

SQA Advanced Unit specification

General information

Unit title: CAD: Principles (SCQF level 7)

Unit code: HV1D 47

Superclass: CH

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Unit purpose

This Unit is designed to introduce learners to CAD Principles. It allows the learner to develop knowledge and skills to allow them to understand how current draughting practice and convention can be applied in an industrial environment. The Unit also provides learners with the opportunity to develop the practical skills to enable them to produce drawings to current British and International Standards.

Outcomes

On successful completion of the Unit the learner will be able to:

- 1 Demonstrate knowledge of current draughting conventions and standards.
- 2 Create single part drawings using a CAD system, consistent with current draughting standards.
- 3 Create assembly drawings using a CAD system, consistent with current draughting standards.
- 4 Create a block or circuit diagram using a CAD system, incorporating standard symbols, consistent with current draughting standards.

Credit points and level

1 SQA Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

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Recommended entry to the Unit

Access is at the discretion of the centre. However, learners should possess a basic knowledge and understanding of 2D draughting techniques. This may be evidenced by the possession of SQA Advanced Units in Computer Aided Draughting and/or a Higher in Graphical Communication or equivalent.

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes for this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

The Unit may be linked/integrated with the *Computer Aided Draughting and Design Graded Unit 1*.

The Assessment Support Pack (ASP) for this Unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website (<http://www.sqa.org.uk/sqa/46233.2769.html>).

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

SQA Advanced Unit specification: Statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

Demonstrate knowledge of current draughting convention and standards.

Knowledge and/or Skills

- ◆ Drawing sheet sizes
- ◆ Orthographic projection, first and third angle
- ◆ Line work — type and width
- ◆ Dimensioning and annotation
- ◆ Abbreviations
- ◆ Sectioning
- ◆ Symbols

Outcome 2

Create single part drawings using a CAD system, consistent with current draughting standards.

Knowledge and/or Skills

- ◆ Single part drawings
- ◆ Annotation
- ◆ Dimensions
- ◆ Orthographic projection
- ◆ Sectioning
- ◆ Draughting standards
- ◆ Tolerances

Outcome 3

Create assembly drawings using a CAD system, consistent with current draughting standards.

Knowledge and/or Skills

- ◆ Assembly drawing
- ◆ Parts list
- ◆ Balloon detailing
- ◆ Orthographic projection
- ◆ Sectioning

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Outcome 4

Create a block or circuit diagram using a CAD system, incorporating standard symbols, consistent with current draughting standards.

Knowledge and/or Skills

- ◆ Circuit/block diagrams
- ◆ Symbols

Evidence Requirements for this Unit

Outcome 1

A learner's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the learner is able to:

- ◆ identify a minimum of two standard drawing sheet sizes
- ◆ identify projection (first and third angle)
- ◆ identify a minimum of three line types which conform to current draughting standards
- ◆ identify the correct method of dimensioning, consistent with current draughting standards
- ◆ identify the meaning of abbreviations conforming to current draughting standards, (a minimum of five abbreviations should be identified)
- ◆ identify the correct method of sectioning for a given component, consistent with current draughting standards
- ◆ identify a minimum of eight symbols, consistent with current British standards

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Learners should be allowed to refer to relevant course material.

Outcome 2

A learner's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the learner is able to:

- ◆ Create an orthographically projected single part drawing, consistent with current draughting standards, which includes:
 - a minimum of three views of the part, inclusive of a section view
 - appropriate dimensions and annotation
 - projection symbol
 - title block

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Learners should be allowed to refer to relevant course material.

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Outcome 3

A learner's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the learner is able to:

- ◆ create an orthographically projected assembly drawing, consistent with current draughting standards, which includes:
 - a minimum of three components making up the assembly
 - a minimum of three views of the assembly, inclusive of a section view
 - parts list
 - balloon detail
 - projection symbol
 - title block

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Learners should be allowed to refer to relevant course material.

