

VCAL provider name: MacKillop Catholic Regional College

VCAL unit name: Numeracy Skills

VCAL unit: Senior

Overview of the assessment task and the project/theme it is linked to:

Each student will complete a Design and Construction Project of their choice using CAD software. They will construct their product using a variety of building materials, both new and recycled. The design projects are predominantly connected with the intended career pathways of students and/or special interests. Students complete a set of activities and worksheets associated with their product. Students also develop mapping skills through theory work on topographical maps and create 3-dimensional models of these maps using computer-aided design software.

Student roles and responsibilities in relation to the task:

- Research, design and construct a product
- Develop computer-aided design skills
- Setup required testing and processing apparatus for tasks
- Develop and maintain an electronic portfolio
- Take electronic images/ videos of their work
- Complete assigned activities/ worksheets within a reasonable timeframe
- Participate in group activities

Level of teacher support:

- Mentor and support students in the application of computer-aided design software
- Supply tools, construction materials and relevant worksheets/ templates.
- Support students during the construction stages in the areas of woodwork, electronics, music and general engineering.
- Facilitate the use of measuring tools such as electronic balances, oscilloscopes, decibel meters etc.
- Facilitate additional assistance from woodwork teacher when requiring specialised cutting tools
- Use Information Computer Technology such as Interactive Whiteboards and computer software to introduce ideas and engage classroom participation

Victorian Certificate of Applied Learning

Please indicate the Learning Outcome/s to be demonstrated by this evidence

Student Evidence (refer to Portfolio of Evidence in section 1)	LO1	LO2	LO3	LO4	LO5	LO6	LO7
Design & Construction Project – Electronic Portfolio	x	x					
Design & Construction Project – Computer-Aided Drawing of Guitar	x	x					
Design & Construction Project - Fret Position Calculation Worksheet/ Spreadsheet	x	x					
Design & Construction Project - Frequency Analysis of Guitar Pickup Worksheet	x	x					
Topographical Mapping Skills - Calculation Worksheet			x				
Slope and Topographic Maps - Calculation Worksheet			x				
3D -Topographical Modelling - Instructions worksheet and completed 3-D computer model			x				
Range and Fuel Consumption – Calculation Worksheet			x				

Is the activity included in this template part of an integrated program?

Yes	No
	x

Please indicate the other VCAL units and learning outcome/s that are also met by this integrated program

	Unit title	Level	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8
Literacy Skills										
Numeracy Skills										
Work Related Skills										
Personal Development Skills										

Teacher name: Pascal Roulant

Date: Monday 19th April, 2010

Comment [01]: Place an 'x' to indicate your answer

Comment [02]: Click in this cell and press tab when you want a new row

Comment [03]: You only need to type R/W for Reading and Writing or O/C for Oral Communication or U1 for Unit number

Comment [04]: You only need to type F for Foundation or I for Intermediate or S for Senior

Assessment Template: Numeracy Skills Senior

Learning outcome 1

Numeracy for practical purposes – design

Can translate between two-dimensional and three-dimensional real life objects and their diagrammatic representations for the purposes of measurement, design, and interpretation.

Description of what the student will be required to do in order to demonstrate successful completion of the learning outcome:

Design & Construction Project – Electric Guitar

- import a 2-dimensional image of an electric guitar onto Google Sketchup {computer-aided design software} and resize the image to show the intended dimensions in millimetres required for construction as well as generate a 3-dimensional version on screen - *element 1.1 and 1.3*
- use the Protractor tool from Google Sketchup to determine several angles of the guitar body for the purpose of construction - *element 1.2 and 1.6*
- apply the Ruler and Tape Measure tool on the computer generated guitar image in order to gauge the appropriate depth and relative positions of guitar components including magnetic pickups, bridge, volume and treble control knobs, switches, input jacks and filter housing. - *element 1.4*
- Create a full size template of the guitar body to place onto the Ashwood guitar body as a guide in preparation for cutting. - *element 1.4*
- Discuss with the teacher, the shape of the guitar body, the relative alignment and spacing of the bridge, magnetic pickup, strings and guitar neck - *element 1.5*
- Assess the finished product with the teacher and staff members of the music department. Using a prepared spreadsheet, create formulae to investigate the fret spacings of the guitar neck and how they relate to the pattern of ratios that exist between successive musical notes. - *element 1.1 and 1.7*

Elements

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

Mathematical knowledge and techniques

- 1.1 Apply ratio to scale drawings or plans.
- 1.2 Estimate, draw and measure angles using a protractor or compass.
- 1.3 Interpret plans and diagrams of three-dimensional objects.
- 1.4 Draw diagrams which include appropriate use of conventions such as scales expressed in ratio form, clear indications of dimensions, clear labelling.

