UNIT   Computing: Install and Maintain Computer Hardware (SCQF level 5)

CODE   F1KF 11

SUMMARY

The Unit is designed to enable candidates to work effectively and safely with a range of computer hardware. The Unit will provide candidates with the practical skills involved in setting up, maintaining and upgrading computer systems as well some basic knowledge of the structure of a computer system. The content of the Unit includes system components and connections, simple fault finding and housekeeping procedures, the use of expansion slots and safe working practices along with environmental issues arising from the use and disposal of computer equipment.

This Unit is suitable for a wide range of candidates and it is particularly appropriate for those who are interested in a career in technical support or a similar area.

OUTCOMES

1   Identify the basic function of hardware components and their safe operation.
2   Set up an operational computer system with a range of computer hardware.
3   Maintain and upgrade an existing computer system.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, it would be beneficial if candidates possessed basic IT skills. This may be evidenced by possession of:

D01D 10   *Information Technology (Intermediate 1)*

or equivalent qualifications or experience.

National Unit Specification: general information (cont)

UNIT   Computing: Install and Maintain Computer Hardware (SCQF level 5)

CREDIT VALUE

1 credit at Intermediate 2 (6 SCQF credit points at SCQF level 5*)

SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.

CORE SKILLS

While there is no automatic certification of Core Skills in this Unit there may be opportunities for developing aspects of Core Skills.

National Unit Specification: statement of standards

UNIT Computing: Install and Maintain Computer Hardware (SCQF level 5)

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 the Scottish Qualifications Authority.

OUTCOME 1

Identify the basic function of hardware components and their safe operation.

Performance Criteria

(a)   Identify the basic hardware components of a computer system.
(b)   Identify the function of the basic hardware components of a computer system.
(c)   Identify health, safety and environmental issues arising from the use of computer equipment.

OUTCOME 2

Set up an operational computer system with a range of computer hardware.

Performance Criteria

(a)   Set up and test a basic stand-alone computer system safely.
(b)   Attach and test peripheral devices to the system safely.
(c)   Diagnose faults with the computer system and hardware correctly.
(d)   Undertake remedial action to resolve the faults diagnosed.

OUTCOME 3

Maintain and upgrade an existing computer system.

Performance Criteria

(a)   Perform basic maintenance and house-keeping procedures correctly and safely.
(b)   Install motherboard components to an existing computer system.
(c)   Install a secondary storage device.

National Unit Specification: statement of standards (cont)

UNIT Computing: Install and Maintain Computer Hardware (SCQF level 5)

EVIDENCE REQUIREMENTS FOR THIS UNIT

Evidence is required that candidates have achieved all Outcomes and Performance Criteria.

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.

For Outcome 1 written and/or oral recorded evidence is required which demonstrates that the candidate has achieved the standard specified in the Outcome and Performance Criteria. The assessment will be supervised, controlled and under closed-book conditions and should last no more than 45 minutes. The instrument of assessment will provide opportunities for the Outcome to be fulfilled by means of sampling across the range of the content of Outcome 1. Where re-assessment is required it should contain a different sample from the range of mandatory content. Achievement can be decided by use of a cut-off score. Each sample must include the following:

- **Five** hardware components from: CPU, main and secondary memory, I/O devices, storage devices, bus system, ports and cabling
- **One** function for **each** of the hardware components identified
- **One** issue relating to health, **two** issues relating to safety and **one** environmental issue

Performance evidence supplemented by an activity log of the candidate's activity and an assessor observation checklist is required for Outcomes 2 and 3 which demonstrates that the candidate has achieved the standard specified in the Outcomes and Performance Criteria. The assessment will be carried out under supervised and controlled conditions. Candidates will have access to notes and reference work as well as on-line help for this assessment. The candidate's activity log will be completed over an extended period of time. The log will provide evidence that the candidate has used safe working practices and tested the system after each activity has been completed.

