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 Geography to support student progress in literacy and numeracy. This advice:

- identifies the sub-elements of the progressions that are most relevant to studying Geography
- 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 Geography.

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 development 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 Geography, whole school planning may address other sub-elements to progress students' literacy and numeracy.

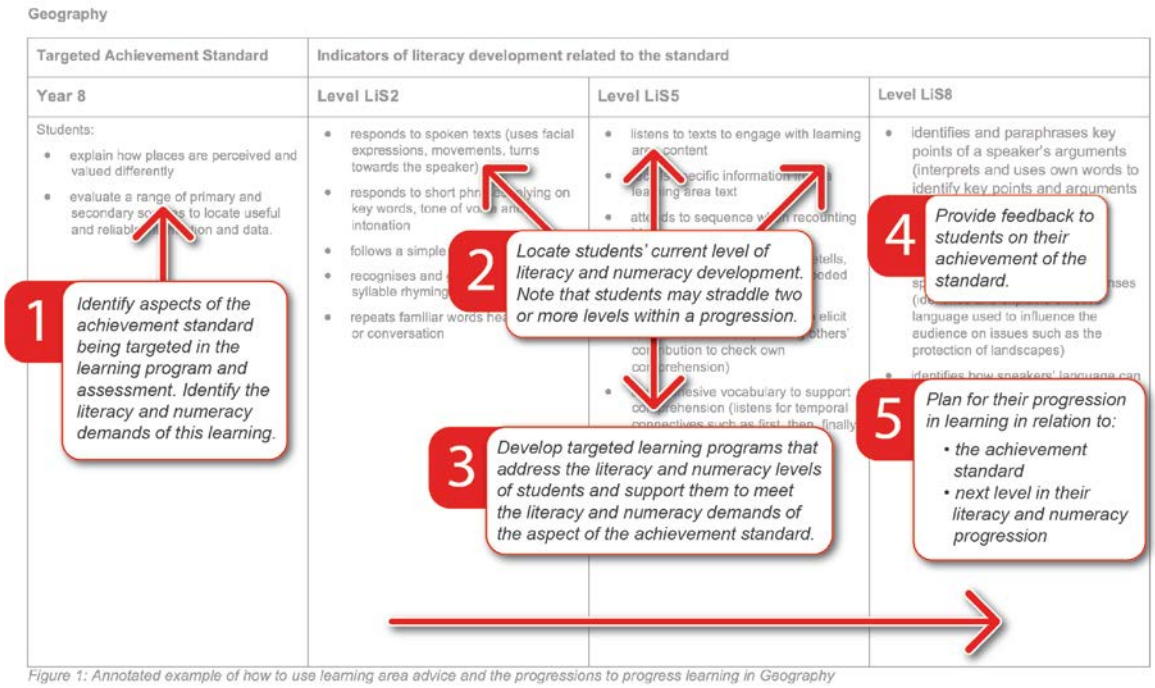

Figure 1: Annotated example of how to use learning area advice and the progressions to progress learning in Geography

Numeracy in Geography

In Geography, students develop numeracy capability as they investigate concepts fundamental to geography, for example, the effects of location and distance, spatial distributions and the organisation and management of space within places. They apply numeracy skills in geographical analysis by counting and measuring, constructing and interpreting tables and graphs, calculating and interpreting statistics and using statistical analysis to test relationships between variables. In constructing and interpreting maps, students work with numerical concepts of grids, scale, distance, area and projections. Numeracy skills are also used when evaluating natural events or phenomena, such as the percentage of rainfall or the wind speeds of a cyclone.

Using the numeracy progression to support students in Geography

The most relevant sub-elements of the numeracy progression for Geography are: *Quantifying numbers, Operating with percentages, Number patterns and algebraic thinking, Comparing units, Understanding units of measurement, Understanding geometric properties, Positioning and locating, Measuring time* and *Interpreting and representing data.*

Quantifying numbers

This sub-element involves students becoming increasingly able to count, recognise, read and interpret large and small numbers. In Geography, students are required to explain environmental and human processes and their consequences over short and long periods of time. Quantifying numbers provides a foundation for students' understanding of change by providing them with the skills to observe and communicate trends and patterns over time.

