

SECTION 49

VBQU152

**Investigate and interpret shapes and measurements and related
formulae in a range of contexts**

Unit Code	VBQU152
Unit Title	Investigate and interpret shapes and measurements and related formulae in a range of contexts
Unit Descriptor	<p>The focus of this unit is on enabling learners to develop numeracy and mathematical skills involving investigating 2-dimensional and 3-dimensional shapes and their representation, and on estimating, measuring and calculating quantities, including using formulae, related to their personal, public, work or education and training lives.</p> <p>The required outcomes described in this unit relate directly to the <i>Australian Core Skills Framework (ACSF)</i>, (© Commonwealth of Australia, 2008). They contribute directly to the achievement of ACSF indicators of competence at Level Four Numeracy: 4.09, 4.10, & 4.11. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
Employability Skills	<p>The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The qualification's Employability Skills Summary in which this unit is included will assist in identifying employability skill requirements. The summary is included in Part B Course Requirements of the <i>Certificate in General Education for Adults</i> (See: Appendix B).</p>
Application of the Unit	<p>People seeking to improve their educational, vocational or community participation options will need to develop a range of numeracy and mathematics skills.</p> <p>Numeracy is seen as making meaning of mathematics - mathematics is a tool to be used efficiently and critically, 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. The goal is therefore to assist learners to develop mathematical concepts and relationships in ways that are personally meaningful.</p> <p>It is strongly recommended that this Unit is integrated with the delivery and assessment of other Numeracy and Mathematics Units. It is also recommended that application is also integrated with other units from across the CGEA. The links between the different units encourage co-delivery and assessment, and replicates real life situations where tasks and activities integrate a wide range of skills including literacy and numeracy.</p>

ELEMENT

PERFORMANCE CRITERIA

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the range statement.

Assessment of performance is to be consistent with the evidence guide.

- | | | |
|---|---|---|
| 1 | Investigate 2-dimensional and 3-dimensional shapes and their representation | <p>1.1 <i>Ratio</i> is used to create <i>scale drawings, simple plans and models</i> and to interpret <i>existing ones</i></p> <p>1.2 2-dimensional shapes and 3-dimensional objects are represented by <i>scale drawings, simple plans and models</i> using <i>appropriate symbols and conventions</i></p> <p>1.3 <i>Scale drawings, simple plans and models</i> are read and interpreted to see if they are representative of the original object and vice versa</p> <p>1.4 <i>Angles</i> are estimated, drawn and measured using a protractor or compass</p> <p>1.5 <i>Language of shape</i> is used to describe objects and their representations</p> |
| 2 | Estimate, measure and calculate quantities using formulae | <p>2.1 Initial <i>estimate of measurement</i> is made and the measurement is <i>performed correctly</i> using <i>appropriate instruments</i></p> <p>2.2 <i>Concepts</i> and <i>units of measure</i> are interpreted, used and described using <i>suitable language and symbols</i></p> <p>2.3 <i>Appropriate formulae</i> are chosen and used to calculate quantities of <i>common shapes</i></p> <p>2.4 <i>Conversion between metric units</i> are performed</p> <p>2.5 Reasonableness of results is checked and results are <i>interpreted in terms of original purpose</i></p> |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

- knowledge that signs / prints/ symbols represent meaning
- communication and literacy skills to read relevant texts and diagrams, and undertake learning and assessment
- ability to interpret, use and calculate with a range of types of numbers, measurements and numerical information
- ability to understand and use simple mathematical formulae in familiar contexts

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different situations that may affect performance, e.g. access to resources, regional contexts. Bold italicised wording in the Performance Criteria is detailed below.

