Purpose of the literacy and numeracy progressions

The purpose and intent of the progressions are to provide a tool to:

- locate the literacy and numeracy development of students
- plan for student progress in literacy and numeracy
- facilitate shared professional understanding of literacy and numeracy development
- support a whole school approach to literacy and numeracy development.

Literacy and numeracy in the learning areas

The learning areas provide rich opportunities for extending and enriching literacy and numeracy. To effectively plan for differentiated teaching of literacy and numeracy in the learning areas, teachers draw on their knowledge of the Australian Curriculum and their knowledge of their students. Recognising that students learn at different rates, the progressions provide a continuum for teachers to identify and build on students' literacy and numeracy skills. The intention is that students will develop their literacy and numeracy expertise purposefully, in meaningful contexts.

Using this advice and the progressions to plan for student progress in literacy and numeracy

This advice illustrates how the progressions can be used in Science to support student progress in literacy and numeracy. This advice:

- identifies the sub-elements of the progressions that are most relevant to studying Science
- identifies some aspects of an achievement standard that include literacy or numeracy demands
- lists some relevant indicators at one or more levels of the progressions to illustrate how the progressions might be unpacked to support student progress in literacy and numeracy in the study of Science.

Figure 1 illustrates how the progressions are to be used by teachers to identify where students are at on the literacy and numeracy continuum and plan for their ongoing progression within the learning areas. Therefore, this advice can support use of the progressions in developing explicit and targeted programs to ensure students are able to access discipline-specific knowledge, concepts, understanding and skills. While advice is provided on the most relevant sub-elements of each progression for the discipline of Science, whole school planning may address other sub-elements to progress students' literacy and numeracy.

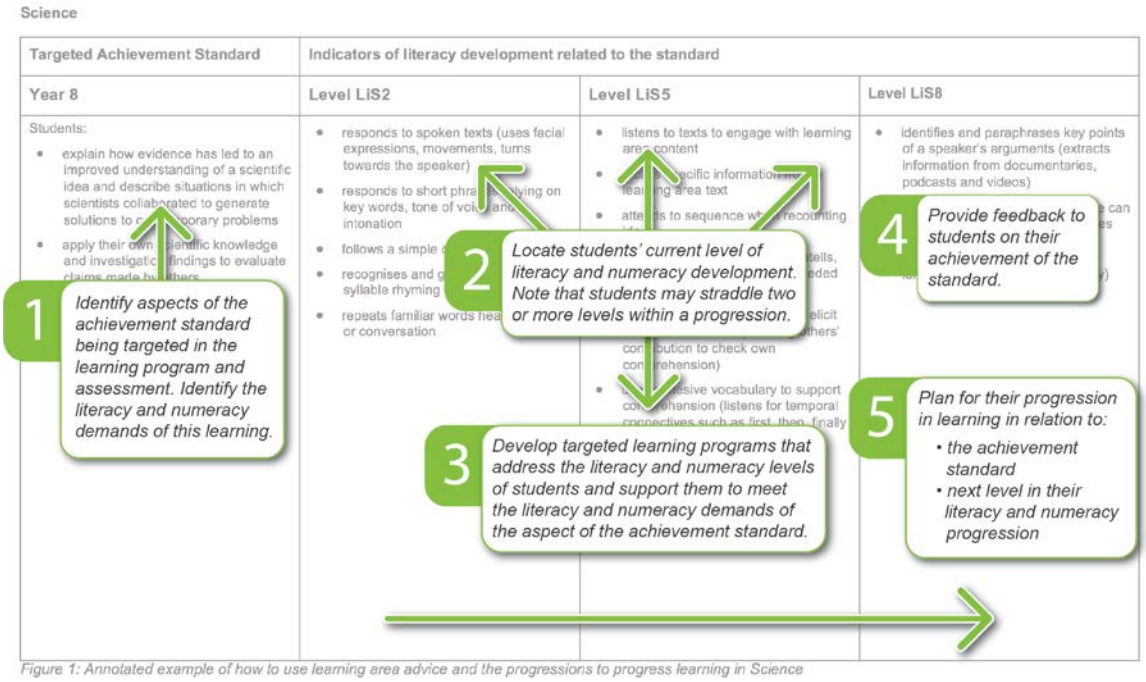

Figure 1: Annotated example of how to use learning area advice and the progressions to progress learning in Science

Literacy in Science

Students develop literacy capability in Science as they explore and investigate the world. They are required to comprehend and compose texts including those that provide information, describe events and phenomena, recount experiments, present and evaluate data, give explanations and present opinions or claims.

By learning the literacy of science, students understand that language varies according to context and they increase their ability to use language flexibly. Scientific vocabulary is often technical and includes specific terms for concepts and features of the world, as well as terms that encapsulate an entire process in a single word, such as 'photosynthesis'. Language is therefore essential in providing the link between the concept itself and student understanding and for assessing whether the student has understood the concept.