<table>
<tr><th>Targeted Achievement Standard</th><th>Examples of how indicators relate to the AC standard. Individual student numeracy may be at different levels of the progression as indicated in Figure 1.</th></tr>
<tr><td>Year 7</td><td>QuN11</td></tr>
<tr><td rowspan="2">Students:
describe geographical processes that influence the characteristics of places
explain interconnections between people and places and environments and describe how these interconnections change places and environments
record and represent data and the location and distribution of geographical phenomena in a range of forms
interpret and analyse geographical maps, data and other information to propose simple explanations for spatial distributions, patterns, trends and relationships, and draw conclusions.</td><td>Understanding place value
reads and writes numbers applying knowledge of the place value periods of ones, thousands, millions (how numbers are written with the digits organised in groups of three – 10 000 is read as ten thousand, such as 10 000 people live in this suburb, 100 000 use the public transport system each week)
recognises the relationship between adjacent positions in place value (200 years is 10 times as large as 20 years, which is 10 times as large as 2 years and applies this to environmental change)</td></tr>
<tr><td>QuN12</td></tr>
<tr><td>Understanding place value (directed numbers)
orders negative numbers (recognises that -10° C is colder than -2.5° C)
Representing place value
recognises, reads and interprets very large and very small numbers (identifies and interprets measurements of periods of time when investigating how geographical phenomena have developed over periods of time – millennium, century, decade, year)</td></tr>
</table>

Operating with percentages

This sub-element involves students using percentages to represent quantities. It is particularly useful to Geography for developing an understanding of geographical concepts such as place, change and environment. Percentages are often also used by students when gathering quantitative evidence as part of an inquiry process.

<table>
<tr><th>Targeted Achievement Standard</th><th>Examples of how indicators relate to the AC standard. Individual student numeracy may be at different levels of the progression as indicated in Figure 1.</th></tr>
<tr><td>Year 10</td><td>OwP5</td></tr>
<tr><td rowspan="3">Students:
predict changes in the characteristics of places and environments over time, across space and at different scales and explain the predicted consequences of change
use a range of methods and digital technologies to interpret and analyse maps, data and other information to make generalisations and inferences, propose explanations for significant patterns, trends, relationships and anomalies across time and space and at different scales, and predict outcomes.</td><td>Adding a percentage as multiplying
increases and decreases quantities by a percentage (calculates percentage increase or decrease in international migration in Australia or internal migration in China over time)</td></tr>
<tr><td>OwP6</td></tr>
<tr><td>Repeatedly adding a percentage
uses percentage increases or decreases as an operator (measures percentage increases or decreases over time, such as comparison of life expectancy in different places to analyse and/or predict changes to human wellbeing across time and space)</td></tr>
</table>

Number patterns and algebraic thinking

This sub-element involves students making generalisations. As students become increasingly able to connect patterns with the structure of numbers, they create a foundation for algebraic thinking (that is, thinking about generalised quantities). This is particularly useful to Geography for developing an understanding of geographical concepts such as place, change and environment. It can also be used by students to gather quantitative evidence as part of an inquiry process.

<table>
<tr><th>Targeted Achievement Standard</th><th>Examples of how indicators relate to the AC standard. Individual student numeracy may be at different levels of the progression as indicated in Figure 1.</th></tr>
<tr><td>Year 10</td><td>NPA9</td></tr>
<tr><td>Students:
use a range of methods and digital technologies to interpret and analyse maps, data and other information to make generalisations and inferences, propose explanations for significant patterns, trends, relationships and anomalies across time and space and</td><td>Algebraic relationships
interprets and uses formulae and algebraic representations that describe relationships in various contexts (the relationship between the HDI and income)
creates an algebraic expression in two unknowns to represent a formula or relationship (neonatal mortality rate (NMR) is the number of neonatal</td></tr>
</table>

Targeted Achievement Standard	Examples of how indicators relate to the AC standard. *Individual student numeracy may be at different levels of the progression as indicated in Figure 1.*
Year 10	**NPA9**
at different scales, and predict outcomes.	deaths (ND) divided by the number of live births (LB); NMR = $\frac{ND}{LB}$)

Comparing units

This sub-element addresses comparing units in ratios, rates and proportions. The sub-element can be applied in Geography to interpret maps and identify spatial patterns, relationships and trends over time. It can also be applied to develop an understanding of the geographical concepts of place, environment, interconnections, sustainability and change or can be used to elicit evidence to support conclusions.

