Higher National Unit Specification

General information for centres

Unit title: PC: First Line Support

Unit code: DV6L 34

Unit purpose: On completion of the Unit the candidate should be able to act as the first line of support for computer users facing basic hardware and software problems. The candidate will gain knowledge and skills in the operating principles of hardware and safe working procedures when working with computer equipment. The candidate should be capable of taking delivery of a disassembled computer system and perform the required steps to assemble the hardware and install the system software. The candidate will be introduced to the basic steps involved in troubleshooting problems, and what actions should be taken when the problems are outwith their area of responsibility.

On completion of the Unit the candidate should be able to:

1   Describe the operating principles of computers.
2   Identify risks and use safe working practices.
3   Commission computer hardware, installing system and application software.
4   Analyse, plan and evaluate basic troubleshooting problems.

Credit points and level: 1 HN Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*).

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.

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre, however, it is recommended that candidates should have some experience in using a computer system.

Core Skills: The achievement of this Unit gives automatic certification of Problem Solving at SCQF level 5.

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.

Assessment: Outcome 1 is assessed by means of a multiple-choice test consisting of twenty questions. This should be carried out in closed-book conditions.

Outcome 2 is a series of extended-response questions to test candidates' understanding of safety and ESD issues, this task should be present prior to any practical work being undertaken.

General information for centres (cont)

Outcome 3 is assessed by performing a series of practical exercises.

Outcome 4 requires the candidate to conduct and fully document a troubleshooting exercise.

For Outcomes 1, 2 and 4 the questions **must** change on each assessment occasion.

Using a laptop, or other highly integrated devices for this Outcome is not acceptable.

There is an opportunity for a candidate to be assessed on-line subject to meeting the prescribed assessment conditions.

Assessors must assure themselves of the authenticity of each candidate's submission. A candidate is encouraged to use the Internet in any research, etc, however, the evidence produced must be the candidate's own written words.

Some of the assessment may be produced using e-assessment. This may take the form of e-testing (for knowledge and understanding and/or e-portfolios (for practical abilities)). There is no requirement to seek prior approval if you wish to use e-assessment for either of these purposes so long as the normal standards for validity and reliability are observed. Please see the following SQA publications for further information on e-assessment: (1) "SQA Guidelines on Online Assessment for Further Education" (March 2003) and (2) "Assessment and Quality Assurance in Open and Distance Learning" (February 2001).

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

♦ multiple-choice
♦ drag and drop
♦ multiple response
♦ mix and match
♦ a combination of the above

It is expected that the questions will be of the multi-choice variety. Centres may consider the use of alternative question types, particularly if using Computer Assisted Assessment approaches. However, care should be taken that the questions are valid and at an appropriate level. The use of simple true/false question responses is unlikely to achieve this.

Higher National Unit specification: statement of standards

Unit title: PC: First Line Support

Unit code: DV6L 34

The sections of the Unit stating the Outcomes, knowledge and/or skills, and Evidence Requirements are mandatory.

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. Candidates 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

Describe the operating principles of computers

Knowledge and/or skills

♦   Describe processors — principles, operation and speed
♦   Describe memory — types and speed
♦   Describe fixed storage — operation, capacity and speed
♦   Describe types of removable storage — operation, capacity and speed
♦   Describe types of printers
♦   Describe types of scanners, monitors
♦   Describe interfacing cables between system components

Evidence Requirements

The Knowledge and Skills component of Outcome1 will be assessed by means of a multiple choice test containing 20 questions on a representative sample. These questions must be drawn from all of the topics listed above. All questions must carry equal weighting.

The questions must change on each assessment occasion.

If a centre is presenting the assessment on-line the following assessment methods, where appropriate, may be selected:

♦   multiple choice
♦   drag and drop
♦   multiple response
♦   mix and match
♦   a combination of the above

It is expected that the questions will be of the multi-choice variety. Centres may consider the use of alternative question types, particularly if using computer assisted assessment approaches. However, care should be taken that the questions are valid and at an appropriate level. The use of simple true/false question responses is unlikely to achieve this.

Higher National Unit specification: statement of standards (cont)

Unit title: PC: First Line Support

Assessment guidelines

Assessment must be undertaken in supervised conditions and is closed-book. A candidate should complete this assessment within one hour. Candidates may not bring to the assessment event any notes, textbooks, handouts or other material (calculators are not allowed).

Candidates must answer at least 60% of the questions correctly.

Outcome 2

Identify risks and use safe working practices

Knowledge and/or skills

♦ Fire hazards and precautions
♦ Electrical hazards and the effects of electric shocks
♦ Function of fuses and Residual Current Devices
♦ PAT Regulations
♦ Effects of ESD
♦ Anti-static precautions and safety hazards
♦ LSZH sheathing cable protection

Evidence Requirements

Health and Safety risks and requirements relating to electrical and cabling work must be described and good working practices explained and demonstrated by the assessor. This must include risks to self and others from electric shock, Portable Appliance Testing regulations, Electro Static Damage and bond resistance testing. Issues surrounding cabling fire risks and the use of LSZH sheathing must be explained. Candidates must be encouraged to work safely at all times, to identify workplace risks and respond appropriately by changing working practices and minimising and reporting hazards.