Ratio

- ratios for scales in the form of 1:25, 1:100, etc. should be understood and interpreted
- simple ratios to be used and applied e.g.1:2, 1:10 or 1:100
- more difficult ratios (e.g. 1:25000) should be interpreted but not used to create drawings or plans

Scale drawings, simple plans and models may include

- plans of a classroom, rooms in a house, a garden, shop, office or a factory floor
- models assembled following written instructions or constructed from nets of 3-D objects
- 2 dimensional drawings should be to scale
- 3 dimensional drawings not necessarily accurately scaled

Existing ones (scale drawings, simple plans and models)

- plans of buildings such as classrooms, a house, a garden, a shop, an office or a factory floor and locations such as shopping centres or workplaces may be interpreted and used to guide activity. Plans of rooms may be used to re-arrange furniture because of changed needs or OH&S requirements, etc.
- Scale drawings can include maps such as local maps, state maps, maps of Australia, survey or bushwalking maps, or any other relevant maps which have keys and defined scales
- 2 dimensional drawings should be to scale
- 3 dimensional drawings not necessarily accurately scaled

- Appropriate symbols and conventions such as***
- scales expressed in ratio form, clear indications of dimensions, clear labelling and symbols (e.g. for parallel lines (\ll) as well as lines of equal length)
- Angles may include***
- the symbols and conventions for angles ($^{\circ}$, $<$)
 - knowledge and language of angles may include acute, obtuse, right, straight, circle etc
 - bearings used to give direction may be introduced.
- Language of shape may include***
- square, rectangle, circle, quadrilateral, triangle, isosceles, equilateral, regular, polygon, hexagon, diagonal, sphere, cube, cylinder, prism, pyramid, edges, corners, faces etc. and descriptions such as symmetrical, horizontal, vertical, perpendicular and parallel and shapes of interest such as crescent and star
- Estimate of measurement implies***
- use of personal body referents and knowledge including visualisation of size and quantity
 - recognition of an appropriate range and level of accuracy required is understood
- Performed correctly***
- the instrument starts at zero where appropriate (not on thermometers), the measurement is made from starting point, the accuracy asked for is given, detailed calibrations on measuring instruments are read and interpreted correctly
- Appropriate instruments means***
- measurement instruments may include tape measures, rulers, kitchen and bathroom scales, letter/parcel scales, thermometers, measuring cups/cylinders, spoons and protractors for angle measurement etc.
 - the instrument of choice must have needed units for required accuracy e.g. mm needed but ruler only has cm marked should be recognised as inappropriate
- Concepts and units of measure includes***
- concepts of linearity, surface, 3D space amount, capacity and corresponding number of dimensions to measure (eg., box - 3 dimensions, sheet of glass - 2 dimensions)
 - units to be included are those for temperature, length, height, mass, capacity, area, volume, angle, or specific interest (e.g. horses' height, amperes, volts, wind speed, air pressure, astronomical distances)
- Suitable language and symbols include***
- metres squared, m^2 , hectares, building squares, cc, cm^3 , ml, m^3 , kL, $\$/m$, $\$/m^2$, $\$/m^3$,

Appropriate formulae ... of common shapes will include

- perimeter, circumference
- standard areas of rectangles, triangles (as half of rectangle), and circles; surface area to be understood as addition of several areas
- standard volumes could include cubes, cuboids and cylinders but not volumes of other solids such as spheres, pyramids
- relevant 3 dimensional shapes could include packaging, buildings, furniture, cubes and other prisms, pyramids etc

Conversion between metric units will involve

- converting mm-cm-m-km, ml-l, g-kg and vice versa. Tonne and kilolitre could be included if relevant.
- converting between units as required before use in area or volume calculations
- converting between km^2 and hectares where relevant or volume and capacity such as cm^3 , ml or m^3 , kL,
- both fraction or decimal notation where this is the appropriate form needed (e.g. 3,500 m is $3\frac{1}{2}$ km or 3.5km)

Interpreted in terms of original purpose

- answers given in required unit
- accuracy is appropriate to task
- outcomes are checked against initial estimates and rough calculations and visualisation of size and quantity
- amount is realistic given the context, for example, if purchasing for cooking is the purpose then 0.5 eggs or if for tiling $\frac{1}{2}$ a tile are unacceptable as answers

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Learners will be able to investigate 2-dimensional and 3-dimensional shapes and their representation.
- Learners will be able to estimate, measure and calculate quantities using formulae.

Where performance criteria include a list of concepts or knowledge (e.g., such as measurement units: millimetres, centimetres, metres, kilometres, grams, kilograms, litres, millilitres, degrees Celsius etc.) it is assumed that most of these will be included as part of the teaching/learning program. It is not envisaged that all the listed items be assessed individually - competence across a representative

sample being sufficient evidence that the criterion can be met.

