SQA Advanced Unit specification

General information for centres

Unit title: CAD: 2D II (SCQF level 7)

Unit code: HR3H 47

Superclass:	CH
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Unit purpose

This Unit is designed to develop the skills and knowledge involved with additional 2-Dimensional (2D) Computer Aided Draughting (CAD) drawing skills.

Outcomes

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

1 Create, save and print a 2D drawing using grouped standard parts with attribute information to a given specification using the CAD package.
2 Create, save and print a 2D drawing using (Xref) externally referenced parts to a given specification using the CAD package.
3 Create, save and print a 2D Pictorial drawing to a given specification using the CAD package.

Credit points and level

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

Recommended entry to the Unit

Access to this Unit is at the discretion of the centre. However, it would be an advantage for learners to have a basic knowledge and understanding of computers and technical drawing and have successfully completed the Unit *CAD: 2D I*.

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.

This Unit is in the framework for the SQA Advanced Certificate/Diploma in Computer Aided Draughting and Design and it is recommended that it is taught within this context.

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.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Learners should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Create, save and print a 2D drawing using grouped standard parts with attribute information to a given specification using the CAD package.

Knowledge and/or Skills

♦   Attribute tags
♦   Grouped 2D standard parts
♦   Attach attribute information
♦   Exportation of grouped 2D standard parts
♦   Standard parts library
♦   Insertion of grouped 2D standard parts
♦   Editing attribute information
♦   Extraction of attribute information
♦   Linked tables
♦   Print/plot a completed drawing to a specified scale for a given size of paper

Outcome 2

Create, save and print a 2D drawing using (Xref) externally referenced parts to a given specification using the CAD package.

Knowledge and/or Skills

♦   Insert and link external files to a main file
♦   Update a main file after linked external files have been modified
♦   Detach, unload and/or bind linked external files from/to the main file
♦   Print/plot a completed drawing

Outcome 3

Create, save and print a 2D Pictorial drawing to a given specification using the CAD package.

Knowledge and/or Skills

- Snap grid set to Isometric mode
- Isometric planes
- Circles in Isometric mode
- Text and dimensions for Isometric objects
- Pictorial drawings
- Print/plot the completed drawing

Evidence Requirements for this Unit

The learner will be required to demonstrate his/her Knowledge and/or Skills in Outcomes 1 through 3 with the production of practical and graphical evidence.

If any of the Outcomes all of the knowledge and/or skills need not be assessed.

The learner will be required to carry out:

- The creation of at least **four** grouped standard parts which contain attribute information
- The insertion of at least **four** grouped standard parts which contain attribute information to a drawing
- The extraction of attribute information from a drawing and inserted into a table and linked to the original drawing
- The creation of drawing files for insertion and modification as External References (Xrefs) in a main drawing file
- The creation of pictorial drawing file of **one** type, eg Isometric, Perspective, Planometric or Cabinet/Cavalier will also be created
- All files will be scaled, saved and printed to a given specification

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 is in the framework for the SQA Advanced Certificate/Diploma in Computer Aided Draughting and Design but may be delivered on a standalone basis or as an option to another Group Award. 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.

This Unit has been written in order to allow learners to develop fundamental knowledge, understanding and skills in the creation and manipulation of the User Co-ordinate System (UCS) within the 2D environment, the creation and manipulation of Viewports within both the Model and Layout/Paper environments of the CAD package, the creation and manipulation of Layout tabs within the Layout/Paper environment; the creation of grouped standard parts which contain attribute information, saving them as external drawing files to a standard parts library and then reinserting them into a drawing file and linking them as externally referenced drawing files; the extraction of attribute information, importing the extraction data into an external program, the creation of a table to be imported and linked back to the drawing file; the creation of Pictorial drawing files, such as Isometric, Perspective, Planometric, or Cabinet/Cavalier; presenting objects within the Layout/Paper environment; and scaling, saving and printing the completed drawings to a given specification.

