

The optional HSC examination is based on all components of this examinable unit of competency as detailed in Section 11.3 of Part A.

Training Package	Construction, Plumbing and Services Integrated Framework (CPC08)		HSC Requirements and Advice
Unit title	Carry out measurements and calculations		
Unit code	Competency field	Unit sector	HSC Indicative Hours
CPCCCM1005A	Common	Construction	20

Unit descriptor	This unit of competency specifies the outcomes required to carry out measurements and perform simple calculations to determine task and material requirements for a job in a construction work environment.
Prerequisite units	CPCCOHS2001A Apply OHS requirements, policies and procedures in the construction industry
Co-requisite units	Nil
Application of the unit	This unit of competency supports achievement of skills to take measurements and use these to calculate material qualities and calculations for related tasks commonly used and applied in construction work.
Employability skills	This unit contains employability skills.

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	Critical aspects for assessment and evidence required to demonstrate competency in this unit	Context of and specific resources for assessment	Method of assessment
This unit of competency could be assessed in the workplace or a close simulation of the workplace environment, provided that simulated or project-based assessment techniques fully replicate construction workplace conditions, materials, activities, responsibilities and procedures.	<p>A person who demonstrates competency in this unit must be able to provide evidence of the ability to:</p> <ul style="list-style-type: none"> locate, interpret and apply relevant information comply with site safety plan, OHS regulations and state and territory legislation applicable to workplace operations comply with organisational policies and procedures, including quality requirements safely and effectively use tools and equipment 	<p>This competency is to be assessed using standard and authorised work practices, safety requirements and environmental constraints.</p> <p>Assessment of essential underpinning knowledge will usually be conducted in an off-site context.</p> <p>Assessment is to comply with relevant regulatory or Australian standards' requirements.</p>	<p>Assessment methods <u>must</u>:</p> <ul style="list-style-type: none"> satisfy the endorsed Assessment Guidelines of the Construction, Plumbing and Services Integrated Framework Training Package include direct observation of tasks in real or simulated work conditions, with questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application reinforce the integration of employability skills with workplace tasks and job roles

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	Critical aspects for assessment and evidence required to demonstrate competency in this unit cont/d	Context of and specific resources for assessment cont/d	Method of assessment cont/d
	<ul style="list-style-type: none"> • communicate and work effectively and safely with others • <i>complete measurements, calculations and determination of quantities for different projects of varying complexity in a range of contexts or occasions over time</i> • <i>calculate each of the following using a realistic construction task or example:</i> <ul style="list-style-type: none"> - <i>length</i> - <i>perimeter</i> - <i>circumference</i> - <i>area</i> - <i>volume</i> - <i>number</i> - <i>ratio</i> - <i>percentage</i> - <i>conversion of metres to millimetres and millimetres to metres</i> - <i>measure using a rule or tape measure five separate tasks within 1mm accuracy.</i> 	<p>Resource implications for assessment include:</p> <ul style="list-style-type: none"> • an induction procedure and requirement • realistic tasks or simulated tasks covering the mandatory task requirements • relevant specifications and work instructions • tools and equipment appropriate to activity • support materials appropriate to applying safe work practices • workplace instructions relating to safe work practices and addressing hazards and emergencies • material safety data sheets • research resources, including industry related systems information. <p>Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support.</p>	<ul style="list-style-type: none"> • confirm that competency is verified and able to be transferred to other circumstances and environments. <p>Validity and sufficiency of evidence <u>requires</u> that:</p> <ul style="list-style-type: none"> • competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace • where the assessment is part of a structured learning experience the evidence collected must be related to a number of performance assessments at different points in time and separated by further learning and practice, with a decision on competency only taken at the point when the assessor has complete confidence in the person's demonstrated ability and applied knowledge • all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence. <p>Assessment processes and techniques should as far as is practical take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed.</p> <p>Supplementary evidence of competency may be obtained from relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.</p>

