National Unit specification

General information

Unit title: Computing: Computer Hardware and Systems (SCQF level 6)

Unit code: F3SY 12

Superclass: CA

Publication date: February 2014

Source: Scottish Qualifications Authority

Version: 03

Unit purpose

This Unit is suitable for learners with practical skills and/or knowledge of computer hardware and systems and who wish to enhance their knowledge. The Unit is also suitable for learners who want an introduction to computer networks.

This Unit will extend the learner's knowledge of the main functional elements and structure in a computer system. The learner will develop skills relating to installing and configuring operating systems for use on a network, and acquire the skills of installing and configuring components and software required by a networked computer system.

The learner will be aware of, and use the necessary safety procedures when installing and upgrading computer hardware on an organisational network. The learner will develop an understanding of the importance of testing and resolving problems. Learners will evaluate identified issues and problems and identify techniques to help resolve these more efficiently in the future.

Outcomes

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

1 Identify computer hardware components and operating system functional elements.
2 Install and configure an operating system to a specific brief.
3 Install and test additional computer system components with due regard to Health and Safety regulations to a specified brief.

National Unit specification: General information (cont)

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Credit points and level

1 National Unit credit at SCQF level 6: (6 SCQF credit points at SCQF level 6)

Recommended entry to the Unit

While entry is at the discretion of the centre, learners would normally be expected to have attained one of the following, or equivalent:

F1KR 11 *Computing: Computer Hardware and Systems*
F1KH 11 *Computing: Computer Networking Fundamentals*
DF2X 11 *Computer Systems*

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 is a mandatory Unit in the National Certificate in Computing with Digital Media at SCQF level 6.

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**.

National 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

Identify computer hardware components and operating system functional elements.

Performance Criteria

(a) Identify different hardware components and their function.
(b) Identify different functional elements in an operating system.
(c) Identify different components that support connection of a computer system to a network.

Outcome 2

Install and configure an operating system to a specific brief.

Performance Criteria

(a) Install and configure an operating system to meet organisational requirements.
(b) Install and test a device driver for specified hardware components.
(c) Install and configure application software to meet organisational requirements.
(d) Diagnose faults using identified procedures.

Outcome 3

Install and test additional computer system components with due regard to Health and Safety regulations to a specified brief.

(a) Install hardware components with due regard to health and safety regulations to enable connection of a computer system to the network.
(b) Configure an operating system for connection to a network.
(c) Connect to and use a service available on another computer on the same network.
(d) Diagnose operational problems using identified procedures.

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Evidence Requirements for this Unit

Assessors should use their professional judgement, subject knowledge and experience, and understanding of their learners to determine the most appropriate ways to generate evidence and the conditions and contexts in which they are used.

The evidence for this Unit may be written, oral, performance based, product or a mix of these. Evidence may be stored in a range of media. Evidence may be captured, stored and presented in a range of media (including audio and video) and formats (analogue and digital). Particular consideration should be given to digital formats and the use of multimedia.

Evidence is required to demonstrate that learners have achieved all Outcomes and Performance Criteria. However, sampling may be used in certain circumstances where the sample is sufficiently random and robust to clearly infer competence in the complete domain.

Whenever possible, evidence should be a naturally occurring by-product of teaching and learning. However, it must be produced by the learner without assistance. Authentication must be used where this is uncertain.

Learners are encouraged to use the internet in any research, etc, however, the evidence produced must be the learner's own words. Assessors should assure themselves of the authenticity of learner's evidence.

Outcome 1

Written and/or oral recorded evidence is required which demonstrates that the learner has achieved Outcome 1 to the standard specified in the Outcome and Performance Criteria. The evidence for this Outcome should be obtained under controlled, closed-book and supervised conditions. The assessment will last no more than 45 minutes. Where re-assessment is required, a different instrument of assessment should be used.

Outcomes 2 and 3

Evidence Requirements for Outcome 2 and 3 is generated by on-going activities rather than a single assessment event.. The evidence should demonstrate the steps that the learner has taken to achieve the Outcome, recording any faults or errors identified during the process.

