically</p> | <ul style="list-style-type: none"> <li>• <b>Questioning and predicting</b></li> </ul> <p>(AC SIS198)<br/>Formulate questions or hypotheses that can be investigated scientifically</p> |
| <p><b>2.LA.4</b></p> | <p>compare and select suitable models or inquiry forms, prepare plans for managing and monitoring investigations (e.g. level of collaboration and allocation of tasks) and record any adjustments to their plans (e.g. using an inquiry journal, spreadsheet or flow chart)</p> | <ul style="list-style-type: none"> <li>•</li> </ul>  | <ul style="list-style-type: none"> <li>•</li> </ul>  |
| <p><b>2.LA.5</b></p> | <p>identify key features of the context for investigation (e.g. concepts, assumptions, conditions, variables, principles of fair testing, level of precision required)</p>  | <ul style="list-style-type: none"> <li>•</li> </ul>  | <ul style="list-style-type: none"> <li>•</li> </ul>  |

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| <p><b>2.LA.6</b></p> | <p>decide on the most suitable methods, including safe use of equipment and selection of suitable technologies, for collecting, managing and analysing data and information, and for communicating findings</p>  | <ul style="list-style-type: none"> <li>• <b>Planning and conducting</b></li> </ul> <p>(AC SIS165)<br/> Plan, select and use appropriate investigation methods, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods</p> | <ul style="list-style-type: none"> <li>• <b>Planning and conducting</b></li> </ul> <p>(AC SIS199)<br/> Plan, select and use appropriate investigation methods, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods</p> |
| <p><b>2.LA.7</b></p> | <p>identify sources and collect data and information in systematic ways to improve reliability (e.g. use refined searches to locate a range of relevant sources, control variables, use repeat trials and replication of experiments with appropriate sample sizes, seek counter-examples or explore proofs to verify truth of propositions)</p> | <ul style="list-style-type: none"> <li>• <b>Evaluating</b></li> </ul> <p>(AC SIS172)<br/> Critically analyse the validity of information in secondary sources and evaluate the approaches used to solve problems</p>   | <ul style="list-style-type: none"> <li>• <b>Evaluating</b></li> </ul> <p>(AC SIS172)<br/> Critically analyse the validity of information in secondary sources and evaluate the approaches used to solve problems</p>   |
| <p><b>2.LA.8</b></p> | <p>manage and organise data and information in ways that assist in their interpretation, analysis and synthesis</p>  | <ul style="list-style-type: none"> <li>•</li> </ul>  | <ul style="list-style-type: none"> <li>•</li> </ul>  |

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| <b>2.LA.9</b>  | routinely evaluate data and information and their sources for accuracy, relevance, reliability, completeness, authenticity and credibility | <ul style="list-style-type: none"> <li>• <b>Evaluating</b></li> </ul> <p>(AC SIS171)<br/>Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data</p>                              | <ul style="list-style-type: none"> <li>• <b>Evaluating</b></li> </ul> <p>(AC SIS171)<br/>Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data</p>                              |
| <b>2.LA.10</b> | explain trends, patterns, relationships and discrepancies in data and information  | <ul style="list-style-type: none"> <li>• <b>Processing and analysing data and information</b></li> </ul> <p>(AC SIS169)<br/>Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies</p>   | <ul style="list-style-type: none"> <li>• <b>Processing and analysing data and information</b></li> </ul> <p>(AC SIS169)<br/>Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies</p>   |
| <b>2.LA.11</b> | draw conclusions that are consistent with the data or information and provide evidence or supporting details                               | <ul style="list-style-type: none"> <li>• <b>Processing and analysing data and information</b></li> </ul> <p>(AC SIS170)<br/>Use knowledge of scientific concepts to draw conclusions that are consistent with evidence</p>  | <ul style="list-style-type: none"> <li>• <b>Processing and analysing data and information</b></li> </ul> <p>(AC SIS170)<br/>Use knowledge of scientific concepts to draw conclusions that are consistent with evidence</p>  |
| <b>2.LA.12</b> | apply mathematical skills and logical processes to make deductions, and to verify and generalise their reasoning                           | <ul style="list-style-type: none"> <li>•</li> </ul>   | <ul style="list-style-type: none"> <li>•</li> </ul>   |
| <b>2.LA.13</b> | present and discuss their investigation using appropriate representations, conventions and terminology specific to the discipline          | <ul style="list-style-type: none"> <li>• <b>Communicating</b></li> </ul> <p>(AC SIS174)<br/>Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations</p> | <ul style="list-style-type: none"> <li>• <b>Communicating</b></li> </ul> <p>(AC SIS174)<br/>Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations</p> |

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| <b>2.LA.14</b> | evaluate methodologies, reasoning and conclusions, and discuss specific improvements to their investigation or ways to conduct further investigations | <ul style="list-style-type: none"><li>•</li></ul> | <ul style="list-style-type: none"><li>•</li></ul> |
| <b>2.LA.15</b> | document sources of information using reference lists, in-text referencing and captions on images, tables and figures                                 | <ul style="list-style-type: none"><li>•</li></ul> | <ul style="list-style-type: none"><li>•</li></ul> |
| <b>2.LA.16</b> | relate their own investigative experiences to the way in which experts in the discipline use evidence to modify explanations and models.              | <ul style="list-style-type: none"><li>•</li></ul> | <ul style="list-style-type: none"><li>•</li></ul> |

| Every chance to learn  |  | Australian Curriculum  |         |
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| 20. The student acts for an environmentally sustainable future |  | AC Strand/s  |         |
|  |  | SU = science understanding SHE = Science as a Human Endeavour SIS = Science Inquiry Skills |         |
|  |  | Year 9   | Year 10 |
| <b>20.LA.1</b>   | key concepts used in contemporary information and debates about environmental sustainability (e.g. biodiversity, carrying capacity, ecological footprint, preservation, conservation, wilderness, heritage, sustainable development) | •  | •       |
| <b>20.LA.2</b>   | events that have significant effects on regional or global ecosystems and their related environmental, social or economic consequences (e.g. drought, cyclones, bushfires, earthquakes, El Nino, climate change)                     | •  | •       |

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| <b>20.LA.3</b> | how environmental decision-making often involves dealing with conflicting values and interests of different individuals or groups (e.g. preservation of wilderness, development of non-renewable and renewable resources) | • | • |
| <b>20.LA.4</b> | how people's views on the environment influence government policy and non-government organisations, and the ways in which governments attempt to address issues of development and sustainability                         | • | • |

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| <p><b>20.LA.5</b></p> | <p>apply relevant scientific understandings to form personal views and make responsible and informed decisions about issues concerning sustainability (e.g. salinity, nuclear energy production, land degradation)</p> | <ul style="list-style-type: none"> <li>•</li> </ul> | <ul style="list-style-type: none"> <li>•</li> </ul> |
| <p><b>20.LA.6</b></p> | <p>consider and explain their own decisions about lifestyle choices and participation in social actions for environmental sustainability</p>   | <ul style="list-style-type: none"> <li>•</li> </ul> | <ul style="list-style-type: none"> <li>•</li> </ul> |
| <p><b>20.LA.7</b></p> | <p>examine examples of individual and global actions to create sustainable futures, assess the strengths and limitations of these, and propose further appropriate actions</p>   | <ul style="list-style-type: none"> <li>•</li> </ul> | <ul style="list-style-type: none"> <li>•</li> </ul> |