



Australian Government

MARL009 Perform basic marine engineering calculations

Release: 1

MARL009 Perform basic marine engineering calculations

Modification History

Release 1. New unit of competency.

Application

This unit involves the skills and knowledge required to perform basic marine engineering calculations required for the operation of marine machinery and equipment.

This unit applies to people working in the maritime industry as a Marine Engineering Watchkeeper on commercial vessels greater than 750 kW or as an Engineer Class 3 Near Coastal.

This unit has links to legislative and certification requirements.

Pre-requisite Unit

Not applicable.

Competency Field

L - Marine Engineering

Unit Sector

Not applicable.

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Apply mathematical formulae to solve marine engineering problems	1.1	Proportions, variation, percentages and averages are calculated, and method of unity is applied
	1.2	Problems involving the manipulation of indices are solved
	1.3	Written descriptions of actual or hypothetical marine engineering problems are expressed in mathematical terms
	1.4	Algebraic formulae and equations are manipulated to change subjects, as and when required
	1.5	Index problems are converted to logarithmic problems, and vice versa, according to the Law of Logarithms

	1.6	Calculator is used to resolve marine engineering problems
2 Calculate areas, volumes and masses of regular and irregular figures	2.1	Problems related to areas and volumes of regular geometric figures are solved using standard formulae
	2.2	Problems relating to surface areas and volumes of circular figures are solved
	2.3	Centres of gravity and centroids of area are found for both line figures and areas
	2.4	Concept of density is applied to calculate masses
3 Apply trigonometry to solve problems relating to angular measurement and the resolution of vectors	3.1	Basic trigonometric ratios of sine, cosine and tangent, together with their reciprocals are explained with respect to the sides of a right-angled triangle
	3.2	Pythagoras' Theorem is proved
	3.3	Problems associated with single angle trigonometric identities including those derived from the application of Pythagoras' Theorem to the basic sin, cos and tan identities are solved
	3.4	Derivation of multiple, double and half angle trigonometric identities are shown and used to simplify complicated trigonometric expressions and identities
	3.5	Sine Rule and Cosine Rule for solution of triangles are proved and applied

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

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

Range of Conditions

Specifies different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the

candidate, accessibility of the item, and local industry and regional contexts) are included.

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Not Applicable.

Unit Mapping Information

This is a new unit. This unit is equivalent to MARL5012A Perform basic marine engineering calculations.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>

Assessment Requirements for MARL009 Perform basic marine engineering calculations

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- assessing own work outcomes and maintaining knowledge of current codes, standards, regulations and industry practices
- explaining basic mathematical concepts and techniques relevant to marine engineering, and
- identifying and determining appropriate mathematical techniques and formula to solve marine engineering problems
- identifying the methods and procedures needed to select mathematical techniques and formula to solve marine engineering problems
- imparting knowledge and ideas through verbal, written and visual means
- performing accurate and reliable calculations
- performing calculations relevant to marine engineering, including volumes and masses of regular and irregular areas
- reading and interpreting written information on marine engineering problems and express this information in mathematical terms
- solving problems using appropriate laws and principles
- using a calculator to resolve marine engineering problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- centre of gravity (CG), longitudinal centre of gravity (LCG), vertical centre of gravity (VCG)
- centroids of area
- formulae for areas, volumes and masses of regular and irregular shapes
- indices
- Law of Logarithms
- proportions, variation, percentages, averages and method of unity
- Pythagoras' Theorem.

Assessment Conditions

Assessors must satisfy National Vocational Education and Training Regulator (NVR)/Australian Quality Training Framework (AQTF) assessor requirements.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- tools, equipment, machinery, materials and personal protective equipment currently used in industry
- applicable documentation such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- range of relevant exercises, case studies and/or simulations.

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