Using the literacy progression to support students in Science

The most relevant sub-elements of the literacy progression for Science are *Listening, Interacting, Speaking, Understanding texts,* and *Creating texts*. These sub-elements are essential for students to develop discipline-specific knowledge, understanding and skills and to demonstrate the learning described in the Science achievement standards. The following descriptions of the role of each sub-element in Science are organised by productive and receptive modes:

Receptive – *Listening and Understanding texts*

Productive – *Interacting, Speaking and Creating Texts*

Receptive Modes

Listening and Understanding texts

These sub-elements involve students using skills and strategies to access and interpret spoken, audio, written, visual and multimodal texts. In the study of Science, students are required to comprehend, interpret, analyse and evaluate primary and secondary sources. This includes employing listening and reading processes to access and understand the increasingly sophisticated language structures of texts. Listening skills are also required when students engage in classroom conversations, discussions and debates.

Texts in Science are wide ranging and include news and magazine articles, reports, diagrams, videos, simulations and models. Engaging with these texts helps students to understand how the world works. They are also required to evaluate these texts and recognise how language and images can be used to make and manipulate meaning.

Listening

Targeted Achievement Standard	**Examples of how indicators relate to the AC standard.** *Individual student literacy may be at different levels of the progression as indicated in Figure 1.*
Year 8	**Level LiS8**
Students: • explain how evidence has led to an improved understanding of a scientific idea and describe situations in which scientists collaborated to generate solutions to contemporary problems • apply their own scientific knowledge and investigation findings to evaluate claims made by others.	• identifies and paraphrases key points of a speaker's arguments (extracts information from documentaries, podcasts and videos) • identifies how speakers' language can be inclusive or alienating (identifies the use of scientific language to increase credibility or everyday language to increase accessibility)

Understanding texts

Targeted Achievement Standard	**Examples of how indicators relate to the AC standard.** *Individual student literacy may be at different levels of the progression as indicated in Figure 1.*
Year 10	**Level UnT11**
Students: • evaluate the evidence for scientific theories that explain the origin of the universe and the diversity of life on Earth • analyse how the models and theories they use have developed over time and discuss the factors that prompted their review • evaluate the validity and reliability of claims made in secondary sources with	**Comprehension** • reads and views sophisticated texts (sources that employ sophisticated language and structural features, multimodal features, technical vocabulary and Science-specific content) • analyses the credibility and validity of primary and secondary sources (analyses information in different texts for reliability and omission and takes account of origin, purpose and context)

Targeted Achievement Standard	Examples of how indicators relate to the AC standard. *Individual student literacy may be at different levels of the progression as indicated in Figure 1.*
Year 10	**Level UnT11**
reference to currently held scientific views, the quality of the methodology and the evidence cited.	• analyses bias in texts (determines the validity and relevance of the evidence of a claim, the limitations of a conclusion) • explains assumptions, beliefs and implicit values in texts (identifies and describes points of ideology and world view, attitudes and values in sources, referring to the place, time, audience and purpose) **Processes** • navigates digital texts to efficiently locate precise information that supports the development of new understandings • identifies contradictions and inconsistencies in texts • identifies relevant and irrelevant information in texts • judiciously selects and synthesises evidence from multiple texts to support ideas or arguments **Vocabulary** • interprets complex, formal, impersonal language in academic texts (primary and secondary sources)

Productive modes

Interacting, Speaking and Creating texts

These sub-elements involve students composing different types of texts for a range of purposes (see Table 2). These texts include spoken, written, visual and multimodal texts, such as charts, graphs, diagrams, pictures, maps, simulations, models and visual media. The Interacting and Speaking indicators involve students creating formal and informal texts as part of classroom learning experiences including group and class discussions, talk that explores and investigates learning area topics, and formal and informal presentations and debates.

Refer to the Grammar indicators for guidance on how grammar can support students to produce effective texts.

Table 2: Text types and purpose of the range of texts students may develop in Years 7-10 Science[1]

Broad text purpose	Text type family	Text type	Purpose
Informative	Procedural	Procedure	to instruct someone how to do something, through a series of steps, such as an experiment (active voice)
		Protocol	to list conditions under which something is to be done, for example, safety considerations in for an experiment (active voice)
		Procedural recount/design	to record steps taken to carry out an investigation, such as an experiment or data collection (passive voice)
	Chronicling	Factual recount	to document a sequence of events to record what happened such as timelines, observations from a field trip or excursion
	Reporting	Factual description	to describe the characteristic features of an object or a process
		Descriptive report	to describe and provide generalised information about a phenomenon, model or concept
		Classifying report	to describe the common and discerning characteristics of classes of things, such as the classification of living things

[1] Adapted from Humphrey, S, Droga, L & Feez, S 2012, *Grammar and Meaning*, Primary English Teaching Association Australia, Newtown, NSW.