In addition to integrated demonstration of the elements and their related performance criteria, look for evidence that confirms:

- the knowledge requirements of this unit
- the skill requirements of this unit.
- assessment of performance requirements in this unit is undertaken over the course of the program
- access to real/authentic or simulated tasks, materials and texts in appropriate and relevant contexts
- access to a computer and internet for information
- access to calculators, computers for word processing or spreadsheets as appropriate

Context of and specific resources for assessment

Guidance information for assessment

A range of assessment strategies or options should be considered to suit the needs of the learner. The needs of the learner will be met by provision of:

- concrete, relevant contexts and materials where the maths content is embedded in relevant but possibly unfamiliar or non-routine texts
- a learning environment appropriate to the assessment task
- appropriate support allowing for full participation
- computer hardware and software, if appropriate

At this level the learner can:

- flexibly use a blend of personal “in the head” methods, and formal pen and paper and calculator procedures (and software programs where appropriate) to solve problems
- work independently and initiate and use support from a range of established resources and recourse to first/other language is acceptable
- use a range of informal and formal oral and written mathematical language, symbols, abbreviations and diagrams

Appropriate assessment strategies include:

- records of teacher observations of students’ activities, discussions and practical tasks
- questioning, for example:

- online responses
- interviews
- self-assessment
- verbal questioning
- written questioning
- portfolios, for example:
 - samples of the learner's written work
 - pictures, diagrams, models etc. created by the learner
 - records of teacher observations of learner's activities, discussions and practical tasks
- third party feedback such as testimonials/reports from other teachers or support workers
- at this level it would be appropriate if learners could be assessed undertaking real tasks such as, running a survey then interpreting and investigating the meaning /consequences of the results obtained, interpreting numerical/statistical information in newspaper articles, measuring property, giving and following directions or using plans in outside locations, etc.
- some of these tasks may be classroom simulations, but where possible, it is preferable learners gain the skills and confidence through undertaking tasks in real situations.

SECTION **50**

VBQU153

**Investigate, interpret and produce numerical and statistical
information**

Unit Code	VBQU153
Unit Title	Investigate, interpret and produce numerical and statistical information in a range of contexts
Unit Descriptor	<p>The focus of this unit is on enabling learners to develop numeracy and mathematical skills involving investigating and interpreting numerical information embedded in a range of texts and creating, investigating and interpreting statistical data, tables and graphs related to their personal, public, work or education and training lives.</p> <p>The required outcomes described in this unit relate directly to the <i>Australian Core Skills Framework (ACSF)</i>, (© Commonwealth of Australia, 2008). They contribute directly to the achievement of ACSF indicators of competence at Level Four Numeracy: 4.09, 4.10, & 4.11. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
Employability Skills	<p>The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The qualification's Employability Skills Summary in which this unit is included will assist in identifying employability skill requirements. The summary is included in Part B Course Requirements of the <i>Certificate in General Education for Adults</i> (See: Appendix B).</p>
Application of the Unit	<p>People seeking to improve their educational, vocational or community participation options will need to develop a range of numeracy and mathematics skills.</p> <p>Numeracy is seen as making meaning of mathematics - mathematics is a tool to be used efficiently and critically, 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. The goal is therefore to assist learners to develop mathematical concepts and relationships in ways that are personally meaningful.</p> <p>It is strongly recommended that this Unit is integrated with the delivery and assessment of other Numeracy and Mathematics Units. It is also recommended that application is also integrated with other units from across the CGEA. The links between the different units encourage co-delivery and assessment, and replicates real life situations where tasks and activities integrate a wide range of skills including literacy and numeracy.</p>

ELEMENT

PERFORMANCE CRITERIA

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the range statement.

Assessment of performance is to be consistent with the evidence guide.

