



Australian Government

Department of Education, Employment and Workplace Relations

MEM09202A Produce freehand sketches

Release: 1

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Modification History

Release 1 - New unit of competency

Unit Descriptor

This unit of competency covers the skills and knowledge required to complete freehand sketches to illustrate or communicate information to be used in engineering drafting applications. It covers standard drawing conventions and techniques to represent the subject in appropriate proportion and view.

Application of the Unit

This unit is suitable for those working within a computer-aided design (CAD) or drafting work environment. Sketches may be used as part of the drafting process to illustrate or communicate information about design, worksite, layout plan or construction features. The unit includes the ability to apply standard drawing conventions to sketching 2-D orthogonal and pictorial freehand drawings and sectional views.

Licensing/Regulatory Information

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1	Determine sketch requirements	1.1	Determine purpose, scope and presentation context for sketch, and the information needs of the audience
		1.2	Identify key features, dimensions and orientation, structures, services and features for inclusion
		1.3	Obtain any additional information required
		1.4	Determine suitable sketching techniques and select and prepare materials
		1.5	Access, interpret and apply compliance or safety procedures relevant to the work activity
2	Create simple sketches of pictorial, orthographic and sectional views	2.1	Prepare simple freehand sketches using standard orthogonal and pictorial conventions
		2.2	Prepare sectional details of simple structural or mechanical elements and elevations using standard orthogonal drawing practice
		2.3	Examine and apply principles of descriptive geometry to ensure correct perspective is achieved
		2.4	Apply industry specific terminology and symbols, and include specifications, as required, to convey required information
		2.5	Identify and label sketch to confirm currency and purpose
		2.6	Confirm sketch is an accurate representation of subject and applies standard drawing conventions
3	Produce sketches of geometric shaped objects	3.1	Sketch geometric shapes using correct construction techniques
		3.2	Obtain tangent points using correct drawing techniques
		3.3	Confirm sketch is an accurate representation of subject and applies standard drawing conventions

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| 4 | Produce pictorial sketches of engineering components | 4.1 | Select principal axes and angles |
| | | 4.2 | Sketch isometric and non-isometric lines |
| | | 4.3 | Construct pictorial circles and arcs |
| | | 4.4 | Sketch isometric, oblique and perspective views |
| | | 4.5 | Conduct calculations, as required, to ensure correct dimensions and proportions and construct and use scales for sketch |
| | | 4.6 | Complete border and title blocks and confirm sketch is an accurate representation of subject and applies standard drawing conventions |

Required Skills and Knowledge

Required skills

Required skills include:

- literacy skills sufficient to read product safety labels and instructions and to prepare sketches for presentation
- numeracy skills sufficient to determine layout issues and to deal with scaling
- applying spatial principles to achieve scale and proportion
- selecting correct media and graded pencils to produce a freehand sketch of components
- applying freehand drawing techniques and conventions in the production of sketches in pictorial, orthographic and sectional views

Required knowledge

Required knowledge includes:

- general knowledge of the elements and principles of design and their specific application to drawing
- general knowledge of different approaches to drawing
- techniques, methods and principles of technical drawing used in descriptive geometry
- awareness of copyright and intellectual property issues and legislation in relation to drawing
- environmental and occupational health and safety (OHS) issues associated with the tools and materials used for drawing
- quality assurance procedures
- principles of plane geometry:
 - geometric shapes
 - plane geometry
 - geometric construction
 - line types during construction
- sketch construction:
 - pictorial axes
 - pictorial angles
 - pictorial lines
 - non-pictorial lines
 - pictorial circles and arcs
- four centre method
- ordinate method:
 - sectioning pictorial shapes
- pictorial drawing:
 - isometric

- oblique (cabinet and cavalier)
- perspective
- dimensioning requirements and techniques

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	A person who demonstrates competency in this unit must be able to produce freehand sketches to communicate or illustrate subject for further drafting work.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.</p> <p>Specifically the candidate must be able to:</p> <ul style="list-style-type: none"> • work within typical site/teamwork structures and methods • apply worksite communication procedures • comply with organisational policies and procedures, including quality requirements • comply with quality requirements • use industry terminology • apply appropriate safety procedures • produce freehand orthogonal sketches and sectional views with information required to inform drawing work.
Context of and specific resources for assessment	<p>This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team.</p> <p>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</p> <p>Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.</p>

	<p>This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with drafting or other units requiring the exercise of the skills and knowledge covered by this unit.</p>
Method of assessment	<p>Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways, including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.</p>

Range Statement

Key features	<p>Key features may include:</p> <ul style="list-style-type: none">• shape• proposed subject• existing structures• services• dimensions• types of structure• shape of structure• type of construction• types of fasteners• layout• service requirements• location of plant and machinery• vertical and horizontal measurements
Orientation	<p>Orientation may include:</p> <ul style="list-style-type: none">• relationship to the north compass point• location of other subjects• relationship to other subjects
Services	<p>Services may include:</p> <ul style="list-style-type: none">• drainage• sewerage• gas• telephone and cable• water• electricity• air conditioning and ventilation• heating and cooling
Additional information	<p>Additional information may include:</p> <ul style="list-style-type: none">• measurements and dimensions• design specifications• material
Drawing materials	<p>Drawing materials may include:</p> <ul style="list-style-type: none">• pen and ink• graphite pencils• graph paper• cartridge paper• tracing paper

Standard drawing conventions	<p>Standard drawing conventions may include:</p> <ul style="list-style-type: none"> • use of correct sectioning technique • identification of cutting plane • accurate line types • appropriate view positions to the recognised drawing convention • use of correct symbols • use of correct dimensioning technique • provision of suitable number of views • use of correct proportions • neat presentation
Construction techniques	<p>Construction techniques may include:</p> <ul style="list-style-type: none"> • use of parallel lines • bisection of lines, angles and arcs • equal division of lines • construction of angles at 90, 45, 30, 60, 75 and 15 degrees • construction of a hexagon • sketching arcs tangential to two lines • sketching arcs tangential to two other arcs, internally and externally • sketching an arc tangential to a straight line and another arc • determining and indicating tangent points
Drawing techniques	<p>Drawing techniques may include:</p> <ul style="list-style-type: none"> • orthogonal projection: <ul style="list-style-type: none"> • first angle projection • third angle projection • projection symbol • preferred system of projection in Australia • number of views • relationship of views • sheet format: <ul style="list-style-type: none"> • borders and title blocks • application of projection symbol • drawing sheets and sizes • lettering styles • Australian standards • dimensioning: <ul style="list-style-type: none"> • unidirectional dimensioning

	<ul style="list-style-type: none">• aligned dimensioning• projection and dimension lines• arrow heads• dimension placement• sectioning:<ul style="list-style-type: none">• types of sections• required section views• placement of views• cutting planes• labelling of cutting planes and section views
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Unit Sector(s)

Drawing, drafting and design

Custom Content Section

Not applicable.