Introduction

The purpose of the document is to raise awareness of the numeracy demands within identified VELS domains and includes

- Teacher knowledge
- Numeracy focus
- Assessment
- Planning and instruction

Recognising that all students learn differently, this document provides a starting point for teachers to consider and build on students’ numeracy skills and understanding within domains, ensuring that all students are able to access the domain specific concepts and behaviours.

To effectively plan for differentiated teaching of numeracy within domains, teachers draw on their knowledge and understanding of key teaching and learning theories, the mathematics developmental overviews and knowledge of the identified VELS domains. Teachers also have excellent knowledge of their students, including their interests and prior knowledge, English language proficiency, and their identified learning strengths and areas for improvement.

Planning, teaching and assessing numeracy within the domains should be a process which is both strategic and sequential in manner and allows for scaffolding of students’ learning from the gradual release of support towards independent learning.

This document describes aspects of numeracy within the following VELS domains:

- The Arts
- English
- Languages Other Than English
- The Humanities – Economics
- The Humanities – Geography
- The Humanities – History
- Mathematics
- Science
- Health and Physical Education
Numeracy Teaching within Domains

The Arts

Teacher knowledge

Effective teachers require:

- thorough knowledge of The Arts VELS domain learning focus statements and standards and progression points – levels 4, 5 and 6 to support planning for differentiated teaching
- knowledge of key concepts in the mathematics Developmental Overviews
- knowledge of the particular needs that students may have in relation to English language and numeracy concepts, including students from Koorie, ESL and or Low SES backgrounds.

Numeracy focus

Being numerate in The Arts requires student understanding of relationships between time and space, and rhythm and line. Students develop understanding of these abstract concepts in various arts forms, for example moving in different directions, creating groups and shapes in dance; conducting singing rounds in music; using metre and rhythm in drama; using shape, scale, proportion and orientation in 2-D and 3-D visual art in visual communication.

Creating arts works requires the use and understanding of measurement in the manipulation of space, time and form, as well as learning about size, scale, proportion, sequence, distance, balance volume and time. Through The Arts students can develop their understanding of number relationships, pattern appreciation and spatial awareness. Creating patterns in The Arts involves counting, measurement and design in different ways across the various arts forms through use of motifs, patterns, repetition, variation, counting, rhythm, phrasing and sections.

Numbers are used in music and dance when learning and rehearsing works. In drama numbers can be used to analyse rhymes and other text patterns.

The Arts also support the development of critical numeracy skills, by engaging students in the deconstruction of media texts. This can include a consideration of how statistics can be used to justify hypotheses.

Assessment

Teachers use data about students’ numeracy achievements including VELS mathematics teacher judgements, VCAA on demand mathematics testing and NAPLAN to understand the starting point for each student’s numeracy learning. They plan for assessment tasks that incorporate opportunities for students to demonstrate their numeracy skills and understanding in an authentic and meaningful way.

Planning and instruction

Assessment is the starting point for planning and informs teaching to differentiate the needs of every student.

When planning for the explicit teaching of numeracy, teachers demonstrate capabilities as described in the e5 Instructional Model. They incorporate the numeracy demands within the domain in their planning. They capture numeracy ‘teachable moments’ and make the numeracy focus explicit to students. They provide students with time and opportunities to use various problem solving strategies.
Numeracy Teaching within Domains

English

Teacher knowledge

Effective teachers require:

- thorough knowledge of VELS English domain learning focus statements and standards and progression points – levels 4, 5 and 6 to support planning for differentiated teaching
- knowledge of key concepts in the mathematics Developmental Overviews
- knowledge of the particular needs that students may have in relation to English language and numeracy concepts, including students from Koorie, ESL and or Low SES backgrounds.

Numeracy focus

Being numerate in English requires the ability to interpret and create information thoughtfully, accurately and critically when it is represented in spatial, numerical and graphic forms.

Analysing quantitative and spatial information when it is presented in various forms, for example, shots in film, pacing of editing in multimedia texts, and analysing use of space in advertising, graphs, tables, spreadsheets, charts and comparative models enables students to make analyses of and responses to texts.

Numbers are used in English when reading poetry and plays and analysing their structural organisation for meaning, for example, use of meter and rhyme in poetry and plays. Counting iambic pentameter is based on numbers and timing and Haikus are based on the number of syllables in each line.

The concept of measurement and sequence of time is reflected in student’s exploration of tense and ordering of events in fiction and non-fiction texts.

Assessment

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Numeracy Teaching within Domains

Languages Other Than English

Teacher knowledge

Effective teachers require:

- thorough knowledge of VELS LOTE domain learning focus statements and standards and progression points—levels 4, 5 and 6 to support planning for differentiated teaching
- knowledge of key concepts in the mathematics Developmental Overviews
- knowledge of the particular needs that students may have in relation to English language and numeracy concepts, including students from Koorie, ESL and or Low SES backgrounds.