Learners should complete an activity log to show how they have completed all the tasks above with due regard to health and safety regulations. This must be endorsed by the assessor.

National 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

The purpose of this Unit is to allow learners develop their existing skills in configuring the main functional elements of a computer system to allow it to successfully connect to a network. Learners will evaluate identified issues and problems and identify techniques to help resolve these more efficiently in the future.

This is a mandatory Unit in the National Certificate in Computing with Digital Media at SCQF level 6.

Outcome 1: The main aim of the Outcome is for the learner to identify computer hardware components and operating system functional elements.

This will include

Motherboard functions

- Identifying motherboard components for example disk controllers, expansion slots, integrated audio, integrated graphics, RAM slots.
- The functions of the system buses including for example PCI, PCI-X, SATA, USB

Functions of networking components

- including: ethernet cable, MAC address, network hub, network interface controller, network router

Functions of operating system components

- The functions of operating system components including: device drivers, disk and file management, memory management, networking

Outcome 2: The main aim of the Outcome is for the learner to install and configure an operating system for use on a network.

National Unit Support Notes (cont)

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The learner will be expected to work to a given brief and install, configure and test an operating system on a computer system, including troubleshooting to resolve any unexpected problems. This will include an understanding of the importance of user accounts, folder options, start menu, browser security settings, file sharing, and device drivers. They will also install and test a driver for a storage device and a driver for a non-storage peripheral. This must be carried out with due regard to health and safety procedures and must also ensure that all software is appropriately licensed.

Outcome 3: The aim of the Outcome is for the learner install and test additional computer system components to connect to a network.

Learners will be expected to work to a given brief and install a network interface card (NIC) into an existing computer system. They will configure the operating system to allow connection to an existing network. The connection will allow the management of shared services including file and printer management. This must be carried out with due regard to health and safety procedures and must also ensure that all software is appropriately licensed.

Outcome	Level 4 Content	Level 5 Content	Level 6 Content
Knowledge and understanding of: ♦ **System hardware components** ♦ **Peripheral devices** ♦ **Software**	**Main System Components** CPU RAM (Random Access Memory) ROM (Read Only Memory **Peripherals** **Input** devices: keyboard, mouse, microphone **Output** devices: monitor, printer, speakers **Backing storage:** USB Flash Drive, Portable HD, SSD (Solid State Drive). **Current operating systems**	**Main Physical Components** CPU, main memory, backing storage and input/output elements Information flow between components Structure + main function of the CPU Current memory types Current options for backing up data **Operating Systems** Main functional elements in an operating system including the role of different user interfaces (CLI, GUI) Comparison of operating systems (Windows, Mac, and Linux) Data transfer techniques **Applications** Comparison of application and systems software. Application software types and functions Utility software, including: disk clean-up, anti-virus/malware, disk formatting and back-up techniques	**Motherboard components** Disk Controllers Expansion Slots Integrated Audio Integrated Graphics RAM slots. **Functions of system buses** PCI PCI-X SATA USB **Functions of networking components** Ethernet Cable MAC Address Network Hub Network Interface Controller Network Router, **Functions of operating system components** Device Drivers Disk and File Management Memory Management Networking
Health and safety	**Safety Procedures** Electric shock Sharp Edges Connections Handling Cleaning Ant-Static Strap (Relate to Health & Safety regulations?)	Health and safety when installing computer hardware components Dangers associated with handling/lifting computer hardware components Safe cabling practices Fire hazards and precautions Electrical hazards and prevention methods such as electrostatic discharge (ESD)	Practical task must be carried out with due regard to health and safety procedures
Legal compliance		Ensuring that all software used is correctly licenced	Ensuring that all software is appropriately licensed
Install hardware	Install **one** (internal) hardware component, from: ♦ Expansion card ♦ Memory ♦ Drive	Install a minimum of **two** main physical components in a computer system from: ♦ motherboard ♦ memory module ♦ additional storage ♦ component cards Install **one** peripheral device	**Install a Network Interface Card** ♦ configure the operating system to allow connection to an existing network. ♦ configure to allow the management of shared services including file and printer management.
Install software	Install **one software package**, from: ♦ OS ♦ System utility ♦ Application	Install **one each** of package types: ♦ OS ♦ Utility ♦ Application	**Install, configure and test an operating system**, User Accounts Folder Options Start Menu Browser Security Settings File Sharing Device Driver **Install and test a driver** ♦ for a storage device