Broad text purpose	Text type family	Text type	Purpose
	Explaining	Sequential explanation	to explain in a sequence the phases of a process to show how the process occurs, such as the processes of rock formation
		Causal explanation	to explain why a process occurs, including cause and effect
		Factorial explanation	to explain the multiple causes of one effect
		Consequential explanation	to explain the multiple effects of one cause
Persuasive	Persuading	Exposition (analytical)	to argue for a particular point of view substantiated with evidence (persuading that)
		Exposition (hortatory)	to argue that a particular action should be taken (persuading to)
		Discussion	to discuss two or more points of view or a range of perspectives on an issue before making a judgement or recommendation
		Challenge	to argue against a point of view

Interacting

Targeted Achievement Standard	**Examples of how indicators relate to the AC standard.** *Individual student literacy may be at different levels of the progression as indicated in Figure 1.*
Year 7	**InT7**
Students: • identify questions that can be investigated scientifically	• synthesises ideas from group discussion into a common theme or hypothesis • poses problems, hypotheses and formulates questions about abstract ideas in group situations
• plan fair experimental methods, identifying variables to be changed and measured	• restates different views and makes suggestions to negotiate agreement • asks questions to clarify assumptions made by the speaker
• draw on evidence to support their conclusions • describe trends and refer to the quality of their data when suggesting improvements to their methods	• questions others to evaluate accuracy of thinking or problem-solving processes
• communicate their ideas, methods and findings using scientific language and appropriate representations.	• interacts with school or the broader community, adjusting language and responses to suit purpose and audience

Speaking

Targeted Achievement Standard	**Examples of how indicators relate to the AC standard.** *Individual student literacy may be at different levels of the progression as indicated in Figure 1.*
Year 9	**SpK6**
Students: • explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions • describe social and technological factors that have influenced scientific developments and predict how future applications of science and technology may affect people's lives • evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.	**Vocabulary** • uses technical vocabulary to demonstrate topic knowledge (radioactivity, isotope)
	SpK9
	• speaks on topics which explore issues drawn from research or learning area content • includes a range of alternative viewpoints in spoken texts, where appropriate • controls and manipulates a sophisticated range of language features to affect the audience • references and quotes authorities or statistics to add authority (according to a recent ANSTO report) • delivers spoken text flexibly, allowing for questions and maintaining the flow of ideas

Creating texts

Targeted Achievement Standard	**Examples of how indicators relate to the AC standard.** *Individual student literacy may be at different levels of the progression as indicated in Figure 1.*	
	Informative texts	**Persuasive texts**
Year 8	**CrT10**	**CrT10**
Students: • analyse the relationship between structure and function at cell, organ and body system levels • use appropriate language and representations to communicate science ideas, methods and findings in a range of text types • apply their own scientific knowledge and investigation findings to evaluate claims made by others.	**Crafting ideas** • writes to explain and analyse (analyses how the structure of biological features relates to their functions) • writes to compare and contrast phenomena (identifies the similarities and differences between cells, organs and body systems) • orients the reader to the topic or concept (uses a definition or classification in the opening paragraph) • intentionally selects structural elements for effect (includes an appropriate conclusion that summarises, restates or synthesises) • uses evidence and research including multimodal resources to expand upon information and concepts and add authority **Text forms and features** • uses more elaborate noun groups that include classifying adjectives and specific nouns (mineral component of sedimentary rocks) • uses passive voice and nominalisation strategically (analysis of results was conducted) **Vocabulary** • uses discipline-specific terminology to provide accurate and explicit information (sedimentary, igneous and metamorphic rocks)	**Crafting ideas** • writes to discuss, evaluate and review (evaluates and reviews experimental methods and results) • includes persuasive points with effective elaborations and supporting evidence (uses change of colour as evidence for a chemical reaction) • uses multimodal resources to add impact to written text (graphs, diagrams, interactive models) • includes counterargument or refutation if appropriate **Text forms and features** • uses research including multimodal resources to add authority • skilfully uses a range of cohesive devices to makes connections between arguments (foreshadows key points in introduction and reinforces key points in topic sentences) • judiciously selects evidence and language to strengthen arguments • uses passive voice and nominalisation strategically (transformation of energy was observed) **Vocabulary** • uses topic-specific vocabulary to add credibility and weight to

Targeted Achievement Standard	Examples of how indicators relate to the AC standard. *Individual student literacy may be at different levels of the progression as indicated in Figure 1.*	
	Informative texts	**Persuasive texts**
Year 8	**CrT10**	**CrT10**
	• uses vocabulary to indicate and describe relationships (additionally, similarly)	arguments (transfer, transformation of energy)