DCSBME604: Use Basic Mathematics in Engineering

UNIT CODE		**DCSBME604**	
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	Round numbers to a given number of significant figures.
		1.3	Explain the International System of units (SI units).
		1.4	Explain common SI units and their abbreviations.
		1.5	Convert between commonly used SI units.
		1.6	Convert numbers between decimal and both scientific and engineering notation.
		1.7	Determine the perimeter and area of two-dimensional shapes.
		1.8	Apply the Theorem of Pythagoras to area and perimeter problems.
		1.9	Determine the volume of simple three-dimensional shapes.
		1.10	Solve mensuration problems including calculating costs and capacity.
		1.11	Form a ratio from information in a practical problem and expresses the ratio in its lowest terms.
		1.12	Divide a quantity into a given ratio.
		1.13	Solve practical problems involving proportional quantities.
2	Use fundamental techniques in geometry	2.1	Name, classify and measure angles in a given diagram using a protractor.
		2.2	Perform angle arithmetic involving angles expressed in degrees, minutes and seconds.

DCSBME604: Use Basic Mathematics in Engineering

		2.3	Determine the size of an unknown angle in a diagram involving complementary, supplementary adjacent or vertically opposite angles, or angles formed by parallel lines.
		2.4	Classify triangles and quadrilaterals by their side and angle properties.
		2.5	Perform calculations involving angle, chord and tangent properties of the circle.
3	Use fundamental concepts in algebra	3.1	Solve problems involving the principle of conservation of momentum
		3.2	Solve problems involving impulse and change of momentum
		3.3	Solve problems involving forces in accelerated linear motion
		3.4	Distinguish between mass and weight
		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	Develop the equation of a straight line from a graph.
		3.9	Determine the equation of a straight line from various situations, including for the line of best fit obtained graphically from empirical data.
		3.10	Use function notation.
		3.11	Solve simultaneous equations analytically and graphically.
4	Use quadratic equations and their graphs in problem solving	4.1	Factorise polynomial expressions involving common factor, difference of two squares and quadratic trinomial types.
		4.2	Simplify algebraic fractions requiring the factorisation of binomial and trinomial expressions.
		4.3	Recognise and define the characteristics of parabolas and sketch their graphs.
		4.4	Solve quadratic equations analytically and graphically.
		4.5	Solve applied problems involving quadratic equations analytically and graphically.
		4.6	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, decimal degrees and in degrees, minutes and seconds.
		5.3	Use a calculator to determine the size of an angle (correct to a certain number of decimal places or correct to the nearest second) given the sine, cosine or tangent of that angle.

DCSBME604: Use Basic Mathematics in Engineering

		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 41975 Use basic mathematics in engineering is equivalent.			

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TITLE	Assessment requirements for DCSBME604 Use basic mathematics in engineering
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: o estimation and rounding o scientific and engineering notation o ratio and percentages o mensuration techniques o definitions in geometry o triangles, quadrilaterals and circles o basic problem solving in geometry o fundamental algebraic concepts o linear equations and graphs o graphing and function notation o translating English into algebra o formulae substitution and transposition o factorisation techniques o methods for solving quadratic equations o definitions in right angle triangle trigonometry o the use of the scientific calculator in finding trigonometric values and inverse trigonometric values o angles relevant to trigonometric problems
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 have:

DCSBME604: Use Basic Mathematics in Engineering

	• the assessor requirements in the standards for registered training organisation (RTOs) current at the time of assessment • vocational competencies at least to the level being delivered and assessed • current industry skills directly relevant to the training and assessment being provided • current knowledge and skills in vocational training and learning that informs their training and assessment • demonstrated, through their RTO, how they are continuing to undertake professional development in the fields of the knowledge and practice of vocational training, learning and assessment including competency-based training and assessment. 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.