



### VCAL NUMERACY SKILLS UNITS

The VCAL Numeracy Skills Units are designed for use within the Literacy and Numeracy Skills Strand of VCAL.

#### **Purpose**

Underpinning the VCAL Numeracy Skills Units is the concept that skills development occurs best when it takes place within social contexts and for social purpose. Like the VCAL Literacy Skills Units, the purpose of the VCAL Numeracy Skills Units is to develop skills and knowledge that allow effective participation in the four main social contexts in which we function in Australian society:

- family and social life
- workplace and institutional settings
- education and training contexts
- community and civic life.

Numeracy and mathematics is used in all these social contexts.

#### **Organising framework**

The learning outcomes are organised into four different domains which focus on the social purposes of numeracy and mathematics:

#### **Numeracy for Personal Organisation**

focuses on the numeracy requirements for personal organisational matters involving money, time and travel.

**Numeracy for Interpreting Society** relates to interpreting and reflecting on numerical, statistical and graphical information of relevance to self, work or community.

**Numeracy for Practical Purposes** addresses aspects of the physical world to do with designing, making and measuring. It incorporates mathematic skills related to the appreciation and application of shape and measurement.

**Numeracy for Knowledge** is included at the Senior level. It deals with learning about formal mathematical skills and conventions needed for further study in mathematics, or other subjects with mathematical underpinnings and/or assumptions.

The mathematics areas of number; space and shape, data, measurement, and algebra are present within the above domains.

#### **Numeracy and Mathematics**

In the VCAL Numeracy Skills Units numeracy and mathematics are interlinked. Numeracy gives meaning to mathematics and mathematics is the tool (the knowledge and skills) to be used efficiently and critically. Numeracy is not associated with a level of mathematics, but is the critical awareness which builds bridges between mathematics, and the real world. The VCAL numeracy learning outcomes were developed with this view in mind, where mathematics is seen as the knowledge and skills to be applied and used for a range of purposes and in a variety of contexts.

#### **VCAL Certificate award level requirements**

There are four VCAL Numeracy Skills units, one at Foundation and Intermediate Level and two at Senior Level: Senior and Advanced Senior.

Each unit has a nominal duration of 100 hours.

#### **Integrating curriculum**

The Numeracy Skills Units are based on the concept that the application of mathematics skills cannot be separated from social context and that skills and knowledge are best developed when applied to real life contexts. In most real life contexts we do not read, write, speak, listen or complete mathematical tasks in isolation. We use a range of skills and knowledge to successfully complete a task.

Integrating learning outcomes across literacy and numeracy domains and across VCAL strands reflects the integration of skills and competencies in social and work activities. The Numeracy Skills Units recognise the connection between the curriculum areas and provide a structure for an integrated approach.

#### **Learning outcomes**

The Numeracy learning outcomes are based on the numeracy domains. The table on page two shows which learning outcomes are covered at each level.

## VCAL INFORMATION SHEET

### Numeracy learning outcomes

|  | Foundation | Intermediate | Senior | Advanced Senior |
|--|------------|--------------|--------|-----------------|
| <b>Numeracy for Personal Organisation</b>                    |            |              |        |                 |
| Location   | ✓          | ✓            | ✓      |                 |
| Money and time   | ✓          | ✓            |        |                 |
| <b>Numeracy for interpreting society</b>                     |            |              |        |                 |
| Numerical information  | ✓          | ✓            | ✓      | ✓               |
| Data   | ✓          | ✓            | ✓      | ✓               |
| <b>Numeracy for practical purposes</b>                       |            |              |        |                 |
| Design   | ✓          | ✓            | ✓      |                 |
| Measuring  | ✓          | ✓            | ✓      |                 |
| <b>Numeracy for Knowledge – Further study in mathematics</b> |            |              |        |                 |
| formulae   |            |              | ✓      |                 |
| formulae and graphs  |            |              |        | ✓               |
| algebraic techniques   |            |              |        | ✓               |
| problem solving  |            |              | ✓      | ✓               |
| area a   |            |              |        | ✓               |
| area b   |            |              |        | ✓               |

In the teaching/learning situation all learning outcomes in a unit should be covered.

However:

- at the Foundation level students must demonstrate competency in five of the six learning outcomes to be credited with the unit
- at the Intermediate level only five out of the six learning outcomes need to be assessed
- at the Senior and Advanced Senior level there are seven learning outcomes and learners must demonstrate competence in six out of the seven.

See page five about reading the learning outcomes.