- The candidate activity log will show that the candidate has completed all of the tasks, with due regard to health and safety. An assessor must endorse each candidate log together with the candidate with each of their names, signature and the relevant date(s).
- The assessor observation checklist will be used to record all the tasks have been undertaken correctly, by the candidate. An assessor must endorse each checklist with the candidate's name, signature and date.
- The Assessment Support Pack (ASP) for this Unit provides sample assessment material including an instrument of assessment for the knowledge, and a sample log and an assessor checklist. Centres wishing to develop their own assessments should refer to Assessment Support Pack to ensure a comparable standard.

National Unit Specification: support notes

UNIT   Computing: Install and Maintain Computer Hardware (SCQF level 5)

This part of the Unit Specification is offered as guidance. The support notes 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 candidates to work safely with computer systems and hardware components. The Unit will provide candidates with information about computer systems and peripherals as well as information on health, safety and environmental issues when using or working with computer hardware.

The context for this Unit is the changing range of computer equipment and the expanding role of computers in everyday situations. The Unit aims to provide candidates with the confidence that they can maintain and upgrade stand-alone computer systems, which will be a useful vocational skill. The precise content of this Unit will change over time, as computing technology develops and new devices are introduced.

Outcome 1

The aim of this Outcome is to familiarise the candidate with the function of the basic hardware components of a computer system and health and safety and environmental issues arising from their use.

The CPU should be introduced as a device for executing programs and main memory presented as the means by which programs are stored and made available to the CPU. The distinction between volatile and non-volatile memory technologies should be introduced. Furthermore candidates should be encouraged to gather technical information relating to these components from a range of sources including the internet and technical manuals.

The need for semi-permanent data storage as well as input and output facilities should be explained. Candidates should also be made aware of the following: distinction between storage devices and storage media, different media formats, current capacities of storage media. Furthermore, a variety of input and output devices should be discussed and actual examples made available for candidates to inspect and use.

The functional role of a bus system in a computer should be carefully explained. This can be presented by means of a block diagram illustrating the role of the address, data and control buses. Candidates should also be made aware of how a bus system is implemented on a motherboard and some current bus technologies should be named and introduced. Candidates should also be shown the physical connections (ie power and data cables, ports, motherboard bus system) necessary to assemble a working computer system.

Candidates should be informed about the physical components of a system unit (PSU, CPU, RAM cards, expansion cards, motherboards, drive bays and drive units, ROM chips, etc). Advice should be provided to candidates with respect to the issue of form factors and compatibility of components.

National Unit Specification: support notes (cont)

UNIT   Computing: Install and Maintain Computer Hardware (SCQF level 5)

Candidates should also be introduced to health, safety and environmental issues associated with the use of computer equipment. Candidates should be aware of the potential electrical hazards associated with working on the internal components of a computer and the means of eliminating or minimising these hazards. Candidates should also be aware of the appropriate procedures for handling delicate electronic components such as printed circuit boards and in particular the need to observe anti-static procedures.

Candidates should be aware of how to minimise power usage and the location of sources of information on environmental issues relating to computer hardware components.

Outcome 2

The aim of this Outcome is to make the candidate aware of how to set up and test computer systems.

Candidates should be shown how to set up and test a basic stand-alone computer system (ie system unit, monitor, keyboard and mouse). Candidates should be shown how to install and test at least two additional peripheral devices such as external drives, digital cameras and projectors, scanners and digital notepads. The various types of ports should be identified (eg PS/2, USB, IEEE 1394a, audio, 10/100 Ethernet) and candidates should be aware of their names and purpose.

Candidates should be aware of the role of device drivers and where appropriate undertake the installation of a driver. Emphasis should be placed on the need for an installed hardware component to be thoroughly tested after installation.

Candidates should gain experience in the correct diagnosis of faults. Candidates should be aware of the need for a systematic approach to fault finding and the importance of documenting faults. Equipment with known faults (cables, ports, devices, etc) should be covered to give candidates exposure to their diagnosis and resolution.

Candidates should be aware of the health and safety issues arising from setting up and testing computer systems. This should include: safe cabling practices, handling of electronic components, electrical safety, etc. Assessors should ensure that candidates follow safe working practices whilst carrying out the activities.