These skills are essential to the creation of more advanced 2D drawings within any discipline, eg section drawings, assembly drawings, illustration drawings, etc. There is one other Unit in the group entitled *CAD: 2D I*, which covers fundamental drawing setup commands and object creation and editing commands. The two Units have been developed as an integrated suite of Units to meet most 2D CAD requirements and can be used in awards as necessary and where appropriate.

In designing this Unit a range of topics have been included which lecturers are expected to cover. Recommendations are given below as to how much time should be spent on each Outcome. This has been done to help lecturers decide what depth of treatment should be given to the topics attached to each of the Outcomes. Whilst it is not mandatory for a centre to use this list of topics, it is strongly recommended that it do so to ensure continuity of teaching and learning across the Units. The assessment exemplar pack for this Unit is based on the knowledge and/or skills and list of topics in each of the Outcomes as well as covering aspects of the discipline, which it is used in, eg Built Environment.

The list of topics is given below. Lecturers are advised to study this list of topics in conjunction with the assessment exemplar pack so that they can get a clear indication of the standard of achievement expected of learners in this Unit.

SQA Advanced Unit Specification

Outcome 1 (12 hours)

Create, save and print a 2D drawing using grouped standard parts with attribute information to a given specification using the CAD package.

The following topics are specific in nature but should be put into context by reference to the CAD software application package being used at the centre:

Create Standard Parts:

♦ Create drawings of standard parts
♦ Create and assign attribute tags with appropriate mode, text, default data and location information to each standard part
♦ Use the block and Wblock commands to create standard parts within a standard parts library

Initiate a new drawing:

♦ Initiate a new drawing using a Standard Template file, which contains a border and title box in the Layout/Paper environment
♦ Save the drawing to a given location with a new name as a drawing file

Use Standard Parts with attribute information:

♦ Insert standard parts from a library into a drawing file, eg section drawings, assembly drawings, illustration drawings; controlling the insertion point, scale and rotation
♦ Edit attribute information, both individually and globally, within a drawing file
♦ Extract attribute data from a drawing file in various formats
♦ Import the extracted data into an external application to create a table
♦ Import and link the table back into the drawing file
♦ Edit information in the application table to see updates in the drawing file table

Setting out and Printing:

♦ Use of Layouts
♦ Viewports within Layouts
♦ Zoom command to Scale to an appropriate scale within a Viewport
♦ MVSETUP to align objects within viewports
♦ A hard copy of the specified drawing is produced to a given scale appropriate to the paper specified

Outcome 2 (8 hours)

Create, save and print a 2D drawing using (Xref) externally referenced parts to a given specification using the CAD package.

The following topics are specific in nature but should be put into context by reference to the CAD software application package being used at the centre:

♦ Use the Xref Manager to link drawings into a master drawing, eg Illustration drawings and Sectional drawings
♦ Edit referenced drawings to see the effect in the master drawing
♦ Unload, reload, and bind original drawings within the master drawing

♦ Control the path of linked drawings
♦ Use layer control to control the visibility of referenced objects

Outcome 3 (12 hours)

Create, save and print a 2D Pictorial drawing to a given specification using the CAD package.

The following topics are specific in nature but should be put into context by reference to the CAD software application package being used at the centre:

Isometric Drawing Concepts:

♦ Set the Isoplane Grid mode within the CAD package
♦ Toggle between the various planes to control drawing of objects
♦ Use the CAD system Isoplane capability to create Isocircles
♦ Use the CAD system Isoplane capability to create Isometric views based on the Orthographic information given
♦ Add text and dimensions to the Isometric objects

Demonstrate other Pictorial drawings types:

♦ Perspective drawings
♦ Planometric drawings
♦ Cabinet/Cavalier drawings

Guidance on approaches to delivery of this Unit

As this Unit provides more advanced CAD skills, which requires continual use to obtain proficiency, it is recommended that the Unit be delivered towards the start or middle of an award so that it may be used with other Unit requirements.

