Background pattern

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Accreditation PeriodUnits 1 and 2 **2023–2027**

Units 3 and 4

**2024–2027**

Victorian Pathways Certificate

**NUMERACY**

CURRICULUM DESIGN

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Important information

Accreditation period

Units 1 and 2: 1 January 2023 – 31 December 2027

Units 3 and 4: 1 January 2023 – 31 December 2027

Implementation for Units 1 and 2 of this study commences in 2023.

Implementation for Units 3 and 4 of this study commences in 2024.

Other sources of information

The [*VCAA Bulletin*](https://www.vcaa.vic.edu.au/news-and-events/bulletins-and-updates/bulletin/Pages/index.aspx) is the only official source of changes to regulations and accredited studies. The *Bulletin* regularly includes advice on Victorian Pathways Certificate (VPC) studies. It is the responsibility of each teacher to refer to each issue of the *Bulletin*. The *Bulletin* is available as an e-newsletter via free subscription on the VCAA’s website at: [www.vcaa.vic.edu.au](https://www.vcaa.vic.edu.au/Pages/HomePage.aspx).

To assist teachers in developing courses, the VCAA publishes an online companion document to the curriculum called *VPC* *Numeracy Support Material*. The *Support Material* provides:

* curriculum development and assessment advice
* examples of teaching and learning activities
* lists of resources
* advice on how to deliver the VCE Vocational Major and VPC in the same classroom
* advice on how to integrate other VPC units with the Literacy units
* advice on teaching students with additional needs, including adjustment advice for students with disabilities.

The [*VPC Administrative Handbook*](https://www.vcaa.vic.edu.au/administration/vce-vcal-handbook/Pages/index.aspx) contains essential information on assessment processes and other procedures.

Providers

Throughout this curriculum design the term ‘school’ is intended to include both schools and non-school providers.

Copyright

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Introduction

Scope of study

The purpose of this study is to enable students to develop their everyday numeracy practices to make sense of their personal, public and future vocational lives. Students develop foundational mathematical skills with consideration of their personal, home, vocational and community environments and contexts, and an awareness and use of accessible and appropriate technologies.

This study focuses on providing students with the fundamental mathematical knowledge, skills, understandings and dispositions to solve problems in real-life contexts for a range of workplace, personal, further learning and community settings relevant to contemporary society. The numeracies will be situated in accessible, concrete and familiar contexts where the mathematics content is explicit with little or no text or distracting information.

The contexts are the starting point and the focus and are framed in terms of personal, financial, civic, and health and recreational classifications. The numeracies are introduced using a problem-solving cycle with four components:

* identifying the mathematics
* acting on and using mathematics
* evaluating and reflecting
* communicating and reporting.

The mathematics includes foundational skills related to measurement, shape, numbers and graphs applied to tasks that are part of the students’ everyday lives. At the end of the two units, students should be able to attempt structured and supported activities and tasks that require simple processes such as counting, sorting, comparing and performing basic arithmetic operations with whole numbers and common, simple fractions and decimals, money, and recognising common spatial representations and measurements in familiar contexts.

Rationale

Numeracy empowers students to use mathematics to make sense of the world and apply mathematics in a context for work, citizenship, personal or social purpose. Numeracy gives meaning to mathematics, and mathematics is the tool (the knowledge and skills) to be used efficiently and critically. Numeracy involves the use and application of a range of mathematical skills and knowledge which arise in a range of different contexts and situations.

Numeracy enables students to develop logical thinking and reasoning strategies in their everyday activities. It develops students’ problem-solving skills, and allows them to make sense of numbers, time, patterns and shapes for everyday activities like cooking, gardening, sport and travel. Through numeracy, students understand the mathematical requirements for personal organisation matters involving money, time and travel. They can then apply these skills to their everyday lives to recognise monetary value, understand scheduling and timetabling, direction, planning, monetary risk and reward.

Technology is an integral part of everyday and working life in Australia. Handheld devices like tablets are used for common daily uses: connectivity, communication, sourcing information, and as a tool for carrying out a myriad of functions. Software applications are available on a range of devices. There is an expectation that our students are ready with these skills when they transition to independent living, further study or to work. The integration of digital technologies in the learning of mathematical processes is essential and is embedded throughout this study.

Underpinned by applied learning

Victorian Pathways Certificate Numeracy is framed around an applied learning approach to teaching ensuring that every student feels empowered to make informed choices about the next stages of their lives through experiential learning and authentic learning experiences.

Applied learning incorporates the teaching of skills and knowledge in the context of ‘real life’ experiences. Students apply what they have learnt by doing, experiencing and relating acquired skills to the real world. Applied learning teaching and practice ensures that what is learnt in the classroom is connected to scenarios and experiences outside the classroom and makes that connection as immediate and transparent as possible.

Applied learning is about nurturing and working with a student in a holistic manner, taking into account their personal strengths, interests, goals and previous experiences to ensure a flexible and independent approach to learning. Applied learning emphasises skills and knowledge that may not normally be the focus of more traditional school curriculums. It also recognises individual differences in ways of learning and post-educational experiences. Real-life application often requires a shift from a traditional focus on discrete curriculum to a more integrated and contextualised approach to learning, as students learn and apply the skills and knowledge required to solve problems, implement projects or participate in the workforce.

The Victorian Pathways Certificate acknowledges that part of the transition from school to further education, training and employment is the ability to participate and function in society as an adult. Moving students out of the classroom to learn allows them to make the shift to become more independent and responsible for their own learning and increase their intrinsic motivation. Best practice applied learning programs are flexible and student-centred, where learning goals and outcomes are individually designed and negotiated with students.

Applied learning can also involve students and their teachers working in partnership with external organisations to access VET and integrated learning placements. These partnerships provide the necessary contexts for students to demonstrate the relevance of the skills and knowledge they have acquired in their study and training.

Approaches to applied learning

This Numeracy curriculum design is based on an applied learning approach to teaching this study. Applied learning principles and practices are embodied in the following five categories.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Motivation to engage in learning | Applied learning practices | Student agency in learning | A student-centred and flexible approach | Assessment practices which promote success |
| * Ensure what is learnt in the classroom is connected to scenarios and experiences outside the classroom and makes that connection as immediate and transparent as possible * Engage students in demonstrations, activities, investigations and problem-solving in the classroom, community, workplace and other educational settings * Undertake activities that challenge the student’s level of competence and support them to succeed and build self-efficacy. | * Ensure students apply what they have learnt by doing, experiencing, reflecting and relating new knowledge and skills to the real-world * To cater for individual student needs, use authentic materials and resources drawn from everyday life rather than mass-produced textbooks or materials * Utilise the experience and knowledge of community members including employers, cultural and community leaders and former students * Ensure learning reflects the integration that occurs in real-life tasks. - include skills and knowledge relevant to the whole task and the whole person such as collaboration, communication, problem solving and interpersonal skills * Present learning activities in different modalities – visual, auditory and kinesthetic, to allow the greatest uptake of knowledge * Explicitly teach the technical language of the content that can be applied by students in talking, reading, writing and listening, using authentic examples. | * Engage in a dialogue with students about the curriculum and how they can make connections * Ensure students are moving to equal partners in determining the learning process as they develop greater independence and responsibility for their own learning * Encourage students to collaborate with peers and identify and utilize individual and group strengths and reflect on each stage of their learning journey * Share knowledge – recognising the intellectual, cultural and practical knowledge students bring to the learning environment. * Value students’ own approaches to the study including effective use of supporting technologies * Support students to learn through interaction and cooperation – via discussion, asking questions, giving explanations and presentations, and working cooperatively in pairs or small groups. | * Understand the student’s knowledge and skills prior to commencing the study and use this as the starting point for their learning * Understand and encourage a student’s personal, education and pathway goals * Consider the whole person and celebrating successes and connections to build resilience, confidence and self-worth * Build on the positive strengths of each student – learning strengths, character strengths * Teach concepts in contexts relevant to the students’ backgrounds, interests and experiences * Facilitate mutually beneficial relationships with a range of local communities while raising awareness about social and community issues and practices that influence and impact on students’ lives and futures. | * Use the assessment method that best fits the content and context and allows for incremental indications of success * Afford students multiple opportunities for success and assessment. |

Aims

This study enables students to:

* develop their everyday numeracy practices to make sense of their personal, public and future vocational lives
* develop foundational mathematical skills with consideration of their personal, home, vocational and community environments and contexts, and an awareness and use of accessible and appropriate technologies.

Structure

This study is made up of four units and each unit contains two modules. The learning goal of each module describes the intended knowledge and skills to be gained by the student. The application describes examples of evidence that will show a student has achieved the learning goal. The approach to achieving the learning goal is centred on applied learning principles and is detailed through the application of key knowledge and skills.

The units have been designed as standalone and can be completed in any order. Each module is based on different numeracies that form the context for the overarching learning intentions.

Each numeracy includes two focus areas that describe the spread of mathematical content knowledge that is required to engage with that specific numeracy. Each focus area includes a learning goal and associated applications.

A glossary defining numerical and mathematical terms and notations used in this study design will be included in the companion Support Materials.