Numeracy focus

In LOTE, students learn to express, in a language other than English, ideas relating to numbers, measurements, location and directions, and chance and data. This provides students with the opportunity of not only reinforcing mathematical understandings, but also the experience of applying the mathematical concepts and skills in another language.

Being numerate in LOTE requires the ability to interpret and create information in a language other than English, thoughtfully, accurately and critically when it is represented in spatial, numerical and graphic forms.

Analysing quantitative and spatial information when it is presented in various forms, analysing use of space in graphs, tables, spreadsheets, charts and comparative models enables students to make analyses of and responses to texts.

The concept of measurement and sequence of time is reflected in student’s exploration of tense and ordering of events in fiction and non-fiction texts in another language.

Assessment

Teachers use data about students’ numeracy achievements including VELS mathematics teacher judgements, VCAA on demand mathematics testing and NAPLAN to understand the starting point for each student’s numeracy learning. They plan for assessment tasks that incorporate opportunities for students to demonstrate their numeracy skills and understanding in an authentic and meaningful way.

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Numeracy Teaching within Domains

Humanities - Economics

Teacher knowledge

Effective teachers require:

- thorough knowledge of VELS Economics domain learning focus statements and standards and progression points - levels 4, 5, and 6 to support planning for differentiated teaching
- knowledge of key concepts in the mathematics Developmental Overviews
- knowledge of the particular needs that students may have in relation to English language and numeracy concepts, including students from Koorie, ESL and or Low SES backgrounds.

Numeracy focus

In Economics, students need to apply concepts and terms related to money, including budgeting, saving, debt, the factors that determine the pricing of items, including human labour, paid and unpaid work. This, in turn, enables them to focus on developing their financial literacy - the ability to make informed judgments and to take effective decisions regarding the use and management of money (VELS). Numeracy skills are required in Economics when exploring a range of topics including interest rates, tax rates, calculating profit, exporting and importing, surveys.

Students also need to understand the numeracy demands within concepts and terms related to market Economics, including surplus, shortage, production, distribution, consumption, scarcity, supply and demand.

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Numeracy Teaching within Domains

Humanities - Geography

Teacher knowledge

Effective teachers require:

- thorough knowledge of VELS Geography domain learning focus statements and standards and progression points – levels 4, 5 and 6 to support planning for differentiated teaching
- knowledge of key concepts in the mathematics Developmental Overviews
- knowledge of the particular needs that students may have in relation to English language and numeracy concepts, including students from Koorie, ESL and or Low SES backgrounds.

Numeracy focus

In Geography, students need to apply the concepts and terms used in mapping, including scale, distance, location, perspective and proximity and use a range of maps to locate information, including atlases, street directories, topographic, overlay and choropleth maps. Students use numeracy skills to locate information using coordinates and compasses, to understand contour lines, to recognise and measure parallels of latitude and meridians of longitude and to calculate time zones.

Measurement is explored in mapping, including the study of land use, the changing distribution of population across the globe, the impact of humans on the natural environment, the effect of natural disasters and the comparison of characteristics across environments.

Numeracy skills are used in Geography to conduct surveys and data collection for fieldwork. Numeracy skills are also used when evaluating natural events or phenomena, including the percentage of rainfall or the wind speeds of a cyclone.

Assessment

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Numeracy Teaching within Domains

Humanities - History

Teacher knowledge

Effective teachers require:
- thorough knowledge of VELS History domain learning focus statements and standards and progression points – levels 4, 5 and 6 to support planning for differentiated teaching
- knowledge of key concepts in the mathematics Developmental Overviews
- knowledge of the particular needs that students may have in relation to English language and numeracy concepts, including students from Koorie, ESL and or Low SES backgrounds.

Numeracy focus

In History, students need to understand concepts and terms related to time, including past, present and future, chronology, continuity and periods of time (ancient, medieval, modern). The concepts of measurement and sequence of time is reflected in student’s exploration of the past and their chronological ordering of events. In addition, students need to be able to identify, calculate and interpret measurements of periods of time (millennium, century, decade, year) and to place a year within a century (place 1975 in the 20th century). Numeracy skills are also used in the reading and construction of timelines and calendars, including early calendars, such as the Roman and Chinese, which used different forms of numerals.

History can also involve the studying of maps, including comparisons of borders before, during and after warfare, maps tracking immigration patterns and the growth and decline of a civilisation.

Numbers are used in History when analysing quantitative information, such as population figures, percentages of casualties in war, number of immigrants, rations provided during the Great Depression, comparison of life expectancy and the cost of daily living through time.