### Teaching and learning strategies for VCAL Numeracy

Strategies adopted should be appropriate to the learning situation and should include:

- use of small group and whole group activities
- undertaking out-of-class activities or investigations such as: trips to learn about reading and using maps and costing of such trips; investigations and experiments to collect data for a statistical analysis; planning, designing, costing and planting a garden, etc.
- use of variety of classroom based activities, investigations, problem solving, etc
- use of the internet to find out about mathematics topics or to find data to analyse etc
- use of oral presentations
- listening to guest speakers
- production of written essays, reports, timelines, posters, flowcharts

- production of multimedia and/or www reports or documents
- undertaking research projects.

Other principles of good teaching practice should also be used which:

- ensure that all students experience success and hence develop their confidence
- use appropriate everyday and mathematical language as part of the teaching of numeracy and mathematics to explain ideas, concepts, and terminology that can be understood by students and applied by them in taking, reading, writing and listening
- encourage students to learn through interaction and cooperation – via discussion, asking questions, giving explanations and presentations, and working cooperatively in pairs or small groups
- use practical and hands-on materials and resources – through out-of-class or classroom based demonstrations, activities, investigations, and puzzle or problem solving
- teach concepts in contexts, relevant to the students, utilising their backgrounds, interests and experiences. This should include putting mathematics into its historical and cultural contexts
- teach in a holistic way, integrating other skill areas such as oral communication, and reading and writing into the numeracy and mathematics learning and teaching, and vice versa
- raise awareness about social and community issues and practices that influence and impact on students' lives.

### Assessment

Assessment should be undertaken as an ongoing process which integrates knowledge and skills with their practical application over a period of time. It will require a combination of evidence collected mainly through teacher observations and some collection of written records of students' attempts at tasks.

It is not expected that all assessment criteria for an outcome can be assessed within one single task e.g. it would be unlikely that both the money and time aspects of the personal organisation learning outcome could be demonstrated within one task. Therefore it might require a number of observations or tasks to completely assess a learning outcome. On the other hand, it will often be possible to assess aspects of more than one learning outcome within one assessment task e.g. a task which involves the practical application of measurement knowledge and skills (practical purposes – measurement) may also allow demonstration of ability to calculate with money (personal organisation).

A range of assessment options should be used according to the needs of the learner group and the learning situation, e.g. in the workplace, assessment could be of observation of students performing on-the-job tasks, whereas these may have to be simulated in a classroom environment.

A folio of evidence could be collected through a combination of the following:

- records of teacher observations of students' activities, oral presentations, practical tasks, etc.

## VCAL INFORMATION SHEET

- samples of students' written work
- written reports of investigations or problem solving activities
- student self assessment sheets, reflections, or journal entries
- pictures, diagrams, models created by students.

A variety of assessment methods should be used to enable students to demonstrate the learning outcomes. Traditional test based assessments are not appropriate strategies for assessing VCAL units.

### The levels

#### Foundation

The purpose of this unit is to enable students to develop the confidence and skills to perform simple and familiar numeracy tasks and to develop the ability to make sense of mathematics in their daily personal lives. The mathematics involved includes measurement, shape, numbers and graphs that are part of the student's normal routines to do with shopping, travelling, cooking, interpreting public information, telling the time etc. On successful completion of this unit students will be able to perform everyday mathematical tasks which involve a single mathematical step or process. Their communication about mathematical ideas would mainly be spoken rather than written responses.

#### Intermediate

The purpose of this Numeracy Unit is to enable learners to develop everyday numeracy to make sense of their daily, personal and public lives. It also introduces learners to the mathematics required outside their immediate personal environment. This may be related to work or the community.

At the completion of this unit, learners will be able to undertake a series of numerical tasks with some confidence including straightforward calculations either manually and/or using a calculator. They will also be able to select the appropriate method or approach required, and be able to communicate their ideas both verbally and in writing.

#### Senior

The Senior level unit aims to enable learners to explore mathematics beyond its familiar and everyday use to its application in wider, less personal contexts such as newspapers, workplace documents and procedures, and specific projects at home or in the community.

The mathematics covered includes measurement, graphs and simple statistics, use of maps and directions and an introductory understanding of the use of formulae and problem solving strategies. Learners who successfully complete the unit are expected to have the capacity to interpret and analyse how mathematics is represented and used, and to recognise and use some of

the conventions and symbolism of formal mathematics.