This Numeracy study design is designed around four complementary and essential components:

1. The **Modules** are framed around **working mathematically across four numeracy contexts**:
2. Personal numeracy
3. Financial numeracy
4. Health and recreational numeracy
5. Civic numeracy.
6. A **four-stage problem-solving cycle** that underpins the capabilities required to solve a mathematical problem embedded in the real world.
7. The development and use of a technical **Mathematical toolkit** to use as they undertake their numeracy activities and tasks. Students should be able to confidently use multiple mathematical tools, both analogue and digital/technological.
8. **Eight Focus Areas** name and describe a range of different mathematical knowledge and skills that are expected to be used and applied across the units and modules.

Diagram, timeline

Description automatically generatedThe structure is illustrated by this diagram.

The structure of Victorian Pathways Numeracy is further explained by the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module** | **Numeracy** | **Focus Area** | **Problem-Solving Cycle** | **Mathematical Toolkit** |
| UNIT 1 | | | | |
| Module 1 | Personal numeracy | * Location * Systematics |  |  |
| Module 2 | Financial numeracy | * Number * Change |  |  |
| UNIT 2 | | | | |
| Module 3 | Health and recreational numeracy | * Shape * Quantity and measures |  |  |
| Module 4 | Civic numeracy | * Data * Likelihood |  |  |
| **UNIT 3** | | | | |
| Module 1 | Personal numeracy | * Location * Systematics |  |  |
| Module 2 | Financial numeracy | * Number * Change |  |  |
| **UNIT 4** | | | | |
| Module 3 | Health and recreational numeracy | * Shape * Quantity and measures |  |  |
| Module 4 | Civic numeracy | * Data * Likelihood |  |  |

Entry

There are no prerequisites for entry into any of the units in this course.

Duration

Each unit requires 100 nominal hours, of which at least 50 hours are scheduled classroom instruction. The VPC is designed to be delivered flexibly to suit the needs and circumstance of individual students. This can include face-to-face learning and can also consist of activities such as work experience, volunteering, community involvement and sports leadership.

Changes to the curriculum

During its period of accreditation minor changes to the study will be announced in the [*VCAA Bulletin*](https://www.vcaa.vic.edu.au/news-and-events/bulletins-and-updates/bulletin/Pages/index.aspx). The *Bulletin* is the only source of changes to regulations and accredited studies. It is the responsibility of each teacher to monitor changes or advice about studies published in the *Bulletin*.

Monitoring for quality

As part of ongoing monitoring and quality assurance, the VCAA will periodically undertake an audit of VPC Numeracy to ensure the study is being taught and assessed as accredited. The details of the audit procedures and requirements are published annually in the VPC Administrative Handbook. Schools will be notified when they are required to submit material to be audited.

Safety and wellbeing

It is the responsibility of the school to ensure that duty of care is exercised in relation to the health and safety of all students undertaking the study.

Employability skills

This study offers a number of opportunities for students to develop employability skills. The Support materialscompanion document will provide specific examples of how students can develop employability skills during learning activities and assessment tasks.

Legislative compliance

When collecting and using information, the provisions of privacy and copyright legislation, such as the Victorian *Privacy and Data Protection Act 2014* and *Health Records Act 2001*, and the federal *Privacy Act 1988* and *Copyright Act 1968*, must be met.

Child Safe Standards

Schools and education and training providers are required to comply with the Child Safe Standards made under the *Child Wellbeing and Safety Act 2005* (Vic). Registered schools are required to comply with *Ministerial Order No. 870 Child Safe Standards – Managing the Risk of Child Abuse in Schools*. For further information, consult the websites of the [Victorian Registration and Qualifications Authority](https://www.vrqa.vic.gov.au/childsafe/Pages/Home.aspx), the [Commission for Children and Young People](https://ccyp.vic.gov.au/) and the [Department of Education and Training](https://www2.education.vic.gov.au/pal/child-safe-standards/policy).

Assessment and reporting

Satisfactory completion

Satisfactory completion of a module is based on the teacher’s decision that the student has demonstrated achievement of the learning goals specified in the module. Students can only be awarded the unit upon satisfactory completion of all modules within that unit.

Teachers must develop courses that provide appropriate opportunities for students to demonstrate satisfactory achievement of modules.

Schools will report a student’s result for each module to the VCAA as S (Satisfactory) or N (Not Satisfactory).

Assessment

The standards of this course are described in the learning goals and applications, which will guide teachers and students as to what students are expected to know, understand and do as a result of the learning. Development of the assessment tasks identified to gather evidence of the designated learning will be done within the specific context of the setting and will be related to applied learning principles by having authentic purposes and practical outcomes. Teachers will then design the learning experiences and instruction necessary for students to meet the goals, following the backward design model.[[1]](#footnote-2)

Evidence of achievement must be ascertained through a range of assessment activities and tasks that demonstrates achievement of the modules. A key indicator of the level of achievement of the standard are the active verbs at the start of each statement, based on the hierarchy of knowledge in Bloom’s Taxonomy[[2]](#footnote-3). This decision will be supported by additional advice on rubric development and practical examples in the VPC Numeracy Support Materials. The Curriculum and Assessment Audit will support the teacher’s understanding and use of such resource materials.

Teaching, learning and assessment strategies should be based on the applied learning principles.

The learning goal and application sections of this document, alongside the Applied Learning Principles, should be used for course design and for the development of learning activities and assessment tasks. Assessment must be a part of the regular teaching and learning program and should be completed mainly in the classroom within a predetermined timeframe.

Assessment is to be undertaken as an ongoing process that integrates knowledge and skills with practical applications over a period of time. It will require a combination of evidence collected through teacher observations along with the collection of records of student work.

Assessment within the VPC should be based on the following principles:

*Assessment should be valid and reliable*

* Assessment tasks/activities should be designed to reflect the nature of the learning goals/elements of the study.
* Students should be assessed across a range of different tasks/activities and contexts.
* Students should be provided with multiple opportunities when required to satisfy the learning goal.

*Assessment should be fair*

* Assessment tasks/activities should be grounded in a relevant context and be sensitive to gender, culture, linguistic background, disability, socioeconomic status and geographic location.
* Instructions for assessment tasks should be clear and explicit.

*Assessment should be flexible*

* Assessment should be open-ended and flexible to meet the specific needs of students.
* Students should have the opportunity to demonstrate achievement at their own level and pace.

*Assessment should be efficient*

* Assessment instruments that provide evidence of achievement across a range of learning goals/studies should be used.

Implementing the study

Approach to learning

The teaching, learning and assessment strategies should be based around the applied learning principles on pages 8–9 in this document. Start from the learner’s point of need and use relevant contexts and materials. The teacher needs to tap into the known skills and knowledge of a student and make connections. The connections need to be made between the study and their real world.

Implementing assessment

Assessment will evaluate the student’s practical application of knowledge and skills. It will require the collection of evidence from a range of assessment activities and tasks. Students should be afforded multiple opportunities to demonstrate satisfactory completion.

Consideration should be given to the applied learning principles on pages 8–9 of this document when determining assessment.

Further support

Students can be supported and guided in their work and in their assessments. Explicit high levels of teacher support, scaffolding and guidance should be made available where needed. The level of support can include, but is not limited to:

* the provision of highly structured guides and templates
* prompting or questioning to help guide the student
* working alongside the student when learning or undertaking a task – explaining and prompting as they work
* encouraging students to document and report on their work and investigations in a way they feel most comfortable with – orally, in writing, using an audio or video recording, an image/graphic.

Authentication

Work related to the outcomes of each unit will be accepted only if the teacher can attest that, to the best of their knowledge, all unacknowledged work is the student’s own. Teachers will need to refer to the [*VPC Administrative Handbook*](https://www.vcaa.vic.edu.au/administration/vce-vcal-handbook/Pages/index.aspx) for authentication procedures.

Units 1 and 2

The purpose of Units 1 and 2 is to focus the teaching and learning on supporting and enabling students to develop their numeracy skills and practices in order to make sense of their daily personal, public and future vocational lives, and in their local community.

Each module describes the range of contexts that are the starting point for developing the students’ numeracy and for underpinning their mathematical skills. This range covers four numeracies where foundational mathematical skills are situated and embedded: personal, financial, health and recreational, and civic.

At this level, the contexts should be highly familiar and relevant to the students and should reflect their personal interests and lives. The numeracy problems to be solved should be authentic, concrete and immediate. Simple, everyday mathematical information will be situated in highly familiar, simple and concise oral and/or written materials where the mathematics is highly explicit.

Learning requirements

Across Units 1 and 2 the student is required to demonstrate achievement of each of the **eight learning goals** that describe the mathematical content knowledge for **three different learning requirements**. These include:

1. Each of the four **numeracies**:

* Personal numeracy
* Financial numeracy
* Health and recreational numeracy
* Civic numeracy.

1. Each of the **four stages of the problem-solving cycle** that underpin the capabilities required to solve a mathematical problem embedded in the real world:

* Identifying the mathematics
* Acting on and using mathematics
* Evaluating and reflecting
* Communicating and reporting.

1. Diagram, timeline

   Description automatically generatedThe use and application of a technical **Mathematical toolkit**.

Numeracy in context

Students should be able to apply the mathematical knowledge and skills from the relevant focus areas, across the four specified numeracy contexts.

The purpose of working mathematically across four numeracy contexts is to focus the teaching and learning on supporting and enabling students to develop a range of different numeracy skills and capabilities to make sense of their daily personal, public and vocational lives. Each numeracy describes the range of contexts that are the starting point for developing the students’ numeracy and mathematical skills.