Language

- 1.5 Describe shapes using the language of shape such as rectangle, triangle, isosceles, equilateral, regular, polygon, hexagon, diagonal, sphere, cube, cylinder, pyramid. and descriptions such as symmetrical, horizontal, vertical, perpendicular and parallel.
- 1.6 Use the symbols and conventions for scales and angles such as: °, etc.

Interpretation

- 1.7 Judge whether models, diagrams or plans are representative of original object or vice versa.

Learning outcome 2

Numeracy for practical purposes – measuring

Can use measurements, the metric system and simple measurement formulae for the purpose of interpreting, making or purchasing materials in practical situations.

Description of what the student will be required to do in order to demonstrate successful completion of the learning outcome:

Design & Construction Project

- Make an initial estimate of the thickness, width and length of the electric guitar body in order to purchase the appropriate size of timber to use. - *element 2.2*
- Through the audio input of a PC, measure and analyse the signal of the output waveform from the magnetic pickup of the guitar using Oscilloscope and Spectrum Frequency Analyser software. Play single notes on the guitar neck and determine if the displayed frequencies correspond to those of known musical notes. Record results in worksheet. - *elements 2.3, 2.4 and 2.8*
- Interpret the oscilloscope signal voltages that are displayed as waveforms over a centimetre grid scale by adjusting amplitude and frequency dial settings. - *element 2.5*
- Estimate the weight of the guitar body by dividing the guitar body template into known regular shapes, working out their individual areas, multiplying the sum of the individual areas by the thickness of the guitar to obtain the volume and then multiplying the volume by the approximate density of the Ashwood timber. - *elements 2.1, 2.2, 2.6, 2.7, 2.8 and 2.9*
- Compare the estimated weight of the guitar body with an electronic scale reading. - *elements 2.4, 2.8 and 2.10*

Elements

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

Mathematical knowledge and techniques

- 2.1 Interpret and use the concepts and units of temperature, length, mass, perimeter, area and volume.
- 2.2 Make an initial estimate of measurements.
- 2.3 Choose appropriately accurate measuring instrument and use it correctly to measure.
- 2.4 Read and interpret detailed calibrations on a range of measuring instruments.
- 2.5 Convert between metric units by applying knowledge of metric prefixes including decimal forms.
- 2.6 Choose and use appropriate formulae to calculate perimeters, areas including surface areas and volumes of common shapes including, where appropriate, composite shapes by using knowledge of standard areas and volumes.
- 2.7 Choose and perform arithmetic operations where appropriate.

Language

- 2.8 Use the words, symbols and conventions for measurement units and rates such as metres squared, m^2 , hectare, building square, cc, cm^3 , m^3 , $\$/m$, $\$/m^2$.

Interpretation

- 2.9 Use estimation skills such as mental arithmetic, visualisation of size and quantity to check outcomes against initial estimates and rough calculations.
- 2.10 Evaluate the measurements and calculations in terms of the purpose of the practical situation.

Learning outcome 3

Numeracy for personal organisation – location

Can use the conventions of distance, location and direction to read, create and use maps.

Description of what the student will be required to do in order to demonstrate successful completion of the learning outcome:

Topographical Mapping Skills Assignment

- Compare the height, distance and slope between different points on a given topographic map by interpreting the values of the contour lines, contour intervals and the scale shown on the map. Complete the assigned worksheet- *element 3.1 and 3.2*
- Identify which routes lie on the flattest sections or on the steepest sections of the map. - *element 3.4*
- Interpret the map key to identify what features or objects lies on several area references of the map. - *element 3.5*
- Use the CAD protractor tool, measure the true bearings of locations relative to several points on the map. - *element 3.3*
- Estimate distances on maps by using dimensions of known objects on the map or using scales provided by Google Maps. - *element 3.6*
- Determine range and fuel consumption of several airplanes for a given set of travel scenarios. Relevant airplane data is provided in the relevant worksheet, including range in nautical miles, cruising speed in knots and fuel capacity in gallons. - *element 3.2*
- Create and scale a 3-dimensional computer model of a topographical map and discuss the differences with interpreting the 2-dimensional model. - *element 3.4 and 3.7*

Elements

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

Mathematical knowledge and techniques

- 3.1 Estimate and determine distances on maps and street directories.
- 3.2 Apply rates concepts such as speed, fuel consumption rates, price rates, to practical calculations of time and cost related to distances to be travelled.
- 3.3 Estimate and measure angles relating to direction and use this to describe the location of places, for example N, NE or bearings such as N50°E.
- 3.4 Describe routes using oral or written instructions or using accurate sketch maps with scale and direction details.