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Required Skills and Knowledge		HSC Requirements and Advice
This section describes the skills and knowledge required for this unit.		
<p>Required skills</p> <p>Required skills for this unit are:</p> <ul style="list-style-type: none"> • communication skills to: <ul style="list-style-type: none"> – determine requirements – enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand – follow instructions – read and interpret: <ul style="list-style-type: none"> ▪ documentation from a variety of sources ▪ drawings and specification – report faults – use language and concepts appropriate to cultural differences – use and interpret non-verbal communication, such as hand signals – written skills to record measurements, calculations and quantities • identifying and accurately reporting to appropriate personnel any faults in tools, equipment or materials • numeracy skills to apply measurements, calculations and geometry • organisational skills, including the ability to plan and set out work • teamwork skills to work with others to action tasks and relate to people from a range of cultural and ethnic backgrounds and with varying physical and mental abilities • technological skills to: <ul style="list-style-type: none"> – use a range of mobile technology, such as two-way radio and mobile phones – voice and hand signals to access and understand site-specific instructions. 	<p>Required knowledge</p> <p>Required knowledge for this unit is:</p> <ul style="list-style-type: none"> • basic calculators • communication devices • company procedures • construction terminology • job safety analysis (JSA) and safe work method statements • measuring, calculating, geometry and determination of quantities • processes for care of measuring equipment • project quality requirements • site and equipment safety (OHS) requirements • tolerances. 	<p>Key Terms and Concepts</p> <ul style="list-style-type: none"> • accuracy • areas • basic calculations • calculating tools and equipment • calculation factors • estimate • geometry • material quantities • measurements • measuring tools and equipment • recording information • volumes • tolerances • workplace documentation.

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Element	Performance Criteria	Range Statement	HSC Requirements and Advice
1 Plan and prepare.	1.1 Work instructions are confirmed and applied using relevant <i>information</i> .	<p>The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. <i>Bold italicised</i> wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p> <p><i>Information includes:</i></p> <ul style="list-style-type: none"> • diagrams or sketches • instructions issued by authorised organisational or external personnel • manufacturer specifications and instructions • maps • material safety data sheets (MSDS) • memos • organisation's work specifications and requirements • plans and specifications • regulatory and legislative requirements • relevant Australian standards • safe work procedures or equivalent • signage • verbal or written and graphical instructions • work bulletins • work schedules. 	<p>Learning experiences for the HSC must address:</p> <p>A range of sources for work instructions and procedures including:</p> <ul style="list-style-type: none"> • work schedule • plans/specifications • diagrams/sketches • job card/job sheet • job safety analysis (JSA)/safe work method statement • standard operating procedures (SOP) • material safety data sheets (MSDS) • regulations/legislation/codes of practice • Australian Standards • workplace/site policies and procedures • workplace bulletins/memos • manufacturer specifications and instructions • client requirements. <p>An awareness of various modes of communication to receive work instructions including:</p> <ul style="list-style-type: none"> • verbal <ul style="list-style-type: none"> - face-to-face (supervisor to employee) - telephone/mobile phone/pager - two-way radio - on-site meeting - voice signals • written communication <ul style="list-style-type: none"> - work plan/job card - memo/message - job description/statement - workplace form - roster - facsimile - email - intranet • non-verbal <ul style="list-style-type: none"> - gestures - signals - signage - diagrams.