The four numeracies can all be customised and adapted to meet the needs and interests of a particular cohort of students and therefore be focused on the personal interests of the learners. Many Pathways students will need targeted, personalised, and sometimes individualised learning, in order to engage them in successful learning experiences and outcomes. Examples follow:

* Personal numeracy explicitly targets the personal, daily lives of the students; however, this numeracy can be linked to the other three numeracies.
* Financial numeracy relates to the individual students as they go about their daily lives.
* Health and recreational numeracy can be used to address a range of different issues of direct concern or that are relevant to the group of students, which may cover their interests in sports or art and crafts, or as a way of addressing concerns related to personal health and wellbeing.
* Civic numeracy can be used to address the particular personal and community interests the students might have in relation to their involvement and participation in their local communities and its activities, or in broader social issues such as the environment.

It is possible to customise or adapt the teaching and learning to have a vocational focus. The numeracies can focus on students’ interests in relation to their future employment or training ambitions, with the program content focusing on work-life balance and coping with the demands of work and/or vocational training. If teaching the numeracies within a vocational or work-related context, the focus may be on different workplace tools, applications and processes or systems; following and giving directions; participating in quality assurance processes and data collection; reading workplace documents and related information or learning about the financial aspects of that vocation and industry.

The four numeracies are elaborated and described further in each of the modules in Units 1 and 2.

Problem-solving cycle

Students will develop the explicit skills and capabilities to be able to solve problems and use their foundational numeracy and mathematical skills to investigate problems where the mathematics is embedded within a real-world context. The purpose of this learning requirement is to make explicit how students can identify and recognise where and how mathematics can be embedded in everyday activities and tasks, and then how to engage with the world of mathematics and use that knowledge to solve problems.

Given that the contexts described in the four different numeracy contexts will be the starting point, students should be taken through the structured problem-solving cycle in order to know how to move from the context set in the real-world to the mathematical world and use their mathematical knowledge to solve the mathematical problem at hand. Part of solving an embedded problem is to be able to review and evaluate the outcomes, then communicate and report on what was been done and the outcomes.

The problem-solving cycle underpinning the curriculum has four distinct components: identifying the mathematics, acting on and using mathematics, evaluating and reflecting, followed by communicating and reporting on the results. The four distinct components are represented in the figure below.

Diagram

Description automatically generated

The skills and knowledge for this learning requirement are organised under the four distinct components to match the problem-solving cycle:

1. **Identify the mathematics**: recognise, select and interpret the mathematical information embedded in a real-world context and decide what mathematics to use
2. **Act on and use mathematics**: perform mathematical actions and processes in order to complete a task – this includes the use and application of a range of technologies
3. **Evaluate and reflect**: check and reflect on the mathematical problem-solving processes and outcomes in relation to the real-world context
4. **Communicate and report**: use a combination of informal and formal mathematical representations to document and report outcomes and results.

Students should be able to use the problem-solving cycle (identify the mathematics, act on and use mathematics, evaluate and reflect, and communicate and report) in an applied learning context, relevant to the key skills and knowledge reflected in the focus areas and across the four numeracies.

The key knowledge and skills described below detail the requirements for satisfying the learning goals for each module in each unit mapped against the four stages of the problem-solving cycle. For each of the key areas of knowledge and skills, the statements specify the range of actions required and the complexity of the numeracy tasks that are expected of students in Units 1 and 2. It also indicates the levels of support that teachers can provide.

Students should be able to demonstrate the key knowledge and skills for each of the four stages of the problem-solving cycle. However, it is not expected that one assessment task or activity can or should cover all key knowledge and skill areas. All should be covered at least once across the different numeracy tasks for each unit.

The key knowledge and skills are grouped according to the four distinct components of the problem-solving cycle.

a) Identify the mathematics

When mathematical problems are embedded within real-world contexts, students need to identify the essential features to be accommodated when transforming the real-world situation into a mathematical problem. This requires students to identify and name the mathematics embedded in the context or scenario and make decisions about how the task can be best represented and solved mathematically. This requires the development of a simple, easy to follow plan, an overview of the context or scenario and related background, and the development of related mathematical questions or investigations of interest.

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| **Key knowledge and skills** | **Complexity of the problem-solving tasks undertaken** |
| * Decide on the purpose of the task and the question(s) to be posed and answered * Identify and interpret the relevant mathematical information embedded in the selected numeracy context and materials * Describe and define the mathematical operations, processes and tools needed to solve the problem * Make a simple, short plan of the activities to be undertaken to perform the mathematical action(s). | * Locates and recognises simple, everyday mathematical information in highly familiar short and simple oral and/or written materials where the mathematics is highly explicit with concise and simple text and little distracting information. * Relies heavily on hands-on (concrete) and real-life materials, personal experience and prior knowledge to select appropriate actions and processes selected from one or two related mathematical processes described in the focus areas. Teacher scaffolding, advice and prompting is available. * Develops a plan that is short and clear, using a combination of both informal and some formal written mathematical language and symbols, with support and guidance available; for example, through the use of a planning template. |

b) Act on and use mathematics

This stage of the problem-solving cycle involves undertaking the mathematical aspects of the task identified in the first stage. It requires the utilisation of mathematical processes and problem-solving techniques, facts and procedures in order to solve the problem, and requires the selection and use of appropriate tools, including technology. For example, students may need to perform simple arithmetic computations, perhaps with the use of devices; read and interpret information from tables and simple everyday graphs; understand and describe two-dimensional shapes or common objects.

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| **Key knowledge and skills** | **Complexity of the problem-solving tasks undertaken** |
| * Select and implement a simple mathematical process for completing the numeracy task * Undertake rough estimations required prior to completing the numeracy task * Undertake relevant mathematical actions, processes and calculations to complete the numeracy task. * Select and use appropriate technology, tools and applications to complete the numeracy task. | * Involves the use and application of one or two related steps or simple processes such as counting, sorting, performing basic arithmetic operations with whole numbers or money, recognising common spatial or location representations, etc. * Uses personal, informal 'in-the-head' or pen-and-paper methods to calculate or uses a calculator, apps or technology. * Identifies and uses appropriate tools at a basic level in a limited range of applications; for example, uses a ruler to decide whether an item is longer than 10 cm or uses a simple calculator to subtract two numbers. |

c) Evaluate and reflect

Responses to real-world numeracy tasks, including any mathematical results or outcomes, require reviewing. Results should be checked against the original situation in terms of its reasonableness and relevance, and comparisons made with any rough initial estimates. Decisions are made about whether the solution is likely to be ‘about right’ or not, or to revise and adjust the results.

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| **Key knowledge and skills** | **Complexity of the problem-solving tasks undertaken** |
| * Check any estimations, actions and any calculation results to see if results are as expected * Review appropriateness and reasonableness of results to the numeracy task and adjust if necessary, including re-doing any calculations if required. | * Relies heavily on hands-on (concrete) and real-life materials, personal experience and prior knowledge to roughly check the reasonableness of the outcome(s) with support via prompting or questioning. |

d) Communicate and report

The results and outcomes of any numeracy task require a summary or presentation of the work to be developed, including the findings from the mathematical activities and related applications. This stage requires students to be able to represent and communicate the mathematical results. This involves the use of both oral and written language, and the use of informal, and some formal, mathematical representations.

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| **Key knowledge and skills** | **Complexity of the problem-solving tasks undertaken** |
| * Use informal and some formal written mathematical representation to document and report on the mathematical processes used and the results of the numeracy task * Use informal and some formal oral mathematical language to present and discuss the mathematical processes used and the results of the numeracy task * Use one or two different formats, devices or technologies to represent and document the numeracy task. | * Writes simple and everyday informal and minimal formal written representations of numbers, monetary amounts and data (into the 100s), including with the support of technology. * Uses common, everyday, informal oral language and gestures to convey numeracy-based information and processing; for example, language of position such as *up, down, behind, right, left, over, through;* comparative language such as *taller, heavier, hotter, smaller;* language of shape, size, colour such as *straight, curved, square, circle, triangle,* etc. * Uses simple and informal symbolism, diagrams and conventions relevant to the mathematical knowledge of the level; for example:   *57, $5.98, ½,+, * |

Mathematical toolkit

Students should develop their own mathematical toolkit to use where necessary as they undertake their numeracy practices, activities and tasks. On completion of the learning requirements students should be able to use a variety of tools and appropriate technologies to solve mathematical problems set in practical contexts. Students should become familiar with analogue and digital tools and be confident in knowing the purpose of everyday tools.

The students’ understanding of different technologies and when to use them should include:

* analogue and/or digital tools which may include clocks, tape measures, measuring cups, etc.
* digital tools, which may include manipulatives, mobile technology, software and applications
* the conventions and use of such analogue and digital tools appropriate to the home or community or learning environment
* awareness of contemporary technological and online and digital media, including software and applications based on computers, tablets, calculators and hand-held (mobile) devices and the functionality of their use and application.

Students should demonstrate competence in the following key skills:

* use highly familiar tools and devices to carry out tasks
* read and interpret the inputs and outputs of highly familiar technology
* use highly familiar technology to compute simple problems mathematically and to interpret the results
* reflect on the technology used and the outcomes obtained relative to personal, contextual and real-world implications.