- | | | |
|---|---|--|
| 1 | Investigate and interpret numerical information in a range of texts | <p>1.1 <i>Numbers and numerical information</i> which is embedded within a range of <i>texts or realistic contexts</i> are identified and extracted</p> <p>1.2 <i>An appropriate mathematical procedure</i> is used to undertake calculations to investigate the <i>numbers and numerical information</i> in the text or context</p> <p>1.3 An <i>initial estimate</i> of the result is made then an accurate <i>numerical calculation</i> is carried out</p> <p>1.4 Descriptive language of numbers and numerical information is used</p> <p>1.5 <i>Interpretations</i> are made regarding the results in terms of their reasonableness against initial estimates and in terms of any personal, social or work consequences.</p> |
| 2 | Investigate and create statistical data, tables and graphs | <p>2.1 <i>Data</i> is collected and represented in tables and in <i>graphical form</i>, using appropriate scales and axes</p> <p>2.2 <i>Measures of central tendency</i> and simple measures of spread for sets of ungrouped data are calculated</p> <p>2.3 <i>Descriptive language</i> of graphs, tables and averages is used</p> <p>2.4 <i>Interpretations</i> are made regarding the results of the investigation in terms of the meaning of the data and /or accompanying texts, tables and graphs and in terms of any personal, social or work consequences.</p> |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

- knowledge that signs / prints/ symbols represent meaning
- **communication and literacy skills to read relevant texts and diagrams, and undertake learning and assessment**
- ability to interpret, use and calculate with a range of types of numbers, measurements and numerical information

- ability to understand and interpret numerical information in texts
- ability to understand and use data, tables and graphs to investigate statistical information

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different situations that may affect performance, e.g. access to resources, regional contexts. Bold italicised wording in the Performance Criteria is detailed below.

Numbers and numerical information

- should include whole numbers, fractions, decimals, percentages and ratios and their equivalent values in a form appropriate to the situation
- should include chance and probability values related to the likelihood of everyday chance events such as chance of rain, gambling, etc
- rates including km/hr, \$/m, \$/m³, one in ten
- ratios should be related to mixing domestic and garden chemicals, recipes, **work-related ratios**, etc
- relevant positive and negative numbers (e.g. as related to **Temperature**)
- numbers expressed as simple powers including simple scientific notation (e.g. 2³, 3.6 x 10³) are understood
- common square roots and their meaning (e.g. $\sqrt{4} = 2$)

Embedded means

- that the mathematical content is embedded in relevant but possibly unfamiliar or non-routine texts, including websites, but is accessible

Texts or realistic contexts may include

- printed and non-print texts such as website, newspaper, or magazine journal articles; workplace documents; relevant texts and information off the internet; financial information such as taxation returns; public information documents, advertising leaflets, catalogues, timetables etc

Appropriate mathematical procedure includes

- addition, subtraction, multiplication, division (+, -, ×, ÷), conversion **between fractions, decimals and percentages then an operation**, several conversions to allow comparison, ordering values, etc.
- using different methods, and choosing the most appropriate method for the question, e.g. 5% done in the head using ½ of 10%, or using pen and paper, whereas complicated calculations such as 4.25% done only using a calculator
- conversion of fractions, decimals, percentages and ratios into their equivalent values in a form appropriate to the situation

Initial estimate

- a rough estimate is appropriate unless a specific accuracy is requested by the assessor

Numerical calculation includes

- +, -, ×, ÷ with whole numbers and decimals (division by decimal values and long division may be worked out on a calculator)
- +, -, ×, ÷ with standard fractions only e.g. 2/3, 1/5, 7/10, etc. and where multiplication and division with fractions is related to relevant applications e.g. multiplying fractions when increasing a recipe with fractions; calculating how far an estimated distance is based on a pace length of ¾ of a metre.
- percentages including % of, % change and A as % of B,
- routine rate and ratio calculations e.g. 2:3=4:?
- calculations can be undertaken flexibly using a blend of relevant “in the head” methods, and formal pen and paper and calculator procedures (and software programs where appropriate)

Descriptive language (of numbers and numerical information is used) includes

- read and write decimal numbers such as point two four five, 0.245, two and five thousandths, 2.005, etc.
- common words, phrases and symbols for mathematical procedures such as percentages, rates, and arithmetical operations
- symbols and words for comparison such as >, <, =, ≥, ≤

Interpretations (for numerical information) refers to

- a reality check of the results
- a comparison of final result to initial estimate or referral to context to decide if the result is possible, relevant
- knowledge may lead to comparison to previous experience and therefore decide whether result is appropriate

Data may include

- whole numbers, percentages, decimals and fractions found in statistical information

Graphical form includes

- pie charts, bar graphs, line graphs, pictograms, etc. of the kind found in newspapers, on household bills, information leaflets, etc.
- may include scatter diagrams, box and whisker plots where relevant
- scales created should be appropriate to the data collected or being investigated.

