Numeracy learning progression and Health and Physical Education

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 Health and Physical Education to support student progress in literacy and numeracy. This advice:

- identifies the sub-elements of the progressions that are most relevant to studying Health and Physical Education
- 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 Health and Physical Education.

Figure 1 illustrates how the progressions are to be used by teachers to identify where students are positioned 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 Health and Physical Education, whole school planning may address other sub-elements to progress students' literacy and numeracy.

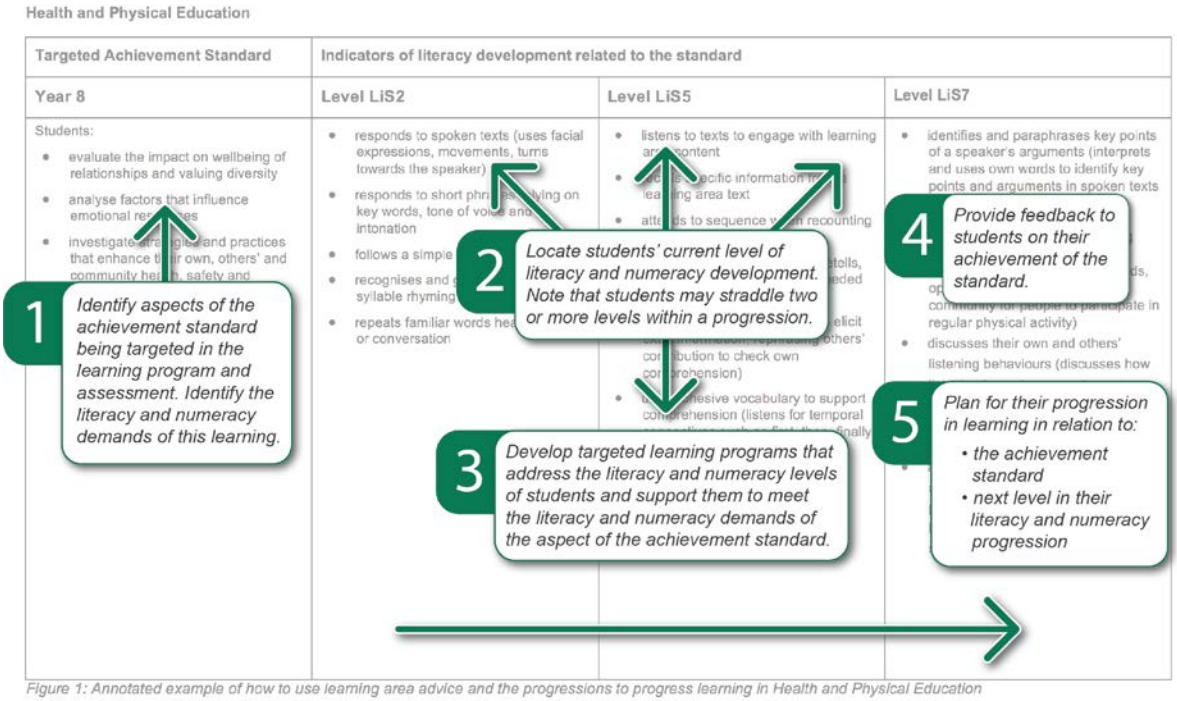

Figure 1: Annotated example of how to use learning area advice and the progressions to progress learning in Health and Physical Education

Numeracy in Health and Physical Education

In Health and Physical Education, students develop numeracy capability when they create, represent and interpret data in spatial, numerical and graphic forms. Students use calculation, estimation and measurement to collect and make sense of information related to, for example, nutrition, fitness, navigation in the outdoors or various skill performances. They use spatial reasoning in movement activities and to develop concepts and strategies for individual and team games, sports or recreational pursuits. Students interpret and analyse health and physical activity information using statistical reasoning, identify patterns and relationships in data to consider trends, draw conclusions, make predictions and inform health behaviour and practices. Analysing numerical data enables students to elicit, interpret and analyse evidence, critically evaluate claims, provide specific analytical feedback and supports students to develop a deeper understanding of health and movement concepts.

Using the numeracy progression to support students in Health and Physical Education

The most relevant sub-elements of the numeracy progression for Health and Physical Education are *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.*

Operating with percentages

This sub-element involves students using percentages to represent quantities. It is particularly useful to Health and Physical Education for identifying trends, drawing conclusions, making predictions and informing health behaviour and practices.