Focus areas

Each numeracy comprises two focus areas that describe the spread of mathematical content knowledge that is required to engage with that specific numeracy. There are eight focus areas in total. The associated focus areas are detailed and have been assigned under each of the numeracies. There is a learning goal and an application for each focus area.

The focus areas comprise:

* Number
* Data
* Location
* Shape
* Quantity and measures
* Change
* Likelihood
* Systematics.

Unit 1

Module 1: Personal numeracy

Personal numeracyrelates to the mathematical requirements for personal organisational matters involving money, time and travel, or for participation in community-based activities and events.

Personal numeracy relates to understanding, using and interpreting numerical and mathematical information presented and embedded in different formats, in order to undertake personally relevant activities in highly familiar situations.

The understanding, use and interpretation of personal numeracy can be drawn from the following, but are not limited to these examples:

* transport and travel: planning routes, travel times and destinations including use of highly familiar maps, apps and software
* planning or scheduling: a day out or attending a social/community event or activity
* planning a BBQ, family event, trips to sites of cultural significance
* personal and home/family day-to-day tasks: such as cooking, gardening, sport, travel.

This module must be taught in conjunction with the aims of the study, which include the integration of the problem-solving cycle and embedded use of analogue and digital technologies.

Focus area: Location

The focus of location includes understanding of space, direction and location in relation to highly familiar local places. Students should be able to follow simple and familiar directions to locations based on digital or printed maps. Students should demonstrate an awareness of their place in space.

Learning goal

On completion of this module students should have the knowledge to be able to:

* find location and give directions in relation to everyday, familiar places within the vicinity
* find location and give directions with everyday, simple and familiar maps and technologies
* use everyday oral directions using informal language such as left/right, up/down, front/back, under/beside/over.

Application

Application of the learning goal requires students to demonstrate the following skills:

* orally describe location of familiar, local places
* use interactive and paper maps to locate highly familiar places or objects
* give and follow simple oral directions to highly familiar locations.

Focus area: Systematics

The focus of systematics includes using everyday technology to input and output information for the purposes of planning and scheduling. Students should be able to choose a number of inputs of familiar data and read the outputs, and any summary information derived from the technology.

Learning goal

On completion of this module students should have the knowledge to be able to:

* find common and familiar information and data inputs
* read data outputs
* summarise information.

Application

Application of the learning goal requires students to demonstrate the following skills:

* input simple data into familiar apps
* read simple output data
* interpret simple output data.

Module 2: Financial numeracy

Financial numeracy relates to undertaking basic and personal financial transactions and making straightforward decisions regarding the use and management of money.

Financial numeracy involves managing relevant personal, social or work-related everyday financial costs, charges, income and expenditure.

The understanding, use and interpretation of financial numeracy can be drawn from the following, but are not limited to these examples:

* income: pay, pay rates, payslips, deductions, loadings
* shopping and living costs: payments, costs, checking change, savings on sale items, utility bills, comparing common familiar food costs *$/kg*, and comparing pricing per unit costs on price tags to ascertain value for money
* personal banking: opening and managing an account, keeping money safe online, and common methods of payments
* savings: personal saving plans and amounts, and how to reduce costs.

This module must be taught in conjunction with the aims of the study, which include the integration of the problem-solving cycle and embedded use of analogue and digital technologies.

Focus area: Number

This focus area aims to develop students’ number sense through meaningful application of numeracy practices to a range of contexts where whole numbers and some simple fractions and decimals are used.

Learning goal

On completion of this module students should have the knowledge to be able to understand:

* place value and numbers up to 1000
* whole numbers and monetary amounts up to $1000
* addition and subtraction (with no borrowing or decomposition) of whole numbers and familiar monetary amounts into the 100s
* common, simple unit fractions such as 1/2, 1/4 and 1/10
* common decimals and percentages such as 0.5, 0.25, 50%, 25%.

Application

Application of the learning goal requires students to demonstrate the following skills:

* identify place value and read whole numbers up to 1000
* perform calculations of addition and subtraction with simple whole number amounts and familiar monetary amounts (into the 100s)
* recognise and understand very common simple unit fractions, decimals and percentages.

Focus area: Change

The focus of change includes the recognition of simple patterns and change in spatial, arithmetical and numerical contexts and applications. Students should recognise when change is occurring.

Learning goal

On completion of this module students should have the knowledge to be able to understand:

* pattern prediction with shapes
* repeating patterns with one element such as with shapes, or $2, $4, $6, $8, …
* changes and number matching with simple numbers; for example, prices increasing or decreasing, matching corresponding numbers.

Application

Application of the learning goal requires students to demonstrate the following skills:

* recognise changes in numerical values such as prices increasing or decreasing with a common fixed price discount
* number matching and comparison of simple numbers in context such as matching prices from receipts to on-the-shelf items
* predict pattern continuation with shapes; for example, triangle, square repeating pattern
* demonstrate repeating patterns with one element; for example, $2, $4, $6, $8, …

Assessment

Satisfactory completion of a module is based on the teacher’s decision that the student has achieved the learning goals for that module. A VPC unit can only be satisfactorily completed once all modules within that unit have been satisfactorily completed. Teachers should use a variety of assessment tasks and activities that provide a range of opportunities for students to demonstrate attainment of the learning.  The *VPC Numeracy Support Materials* provides details that will assist in assuring students meet the minimum requirements.

The eight focus areas, including the learning goals and applications listed for each module, should be used for course design and the development of learning activities and assessment tasks. Assessment must be a part of the regular teaching and learning program and should be completed mainly in class and within a limited timeframe.

Demonstration of achievement should be based on the students’ performance on a selection of evidence encompassing:

* each of the four numeracy modules with the learning goals where students apply their numeracy capabilities developed from the four numeracy modules and focus areas, including the learning goals and applications across the four specified numeracy contexts
* the four stages of the problem-solving cycle where students use the problem-solving cycle (identify the mathematics, act on and use mathematics, evaluate and reflect, and communicate and report) in an applied learning context, relevant to the key skills and knowledge reflected in the modules
* the technical mathematical toolkit where students apply the appropriate mathematical tool from the toolkit to undertake the numeracy tasks required. The toolkit should be applied and should underpin all learning and teaching activities in the problem-solving cycle.

The following table provides suitable tasks for assessment for each module.

|  |  |
| --- | --- |
| **Learning goals** | **Assessment tasks** |
| **Module 1 Learning goal 1.1:**  On completion of this module the student should be able to:   * find location and direction in relation to everyday, familiar places within the vicinity * find location and direction with everyday, simple and familiar maps and technologies * use everyday oral directions using informal language such as left/right, up/down, front/back, under/beside/over.   **Module 1 Learning goal 1.2**  On completion of this module the student should to be able to:   * find common and familiar information and data inputs * read data outputs * summarise information. | Assessment tasks are practical activities and records of active application and participation in collaborative and independent learning strategies.  Assessment could consist of, but is not limited to, a combination of the following activities where students should apply and demonstrate their learning:   * Investigations and projects; for example, keeping a record or diary on a ‘day in the life of me’, recording what they did and when; using a recipe and baking using measuring instruments; or measuring quantities of groceries and comparing these to the stated measurements. * Multimedia presentation, poster or report; for example, exploring games in common usage such as netball, AFL, 10 pin bowling, considering number facts and operations; compare costs of items on sale; comparing class data on favourite activities, sports or TV shows. * Interview, blog or vlog; for example, describing an excursion or trip showing directions using a mapping app, giving oral directions and main time points; comparing the nutritional information on favourite foods. |
| **Module 2 Learning goal 1.3**  On completion of this module the student should to be able to understand:   * place value and numbers up to 1000 * whole numbers and monetary amounts up to $1000 * addition and subtraction (with no borrowing or decomposition) of whole numbers and familiar monetary amounts into the 100s * common, simple unit fractions such as 1/2, 1/4 and 1/10 * common decimals and percentages such as 0.5, 0.25, 50%, 25%.   **Module 2 Learning goal 1.4**  On completion of this module the student should to be able to understand:   * pattern prediction with shapes * repeating patterns with one element such as with shapes, or $2, $4, $6, $8, … * changes and number matching with simple numbers, for example prices increasing or decreasing, matching corresponding numbers. |

Where teachers allow students to choose between tasks, they must ensure that the tasks they set are of comparable scope and demand.

Unit 2

Module 3: Health and recreational numeracy

Health and recreational numeracy relates to accessing, understanding and using foundational mathematical information to raise awareness of issues related to health and wellbeing, or when engaging in different recreational activities. Recreational activities may include indoor and outdoor pursuits, arts, social media, gaming and other personal interests and hobbies.

The understanding, use and interpretation of health and recreational numeracy can be drawn from the following, but are not limited to these examples:

* personal health and wellbeing: food and drinks ingredients and intakes, current social issues affecting youth such as binge drinking or vaping
* First Nations peoples’ health awareness
* traditional games in the First Nations peoples’ context including games from different regions within Australia
* cooking and eating: planning and making meals, following simple recipes
* sport and e-sports/games: score keeping, timing, shapes/dimensions of playing spaces
* crafts and hobbies: concepts of shape and dimension in design and creation of goods/items.