Measures of central tendency refers to

- mean, median and mode calculated from survey results, wages, production figures, sports information, packet contents, etc. (but not expected for grouped data)

- the use or misuse of the term average in relation to this should be discussed

Simple measures of spread refers to

- range, interquartile range

Descriptive language (of graphs, tables and averages) may include

- common words, phrases and symbols for mathematical procedures such as percentages, rates, and arithmetical operations
- symbols **and words** for comparison such as $>$, $<$, $=$, \geq , \leq
- descriptive language of graphs, tables and averages such as maximum, minimum, increasing, decreasing, constant, slope, fluctuating, average, above/below average, **range**, etc.

Interpretations (for statistical data) refers to

- a reality check of the results of the statistical investigation
- personal implications, social consequences, how it was applied, the validity and accuracy of the data
- knowledge may lead to comparison to previous experience and therefore decide whether result is appropriate

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Learners will be able to investigate and interpret numerical information in texts
- Learners will be able to create and investigate statistical data, tables and graphs.

Where performance criteria include a list of concepts or knowledge (e.g., the range of graphs such as pictographs, column/bar graphs, line graphs and pie charts) it is assumed that most of these will be included as part of the teaching/learning program. It is not envisaged that all the listed items be assessed individually - competence across a representative sample being sufficient evidence that the criterion can be met.

In addition to integrated demonstration of the elements and their related performance criteria, look for evidence that confirms:

- the knowledge requirements of this unit
- the skill requirements of this unit.

Context of and specific resources

- assessment of performance requirements in this unit is

for assessment

undertaken over the course of the program

- access to real/authentic or simulated tasks, materials and texts in appropriate and relevant contexts
- access to a computer and internet for information
- access to calculators, computers for word processing or spreadsheets as appropriate

Guidance information for assessment

A range of assessment strategies or options should be considered to suit the needs of the learner. The needs of the learner will be met by provision of:

- concrete, relevant contexts and materials where the maths content is embedded in relevant but possibly unfamiliar or non-routine texts
- a learning environment appropriate to the assessment task
- appropriate support allowing for full participation
- computer hardware and software, if appropriate

At this level the learner can:

- flexibly use a blend of personal “in the head” methods, and formal pen and paper and calculator procedures (and software programs where appropriate) to solve problems
- work independently and initiate and use support from a range of established resources and recourse to first/other language is acceptable
- use a range of informal and formal oral and written mathematical language, symbols, abbreviations and diagrams

Appropriate assessment strategies include:

- records of teacher observations of students’ activities, discussions and practical tasks
- questioning, for example:
 - online responses
 - interviews
 - self-assessment
 - verbal questioning
 - written questioning
- portfolios, for example:
 - samples of the learner’s written work

- pictures, diagrams, models etc. created by the learner
- records of teacher observations of learner's activities, discussions and practical tasks
- third party feedback such as testimonials/reports from other teachers or support workers
- at this level it would be appropriate if learners could be assessed undertaking real tasks such as, running a survey then interpreting and investigating the meaning /consequences of the results obtained, interpreting numerical/statistical information in newspaper articles, measuring property, giving and following directions or using plans in outside locations, etc.
- some of these tasks may be classroom simulations, but where possible, it is preferable learners gain the skills and confidence through undertaking tasks in real situations.