<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>OwP2</td></tr>
<tr><td rowspan="6">Students:
access, synthesise and apply health information from credible sources to propose and justify responses to health situations
apply decision-making and problem-solving skills when taking action to enhance their own and others' health, safety and wellbeing
analyse the impact of effort, space, time, objects and people when composing and performing movement sequences.</td><td>Find percentage as a part of a whole
finds a percentage of a quantity (calculates the percentage of road accidents by age group, the percentage of three-point baskets in a basketball score, determines maximum training heart rate)
multiplies to calculate a percentage of any amount (calculates the amount of sugar/fat in a breakfast cereal to make a recommendation on a healthy choice, such as 12% of 250 g = 30 g)
finds percentages of quantities and expresses one quantity as a percentage of another (determines what percentage 10 mL is of 200 mL when calculating appropriate doses of medicine, or time spent attacking in a game situation)</td></tr>
<tr><td>OwP4</td></tr>
<tr><td>Find the whole from a percentage and a part
determines the whole given a percentage (given 20% is 1300 kJ, determines the whole is 6500 kJ, for example when calculating the amount of energy consumed as part of the Daily Recommended Intake)</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 to identify trends and draws conclusions, such as physical activity by age group, or projects percentage increase in popularity of a sport to plan facilities)
chooses appropriate strategies for problems in a range of multiplicative situations (examines food labels and nutritional tables to calculate the percentage a fast food meal exceeds in sugar/fats, and calculates percentage reduction required for a healthy meal, determines the role of statistical efficiency in goal kicking to assess the perceived trade value of a player)</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). Algebraic thinking is particularly useful to Health and Physical Education for identifying patterns and relationships that help to inform health and movement strategies.

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**
Students: • access, synthesise and apply health information from credible sources to propose and justify responses to health situations • apply decision-making and problem-solving skills when taking action to enhance their own and others' health, safety and wellbeing • apply and transfer movement concepts and strategies to new and challenging movement situations.	**Algebraic relationships** • interprets and uses formulae and algebraic representations that describe relationships in various contexts (uses Body Mass Index when developing healthy eating and fitness plans, recognises that Body Mass Index represents the relationship between body weight and height squared – kg/m2) • creates an algebraic expression in two unknowns to represent a formula or relationship (for straight-line motion the momentum is the product of mass and velocity; this relationship can inform movement skills and strategies)

Comparing units

This sub-element addresses comparing units in ratios, rates and proportions. The sub-element can be applied in Health and Physical Education to identify patterns and relationships between quantities. It is an essential component in interpreting nutritional tables and labels, analysing strategy in games and sports, such as kick to handball ratio in AFL and in designing healthy eating and fitness 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 10</td><td>CoU2</td></tr>
<tr><td rowspan="3">Students:
access, synthesise and apply health information from credible sources to propose and justify responses to health situations
apply decision-making and problem-solving skills when taking action to enhance their own and others' health, safety and wellbeing
propose and evaluate interventions to improve fitness and physical activity levels in their communities
apply and transfer movement concepts and strategies to new and challenging movement situations.</td><td>Ratios
interprets ratios as a comparison between the same units of measure (interprets scale ratios on maps to measure distance between two points when navigating outdoors or bushwalking, calculates the length and width of a playing field when the ratio of length to width is 3:2, or the ratio of carbohydrates to fat to protein in a food)
expresses a ratio as equivalent fractions or percentages (ratio 1:1, each part represents ½ or 50% of the whole, such as when interpreting food labels and make healthy eating choices)
uses a ratio to increase or decrease quantities to maintain a given consistency (halving a recipe or applying force to a golf ball)
Rates
uses rates to determine how quantities change (measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities, calculates running speed in terms of m/sec, m/min, km/h)</td></tr>
<tr><td>CoU3</td></tr>
<tr><td>Applying proportion
interprets proportion as the equality of two ratios or rates (totals grams of fat/sugar as a proportion of a total, compares equal Blood Alcohol Content as a measure of grams of alcohol per 100 mL of blood for different people, understands that different proportions of maximum training heart rate are needed for particular types of impacts, such as using 60% for aerobic training and 90% for anaerobic training)
demonstrates how increasing one quantity in a ratio will affect the total proportion (an increase of 0.01 Blood Alcohol Content will increase alcohol by 10 mg per 100 mL blood)</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.*
	• explains and applies the difference between direct and indirect proportion (when proposing strategies for enhancing community health, safety and wellbeing, applies direct and indirect proportion, such as increase in exercise and increase in fitness – direct – and increase exercise and decrease risk of coronary heart disease – indirect)

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 Health and Physical Education, this sub-element includes measuring speed, distance, weight, capacity and height to collect and make sense of information related to, for example, nutrition, fitness, navigation in the outdoors or various skill performances. Being able to measure is essential for students developing strategies for improving health, wellbeing and fitness.