This module must be taught in conjunction with the aims of the study, which include the integration of the problem-solving cycle and embedded use of analogue and digital technologies.

Focus area: Shape

The focus of shape includes the recognition, naming and comparison of familiar shapes and objects in relation to size and shape of common one- and two-dimensional shapes. Students should be able to describe and classify common and familiar shapes in both diagrammatical and concrete forms. This focus also includes common characteristics and properties used in classifying shapes.

Learning goal

On completion of this module students should have the knowledge to be able to understand:

* common and familiar one- and two-dimensional shapes such as lines, triangles, circles, squares, etc.
* common properties of different one- and two-dimensional shapes such as size, colour, number and type of sides (straight/curved).

Application

Application of the learning goal requires students to demonstrate the following skills:

* recognise common and familiar one- and two-dimensional shapes
* name common and familiar one- and two-dimensional shapes
* construct common and familiar two-dimensional shapes
* categorise similar shapes according to common classifications.

Focus area: Quantity and measures

The focus of quality and measures enables students to explore highly familiar everyday measurements and quantities. Students develop a beginning sense of estimation and become familiar with and use simple and straightforward quantities and measurements such as those found in the home.

Learning goal

On completion of this module students should have the knowledge to be able to:

* use common and familiar basic metric measurements and quantities such as length, mass, capacity/volume, time and temperature such as personal height and weight, door height, liquid measurement, temperatures
* recognise common and familiar units such as m, cm, Kg, L, degrees C
* recognise 12-hour digital time, including minutes and hours on digital clocks, and hours, quarter-, and half-hours on analogue clocks
* recognise day and month dates.

Application

Application of the learning goal requires students to demonstrate the following skills:

* estimate lengths of highly familiar objects or items
* order and compare simple everyday measures and quantities
* recognise familiar and commonly used units of metric measurement
* read common and familiar dates and times using digital and analogue clocks.

Module 4: Civic numeracy

Civic numeracyrefers to activities related to participating in the student’s community and social life through being aware of and knowing about government and societal data, information and related processes.

The understanding, use and interpretation of civic numeracy can be drawn from the following, but are not limited to these examples:

* data and information in the popular media: sports results, weather, music, and film
* infographics: reading and understanding basic data and information presented in infographics from government, authorities, independent agencies, cultural and community organisations
* simple, everyday risk and likelihood of events: understanding basic risk and generalised likelihood and chance of events relating to society such as weather, health, polls.

This module must be taught in conjunction with the aims of the study, which include the integration of the problem-solving cycle and embedded use of analogue and digital technologies.

Focus area: Data

Data can be found in everyday life, workplaces, and society. Students should be able to collect, represent and read familiar data represented in simple graphs and tables found in the media or in everyday contexts.

Learning goal

On completion of this module students should have the knowledge to be able to understand:

* simple data collection by hand or with tables
* simple cases of data, graphs and infographics.

Application

Application of the learning goal requires students to demonstrate the following skills:

* collect and display simple data
* read simple graphs such as bar or pie graphs
* read simple tables
* identify and locate key facts from simple data.

Focus area: Likelihood

The focus of likelihood includes being able to understand and use everyday language of likelihood and chance related to common and familiar events. Students should be able to talk about chance and risk given the likelihood of common and familiar events occurring.

Learning goal

On completion of this module students should have the knowledge to be able to:

* use everyday language to talk about the likelihood of an event occurring such as ‘possible’, ‘impossible’, ‘unlikely’, ‘likely’, ‘certain’, ‘Buckley’s chance’, ‘pigs might fly’, ‘dead-set’
* understand language and relative magnitude of simple and highly familiar chance events.

Application

Application of the learning goal requires students to demonstrate the following skills:

* recognise and use the everyday language of chance and likelihood
* use everyday language to compare and order different and simple magnitudes of chance.

Assessment

Satisfactory completion of a module is based on the teacher’s decision that the student has achieved the learning goals for that module. A VPC unit can only be satisfactorily completed once all modules within that unit have been satisfactorily completed. Teachers should use a variety of assessment tasks and activities that provide a range of opportunities for students to demonstrate attainment of the learning. The *VPC Numeracy Support Materials* provides details that will assist in assuring students meet the minimum requirements.

The eight focus areas, including the learning goals and applications listed for each module, should be used for course design and the development of learning activities and assessment tasks. Assessment must be a part of the regular teaching and learning program and should be completed mainly in class and within a limited timeframe.

Demonstration of achievement should be based on the students’ performance on a selection of evidence encompassing:

* each of the four numeracy modules with the learning goals where students apply their numeracy capabilities developed from the four numeracy modules and focus areas, including the learning goals and applications across the four specified numeracy contexts
* the four stages of the problem-solving cycle where students use the problem-solving cycle (identify the mathematics, act on and use mathematics, evaluate and reflect, and communicate and report) in an applied learning context, relevant to the key skills and knowledge reflected in the modules
* the technical mathematical toolkit where students apply the appropriate mathematical tool from the toolkit to undertake the numeracy tasks required. The toolkit should be applied and should underpin all learning and teaching activities in the problem-solving cycle.

The following table provides suitable tasks for assessment for each module.

|  |  |
| --- | --- |
| **Learning goal** | **Assessment tasks** |
| **Module 3 Learning goal 2.1**  On completion of this module the student should to be able to understand:   * common and familiar one- and two-dimensional shapes such as lines, triangles, circles and squares * common properties of different one- and two-dimensional shapes such as size, colour, number and type of sides (straight/curved).   **Module 3 Learning goal 2.2**  On completion of this module the student should be able to:   * use common and familiar basic metric measurements and quantities such as length, mass, capacity/volume, time and temperature in everyday ways such as personal height and weight, door height, liquid measurement, temperatures * recognise common and familiar units such as m, cm, Kg, L, degrees C * recognise 12-hour digital time, including minutes and hours on digital clocks, and hours, quarter-, and half-hours on analogue clocks * recognise day and month dates. | Assessment tasks are practical activities and records of active application and participation in collaborative and independent learning strategies.  Assessment could consist of, but is not limited to, a combination of the following activities where students should apply and demonstrate their learning:   * Investigations and projects; for example, keeping a record or diary on a ‘day in the life of me’, recording what they did and when; using a recipe and baking using measuring instruments; or measuring quantities of groceries and comparing these to the stated measurements. * Multimedia presentation, poster or report; for example, exploring games in common usage such as netball, AFL, 10 pin bowling, considering number facts and operations; compare costs of items on sale; comparing class data on favourite activities, sports or TV shows. * Interview, blog or vlog; for example, describing an excursion or trip showing directions using a mapping app, giving oral directions and main time points; comparing the nutritional information on favourite foods. |
| **Module 4 Learning goal 2.3**  On completion of this module the student should to be able to understand:   * simple data collection by hand or with tables * simple cases of data, graphs and infographics.   **Module 4 Learning goal 2.4**  On completion of this module the student should be able to:   * use everyday language to talk about the likelihood of an event occurring such as ‘possible’, ‘impossible’, ‘unlikely’, ‘likely’, ‘certain’, ‘Buckley’s chance’, ’pigs might fly’, ‘dead-set’ * understand language and relative magnitude of simple and highly familiar chance events. |

Where teachers allow students to choose between tasks, they must ensure that the tasks they set are of comparable scope and demand.

Units 3 and 4

The purpose of Units 3 and 4 is to focus the teaching and learning on supporting and enabling students to further develop their numeracy skills and practices in order to make sense of their daily personal, public and future vocational lives, and in their local community.

Each module describes the range of contexts that are the starting points for developing the students’ numeracy and for underpinning their mathematical skills. This range covers four numeracies where foundational mathematical skills are situated and embedded: personal, financial, health and recreational, and civic.

At this level, the contexts should be familiar and relevant to the students and should reflect their personal interests and lives. The numeracy problems to be solved should be authentic, concrete and immediate. Simple, everyday mathematical information will be situated in familiar, simple and concise oral and/or written materials where the mathematics is explicit.

Learning requirements

Across Units 3 and 4 the student is required to demonstrate achievement of each of the **eight learning goals** that describe the mathematical content knowledge for **three different learning requirements**. These include:

1. Each of the four **numeracies**:

* Personal numeracy
* Financial numeracy
* Health and recreational numeracy
* Civic numeracy.

1. Each of the **four stages of the problem-solving cycle** that underpin the capabilities required to solve a mathematical problem embedded in the real-world:

* Identifying the mathematics
* Acting on and using mathematics
* Evaluating and reflecting
* Communicating and reporting.

1. Diagram, timeline

   Description automatically generatedThe use and application of a technical **Mathematical toolkit**.

Numeracy in context

Students should be able to apply the mathematical knowledge and skills from the relevant focus areas, across the four specified numeracy contexts.

The purpose of working mathematically across four numeracy contexts is to focus the teaching and learning on supporting and enabling students to develop a range of different numeracy skills and capabilities to make sense of their daily personal, public and vocational lives. Each numeracy describes the range of contexts that are the starting point for developing the students’ numeracy and mathematical skills.