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			<p>A basic overview of the role of employees in quality assurance.</p> <p>Strategies for obtaining, understanding and clarifying instructions/procedures including:</p> <ul style="list-style-type: none"> • correct sourcing and selection of information • consulting appropriate personnel • active listening • open and closed questions.
	<p>1.2 <i>Safety (OHS)</i> requirements are obtained from site safety plan, other regulatory specifications or legal obligations, and are applied.</p>	<p><i>Safety (OHS)</i> is to be in accordance with state or territory legislation and regulations, organisational safety policies and procedures, and project safety plan and may include:</p> <ul style="list-style-type: none"> • clothing and equipment • handling of materials • hazard control • hazardous materials and substances • organisational first aid • use of firefighting equipment • use of tools and equipment • workplace environment and safety. 	<p>Learning experiences for the HSC must address:</p> <p>Safe work practices and procedures for the construction industry.</p> <p>Project/site safety plan.</p>
	<p>1.3 Measuring and calculating <i>equipment</i> selected to carry out tasks is consistent with job requirements, is checked for serviceability, and any faults are rectified or reported.</p>	<p><i>Equipment includes:</i></p> <ul style="list-style-type: none"> • calculators and laser equipment • rulers • tape measures • trundle wheels. 	<p>Learning experiences for the HSC must address:</p> <p>General features, purpose, maintenance, working knowledge and the safe use of a range of measuring and calculating tools and equipment.</p> <p>Procedures and documentation for identifying faulty tools and equipment including those with:</p> <ul style="list-style-type: none"> • malfunctions • worn, broken or missing components. <p>The importance of acting within level of authority in terms of:</p> <ul style="list-style-type: none"> • taking initiative • problem-solving • decision-making. <p>Solutions to a range of potential faults.</p>

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			Personnel to whom problems should be reported: <ul style="list-style-type: none"> • supervisor/manager • supplier/manufacturer. Reporting of faults including: <ul style="list-style-type: none"> • formal/informal • verbal/written.
2 Obtain measurements.	2.1 Method of obtaining the measurement is selected and applied.		
	2.2 <i>Measurements</i> are obtained using a rule or tape accurate to 1mm.	<i>Measurements are to:</i> <ul style="list-style-type: none"> • be in metric scale • cover all necessary calculations. 	Learning experiences for the HSC must address: Appropriate units of measurement and calculations.
	2.3 Measurements, including <i>areas and volumes</i> , are confirmed and recorded.	<i>Areas and volumes include:</i> <ul style="list-style-type: none"> • calculating regular and irregular shapes, such as rectangles, squares, circles, triangles, trapeziums, cubes, cones, pyramids and cylinders that represent calculations taken in a construction environment. 	Learning experiences for the HSC must address: The importance of accurate measurements. Documentation typical to the construction industry for recording material requirements for projects. The importance of recording information that is <ul style="list-style-type: none"> • clear • legible • accurate • concise • contains appropriate use of industry terminology and abbreviations.
3 Perform calculations.	3.1 Appropriate <i>calculation factors</i> are determined and correct method is selected for achieving required result.	<i>Calculation factors:</i> <ul style="list-style-type: none"> • <u>include</u> length, area, weight, height, width, depth, volume, mass, scales, ratios, perimeters, quantities, numbers, grade, percentages, addition, subtraction, multiplication and division • <u>are to</u> be performed manually and with the aid of a calculator. 	

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Element	Performance Criteria	Range Statement	HSC Requirements and Advice
	3.2 <i>Material quantities</i> for the project are correctly calculated using appropriate factors.	<i>Material quantities</i> <u>are to</u> be: <ul style="list-style-type: none"> • calculated in either packed, bulk, loose or compacted states • converted to volumes in the other states. 	Learning experiences for the HSC must address: An awareness of the consequences of incorrect measurements and calculations for: <ul style="list-style-type: none"> • the client • the workplace • the environment.
	3.3 Results are confirmed and recorded.		Learning experiences for the HSC must address: The importance of accurate calculations.
4 Estimate approximate quantities.	4.1 Calculations for determining material requirements are taken.		Learning experiences for the HSC must address: An understanding of: <ul style="list-style-type: none"> • metric • scale • ratios • estimations • tolerances • project quality requirements • waste minimisation.
	4.2 Appropriate formulas for calculating quantities are selected.		Learning experiences for the HSC must address: Knowledge of a range of mathematical formulae commonly used for the calculation of quantities in a construction environment. Selection and application of mathematical formulae for calculation of quantities.
	4.3 Quantities are estimated from the calculations taken.		
	4.4 Material quantities for the project are calculated, confirmed and recorded within enterprise tolerances.		