<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>UuM7</td></tr>
<tr><td rowspan="3">Students:
investigate strategies and practices that enhance their own, others' and community health, safety and wellbeing
investigate and apply movement concepts and select strategies to achieve movement and fitness outcomes
examine how connecting to the environment can enhance health and wellbeing
demonstrate skills to make informed decisions, and propose and implement actions that promote their own and others' health, safety and wellbeing.</td><td>Using formal units
measures, compares and estimates length, area, mass, volume and capacity using standard formal units (in health and physical education contexts, such as when planning a nutritious diet, measuring a personal best performance or developing a fitness plan)</td></tr>
<tr><td>UuM8</td></tr>
<tr><td>Calculating measurements
converts between formal units of measurement (converts between metric units, such as cm to m when measuring length or height, m to km when measuring distance or speed, L to mL when measuring capacity, g to kg when measuring weight)
explains why having 100 cm in a metre results in 10 000 cm2 in a square metre (measures surface area, such as use of square metres, hectares of bushland, or size of skin exposure to sun)</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, in Health and Physical Education, students are required to understand angles in order to critique and improve movement sequences. They use spatial reasoning in movement activities, such as manipulating space and their relationship to other players in this space when playing games.

<table>
<tr><td>Targeted Achievement Standard</td><td>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.</td></tr>
<tr><td>Year 8</td><td>UGP5</td></tr>
<tr><td rowspan="3">Students:
investigate and apply movement concepts and select strategies to achieve movement and fitness outcomes
demonstrate control and accuracy when performing specialised movement sequences and skills
apply movement concepts and refine strategies to suit different movement situations.</td><td>Angles and lines
estimates and identifies measures of angles in degrees up to one revolution (estimates angles, such as those formed at the elbows when releasing an object, and determines the effect of angles on the height and distance of flight in jumps, accounts for wind resistance when angling a bat, racquet or stick to hit, explains swing bowling in cricket in terms of the angle of the ball seam)</td></tr>
<tr><td>UGP6</td></tr>
<tr><td>Geometric properties
uses relevant properties of geometrical figures to find unknown lengths and angles (analyses movement sequences to find optimal angles for throwing, hitting or kicking a ball a long distance and predicts the trajectory through space and time, optimises goal shooting angles in football, adjusts angle of impact to affect the types of shots strategically required in tennis or badminton)</td></tr>
</table>

Positioning and locating

This sub-element describes how a student becomes increasingly able to recognise the attributes of position and location. This sub-element is important to Health and Physical Education as it assists with developing spatial reasoning, coordination (hand-eye when hitting) and kinaesthetic awareness (position of the body in space) in movement activities and in developing concepts and strategies for individual and team sports, fitness or recreational pursuits, such as bushwalking.

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<tr><td>Targeted Achievement Standard</td><td>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.</td></tr>
<tr><td>Year 8</td><td>PoL4</td></tr>
<tr><td rowspan="3">Students:
demonstrate skills to make informed decisions, and propose and implement actions that promote their own and others' health, safety and wellbeing.</td><td>Using formal maps and plans
locates position on maps using grid references (identifies location in relation to destination when bushwalking or orienteering)
identifies features on maps and plans (reads maps when participating in adventure activities, such as bushwalking or orienteering, interprets plans of game tactics, uses internet-based navigation and tracking systems as part of fitness regimes)
describes routes using landmarks and directional language (designs movement sequences to travel around, over, under and through natural and built obstacles, plans effective fitness circuits using natural features within a geographic area, communicates strategic plays in relation to coaching a team game or sport)</td></tr>
<tr><td>PoL5</td></tr>
<tr><td>Interpreting maps and plans
interprets the scale as a ratio used to create plans, drawings or maps (interprets scale to measure the distance between two points when orienteering)
uses compass directions, latitude and longitude to locate position (when participating in outdoor recreation, such as bushwalking or orienteering)</td></tr>
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Measuring time

This sub-element describes how a student becomes increasingly aware of the passage of time. In Health and Physical Education, this sub-element is fundamental for measuring and recording time (and speed) in a range of physical activities.