The four numeracies can all be customised and adapted to meet the needs and interests of a particular cohort of students and therefore be focused on the personal interests of the learners. Many Pathways students will need targeted, personalised, and sometimes individualised learning, in order to engage them in successful learning experiences and outcomes. Examples follow:

* Personal numeracy explicitly targets the personal, daily lives of the students; however, this numeracy can be linked to the other three numeracies.
* Financial numeracy relates to the monetary and financial constructs of individual students as they go about their daily lives.
* Health and recreational numeracy can be used to address a range of different issues of direct concern or relevance to the group of students, which may include their interests in sports or art and crafts, or as a way of addressing concerns related to personal health and wellbeing.
* Civic numeracy can be used to address the particular personal and community interests the students might have in relation to their involvement and participation in their local communities and activities, or in broader social issues such as the environment.

It is possible to customise or adapt the teaching and learning so that it has a vocational focus. The numeracies can focus on students’ interests in relation to their future employment or training ambitions, with the program content focusing on work-life balance and coping with the demands of work and/or vocational training. When teaching the numeracies within a vocational or work-related context, the focus may be on different workplace tools, applications and processes or systems; following and giving directions; participating in quality assurance processes and data collection; reading workplace documents and related information or learning about the financial aspects of that vocation and industry.

The four numeracies are elaborated upon and described further in each of the modules in Units 3 and 4.

Problem-solving cycle

Students develop the explicit skills and capabilities to be able to solve problems and use their foundational numeracy and mathematical skills to investigate problems where the mathematics is embedded within a real-world context. The purpose of this learning requirement is to make explicit how students can identify and recognise where and how mathematics can be embedded in everyday activities and tasks, and then how to engage with the world of mathematics and use that knowledge to solve problems.

Given that the contexts described in the four different numeracy contexts will be the starting point, students should be taken through the structured problem-solving cycle in order to know how to move from the context set in the real-world to the mathematical world, and use their mathematical knowledge to solve the mathematical problem at hand. Part of solving an embedded problem is to be able to review and evaluate the outcomes, then communicate and report on what was been done and the outcomes.

The problem-solving cycle underpinning the curriculum has four distinct components of identifying the mathematics, acting on and using mathematics, evaluating and reflecting, followed by communicating and reporting on the results. The four distinct components are represented in the figure below.

Diagram

Description automatically generated

The skills and knowledge for this learning requirement are organised under four distinct components to match the problem-solving cycle:

1. **Identify the mathematics**: recognise, select and interpret the mathematical information embedded in a real-world context and decide what mathematics to use
2. **Act on and use mathematics**: perform mathematical actions and processes in order to complete a task – this includes the use and application of a range of technologies
3. **Evaluate and reflect**: check and reflect on the mathematical problem-solving processes and outcomes in relation to the real-world context
4. **Communicate and report**: use a combination of informal and formal mathematical representations to document and report outcomes and results.

Students should be able to use the problem-solving cycle (identify the mathematics, act on and use mathematics, evaluate and reflect, and communicate and report) in an applied learning context, relevant to the key skills and knowledge reflected in the focus areas and across the four numeracies.

The key knowledge and skills described below detail the requirements for satisfying the learning goals for each module in each unit mapped against the four stages of the problem-solving cycle. For each of the key areas of knowledge and skills, the statements specify the range of actions required and the complexity of the numeracy tasks that are expected of students in Units 3 and 4. It also indicates the levels of support that teachers can provide.

Students should demonstrate achievement of the key knowledge and skills for each of the four stages of the problem-solving cycle. However, it is not expected that one assessment task or activity can or should cover all key knowledge and skill areas. All should be covered at least once across the different numeracy tasks for each unit.

The key knowledge and skills are grouped according to the four distinct components of the problem-solving cycle.

a) Identify the mathematics

When mathematical problems are embedded within real-world contexts, students need to identify the essential features to be accommodated when transforming the real-world situation into a mathematical problem. This requires students to identify and name the mathematics embedded in the context or scenario and make decisions about how the task can be best represented and solved mathematically. This requires the development of a simple, easy to follow plan, an overview of the context or scenario and related background, and the development of related mathematical questions or investigations of interest.

|  |  |
| --- | --- |
| **Key knowledge and skills** | **Complexity of the problem-solving tasks undertaken** |
| * Decide on the purpose of the task and the question(s) to be posed and answered. * Identify and interpret the relevant mathematical information embedded in the selected numeracy context and materials. * Describe and define the mathematical operations, processes and tools needed to solve the problem. * Make a simple plan of the activities to be undertaken to perform the mathematical action(s). | * Identifies and interprets simple, everyday mathematical information in familiar and simple oral and/or written materials where the mathematics is partially embedded with little text and minimal distracting information. * Relies substantially on hands-on (manipulatives) and real-life materials, personal experience and prior knowledge to select an appropriate method of processing, selected from one or two familiar mathematical processes described in the focus areas. When requested, teacher scaffolding, guidance, and prompting should be made available. * Develops a plan that is simple and clear, using a combination of both informal and formal written mathematical language and symbols, with support and guidance available when requested; for example, through scaffolding or the use of a planning template. |

b) Act on and use mathematics

This stage of the problem-solving cycle involves undertaking the mathematical aspects of the task identified in the first stage. It requires the utilisation of mathematical processes and problem-solving techniques, facts and procedures in order to solve the problem, and requires the selection and use of appropriate tools, including technology. For example, students may need to perform simple arithmetic computations, perhaps with use of devices; read and interpret information from tables and simple everyday graphs; undertake and record familiar measurements; understand and describe two-dimensional shapes or common objects.

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| **Key knowledge and skills** | **Complexity of the problem-solving tasks undertaken** |
| * Select and implement a simple mathematical method for completing the numeracy task. * Undertake rough estimations required prior to completing the numeracy task. * Undertake relevant mathematical actions, processes and calculations to complete the numeracy task. * Select and use appropriate technology, tools and applications to complete the numeracy task. | * Involves the use and application of one or two familiar mathematical steps or processes such as the ones described in the focus areas. * Uses personal and informal by-hand methods to calculate, and selects and uses an appropriate calculator, app or technology. * Identifies and uses appropriate tools and uses them in familiar applications; for example, uses a familiar measuring instrument, such as a tape measure to measure length, or records relevant data on a spreadsheet. |

c) Evaluate and reflect

Responses to real-world numeracy tasks, including any mathematical results or outcomes, require reviewing. Results should be checked against the original situation in terms of its reasonableness and relevance, and comparisons made with any rough initial estimates. Decisions are made about whether the solution is likely to be ‘about right’ or not, or to revise and adjust the results.

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| **Key knowledge and skills** | **Complexity of the problem-solving tasks undertaken** |
| * Check any estimations, actions and any calculation results to see if results are as expected. * Review appropriateness and reasonableness of results to the numeracy task and adjust if necessary, including re-doing any mathematical processes or calculations if required. | * Identifies which mathematical processes and actions need checking to see if the results are as expected. * Relies substantially on hands-on (manipulatives) and real-life materials, personal experience and prior knowledge to review initial estimates, and checks reasonableness of results and outcomes in relation to the context. * Implements appropriate adjustments and changes to mathematical processes or calculations as required. When requested, teacher scaffolding, advice and prompting can be made available. |

d) Communicate and report

The results and outcomes of any numeracy task require a summary or presentation of the work to be developed, including the findings from the mathematical activities and related applications. This stage requires students to be able to represent and communicate the mathematical results. This involves the use of both oral and written language, and the use of informal, and some formal, mathematical representations.

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| **Key knowledge and skills** | **Complexity of the problem-solving tasks undertaken** |
| * Use informal and formal written mathematical representation to document and report on the mathematical processes used and the results of the numeracy task. * Use informal and formal oral mathematical language to present and discuss the mathematical processes used and the results of the numeracy task. * Use different formats, devices or technologies to represent and document the numeracy task. | * Uses basic and everyday informal, and some formal, written and visual representations of numbers (into the 10 000s), monetary amounts, measurements, shapes, locations and directions, and data, including with the support of technology. * Uses basic and everyday informal, and some formal, oral language and gestures to convey everyday mathematically based information and processes such as language of shape and measurement; for example, *quadrilaterals, dimensions, cube, cylinder, faces;* language of location: N, S, W, E; everyday language of likelihood such as *chance, possibility, highly likely, certain;* andcomparative language such as *greater than/less than, further, closer.* * Uses a combination of informal, and some formal, symbolism, diagrams, graphs and conventions relevant to the mathematical knowledge of the level, as described in the focus areas; for example:   *1/4, 1/10, 50%, 0.25, +, -, x, ÷, ml, °C,* 16 cm, N, E, familiar bar charts. |

Mathematical toolkit

Students should develop their own mathematical toolkit to use as they undertake numeracy practices, activities and tasks. On completion of the learning requirements students should be able to use a variety of tools and appropriate technologies to solve and represent mathematical problems set in practical contexts. Students should become familiar with analogue and digital tools and be confident in knowing the purpose of everyday tools.

The students’ understanding of different technologies and when to use them should include:

* analogue and/or digital tools which may include clocks, tape measures, measuring cups, etc.
* digital tools, which may include manipulatives, mobile technology, software and applications
* the conventions and use of such analogue and digital tools appropriate to the home or community or learning environment
* awareness of contemporary technological and online and digital media, including software and applications based on computers, tablets, calculators and hand-held (mobile) devices, and the functionality of their use and application.

