DCSBME631: Use Basic Mathematics in Engineering

UNIT CODE		**DCSBME631**	
UNIT TITLE		**Use basic mathematics in engineering**	
APPLICATION		This unit describes the performance outcomes, skills and knowledge required to apply basic concepts of mathematics appropriate to engineering situations. The unit of competency is applied by technicians in an engineering environment to complete basic mathematical calculations. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.	
ELEMENTS		**PERFORMANCE CRITERIA**	
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1	Use fundamental techniques in arithmetic, measurement and mensuration.	1.1	Round numbers to a given degree of accuracy.
		1.2	Convert between commonly used SI units.
		1.3	Convert numbers between decimal and scientific notation.
		1.4	Determine the perimeter and area of complex shapes.
		1.5	Apply the Theorem of Pythagoras to area and perimeter problems.
		1.6	Determine the volume of complex shapes.
		1.7	Solve mensuration problems including calculating costs and capacity.
		1.8	Solve practical problems involving proportional quantities.
2	Use fundamental techniques in geometry.	2.1	Perform angle arithmetic involving angles expressed in degrees, minutes and seconds.
		2.2	Determine the size of an unknown angle in a diagram involving complementary, supplementary adjacent or vertically opposite angles, or angles formed by parallel lines.
		2.3	Perform calculations involving angle, chord and tangent properties of the circle.
3	Use fundamental concepts in algebra.	3.1	Solve arithmetical problems using the correct order of operations.
		3.2	Substitute into and evaluate algebraic expressions.
		3.3	Simplify algebraic expressions by combining like terms and using the distributive law.

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		3.4	Simplify algebraic fractions.
		3.5	Solve linear equations in one unknown, including applied problems from which an equation can be created.
		3.6	Evaluate formulae by substitution, giving answers with appropriate units.
		3.7	Transpose formulae including those where one variable is repeated.
		3.8	Determine the equation of a straight line from various situations, including for the line of best fit obtained graphically from empirical data.
		3.9	Use function notation.
		3.10	Solve simultaneous equations analytically and graphically.
4	Use quadratic equations and their graphs in problem solving.	4.1	Factorise polynomial expressions involving common factor and difference of two squares.
		4.2	Solve analytically and graphically a system consisting of a quadratic and linear function.
5	Use right triangle trigonometry to solve applied problems.	5.1	Define the trigonometric ratios sine, cosine and tangent from a right triangle.
		5.2	Use a calculator to determine the sine, cosine and tangent of angles stated in degrees.
		5.3	Use a calculator to determine the size of an angle (correct to a certain number of decimal places) given the sine, cosine or tangent of that angle.
		5.4	Determine an unknown side of a right triangle using the sine, cosine or tangent of a known angle.
		5.5	Determine an unknown angle of a right triangle using inverse sine, inverse cosine or inverse tangent of known sides.
		5.6	Solve applied problems using Pythagoras' theorem and the trigonometric ratios sine, cosine and tangent.

FOUNDATION SKILLS
Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

UNIT MAPPING INFORMATION
DCSBME604 Use basic mathematics in engineering is equivalent.

TITLE	**Assessment requirements for DCSBME631 Use basic mathematics in engineering**

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PERFORMANCE EVIDENCE	To achieve competency in this unit, a person must satisfy the requirements of the elements and performance criteria, foundation skills and range of conditions included in the unit. The person must also: • correctly solve written problems in mathematics • collect and analyse data • report and present data in an appropriate format Note: If a specific volume or frequency is not stated, then evidence must be provided at least once for each criterion.
KNOWLEDGE EVIDENCE	To achieve competency in this unit, a person must demonstrate knowledge of key concepts in mathematics, including: • estimation and rounding • scientific notation • ratio and percentages • mensuration techniques • triangles, quadrilaterals and circles • basic problem solving in geometry • fundamental algebraic concepts • linear equations and graphs • graphing and function notation • translating English into algebra • formulae substitution and transposition • quadratic formula for solving quadratic equations • the use of the scientific calculator in finding trigonometric values and inverse trigonometric values • Indices • Use of software

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ASSESSMENT CONDITIONS	**Assessment Conditions:** All assessment must be completed in accordance with work health and safety standards. When assessments are conducted remotely, invigilation software must be used to ensure authenticity of work completed. Model answers or marking guides must be provided for all assessments to ensure reliability of assessment judgements when marking is undertaken by different assessors. Assessors must gather a range of evidence that is valid, sufficient, authentic, and current. Questioning techniques must not require language, literacy and numeracy skills beyond those required in this module. The candidate must have access to all tools, equipment, materials and documentation required. **Assessor Requirements:** Assessment must be conducted only by persons who: • hold vocational competencies at least to the level being delivered and assessed • maintain current industry skills directly relevant to the training and assessment being provided • hold a tertiary qualification in engineering or a related field • meet the assessor requirements specified in the current Standards for Registered Training Organisations (RTOs) • undertake ongoing professional development in vocational training, learning, and assessment, including competency-based training and assessment, as required by their RTO. The RTO must also ensure that trainers and assessors keep their industry knowledge up to date through ongoing professional development. The RTO must take appropriate steps, as an ongoing procedure, to verify information about trainer and assessor's qualifications.