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<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>MeT3</td></tr>
<tr><td rowspan="6">It is important to note that, even though the achievement standards in Year 7 – 10 Health and Physical Education do not include overt references to Measuring time, these skills are essential and implied in the sub-strand Movement and Physical Activity. The following aspects of the achievement standard may require skills in Measuring time

Students:
• investigate and apply movement concepts and select strategies to achieve movement and fitness outcomes
• demonstrate skills to make informed decisions, and propose and implement actions that promote their own and others' health, safety and wellbeing.</td><td>Units of time
• uses standard instruments and units to describe and measure time to minutes (measures the time it took for a student to run 800 m)
• reads and interprets different representations of time on an analogue clock, digital clock or timer (uses lap times on a stop watch or app)</td></tr>
<tr><td>MeT4</td></tr>
<tr><td>Relating units of time
• explains the relationship between different units of time (months and years, seconds, minutes and hours, such as when interpreting health data from Australian Bureau Statistics, for example as deaths per 100,000 over the short- and long-term)
• determines elapsed time using different units (hours, minutes and seconds, days and weeks and applies this unit when developing fitness plans, tracking growth and development progress and setting realistic personal and health goals)</td></tr>
<tr><td>MeT5</td></tr>
<tr><td>Time zones
• uses appropriate units for measuring both large and small durations of time (such as when exploring reaction times in sports or games or in relation to drug use and safe driving)</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. Making sense of data is vital to studying Health and Physical Education. Students use data to develop displays to propose explanations for patterns, relationships and trends, to predict outcomes and to propose future action. They interpret statistical displays and 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">It is important to note that this sub-element of the progression could apply to all aspects of the achievement standard and will depend on the focus of the investigation or task. The most relevant aspects are identified below:

Students:

• access, synthesise and apply health information from credible sources to propose and justify responses to health situations
• apply decision-making and problem-solving skills when taking action to enhance their own and others' health, safety and wellbeing.</td><td>Shape of data displays

• determines and calculates the most appropriate statistic to describe the data (selects the mean to describe the average heart rate – beats per minute – before and after exercise)
• uses simple descriptive statistics (arithmetical mean or median) as measures to represent typical values of a distribution (describes the mean kJ intake and median hours of exercise of a sample population when investigating community health and wellbeing, describes central tendency when analysing road safety statistics)
• compares the usefulness of different representations of the same data (the usefulness of a line graph compared to a bar chart when illustrating change over time, such as changes to fitness levels following the implementation of a personal fitness plan or reductions in young people's levels of smoking over the last two decades)</td></tr>
<tr><td>IRD5

Graphical representations of data

• uses graphical representations relevant to the purpose of the collection of the data (selects a line graph to demonstrate a trend, a bar graph to compare fitness levels of different age groups or a histogram to show the ages of runners completing a marathon)
• uses features of graphical representations to make predictions (interprets a range of graphs to identify trends, such as trends in participation in organised junior sports, and predicts future trends and possible action based on the data)
• recognises that continuous variables depicting growth or change often vary over time (interprets charts that show changes in sports participation, recreational activities or consumption of fast food</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.*
	over time, investigates seasonal variations in sports participation or reports of mental health issues during puberty) • interprets graphs depicting motion, such as distance–time graphs (interprets maps of batting trajectories in cricket) • interprets and describes patterns in graphical representations in real-life situations (flight trajectory, scatter plots to investigate the relationship between two variables, such as obesity and exercise, motor vehicle accidents and age) • interprets the impact of outliers in data (interprets the impact of the income of a world-class professional athlete on the average income of players at the state/territory level) • determines whether to use data from a sample or a population (investigates sample size and funding source when health-related research results are published) • determines what type of sample to use from a population (such as when researching beliefs about a health issue) • makes reasonable statements about a population based on evidence from samples (considers accuracy of representation of marginalised individuals or population groups)
	IRD6
	Recognising bias • applies an understanding of distributions to evaluate claims based on data (evaluates claims made by the media regarding young people in relation to drugs and/or risk-taking behaviours, or critically analyses statistics that reinforce stereotypes) • justifies criticisms of data sources that include biased statistical elements (inappropriate sampling from populations, such as whether issues concerning young people include their voices) • 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 racism, sexism, disability discrimination and homophobia or the relationship between violence and mental illness)