National Unit specification

General information

Unit title: Computing: Computer Hardware and Systems (SCQF level 5)

Unit code: F1KR 11

Superclass:	CA
Publication date:	January 2014
Source:	Scottish Qualifications Authority
Version:	02

Unit purpose

This Unit is designed for learners who have an interest in developing the skills required to upgrade an existing computer system. The Unit will introduce learners to the main hardware and software components of a computer system. Learners will install a variety of hardware components, and software packages onto a computer system. This will help develop an understanding of operating systems, upgrades and the appropriate use of application and utility software. Learners will become aware of, and use, the necessary safety procedures when installing and upgrading computer hardware.

Outcomes

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

1 Identify the components and functional elements of a computer system.
2 Use appropriate procedures for working safely on a computer system.
3 Upgrade an existing computer system.

Credit points and level

1 National Unit credit at SCQF level 5: (6 SCQF credit points at SCQF level 5)

National Unit specification: General information (cont)

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Recommended entry to the Unit

Entry is at the discretion of the centre. However, it would be advantageous if learners possessed basic IT skills. This may be evidenced by the possession of:

F3GC 10   Information and Communication Technology

Or

F1K2 10   Computing: Computer Hardware and 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 5.

National Unit specification: General information (cont)

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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 the components and functional elements of a computer system.

Performance Criteria

(a) Identify the main functional elements of a computer system.
(b) Identify the characteristics of the hardware components.
(c) Identify the basic functions of an operating system
(d) Identify the basic functions of a range of application software.

Outcome 2

Use appropriate procedures for working safely on a computer system.

(a) Assess a work area safety.
(b) Use appropriate tools and techniques to undertake tasks.
(c) Conform to safety procedures and legal constraints.

Outcome 3

Upgrade an existing computer system.

Performance Criteria

(a) Identify correct safety procedures for installing hardware.
(b) Install hardware components in a computer system.
(c) Install an operating system, utility and application software.
(d) Diagnose and resolve faults.

National Unit specification: Statement of standards (cont)

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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.

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

Outcomes 1 and 2

Written and/or oral recorded evidence is required which demonstrates that the candidate has achieved to the standard specified in the Outcomes and Performance Criteria. The evidence should be obtained under controlled closed-book and supervised conditions.

Outcome 3

Evidence Requirements for Outcome 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 rectified during the process.

Each learner should complete a risk assessment.

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 overall aim of this Unit is to enable learners to understand the operation and functionality of a standard computer system. The Unit will provide learners with information about hardware and software components along with appropriate methods and tools required to analyse and understand the functions of a computer system. The candidate will also gain a basic knowledge of common data transfer/representation techniques and key computing terminology.

A variety of different computer components and peripherals will be covered in this Unit. The candidate will be required to exhibit knowledge in the following areas:

Main physical components

♦ CPU, main memory, backing storage and input/output elements
♦ Information flow between each component
♦ The structure and 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)
♦ Discussion of different operating systems types (Windows, Mac, and Linux) and the relative advantages/disadvantages between each type
♦ Data transfer techniques

System and application software

♦ Differences between application software and systems software. The candidate will describe different application software types and functions
♦ Application software types and functions
♦ Different utility software such as disk clean-up, anti-virus/malware, disk formatting and back-up techniques should be discussed.

National Unit Support Notes (cont)

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Outcome 1: The main aim of the Outcome is for the learner to identify how the functional components of a computer system operate both in isolation and as part of a system.

This may include being able to identify the following:

♦ Two functional elements of a computer system
♦ One feature of three different computer hardware components
♦ One feature of three different computer input and output devices
♦ Two physical connections between components and the motherboard
♦ Three basic functions of an operating system
♦ One basic function of two different applications software
♦ One purpose of two different software drivers
♦ Two data transfer methods/techniques

Outcome 2: The aim of the Outcome is to provide the learner the relevant knowledge regarding legal constraints, and safety procedures, when building and configuring a computer system. This relates to the practical installation of hardware components. Learners will acquire knowledge in the following areas before they carry out the practical tasks:

This will include:

♦ Health and safety procedures that must be adhered to 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)
♦ Ensuring that all software used is correctly licenced

Outcome 3: The learner will demonstrate their ability to achieve this Outcome by successfully upgrading an existing computer and installing a variety of application and utility software.

Outcome 3 could be assessed by each learner completing a logbook or by using an assessor checklist. This allows learners to be assessed at their own pace.

An activity log should show that the learner has completed all the tasks above with due regard to health and safety. An assessor should endorse each learner activity log together with the learner's name, their name, signature and date

National Unit Support Notes (cont)

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This may include evidence that the learner has achieved the following:

♦ Install a minimum of two main physical components in a computer system e.g.
  motherboard, memory module, additional storage, component cards.
♦ Install an operating system
♦ Install one peripheral device and install the appropriate drivers
♦ Install one software application package and one utility software application
♦ Diagnose up to two faults

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 upto **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:   15 hours
Outcome 2:   10 hours
Outcome 3:   15 hours

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.

An activity log documenting achievement of tasks using digital formats would be an ideal way of assessing learner knowledge and understanding. Within this log underpinning knowledge could be assessed by short answer closed book questions at regular intervals throughout the tasks. If this is not possible then the knowledge could be assessed by a short answer paper. Where re-assessment is required, a different instrument of assessment should be used.

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.

An assessor observation checklist would be a helpful way to record that all the tasks have been undertaken correctly by the learner. An assessor must endorse each checklist with the learner's name, their name, signature and date.

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

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

F3GD 10/11   *Problem Solving*
F1KD 11   *Computing: Troubleshoot and Secure IT Systems*
F1KP 11   *Computing: Install and Maintain Computer Software*
F1KF 11   *Computing: Install and Maintain Computer Hardware*

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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 the essential skill, *Problem Solving*.

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	Updated to reflect changes in technology; streamline Outcome statements and Evidence Requirements in line with current guidelines. Additional content grid inserted.	08/01/2014

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 an existing computer system and installing a variety of software that allows safe and secure use when accessing the Internet. You will develop an understanding of the technical terms used in computing that will allow you to converse with suppliers and employers.

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 questions to ensure that you have understood the underlying principles involved in the components involved in building a computer. This will include being aware of Health and Safety precautions and legal requirements.