SECTION **51**

VBQU154

Investigate and use simple mathematical formulae and problem solving techniques in a range of contexts

Unit Code	VBQU154
Unit Title	Investigate and use simple mathematical formulae and problem solving techniques in a range of contexts
Unit Descriptor	<p>The focus of this unit is on enabling learners to develop numeracy and mathematical skills involving developing and using simple formulae to describe and represent relationships between variables in range of real life contexts, and on using simple mathematical problem solving techniques to interpret and solve straight forward mathematical problems related to their personal, public, work or education and training lives.</p> <p>The required outcomes described in this unit relate directly to the <i>Australian Core Skills Framework (ACSF)</i>, (© Commonwealth of Australia, 2008). They contribute directly to the achievement of ACSF indicators of competence at Level Four Numeracy: 4.09, 4.10, & 4.11. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
Employability Skills	<p>The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The qualification's Employability Skills Summary in which this unit is included will assist in identifying employability skill requirements. The summary is included in Part B Course Requirements of the <i>Certificate in General Education for Adults</i> (See: Appendix B).</p>
Application of the Unit	<p>People seeking to improve their educational, vocational or community participation options will need to develop a range of numeracy and mathematics skills.</p> <p>Numeracy is seen as making meaning of mathematics - mathematics is a tool to be used efficiently and critically, 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. The goal is therefore to assist learners to develop mathematical concepts and relationships in ways that are personally meaningful.</p> <p>It is strongly recommended that this Unit is integrated with the delivery and assessment of other Numeracy and Mathematics Units. It is also recommended that application is also integrated with other units from across the CGEA. The links between the different units encourage co-delivery and assessment, and replicates real life situations where tasks and activities integrate a wide range of skills including literacy and numeracy.</p>

ELEMENT

Elements describe the essential outcomes of a unit of competency.

PERFORMANCE CRITERIA

Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the range statement.

Assessment of performance is to be consistent with the evidence guide.

- | | | |
|---|--|---|
| 1 | Investigate and use simple mathematical formulae in relevant contexts | <p>1.1 <i>Simple formulae</i> and <i>algebraic expressions</i> are developed which generalise straightforward number patterns or relationships between variables in <i>familiar or routine contexts</i>.</p> <p>1.2 <i>Simple worded problems</i> involving unknown quantities are translated into simple <i>equations</i>.</p> <p>1.3 Substitution into <i>simple formulae</i> or equations is used to find particular values and to check the effectiveness of the developed formulae or equation.</p> <p>1.4 <i>Verbal generalisations</i> and <i>informal and symbolic notation, representation and conventions</i> of algebraic expressions are used.</p> <p>1.5 Solve simple equations using <i>informal techniques</i>.</p> |
| 2 | Use mathematical problem-solving techniques to investigate and solve relevant problems | <p>2.1 <i>Appropriate techniques</i> are used to interpret and extract relevant information from text or <i>problem-solving activity</i></p> <p>2.2 A range of appropriate <i>problem-solving techniques</i> are selected and used</p> <p>2.3 The <i>reasonableness of the result</i> is assessed and alternative problem-solving techniques are used, if necessary</p> <p>2.4 The <i>language and terminology</i> of problem-solving are used to communicate the procedures and outcomes of the problem solving activity</p> |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

- knowledge that signs / prints/ symbols represent meaning
- communication and literacy skills to read relevant texts and diagrams, and undertake learning and assessment
- ability to interpret, use and calculate with a range of types of numbers, measurements and

numerical information

- ability to understand and use simple mathematical formulae in familiar contexts
- ability to understand and use mathematical problem-solving techniques to investigate and solve familiar problems

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different situations that may affect performance, e.g. access to resources, regional contexts. Bold italicised wording in the Performance Criteria is detailed below.

Simple formulae and algebraic expressions

- should include formulae between variables in familiar or routine contexts such as Volume of a rectangular prism ($V = L \times W \times H$), Australian Rules football scores ($P = 6g + b$), Pythagoras theorem ($a^2 = b^2 + c^2$); Cost of payment for a plumber charging \$120 per hour and a call out fee of \$50 ($C = 50 + 120h$), etc.
- algebraic expressions for number patterns should involve only one or two arithmetical steps and based around situations that can be described or modelled

Familiar or routine contexts include

- football scores, taxi fares, cooking, repair charges, utility payments, routine area and volume calculations, using Pythagoras to create a right angle triangle, etc.

Simple worded problems

- should include one or two arithmetical steps and use language such as doubling, halving, words for the four arithmetic operations, etc. For example, “double the number and add five more”.