Students should demonstrate competence in the following key skills:

* select and use a range of common, familiar tools and devices to carry out tasks
* read and interpret the inputs and outputs of common familiar technology
* use common, familiar technology to compute problems mathematically and to interpret the results
* reflect on the technology used and its appropriateness as well as the outcomes obtained relative to personal, contextual and real-world implications.

Focus areas

Each numeracy comprises two focus areas that describe the spread of mathematical content knowledge that is required to engage with that specific numeracy. There are eight focus areas in total. The associated focus areas are detailed and have been assigned under each of the numeracies. There is a learning goal and an application for each focus area.

The focus areas comprise:

* Number
* Data
* Location
* Shape
* Quantity and measures
* Change
* Likelihood
* Systematics.

Unit 3

Module 1: Personal numeracy

Personal numeracyrelates to the mathematical requirements for personal organisational matters involving money, time and travel; or for participation in community-based activities and events.

Personal numeracy relates to understanding, using and interpreting numerical and mathematical information presented and embedded in different formats, in order to undertake personally relevant activities in familiar situations.

The understanding, use and interpretation of personal numeracy can be drawn from the following, but are not limited to these examples:

* transport and travel: planning routes, travel times and destinations including use of familiar maps, apps and software
* planning or scheduling a day out or attending a social/community event or activity
* planning a BBQ, family event, trips to sites of cultural significance
* personal and home/family day-to-day tasks such as cooking, gardening, sport, travel.

This module must be taught in conjunction with the aims of the study, which include the integration of the problem-solving cycle and embedded use of analogue and digital technologies.

Focus area: Location

The focus of location includes understanding of space, direction and location in relation to common and familiar local places. Students should be able to follow and give simple directions to locations based on digital or printed maps. Students should demonstrate an awareness of their place in space.

Learning goal

On completion of this module students should have the knowledge to be able to:

* find locations and give directions in relation to everyday, familiar places within their extended vicinity
* find locations and give directions using simple navigation with everyday, familiar maps and technologies
* use informal, and some formal, language of location and direction, including simple angle measures and representations such as: quarter and half turns, left and right, N, S, W, E.

Application

Application of the learning goal requires students to demonstrate the following skills:

* provide oral and written instructions to describe the location of familiar, local places and landmarks
* use interactive, digital technologies and paper maps to locate familiar places or landmarks and places of significance, and describe suitable routes
* give and follow simple oral and written directions to familiar locations
* use everyday language of angles and compass directions (N, S, W, E) to describe familiar locations and directions such as half turn, U-turn.

Focus area: Systematics

The focus of systematics includes using everyday technology to input and output information for the purposes of planning, collecting, sorting or categorising common and familiar data and information. Students should be able to choose a number of inputs of familiar data and read the outputs and interpret summary information derived from the technology.

Learning goal

On completion of this module students should have the knowledge to be able to:

* use common and familiar information including data
* read and interpret data inputs and outputs
* summarise information
* plan and schedule.

Application

Application of the learning goal requires students to demonstrate the following skills:

* input data into familiar apps
* read input and output data
* interpret simple output data
* plan and schedule with common and familiar data.

Module 2: Financial numeracy

Financial numeracy relates to undertaking basic and personal financial transactions and making straightforward decisions regarding the use and management of money.

Financial numeracy involves managing relevant personal, social or work-related everyday financial costs, charges, income and expenditure.

The understanding, use and interpretation of financial numeracy can be drawn from the following, but are not limited to these examples:

* income: pay, pay rates, payslips, deductions, loadings
* shopping and living costs: payments, costs, checking change, savings on sale items, utility bills, comparing common familiar food costs $/kg, and comparing pricing per unit costs on price tags to ascertain value for money
* personal banking: opening and managing an account, keeping money safe online, and common methods of payments
* savings: personal saving plans and amounts, and how to reduce costs.

This module must be taught in conjunction with the aims of the study, which include the integration of the problem-solving cycle and embedded use of analogue and digital technologies.

Focus area: Number

This focus area aims to extend students’ number sense through meaningful application of numeracy practices to a range of contexts where whole numbers and some simple fractions, decimals and percentages are used.

Learning goal

On completion of this module students should have the knowledge to be able to understand:

* place value and reading numbers up to 10 000
* whole numbers and monetary amounts up to $10 000
* common decimals and fractions and percentages such as and other common decimals up to two decimal places, such as money and time
* addition and subtraction with borrowing and decomposition
* multiplication and division related to small whole-value numbers
* the order of the four arithmetical operations.

Application

Application of the learning goal requires students to demonstrate the following skills:

* identify place value and read whole numbers up to 10 000
* perform calculations of addition and subtraction with numbers up to 10 000
* recognise and use common decimals, fractions, and percentages such as and other common decimals up to two decimal places
* find and use multiplication and division facts related to small whole-value number values only
* calculate simple problems using the order of the four arithmetical operations with whole-value numbers only.

Focus area: Change

The focus of change includes the recognition and use of simple patterns, and application of changes in spatial, arithmetical and numerical contexts. Students should recognise when change is occurring and estimate simple rules and find the next step in a growing pattern.

Learning goal

On completion of this module students should have the knowledge to be able to understand:

* familiar and simple patterns or sequences in patterns and in a series of numbers
* familiar mathematical language and terms used in numerical pattern prediction
* changes and reconciliation in sets of numbers into the 1000s
* repeating patterns with two or more elements such as simple pricing structures.

Application

Application of the learning goal requires students to demonstrate the following skills:

* identify and describe relationships and patterns of change in sets of simple numerical values
* demonstrate repeating patterns with one element, for example: $2, $4, $8, $16…
* reconcile and compare simple numbers in context, for example: prices, warehouse stock levels
* predict simple pattern continuation using familiar mathematical terms
* demonstrate repeating arithmetical and spatial patterns of familiar and simple numbers with more than one element.

Assessment

Satisfactory completion of a module is based on the teacher’s decision that the student has achieved the learning goals for that module. A VPC unit can only be satisfactorily completed once all modules within that unit have been satisfactorily completed. Teachers should use a variety of assessment tasks and activities that provide a range of opportunities for students to demonstrate attainment of the learning. The *VPC Numeracy Support Materials* provides details that will assist in assuring students meet the minimum requirements.

The eight focus areas, including the learning goals and applications listed for each module, should be used for course design and the development of learning activities and assessment tasks. Assessment must be a part of the regular teaching and learning program and should be completed mainly in class and within a limited timeframe.

Demonstration of achievement should be based on the students’ performance on a selection of evidence encompassing:

* each of the four numeracy modules with the learning goals where students apply their numeracy capabilities developed from the four numeracy modules and focus areas, including the learning goals and applications across the four specified numeracy contexts
* the four stages of the problem-solving cycle where students use the problem-solving cycle (identify the mathematics, act on and use mathematics, evaluate and reflect, and communicate and report) in an applied learning context, relevant to the key skills and knowledge reflected in the modules.
* the technical mathematical toolkit where students apply the appropriate mathematical tool from the toolkit to undertake the numeracy tasks required. The toolkit should be applied and should underpin all learning and teaching activities in the problem-solving cycle.

The following table provides suitable tasks for assessment for each module.

|  |  |
| --- | --- |
| **Learning goal** | **Assessment tasks** |
| **Module 1 Learning goal 3.1**  On completion of this module students should have the knowledge to be able to:   * find locations and give directions in relation to everyday, familiar places within their extended vicinity * find locations and give directions using simple navigation with everyday, familiar maps and technologies * use informal, and some formal, language of location and direction, including simple angle measures and representations such as: quarter and half turns, left and right, N, S, W, E.   **Module 1 Learning goal 3.2**  On completion of this module students should have the knowledge to be able to:   * use common and familiar information including data * read and interpret data inputs and outputs * summarise information * plan and schedule. | Assessment tasks are practical activities and records of active application and participation in collaborative and independent learning strategies.  Assessment could consist of, but is not limited to, a combination of the following activities where students should apply and demonstrate their learning:   * Investigations and projects; for example, planning a market stall, recording what they did and when; using a recipe and baking using measuring instruments; or measuring quantities of groceries and planning and organising a shared meal. * Multimedia presentation, poster or report; for example, planning a trip to a site of cultural significance; comparing costs of items on sale; comparing costs of trade services in the home. * Portfolio: for example, examining weather data and associated risks; planning and preparing a menu for the school canteen; examining the costs of steaming services. |
| **Module 2 Learning goal 3.3**  On completion of this module students should have the knowledge to be able to understand:   * place value and reading numbers up to 10 000 * whole numbers and monetary amounts up to $10 000 * common decimals and fractions and percentages such as and other common decimals up to two decimal places, such as money and time * addition and subtraction with borrowing and decomposition * multiplication and division related to small whole-value numbers * the order of the four arithmetical operations.   **Module 2 Learning goal 3.4**  On completion of this module students should have the knowledge to be able to understand:   * familiar and simple patterns or sequences in patterns and in a series of numbers * familiar mathematical language and terms used in numerical pattern prediction * changes and reconciliation in sets of numbers into the 1000s * repeating patterns with two or more elements such as simple pricing structures. |

Where teachers allow students to choose between tasks, they must ensure that the tasks they set are of comparable scope and demand.