Targeted Achievement Standard	Examples of how indicators relate to the AC standard. *Individual student numeracy may be at different levels of the progression as indicated in Figure 1.*
Year 9	**CoU2**
Students: • predict changes in the characteristics of places over time and identify the possible implications of change for the future • use a range of methods and digital technologies to interpret and analyse maps, data and other information to propose explanations for patterns, trends, relationships and anomalies across time and space, and to predict outcomes.	**Ratios** • interprets ratios as a comparison between the same units of measure (interprets scale ratios on maps to measure distance, such as the distance between two trading partners) **Rates** • uses rates to determine how quantities change (uses rates of change to calculate changes to crop yield over time and to predict future crop yields)
	CoU3
	Applying proportion • interprets proportion as the equality of two ratios or rates (the proportion of calories from the world's crops: 55% are eaten directly, 39% are used for animal feed and 9% goes to biofuel and other industrial use) • explains and applies the difference between direct and indirect proportion (direct – increase in the global population and demand for food, indirect — increase in salinity and decrease in crop yields)

Understanding units of measurement

This sub-element describes how a student becomes increasingly able to recognise attributes that can be measured and how units of measure are used and calculated. In Geography, this sub-element is important for both data collection and the construction and interpretation of maps and plans.

<table>
<tr><th>Targeted Achievement Standard</th><th>Examples of how indicators relate to the AC standard. Individual student numeracy may be at different levels of the progression as indicated in Figure 1.</th></tr>
<tr><td>Year 8</td><td>UuM8</td></tr>
<tr><td rowspan="3">Students:
select, record and represent data and the location and distribution of geographical phenomena in a range of appropriate digital and non-digital forms, including maps at different scales that conform to cartographic conventions
analyse geographical maps, data and other information to propose explanations for spatial distributions, patterns, trends and relationships, and draw reasoned conclusions.</td><td>Converting units
converts between formal units of measurement (uses scale of maps, converts between metric units such as m to km when measuring distance, L to mL when measuring capacity)
recognises the relationship between metric units of measurement and the base-ten place value system (coverts mm to cm and m to km when calculating distance)
explains why having 100 cm in a metre results in 10 000 cm2 in a square metre (use of square kilometres and hectares with area of land)</td></tr>
<tr><td>UuM9</td></tr>
<tr><td>Calculating measurements
identifies appropriate levels of precision with measurement (measures distance on a map and identifies the impact of scale factors on the error in the actual distance)</td></tr>
</table>

Understanding geometric properties

This sub-element describes how a student becomes increasingly able to identify the attributes of shapes and objects and how they can be combined or transformed. Being able to use spatial reasoning and geometric properties to solve problems is important for a range of tasks. For example, dissection and rearrangement combined with basic geometric properties underpins urban design, as well as interpreting plans.

<table>
<tr><th>Targeted Achievement Standard</th><th>Examples of how indicators relate to the AC standard. Individual student numeracy may be at different levels of the progression as indicated in Figure 1.</th></tr>
<tr><td>Year 7</td><td>UGP6</td></tr>
<tr><td>record and represent data and the location and distribution of geographical phenomena in a range of forms, including large-scale and small-scale maps that conform to cartographic conventions</td><td>Geometric properties
uses relevant properties of geometrical figures to find unknown lengths and angles (uses the readout from a laser range finder to measure distance and calculate area, uses differences in longitude to find</td></tr>
</table>

Targeted Achievement Standard	Examples of how indicators relate to the AC standard. *Individual student numeracy may be at different levels of the progression as indicated in Figure 1.*
Year 7	**UGP6**
• interpret and analyse geographical maps, data and other information to propose simple explanations for spatial distributions, patterns, trends and relationships, and draw conclusions.	the time difference between two points, calculates spray patterns for irrigation)

Positioning and locating

This sub-element describes how a student becomes increasingly able to recognise the attributes of position and location. A student learns to reason with representations of shapes and objects regarding position and location, and to visualise and orientate objects to solve problems in spatial contexts, such as navigating. The use of scales on maps is an application of proportional reasoning.

Targeted Achievement Standard	Examples of how indicators relate to the AC standard. *Individual student numeracy may be at different levels of the progression as indicated in Figure 1.*
Year 7	**PoL4**
Students: • record and represent data and the location and distribution of geographical phenomena in a range of forms, including large-scale and small-scale maps that conform to cartographic conventions • interpret and analyse geographical maps, data and other information to propose simple explanations for spatial distributions, patterns, trends and relationships, and draw conclusions.	**Using formal maps and plans** • locates position on maps using grid references • identifies features on maps and plans • describes routes using landmarks and directional language
	PoL5
	Interpreting maps and plans • interprets the scale as a ratio used to create plans, drawings or maps • interprets plans involving scale • uses compass directions, latitude and longitude to locate position

Measuring time

This sub-element describes how a student becomes increasingly aware of the passage of time. In Geography, this sub-element provides an important foundation for understanding the duration of geographical processes to recognise and measure parallels of latitude and meridians of longitude and to calculate time zones scale.