Language

- 3.5 Interpret and use symbols for distance, speed and rates, including ratio notation, visual keys, terminology such as km/h, kph, litres/100km, \$/l.

Interpretation

- 3.6 Decide whether descriptions are accurate by self checking and observations of other interpretations.
- 3.7 Evaluate calculations through a combination of estimation techniques and reference to prior experience and knowledge.

Learning outcome 4

Numeracy for interpreting society – data

Can create, use and interpret tables and graphs, and calculate and use averages, in order to reflect on information of relevance to self, work or community.

Description of what the student will be required to do in order to demonstrate successful completion of the learning outcome:

Elements

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

Mathematical knowledge and techniques

- 4.1 Collect and represent data in graphical form using appropriate scales and axes.
- 4.2 Use whole numbers, percentages, decimals, fractions and ratios found in statistical information in text, tables and graphs.
- 4.3 Calculate, and interpret the meaning of – mean, median and mode for sets of ungrouped data.

Language

- 4.4 Use a range of descriptive language of graphs, tables and averages such as maximum, minimum, increasing, decreasing, constant, slope, fluctuating, average, above/below average.

Interpretation

- 4.5 Interpret the meaning of data and the accompanying text in terms of personal implications, social consequences, and their validity and accuracy.

Learning outcome 5

Numeracy for interpreting society – numerical information

Can use, and calculate with, fractions, percentages, decimals, rates and large numbers, to reflect on aspects of personal, work or community life

Description of what the student will be required to do in order to demonstrate successful completion of the learning outcome:

Elements

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

Mathematical knowledge and techniques

- 5.1 Determine an appropriate mathematical procedure to solve the problem.
- 5.2 Make a rough estimate to numerical calculations.
- 5.3 Select the appropriate arithmetical operation and accurately calculate with large whole numbers, fractions, decimals, percentages, rates and ratios.
- 5.4 Convert between equivalent values for fractions, decimals, percentages and ratios, choosing a form appropriate to the calculation.

Language

- 5.5 Read and write decimal numbers such as point two four five, 0.245, two and five thousandths, 2.005.

- 5.6 Use appropriately the common words, phrases and symbols for mathematical procedures such as percentage, rate and arithmetical operations.

Interpretation

- 5.7 Check the reasonableness of calculations against initial rough estimates and interpret the meaning of the result in terms of personal and/or social consequences.

Learning outcome 6

Numeracy for knowledge – further study in maths (formulae)

Can develop and use simple formulae to describe and represent relationships between variables in real life contexts.

Description of what the student will be required to do in order to demonstrate successful completion of the learning outcome:

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Elements

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

Mathematical knowledge and techniques

- 6.1 Develop simple formulae and algebraic expressions which generalise straightforward number patterns or relationships between variables in familiar contexts such as cooking, repair charges, mixing chemicals, areas and volumes.
- 6.2 Substitute appropriately into developed formulae to find particular values.
- 6.3 Translate simple worded problems involving unknown quantities into simple equations.
- 6.4 Solve simple equations using informal techniques such as backtracking; or guess, check and improve.

Language

- 6.5 Make verbal generalisations of the number patterns or relationships being investigated using language such as doubling, halving, squaring, '\$25 plus \$60 per hour', etc.
- 6.6 Use informal and some symbolic notation and representation of algebraic expressions such as letters, brackets, squares, cubes and square roots, conventions for multiplication and division in algebra.

Interpretation

- 6.7 Decide on the effectiveness of the developed formulae by substituting known values.
- 6.8 Interpret the results obtained in the context of the original problem.

Learning outcome 7

Numeracy for knowledge – further study in maths (problem-solving)

Can use simple mathematical problem-solving techniques to interpret and solve straightforward mathematical problems.

Description of what the student will be required to do in order to demonstrate successful completion of the learning outcome:

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Elements

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

Mathematical knowledge and techniques

- 7.1 Interpret and extract relevant information from text or problem-solving activity by using appropriate techniques such as restating/rewriting, drawing diagrams or sketch.

- 7.2 Use a range of appropriate problem-solving techniques selected from strategies such as guess and check; elimination; making a table, diagram or sketch; using patterns; simplifying; concrete modelling.
- 7.3 Assess the reasonableness of the result and utilise alternative problem-solving techniques where appropriate.

Language

- 7.4 Use appropriately both oral and written language to explain procedures used and to communicate the outcomes of the problem.

Interpretation

- 7.5 Interpret and comment upon the results obtained in the context of the original problem.