### NUMERACY FOR KNOWLEDGE

Numeracy for Knowledge is included at Senior level and extended at Advanced Senior level. It is introduced in order to provide VCAL learners with knowledge about the conventions and techniques of formal study in mathematics.

At Senior level learners should have an introductory understanding of the use of formulae and problem solving strategies, whereas at Advanced Senior level this is strengthened to incorporate the understanding, use and application of formulae and their graphs, algebraic techniques and problem solving strategies; and familiarity with fundamental processes of at least two other selected specialist mathematical areas.

There are two Numeracy for Knowledge learning outcomes at Senior level – Further Study in Maths (formulae) and Further Study in Maths (problem solving). These provide learners with a basic introduction and understanding of how mathematics may be used to generalise about real life situations and about how there are a number of different problem solving techniques than can be applied and used.

At the Advanced Senior level the focus is on Numeracy for Knowledge – Further Study in Maths and there is flexibility in the content which is dependent on likely or possible future areas of study. There are five Numeracy for Knowledge – Further Study in Mathematics learning outcomes – one for formulae and graphs, one for algebraic techniques, another for problem solving and two unspecified ones for specialist areas of study. The two optional areas of study could be chosen from areas such as trigonometry, vectors and scalars, introduction to calculus, matrices, business mathematics, statistics, probability, formal geometry, etc. If, for example, learners were aiming to study drafting, then trigonometry and geometry may well be the two chosen areas. Whatever the on-going study, formulae and graphs, algebraic techniques and problem solving are seen as core areas.

#### Advanced Senior

This level of the VCAL Numeracy Skills Units, has a focus on learning mathematics for further study and includes a solid basis to the knowledge and skills belonging to several formal areas of mathematics. The mathematics involved includes: numerical calculations and analysis of graphical data required for interpreting information about society; the use of formulae and their graphs, algebraic techniques and problem solving strategies; and familiarity with fundamental processes of at least two selected specialist mathematical areas.

At the end of this level learners will be able to confidently perform calculations using a variety of methods. They will be able to interpret and use the formal processes and conventions of the chosen fields of mathematics in order to solve problems, and to communicate their problem solving processing in writing using a variety of informal and formal language.

# VCAL INFORMATION SHEET

## A Guide to understanding the Learning Outcomes

**Learning outcomes**  
Each unit has six or seven learning outcomes. The learning outcome describes the general aim and intention of the mathematics to be used. It is important to keep this 'big picture' in mind when teaching.

**Assessment criteria**  
The assessment criteria give the detailed criteria for satisfying the learning outcome. The learning outcome is achieved when the learner can demonstrate competence in all the assessment criteria. Not all the assessment criteria need to be covered in the one activity/task. The assessment criteria are grouped according to three categories:

- Mathematical knowledge and techniques
- Language
- Interpretation

**Content range**  
The content range illustrates the possible contexts, appropriate instruments, materials and/or texts that are suitable for use at a specific level. This section also clarifies and refines specific mathematical content and language appropriate to the level.

### LEARNING OUTCOME 5

#### Numeracy for Interpreting Society – Data

Can use and create everyday tables and graphs to represent and interpret public information which is of interest or relevance.

#### Assessment criteria

Not all assessment criteria need to be met in the one assessment task or activity.

#### Mathematical Knowledge & techniques

- identify the key features and conventions of everyday tables and graphs including the concept of scale
- use whole numbers, percentages, decimals and fractions found on tables and graphs
- collect, sort and record data in a table using simple techniques
- draw an appropriate graph for the data, labelling the graph and axes and marking in the scale
- interpret and discuss the meaning of tables, graphs and accompanying text.

#### Language

- use the descriptive language of tables and graphs such as maximum, minimum, increasing, decreasing, going up, constant, changing, slope, etc.

#### Interpretation

- interpret the meaning of graphs or tables in response to teacher prompting in terms of personal implications and/or social consequences
- decide on the fairness or bias of the data in response to teacher prompting.

#### Educational practices

For descriptions of teaching and learning strategies see the Teaching/Learning strategies section at the beginning of this unit.

#### Content range

- The types of tables and graphs could include simple pie graphs, bar graphs, line graphs, pictograms, etc. of the kind found in newspapers, on household bills, information leaflets, etc.
- Scales created should count in ones, two, fives or tens.
- Scales interpreted from public information are not limited to the above simple scales – can interpret from more complex scales available on public information.

#### Supporting information

Additional supporting information is provided in each Numeracy unit. This information covers:

- teaching/learning strategies
- learning to learn
- conditions of assessment
- examples of possible assessment tasks.