Equations

- should involve only one or two arithmetical steps

Verbal generalisations may include

- language such as doubling, halving, squaring, ‘\$25 plus \$60 per hour’

Informal and symbolic notation, representation and conventions of algebraic expressions includes

- informal representations using words or letters and symbols and standard abbreviations and conventions for the four operations, squares, and fractional amounts. This includes using meaningful symbols such as □’s for unknowns, t’s for teaspoons, P for profit, etc. for written generalisations (formal use of x’s and y’s is not necessary)
- conventions for writing algebraic expression are used, e.g. not using a symbol for multiplication as in $6g = 6 \times g$

Informal techniques may include

- techniques or methods such as backtracking; or guess, check and improve can be used.

Appropriate techniques may

- restating/rewriting, drawing diagrams, using flow charts,

- include* sketching a graph, etc.
- Problem-solving activity**
- activities or tasks should be those requiring strategies other than standard application of arithmetical processes.
- Problem-solving techniques may include**
- a variety techniques such as guess and check; elimination; making a table, diagram or sketch; using patterns; simplifying; concrete modelling
 - problem-solving techniques should be modelled by the teacher at this level with guidance and support via leading questions, etc.
- Reasonableness of the result refers to**
- a reality check of the results
 - a comparison of final result to initial estimate or referral to context to decide if the result is possible, relevant
 - knowledge may lead to comparison to previous experience and therefore decide whether result is appropriate
- Language and terminology includes**
- common words and phrases for mathematical problem-solving techniques such as guess and check, pattern, simplify, trial and error, etc

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Learners will be able to investigate and use simple mathematical formulae in familiar contexts
- Learners will be able to use mathematical problem-solving techniques to investigate and solve familiar problems.

Where performance criteria include a list of concepts or knowledge (e.g., the range of problem solving techniques such as guess and check; elimination; making a table, diagram or sketch; using patterns; simplifying; concrete modelling etc.) it is assumed that most of these will be included as part of the teaching/learning program. It is not envisaged that all the listed items be assessed individually - competence across a representative sample being sufficient evidence that the criterion can be met.

In addition to integrated demonstration of the elements and their related performance criteria, look for evidence that confirms:

- the knowledge requirements of this unit

Context of and specific resources for assessment

- the skill requirements of this unit.
- assessment of performance requirements in this unit is undertaken over the course of the program
- access to real/authentic or simulated tasks, materials and texts in familiar and relevant contexts
- access to a computer and internet for information
- access to calculators, computers for word processing or spreadsheets as appropriate

Guidance information for assessment

A range of assessment strategies or options should be considered to suit the needs of the learner. The needs of the learner will be met by provision of:

- concrete, relevant contexts and materials where the maths content is embedded in relevant but possibly unfamiliar or non-routine texts
- a learning environment appropriate to the assessment task
- appropriate support allowing for full participation
- computer hardware and software, if appropriate

At this level the learner can:

- flexibly use a blend of personal “in the head” methods, and formal pen and paper and calculator procedures (and software programs where appropriate) to solve problems
- work independently and initiate and use support from a range of established resources and recourse to first/other language is acceptable
- use a range of informal and formal oral and written mathematical language, symbols, abbreviations and diagrams

Appropriate assessment strategies include:

- records of teacher observations of students’ activities, discussions and practical tasks
- questioning, for example:
 - online responses
 - interviews
 - self-assessment
 - verbal questioning
 - written questioning

- portfolios, for example:
 - samples compiled by the learner
 - written reports of investigations or problem-solving activities
 - product with supporting documentation
 - self-assessment sheets, reflections, journal entries
 - pictures, diagrams, models etc. created by the learner
- third party feedback such as testimonials/reports from other teachers or support workers
- at this level it would be appropriate if learners could be assessed undertaking real tasks such as using algebra and problem solving in order to develop a materials list and costing for a building or landscaping project that requires the use and application of area and volume formulae calculations and pricing rates to determine the materials required and total expenses
- some of these tasks may be classroom simulations, but where possible, it is preferable learners gain the skills and confidence through undertaking tasks in real situations.