Unit 4

Module 3: Health and recreational numeracy

Health and recreational numeracy involves accessing, understanding and using foundational mathematical information to raise awareness of issues related to health and wellbeing. This can include engaging in different recreational activities such as indoor and outdoor pursuits, arts, social media, gaming and other personal interests and hobbies.

The understanding, use and interpretation of health and recreational numeracy can be drawn from the following, but are not limited to these examples:

* personal health and wellbeing: food and drinks ingredients and intakes, current social issues affecting youth such as binge drinking or vaping
* First Nations peoples’ health awareness
* traditional games of First Nations people, including games from different regions within Australia
* cooking and eating: planning and making meals, following simple recipes
* sport and e-sports/games: score keeping, timing, shapes/dimensions of playing spaces
* crafts and hobbies: concepts of shape and dimension in design and creation of goods/items.

This module must be taught in conjunction with the aims of the study, which include the integration of the problem-solving cycle and embedded use of analogue and digital technologies.

Focus area: Shape

* The focus of shape includes the recognition, naming and categorisation of a range of two- and simple three-dimensional shapes. Students should be able to recognise, classify, describe and construct a range of simple shapes in both diagrammatical and concrete forms. This focus also includes understanding different characteristics and properties used in classifying two-dimensional shapes and simple three-dimensional objects.

Learning goal

On completion of this module students should have the knowledge to be able to understand:

* common two-dimensional shapes such as circles, triangles, quadrilaterals
* simple three-dimensional objects such as cube, cylinder, simple prisms
* common properties and language of two-dimensional shapes and three-dimensional objects (such as edges, faces, corners) and making connections between nets and three-dimensional objects; for example, matching solids and nets.

Application

Application of the learning goal requires students to demonstrate the following skills:

* recognise and name common two-dimensional shapes and simple three-dimensional objects
* construct common two-dimensional shapes and simple three-dimensional objects
* categorise common two-dimensional shapes and simple three-dimensional objects and shapes according to different common classifications
* match common and familiar three-dimensional solids and their nets.

Focus area: Quantity and measures

The focus area of quantity and measures is on enabling students to explore common everyday measurements and quantities. Students develop a sense of estimation and become familiar with and use everyday quantities and measurements such as those found in the home, in the community or in vocational studies or work.

Learning goal

On completion of this module students should have the knowledge to be able to understand:

* common metric distance and length measurements and quantities
* simple perimeter and area measurements such as measuring area by squares
* simple conversions between common and familiar metric units or common measures such as one teaspoon is 5 ml, one cup is 250 ml
* common units of quantities, such as mass (g, Kg) and volume (ml, L) and temperature in degrees Celsius
* analogue and digital times, including 12-hour time in hours (AM and PM), minutes and seconds on digital clocks, and hours, quarters, and halves, 10 and 5 to/from on analogue clocks
* digital and analogue calendars.

Application

Application of the learning goal requires students to demonstrate the following skills:

* estimate, measure and compare distance and length, mass (g, Kg) and volume (ml, L) of familiar items and quantities
* estimate, measure and compare simple quantity and measures such as perimeter, area, and temperatures in degrees Celsius
* make simple conversions between commonly used units; for example, one cup is 250 ml
* read and interpret common and familiar dates and times using digital and analogue clocks and calendars.

Module 4: Civic numeracy

Civic numeracyrefers to activities where students participate in their community and social life through being aware of government and societal data, information and related processes.

The understanding, use and interpretation of civic numeracy can be drawn from the following, but are not limited to these examples:

* data and information in the popular media: sports results, weather, music, film
* infographics: reading and understanding basic data and information presented in infographics from government, authorities, independent agencies, cultural and community organisations
* simple, everyday risk and likelihood of events: understanding basic risk and generalised likelihood and chance of events relating to society, such as weather, health, polls.

This module must be taught in conjunction with the aims of the study, which include the integration of the problem-solving cycle and embedded use of analogue and digital technologies.

Focus area: Data

Data can be found in everyday life, workplaces and society. Students should be able to collect, read and interpret familiar or commonly used data represented in simple graphs and tables found in the media or in everyday contexts.

Learning goal

On completion of this module students should have the knowledge to be able to understand:

* simple data collection methods including use of tables, spreadsheets and tallies
* display of data with commonly used tables and graphs with scale of 1’s, 5’s or 10’s including familiar and simple cases of data, graphs and infographics.

Application

Application of the learning goal requires students to demonstrate the following skills:

* collect, collate, sort and order data sets, for example use survey to collect data, use tallies to collate data and insert sets of data into a table/spreadsheet, sort from lowest to highest
* construct simple charts or graphs using familiar data with simple scales, for example in 1’s, 5’s or 10’s
* read, identify and interpret familiar information and facts from simple tables, graphs and infographics
* make simple comparisons and interpretations between provided simple data sets and their representations.

Focus area: Likelihood

The focus of likelihood includes understanding and using common language and terminology of likelihood and chance related to common and familiar events. Students should be able to talk about ideas of chance and risk, and interpret the likelihood of common and familiar events occurring.

Learning goal

On completion of this module students should have the knowledge to be able to understand:

* likelihood of familiar events or occurrences happening, using everyday language of chance
* common likelihoods and chance events such as weather predictions, dice or spinner success rates
* language and relative magnitude of the risk of common or familiar events of chance.

Application

Application of the learning goal requires students to demonstrate the following skills:

* order and compare simple familiar likelihood events and statements such as ‘evens’, ‘for sure’, ‘Buckley’s chance’, ‘impossible’
* read, interpret and make decisions about likelihood statements based on their chance of occurrence or success/failure
* order and compare the relative magnitude of the risk of common and familiar events of chance
* use the language of likelihood such as chance, possibility, highly likely, certain, risk, success/failure, predict.

Assessment

Satisfactory completion of a module is based on the teacher’s decision that the student has achieved the learning goals for that module. A VPC unit can only be satisfactorily completed once all modules within that unit have been satisfactorily completed. Teachers should use a variety of assessment tasks and activities that provide a range of opportunities for students to demonstrate attainment of the learning. The *VPC Numeracy Support Materials* provides details that will assist in assuring students meet the minimum requirements.

The eight focus areas, including the learning goals and applications listed for each module, should be used for course design and the development of learning activities and assessment tasks. Assessment must be a part of the regular teaching and learning program and should be completed mainly in class and within a limited timeframe.

Demonstration of achievement should be based on the students’ performance on a selection of evidence encompassing:

* each of the four numeracy modules with the learning goals where students apply their numeracy capabilities developed from the four numeracy modules and focus areas, including the learning goals and applications across the four specified numeracy contexts
* the four stages of the problem-solving cycle where students use the problem-solving cycle (identify the mathematics, act on and use mathematics, evaluate and reflect, and communicate and report) in an applied learning context, relevant to the key skills and knowledge reflected in the modules.
* the technical mathematical toolkit where students apply the appropriate mathematical tool from the toolkit to undertake the numeracy tasks required. The toolkit should be applied and should underpin all learning and teaching activities in the problem-solving cycle.

The following table provides suitable tasks for assessment for each module.

|  |  |
| --- | --- |
| **Learning goal** | **Assessment tasks** |
| Module 3 Learning goal 4.1   * common two-dimensional shapes such as circles, triangles, quadrilaterals * simple three-dimensional objects such as cube, cylinder, simple prisms * common properties and language of two-dimensional shapes and three-dimensional objects (such as edges, faces, corners) and making connections between nets and three-dimensional objects; for example, matching solids and nets.   Module 3 Learning Goal 4.2   * common metric distance and length measurements and quantities * simple perimeter and area measurements such as measuring area by squares * simple conversions between common and familiar metric units or common measures such as one teaspoon is 5 ml, one cup is 250 ml * common units of quantities, such as mass (g, Kg) and volume (ml, L) and temperature in degrees Celsius * analogue and digital times, including 12-hour time in hours (AM and PM), minutes and seconds on digital clocks, and hours, quarters, and halves, 10 and 5 to/from on analogue clocks * digital and analogue calendars. | Assessment tasks are practical activities and records of active application and participation in collaborative and independent learning strategies.  Assessment could consist of, but is not limited to, a combination of the following activities where students should apply and demonstrate their learning:   * Investigative report; for example, select a topic to explore and identify and collect a range of data from a variety of sources to form a view. * Create an experiment; for example, use a range of tools to measure and collect data about an identified topic such as student height. * Design a game or sport to play; for example, create a large-scale puzzle out of a range of 3D shapes; design a physical game that requires timed activities. |
| **Module 4 Learning goal 4.3**   * simple data collection methods including use of tables, spreadsheets and tallies * display of data with commonly used tables and graphs with scale of 1’s, 5’s or 10’s, including familiar and simple cases of data, graphs and infographics.   **Module 4 Learning goal 4.4**   * likelihood of familiar events or occurrences happening, using everyday language of chance * common likelihoods and chance events such as weather predictions, dice or spinner success rates * language and relative magnitude of the risk of common or familiar events of chance. |

Where teachers allow students to choose between tasks, they must ensure that the tasks they set are of comparable scope and demand.

1. McTighe, J. (n.d.). *Understanding by Design*. Three Stages of Backward Design: Frequently Asked Questions  
    [↑](#footnote-ref-2)
2. Bloom, B 1984 *Taxonomy of Educational Objectives,* Allyn and Bacon, Boston [↑](#footnote-ref-3)