<table>
<tr><th>Targeted Achievement Standard</th><th>Examples of how indicators relate to the AC standard. Individual student numeracy may be at different levels of the progression as indicated in Figure 1.</th></tr>
<tr><td>Year 8</td><td>MeT4</td></tr>
<tr><td rowspan="3">Students:
explain geographical processes that influence the characteristics of places
explain interconnections within environments and between people and places and explain how they change places and environments.</td><td>Relating units of time
explains the relationship between different units of time (a millennium is 10 centuries, a century is 100 years, a decade is 10 years).
determines elapsed time using different units (uses scaled units of time such as years, decades and centuries to describe the duration of significant geographical change)</td></tr>
<tr><td>MeT5</td></tr>
<tr><td>Time zones
uses appropriate units for measuring both large and small durations of time (identifies, calculates and interprets measurements of periods of time – millennium, century, decade, year)
identifies issues associated with different time zones
identifies the relationship between longitude and time zones (investigates the location of the International Date Line)</td></tr>
</table>

Interpreting and representing data

This sub-element describes how a student becomes increasingly able to recognise and use visual and numerical displays to describe data associated with statistical investigations. Making sense of data is vital to studying Geography. Students use data to develop displays to propose explanations for patterns, trends, relationships and anomalies across time and space, and to predict outcomes. They interpret statistical displays to support their own interpretations and to think critically about claims made by others, either questioning or confirming them.

<table>
<tr><th>Targeted Achievement Standard</th><th>Examples of how indicators relate to the AC standard. Individual student numeracy may be at different levels of the progression as indicated in Figure 1.</th></tr>
<tr><td>Year 10</td><td>IRD4</td></tr>
<tr><td rowspan="2">Students:
identify, analyse and explain significant interconnections between people, places and environments and explain changes that result from these interconnections and their consequences
predict changes in the characteristics of places and environments over time, across space and at different scales and explain the predicted consequences of change
critically evaluate a range of primary and secondary sources to select and collect relevant, reliable and unbiased geographical information and data. record and represent multi-variable data in of the most appropriate digital and non-digital forms, including a range of graphs
use a range of methods and digital technologies to interpret and analyse maps, data and other information to make generalisations and inferences, propose explanations for significant patterns, trends, relationships and anomalies across time and space and at different scales, and predict outcomes.</td><td>Shape of data displays
determines and calculates the most appropriate statistic to describe the data (determines population density)
uses simple descriptive statistics (arithmetical mean or median) as measures to represent typical values of a distribution (uses the difference between mean and median to describe the distribution of wealth)
compares the usefulness of different representations of the same data (compares and determines the usefulness of a line graph to a bar chart when illustrating change over time)</td></tr>
<tr><td>IRD5

Graphical representations of data
uses graphical representations relevant to the purpose of the collection of the data (selects a climate graph to illustrate the characteristics of a place, a line graph to demonstrate change over time, selects a population pyramid to show the makeup of a population)
uses features of graphical representations to make predictions (interprets a range of graphs to predict changes to an environment being investigated)
recognises that continuous variables depicting growth or change often vary over time (growth charts, temperature charts)
interprets and describes patterns in graphical representations in real-life situations (uses scatter plots of data for countries or smaller areas to investigate the relationship between two variables, such as per capita income and life expectancy for countries)
interprets the impact of outliers in data (interprets the impact of a severe weather event on average rainfall)</td></tr>
</table>

Targeted Achievement Standard	**Examples of how indicators relate to the AC standard.** *Individual student numeracy may be at different levels of the progression as indicated in Figure 1.*
	• determines whether to use data from a sample or a population • determines what type of sample to use from a population • makes reasonable statements about a population based on evidence from samples
	IRD6
	Recognising bias • applies an understanding of distributions to evaluate claims based on data (evaluates claims made regarding human wellbeing) • justifies criticisms of data sources that include biased statistical elements (inappropriate sampling from populations) • recognises and explains bias as a possible source of error in media reports of survey data (evaluates the validity of evidence provided by data to test media claims on attitudes to human-induced environmental change)