			♦ a non-storage peripheral
Troubleshooting		Diagnose up to **two** faults	Diagnose operational problems.

National Unit Support Notes (cont)

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Guidance on approaches to delivery of this Unit

The actual distribution of time between Outcomes is at the discretion of the centre. However, one possible approach is to distribute the available time as follows:

Outcome 1: 10 hours
Outcome 2: 20 hours
Outcome 3: 10 hours

This Unit may be delivered stand-alone or in conjunction with other units. Where it is delivered alongside other related units, it is recommended that they are taught in conjunction to allow the learners to reinforce and deepen their knowledge.

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 evidence for Outcome 1 should be obtained under controlled, closed-book and supervised conditions. The assessment should last no more than 45 minutes. Short answer questions would be a suitable method to assess understanding.
Where re-assessment is required, a different instrument of assessment should be used.

A detailed activity log documenting, identifying, and resolving problems and issues that arise while completing the tasks using digital formats would be an ideal way of assessing learners' knowledge and understanding of Outcomes 2 and 3.

The activity log should be completed by the learner to show that they have undertaken all the tasks with due regard to health and safety procedures and have ensured that all software is appropriately licensed. Learners should evaluate identified issues and problems and identify techniques to resolve these more efficiently in the future.

An assessor observation checklist could be used to record that all the tasks have been undertaken correctly by the learner. An assessor should endorse each checklist with the learner's name, their name, signature and date.

Where evidence of the learner identifying safety procedure is generated without supervision some means of authentication must be carried out (such as oral questioning, source review).

National Unit Support Notes (cont)

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There are opportunities to develop a broader understanding of sustainable development. Within the Computing with Digital Media framework there are several Units that could be integrated and taught holistically over a longer period of time. These include:

H2N5 12 Security Fundamentals
H2N6 12 Network Fundamentals
H2N7 12 Server Administration Fundamentals

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

In this Unit learners will have the opportunity to gather evidence towards Core Skills. As learners are required to write up their practical tasks this may provide an opportunity for developing aspects of the Core Skill in Communications. Due to the nature of the Unit learners may be able to develop aspects of Problem Solving Core Skill.

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

History of changes to Unit

Version	Description of change	Date
02	Page 5.Change to evidence requirements to clarify requirements for Outcome 1. Page 9 .The wording in assessment for Outcome 1 changed from "range of extended response questions" to "using multiple choice"	28/04/2010
03	Updated to reflect changes in technology; streamline Outcome statements and Evidence Requirements in line with current guidelines. Additional content grid inserted.	24/02/2014

General information for learners

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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 is taught as a practical hands on Unit that allows you to understand what is involved in successfully upgrading and configuring a computer system, allowing safe and secure access across an organisational network. You will develop an understanding of the technical terms used in computing that will allow you to converse with suppliers and employers. You will evaluate identified issues and problems and identify techniques to help resolve these more efficiently in the future.

You will be encouraged to research relevant educational websites, and the use of computing magazines, technical reference manuals and internet research is also recommended. This will allow you to keep up to date with all advances in computing.

The majority of the assessment for this Unit will be undertaken through practical tasks over an extended period of time with access to notes and online resources.

You may also be assessed through some closed book, short answer questions to ensure that you have understood the underlying principles involved in building a networked computer. This will include taking Health and Safety precautions and being aware of legal requirements.