Outcome 4

A learner's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the learner is able to:

- ◆ create a block/circuit diagram, consistent with current draughting standards, which includes a minimum of eight components

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Learners should be allowed to refer to relevant course material.

SQA Advanced Unit Support Notes

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Unit Support Notes are offered as guidance and are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit has been written in order to allow learners to develop knowledge, understanding and skills in the following areas:

- 1 Demonstrate knowledge of current draughting convention and standards.
- 2 Creation of single part drawings in multi-view format using a CAD system, consistent with current draughting standards.
- 3 Creation of assembly drawings using a CAD system, consistent with current draughting standards.
- 4 Creation of block/circuit diagrams using a CAD system, incorporating standard symbols, consistent with current draughting standards.

This Unit is at SCQF level 7 and has been devised as a mandatory Unit within the SQA Advanced Certificate and SQA Advanced Diploma Computer Aided Draughting and Design awards. However, this does not preclude the use of the Unit in other awards where award designers feel this to be appropriate.

In designing this Unit, the Unit writer has identified the range of topics that would be expected to be covered by lecturers. The writer has also given recommendations as to how much time should be spent on each Outcome assessment. This has been done to help lecturers decide what depth of treatment should be given to the topics attached to each of the Outcomes. While it is not mandatory for centres to use this list of topics, it is recommended that they do so as the Assessment Support Pack (ASP) for this Unit is based on the Knowledge and/or Skills and list of topics in each of the Outcomes.

A list of topics for each Outcome is given below. Lecturers are advised to study this list in conjunction with the Assessment Support Pack (ASP) so that they can get a clear indication of the standard of achievement of learners in this Unit.

Outcome 1

Demonstrate knowledge of current draughting convention and standards. **(7 hours)**

Where possible the learners should be provided with access to BS8888 or relevant material, which covers current British standards in the following topics:

- ◆ Name and size of drawing sheets available that conform to current draughting standards
- ◆ Orthographic projection, first and third angle
- ◆ Types of lines, line weight and examples of their use in the creation of drawings, which conform with current draughting standards
- ◆ Dimensioning of components in a drawing, conforming with current draughting standards

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- ◆ Standard format for annotating a drawing (minimum character heights, position and orientation, etc.)
- ◆ Abbreviations, consistent with current draughting standards
- ◆ Sectioning of single part geometry, consistent with current draughting standards
- ◆ Symbols, which are consistent with current British standards (welding, electrical, electronic, pneumatic, etc)

Outcome 2

Create single part drawings using a CAD system, consistent with current draughting standards. **(10 hours)**

Where possible the learners should be provided with access to BS8888 or relevant material, which covers current British standards in the following topics:

- ◆ Creation of single part drawings with multiple views in orthographic format:
 - views: elevation, end elevation, plan, section, detail, etc.
- ◆ Appropriate annotation is added to the drawing which clearly communicates all required information not included in the line work
- ◆ All required dimensions should be added to the drawing. The dimensions must fully and accurately detail the design intent of the component, while remaining consistent with current draughting standards
- ◆ Orthographic projection: first/third angle

Outcome 3

Create assembly drawings using a CAD system, consistent with current draughting standards. **(10 hours)**

Where possible the learners should be provided with access to BS8888 or relevant material, which covers current British standards in the following topics:

- ◆ Creation of assembly drawings with multiple views in orthographic format:
 - views: elevation, end elevation, plan, section, detail, etc. A minimum of **three** components should be included in the assembly.
- ◆ Creation of parts list and balloon detailing: should be used to convey important information about the components in the assembly. The parts list could contain information on the following:
 - Part Number
 - Part Name
 - Quantity
 - Material
 - Description
- ◆ Orthographic projection: first/third angle

Outcome 4

Create a block or circuit diagram using a CAD system, incorporating standard symbols, consistent with current draughting standards. **(6 hours)**

Where possible the learners should be provided with access to BS8888 or relevant material, which covers current British standards in the following topics:

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- ◆ Circuit/block diagrams could be based on a variety of different applications, eg electrical/electronic, HVAC, Pneumatics, etc. The learner should be introduced to the variety of circuit/block diagrams used in industry, ie block, theoretical and production. One drawing should be produced for any one of the types listed.