The candidate must demonstrate awareness of risks to Health and Safety and of ESD damage to equipment, and the ability to minimise risk to self, others and equipment at all times. Awareness will be evidenced by the candidate answering **all** extended response questions. Each candidate should certify that safe working practices have been explained and demonstrated to him/her. As a simple safety precaution, this practice is also recommended as a prerequisite for any candidate attempting practical work.

Evidence of all Knowledge and Skills in this Outcome should be assessed with 15 extended response questions. There should be two questions covering each bullet point with the exception of bullet point 2 (which will be three).

Assessment must be undertaken in supervised conditions and is closed-book. A candidate should complete this assessment within two hours. Candidates may not bring to the assessment event any notes, textbook, handouts or other material.

Candidates must answer at least 60% of the questions correctly.

Higher National Unit specification: statement of standards (cont)

Unit title: PC: First Line Support

Assessment guidelines

This Outcome and Evidence Requirements are identical to those for Outcome 4, *DH2Y34 Computer Hardware: Installation and Maintenance*, and Outcome 2, bullet point 3 *DH3134 Computer Networks: Building Local Area Networks* and Outcome 2, *DH2W35 Computer Hardware: Building a Network PC*.

Outcome 3

Commission computer hardware, installing system and application software

Knowledge and/or skills

♦   Recording receipt of equipment.
♦   Connecting equipment.
♦   Testing equipment.
♦   Installation of system and application software

Evidence Requirements

Candidates will need evidence to demonstrate their skills and/or knowledge by showing that they can perform each of the following exercises described below:

Assessment Task 1

Perform a practical exercise that reasonably simulates the activity of receiving and commissioning computer hardware. The system commissioned must comprise of the first four components plus three others from the list below:

♦   System Unit
♦   Monitor
♦   Keyboard
♦   Mouse or other pointing device
♦   Sound card
♦   Printer
♦   Scanner
♦   External mass storage/backup device
♦   Network card
♦   Modem/Broadband Adapter

For each device the following information must be recorded:

♦   Manufacturer
♦   Model number
♦   Asset number (if appropriate)
♦   Comments (marks on casing etc.)
♦   General specifications

Higher National Unit specification: statement of standards (cont)

Unit title: PC: First Line Support

Assessment Task 2

Perform an installation of an operating system. This must be documented by providing the following information

♦ Name and version of operating system
♦ Media used for installation
♦ Licence number (if applicable – type of licence such as GPL must be noted)

Logs must be based on a pro-forma given to candidates, and as a minimum be properly titled with the candidate's name and date, and signed by the assessor confirming that each task is the candidate's own work. The assessor must endorse each practical activity log to confirm whether the candidate uses safe working practices.

Assessment Task 3

Perform an installation of commercial software that is used in a business context. This must be documented by providing the following information

♦ Name and version of the application
♦ Media used for installation
♦ Licence number must be noted

Logs must be based on a pro-forma given to candidates, and as a minimum be properly titled with the candidate's name and date, and signed by the assessor confirming that each task is the candidate's own work. The assessor must endorse each practical activity log to confirm whether the candidate uses safe working practices.

Assessment guidelines

Difficulties encountered in performing these exercises may be used for the troubleshooting exercise for Outcome 3.

Outcome 4

Analyse, plan and evaluate basic troubleshooting problems

Knowledge and/or skills

♦ Principles of troubleshooting
♦ The troubleshooting life cycle
♦ Identification of symptoms
♦ Information gathering
♦ Developing a solution
♦ Testing effectiveness of solution
♦ Reporting problem and solutions attempted

Higher National Unit specification: statement of standards (cont)

Unit title: PC: First Line Support

Evidence Requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can perform simple troubleshooting.

The candidate must provide the following evidence of troubleshooting a problem selected by the assessor. This may either be a problem encountered in the previous Outcome or a known fault in a prepared system.

1   A clear account of the problem as reported (this may be a fault report form).
2   The results of the preliminary examination of the system (including physical symptoms, such as noise, smell or heat).
3   A list of at least five questions used to gather more information about the problem.
4   A plan detailing the approach that will be taken to attempt to solve the problem. This may be produced in a diagrammatic form, such as a flowchart. The plan must cover at least four possible eventualities, and be produced before any attempt is made to remedy the problem.
5   The result of applying the plan — this must be in the form of a walkthrough of the plan, noting the path(s) taken through the plan.
6   If the problem is solved, then the problem and its solution must be documented for future reference. If the problem has not been resolved, then the problem and the attempted solutions must be documented in preparation for escalation to the next level of technical support.
7   A reflection on the plan and how it was conducted. This could include information on how the information was collected (were the correct questions asked?) how the plan was formulated (was the initial 'hunch' or hypothesis well founded?) were the questions in the plan in the right sequence — could a cheaper sequence have been employed? Given the experience of performing the plan what could have been done to improve it?