Assessment

Teachers use data about students’ numeracy achievements including VELS mathematics teacher judgements, VCAA on demand mathematics testing and NAPLAN to understand the starting point for each student’s numeracy learning. They plan for assessment tasks that incorporate opportunities for students to demonstrate their numeracy skills and understanding in an authentic and meaningful way.

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Numeracy Teaching within Domains

Science

Teacher knowledge

Effective teachers require:

- thorough knowledge of VELS Science domain learning focus statements and standards and progression points – levels 4, 5 and 6 to support planning for differentiated teaching
- knowledge of key concepts in the mathematics Developmental Overviews
- knowledge of the particular needs that students may have in relation to English language and numeracy concepts, including students from Koorie, ESL and or Low SES backgrounds.

Numeracy focus

Numeracy is inherent in Science. Students require a strong understanding of number, space, shape, structure, measurement, chance and data in order to problem solve and ask appropriate questions to further investigate the world around them.

In Science, students identify and use appropriate measuring instruments and units of measurement, sampling procedures and appropriate types of data collection to achieve a specified purpose. They learn to make estimates, relate measurement to an investigation, develop an understanding of error in measurement and identify methods to improve accuracy and the conclusions drawn against the prediction or hypothesis investigated.

Spatial visualisation, scale and representation are required to use and build models to understand systems, including the use of computer models, images and simulations to explain and interpret observations.

In Science, students require numeracy skills in understanding the variety of ways data are collected, recorded and represented (using symbols, diagrams, graphs and equations). Students analyse data qualitatively in terms of error of measurement and use data to make comparisons. They design and conduct scientific investigations of their choice in ways that lead to the collection, interpretation and presentation of valid data. They explain trends and patterns in data and discrepancies in experimental results and make suggestions for improvements.

Assessment

Teachers use data about students’ numeracy achievements including VELS mathematics teacher judgements, VCAA on demand mathematics testing and NAPLAN to understand the starting point for each student’s numeracy learning. They plan for assessment tasks that incorporate opportunities for students to demonstrate their numeracy skills and understanding in an authentic and meaningful way.

Planning and instruction

Assessment is the starting point for planning and informs teaching to differentiate the needs of every student.

When planning for the explicit teaching of numeracy, teachers demonstrate capabilities as described in the Instructional Model. They incorporate the numeracy demands within the domain in their planning. They capture numeracy ‘teachable moments’ and make the numeracy focus explicit to students. They provide students with time and opportunities to use various problem solving strategies.
Numeracy Teaching within Domains

Health and Physical Education

Teacher knowledge

Effective teachers require:

- thorough knowledge of VELS Health and Physical Education domain [learning focus statements and standards](http://www.education.vic.gov.au/studentlearning/litnum/) and progression points - levels 4, 5 and 6 to support planning for differentiated teaching
- knowledge of key concepts in the mathematics [Developmental Overviews](http://www.education.vic.gov.au/studentlearning/litnum/)
- knowledge of the particular needs that students may have in relation to English language and numeracy concepts, including students from [Koorie](http://www.education.vic.gov.au/studentlearning/litnum/), ESL and or Low SES backgrounds.

Numeracy focus

Number, measurement, space, chance and data are integral aspects in Health and Physical Education. Being numerate in Health and Physical Education requires the accurate and critical creation, representation and interpretation of data in spatial, numerical and graphic forms.

Students develop their numeracy skills in counting and calculating, including counting, score keeping, calculating averages, percentages and statistics.

The numeracy demands of space and measurement in Health and Physical Education include measuring time, speed, distance, weight, capacity and height and representing and Interpreting measurements including rankings, percentages, graphs, tables, angles, time and forces.

Problem solving strategies are applied through investigations of sporting performance and health issues.

Assessment

Teachers use data about students' numeracy achievements including VELS mathematics teacher judgements, [VCAA on demand mathematics testing](http://www.education.vic.gov.au/studentlearning/litnum/) and [NAPLAN](http://www.education.vic.gov.au/studentlearning/litnum/) to understand the starting point for each student's numeracy learning. They plan for assessment tasks that incorporate opportunities for students to demonstrate their numeracy skills and understanding in an authentic and meaningful way.

Planning and instruction

Assessment is the starting point for planning and informs teaching to differentiate the needs of every student.

When planning for the explicit teaching of numeracy, teachers demonstrate capabilities as described in the [e5 Instructional Model](http://www.education.vic.gov.au/studentlearning/litnum/). They incorporate the numeracy demands within the domain in their planning. They capture numeracy ‘teachable moments’ and make the numeracy focus explicit to students. They provide students with time and opportunities to use various problem solving strategies.