Outcome 3

This Outcome relates to the maintenance and upgrading of a computer system.
Candidates should be introduced to the following basic maintenance and house-keeping procedures:

♦ Cleaning routines
♦ External cable and plug checks
♦ Internal visual inspection of system unit components to check cable connections and that cards are seated properly in slots
♦ Replacement of internal batteries
♦ Use of diagnostic software relating to system performance
♦ Secondary storage house-keeping.

National Unit Specification: support notes (cont)

UNIT Computing: Install and Maintain Computer Hardware (SCQF level 5)

Candidates should be introduced to the safe and correct use of motherboard components such as expansion cards, memory modules and CPU to upgrade a computer system. Candidates should become aware of how to install and test components. The issue of hardware compatibility should be emphasised.

Candidates should be shown the procedure for installing an additional internal secondary storage device such as a hard drive or optical drive. Candidates should be aware of how to diagnose problems arising from this procedure as well as techniques for resolving them.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Outcomes 2 and 3 are skills based and a practical hands-on approach to learning should be adopted to engage learners and exemplify key concepts. However, all practical activities should be underpinned with appropriate knowledge before candidates commence them.

It is recommended that candidates gain experience of a range of computer systems including laptops, desktops and tower systems. It is also recommended that candidates have access to a range of peripherals such as printers, scanners, web cams, digital cameras, fax machines, and external drives. In the practical activities relating to Outcome 2 the introduction of known faults to a computer system should be used to provide opportunities for fault diagnosis and remedial action.

An important aspect of this Unit is that candidates develop an appropriate technical vocabulary relating to computer hardware terminology and underpinning knowledge should be introduced in a practical context.

Throughout this Unit candidate activities, where possible, should relate to personal and vocational interests. Candidates should be encouraged to think about the ways in which they could economically upgrade their own computing systems or build a first system.

The use of computing magazines and technical reference manuals is recommended.

The actual distribution of time between Outcomes is at the discretion of the centre. However, one possible distribution is:

Outcome 1   5 hours
Outcome 2   20 hours
Outcome 3   15 hours

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

In this Unit candidates are required to identify faults. This is a good opportunity for developing aspects of the Core Skill in Problem Solving. In addition, opportunities may arise for candidates to work together as part of the learning process. These opportunities may allow candidates to develop aspects of the Core Skill of Working with Others.

National Unit Specification: support notes (cont)

UNIT Computing: Install and Maintain Computer Hardware (SCQF level 5)

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

It may be appropriate for some of the evidence for this Unit to be produced using e-assessment provided the national standard is applied and the conditions of assessment are consistent for all candidates. This may take the form of e-testing (for knowledge and understanding) and/or e-portfolios (for practical abilities).

A suitable assessment for Outcome 1 would be an objective test which provides an opportunity for the Outcome to be fulfilled by means of sampling across the range of the content of Outcome 1.

If a centre is presenting Outcome 1 of these assessments on-line the following assessment methods, where appropriate, may be selected:

Multiple choice
Drag and drop
Multiple response
Mix and match
Or a combination of the above

A practical approach has been taken with respect to Outcomes 2 and 3 and it is envisaged that the Performance Criteria relating to these Outcomes will be covered by a series of tasks. This assessment may be tackled in stages, for example a basic computer system is set up and tested, and then later an additional internal drive is added to the system. Re-assessment of practical tasks should involve the repetition of the task rather than the whole assessment.

The activity log will provide evidence that the candidate completed all the tasks. The activity log and observation checklist must be authenticated by the assessor, who must confirm that the log is an accurate record of candidate activity.

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

The Assessment Support Pack (ASP) for this Unit provides sample assessment material including an instrument of assessment for the knowledge, and a sample candidate log and an assessor checklist. Centres wishing to develop their own assessments should refer to Assessment Support Pack to ensure a comparable standard.

CANDIDATES WITH DISABILITIES AND/OR ADDITIONAL SUPPORT NEEDS

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (**www.sqa.org.uk**).

National Unit Specification: support notes (cont)

UNIT   Computing: Install and Maintain Computer Hardware (SCQF level 5)

History of changes:

Version	Description of change	Date
02	Page 6.Evidence requirements amended to clarify number of peripheral devices requirements in Outcome 2.	28/04/2010