Where this Unit is incorporated into other Group Awards it is recommended that it be delivered in the context of the specific occupational area(s) that the award is designed to cover, eg architectural drawings with Built Environment courses.

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.

The intention for the assessment of all Outcomes in this Unit is that they be combined together into a single practical assessment. A single assessment may be given in whole or in parts at the discretion of the lecturer under controlled, supervised conditions over an eight-hour period. However, individual assessments of one to three hours each may be given at the discretion of the centre.

Assessment will be under open-book conditions and as such learners **will be allowed** to bring any textbooks or notes to the assessment or use the Help system available within the application software.

Graphical evidence will be in the form of CAD application drawing files presented as printed copies of finished drawings.

It should be noted that learners must achieve all the minimum evidence specified for each Outcome in order to pass the Unit. Learners whose assessment response does not meet the minimum evidence will be offered remediation and the opportunity for re-submission to reflect industry practice.

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

Assessment Guidelines

Evidence must be generated through practical assessment undertaken in controlled, supervised conditions. The time allocation for the assessments are as follows:

♦   Integrated assessment covering all Outcomes totalling eight hours
OR
♦   Separate assessments of three hours per Outcome

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 original computer aided design work. Access to, and interpretation and evaluation of examples of, complex graphic design would be of value. Learners should be able to work unaided in the selection of appropriate software and the modification or customising of applications to meet the identified needs of purpose and context.

They could, however, benefit from discussions with the class group and/or assessor in order to reinforce, analytical evaluation of approaches to the design process.

As they consider design solutions to a given brief learners could be encouraged to analyse potential solutions to a number of associated theoretical and practical problems and to formally identify specific objectives. The chance to identify and fully consider any underlying variables, including all potential resources, and to examine the relative significance of each before identifying and justifying an appropriate design approach will provide opportunities to develop problem solving skills to an advanced level. Evaluating the potential effect and impact of proposed design solutions will be a critical aspect of knowledge and understanding. Learners could be supported in identifying appropriate evaluative methods to measure progress and achievement.

Accuracy 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 the effectiveness of their analysis and application of graphic data, and the use of software packages or on-line tutorials to enhance skills may be useful.

History of changes to Unit

Version	Description of change	Date

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: 2D II (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 help you to develop knowledge, understanding and additional skills in the use of Computer Aided Design application software for the creation of two-dimensional drawings. From the use of Template files to creation of standard part libraries with attached attribute information; to the use/creation of externally referenced drawings, orthographic drawings, pictorial drawings, illustration drawings and sectional drawings to final printing of layout sheets, this Unit will provide a sound basis for future CAD Units and for use within a chosen award group, such as Built Environment, Architectural, Mechanical or Civil Engineering Group Awards.

Through a series of practical exercises and drawing tutorials, you will logically progress through more advanced CAD commands in producing 2D fully working drawings to a given specification.

Formal assessments for this Unit are based on your competence in producing drawings to a given specification via practical assignments using CAD system commands effectively and efficiently.

The assessment for this Unit may be in the form of one formal practical assessment with times as follows:

♦   Outcome 1 to 3: Practical, (8 hours)
OR
♦   Separate assessments of three hours per Outcome

The assessments will be supervised and conducted under open-book conditions in which you will be allowed to take notes, textbooks, etc into the assessment. The assessment may be given over the course of the Unit or as an end assessment.

This is a practical Unit requiring you to have individual access to a CAD system. A CAD system is defined as hardware and software, which will enable an operator to generate (and regenerate) drawings at an acceptable processor speed. A typical minimum hardware configuration would be a current single user PC fitted with suitable peripherals attached, such as a printer/plotter to produce hard copies of your work. Alternatively other configurations such as networked CAD stations are acceptable provided they can satisfy the Unit's criteria.