Guidance on approaches to delivery of this Unit

It is intended that this Unit be presented at all times using the specialist application CAD software available at the centre. Appropriate technical and support material should be available to the learner.

In delivery of this Unit, learners should be provided with the opportunity to gain as much 'hands on' experience as possible. Each learner should have access to a PC with the CAD software installed. Learners should NOT work in groups.

Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Outcome 1 should consist of a short written exercise or multiple-choice questions. Outcomes 2, 3 and 4 in this Unit should be practical.

The assessment for Outcome 1 in this Unit should be taken by learners at one single event that should last 1 hour. The questions should be composed of a suitable balance of short answer, restricted response and structured questions and/or as a multiple-choice paper. Assessment should be conducted under open-book conditions.

Outcome 2 should be assessed as a single assignment in which learners are asked to create a single part drawing, accurate with current draughting standards (most recent revision of BS8888), and should last no more than 2 hours. Learners should be allowed to refer to relevant course material.

Outcome 3 should be assessed as a single assignment in which learners are asked to create an assembly drawing, accurate with current draughting standards (most recent revision of BS8888), and should last no more than 2 hours. Learners should be allowed to refer to relevant course material.

Outcome 4 should be assessed as a single assignment in which learners are asked to create a circuit/block diagram, accurate with current British standards. The time allocated for this assessment should be no more than 2 hours. Learners should be allowed to refer to relevant course material.

These assessments should be conducted under controlled, supervised conditions.

Learners whose assessment response does not meet the minimum evidence will be offered remediation and resubmission to reflect industry practice.

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It is recommended that centres develop checklists to support the assessment requirements for each of the Knowledge and/or Skills items.

An Assessment Support Pack (ASP) is available for this Unit.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at www.sqa.org.uk/e-assessment.

Opportunities for developing Core and other essential skills

Learners are working in a context which requires that they produce original computer aided design work. All elements of the Core Skill of *Problem Solving*, namely Planning and Organising, Critical Thinking, and Reviewing and Evaluating would be developed and enhanced as learners undertake the Unit and analyse and seek design solutions to a range of theoretical and practical problems and issues working to a specific brief. Learners will work unaided in the selection of appropriate software and the modification or customising of applications to meet needs of purpose and context. Following procedures for security and safety will be routine practice. Analytical evaluation of all stages of proposed solutions and their potential and actual impact will be on-going. Access to and interpretation and evaluation of examples of, complex CAD graphic design would be of value during formative work and learners could be supported in identifying appropriate methods to measure achievement and progress.

Accuracy and effectiveness in the interpretation and communication of graphic information underpins the competencies developed in the Unit. Some learners may benefit from formative opportunities to further develop skills in the analysis and application of graphic data, and the use of software packages or on-line tutorials to enhance skills may be useful.

Although communication skills are not formally assessed learners should be expected to produce and present written evidence to a professional standard, to express essential ideas, information accurately and coherently. Use of language, spelling, and punctuation should be accurate.

History of changes to Unit

Version	Description of change	Date

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced Qualifications.

FURTHER INFORMATION: Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our [Centre Feedback Form](#).

General information for learners

Unit title: CAD: Principles (SCQF level 7)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

This Unit has been designed to provide you with the knowledge and skills that will enable you to understand the basic concepts of draughting practice.

This Unit will also allow you to develop practical skills that will enable you to create single part, assembly and circuit drawings.

The formal assessment for this Unit is practical although there is a small written assessment requirement.

The actual assessment times are as follows:

Outcome 1	Written	1 hour
Outcome 2	Practical	2 hours
Outcome 3	Practical	2 hours
Outcome 4	Practical	2 hours

Being asked to satisfactorily create part, assembly and circuit drawings will assess your practical skills. You will be presented with the basic drawing/sketches, sizes and layouts that are needed to create these drawings.