Assessment guidelines

A number of different faults may be encountered through the course of the Unit, or may be created for the purpose of the assessment. It is essential that problems be realistic rather than contrived.

Administrative Information

Unit code: DV6L 34

Unit title: PC: First Line Support

Superclass category: CA

Original date of publication: April 2006

Version: 02 (September 2013)

History of Changes:

Version	Description of change	Date
02	Implementation of a 60% threshold in Evidence Requirements for Outcome 2.	11/09/13

Source: SQA

Higher National Unit specification: support notes

Unit title: PC: First Line Support

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

This Unit is designed to give an introduction to the practical aspects of dealing with supporting desktop computing systems in a home or office setting. It was developed to be part of the HNC Information Technology, but may be of use in other frameworks where knowledge of personal computers is developed beyond that of a user.

As the knowledge and skills for this Unit are applicable for a wide range of employments a broad treatment is possible, but the context should be compatible with the rest of the Units in the framework.

It is essential that candidates are made aware from the outset of the health and safety risks to themselves and others which can arise in working with electrical equipment. The risks to equipment from ESD should be explained, and safe-working practices explained and demonstrated which balance these two problems. This is particularly important as candidates could be working in an anti-static environment and using anti-static equipment, which significantly increases health and safety risks if improperly used. It is recommended that candidates should not be permitted to work on live or exposed equipment until they have acknowledged in writing that they have received adequate safety training and have satisfied the requirements of the assessment covering this topic. **The importance to strict adherence to safe working practices should be stressed throughout the programme of study.**

Guidance on the delivery and assessment of this Unit

The three Outcomes are intended to be approximately equal in terms of the time required to complete, but it is anticipated that the practical exercises required for Outcome 2 may take a little longer to perform, so a time budget of 40 hours could be split in the following manner:

Outcome 1   12 hours
Outcome 2   3 hours
Outcome 3   13 hours
Outcome 4   12 hours

Wherever possible, this Unit is non-specific about the details of technologies and devices used by the computer systems being studied. This is done to try and future-proof the Unit, and avoid obsolescence in this rapidly evolving field. It is, however, important that candidates are exposed to a balanced range of current software and hardware components. **Lack of specificity should not be taken as an excuse to use hardware and software that are not the current standard.**

Higher National Unit specification: support notes (cont)

Unit title: PC: First Line Support

Outcome 1

Describe processors — principles, operation and speeds

A brief overview of how a processor works and its role within the system. Concepts such as functional units and fetch execute cycle may be mentioned, but need not be developed to any great depth. The concept of processor speed should be developed and placed in context of the demands placed on the machine. Specifications for a number of systems could be examined as a research exercise.

Describe memory — types and speed

The different types of memory found in current systems could be discussed, in terms of speed, price and role. As a minimum, DRAM, SRAM, Flash and ROM should be included.

Describe fixed storage — operation, capacity and speed

A range of current devices should be investigated. It is suggested that aspects of logical layout such as tracks, sectors and clusters could be included in taught material. At the time of writing hard disks are the predominant form of fixed storage – the different forms of interface — PATA, SATA and SCSI could be included here.

Describe removable storage — operation, capacities and speeds

At the time of writing removable storage includes floppy disks, CD-R/RW/ROM, DVD formats and hot pluggable flash units (USB pen drives etc).

Describe printers — types, operation and roles

A candidate should identify the different types of printer, such as dot matrix (still used for multi-part invoices), laser and ink jet. The difficulties of working with laser toner should also be included with safe waste disposal methods.

Describe scanners, monitors and cables to connect system components

CRT displays. LCD displays. Flat bed, drum scanners. Cold cathode scanners, etc. Such issues as keying and polarisation of connectors should form part of the considerations for this topic.

Higher National Unit specification: support notes (cont)

Unit title: PC: First Line Support

Outcome 2

This Outcome should be introduced early in the delivery of the Unit and before any practical work is carried out. The candidate must certify (by signature) that they fully understand the implications of health and safety within the context of delivery.

Lifting/movement of equipment

Obvious considerations are those for lifting heavy objects (straight back) and ensuing that equipment is safe on a surface before releasing (dropping hazard) Wedging fire doors open to move equipment offers hazards as does carrying stacked equipment (monitor, keyboard, mouse and base unit in one go)

Fire hazards and precautions

Build up of dust in a system, watering a potted plant on top of a computer, drinking at the machine, blocking ventilation ducts/slots stalled fans. Frayed cables.

Fire extinguishers – type and applicability (Carbon Dioxide, Water, foam, etc)

Hazards of fire extinguishers – water on electrical fires, cold, asphyxiation, static charge for Carbon Dioxide extinguishers, etc.

Hazardous components (high voltage)

Opening monitors and power supplies, operating systems with case open, defeating safety interlocks. The risk of electric shock to the heart, the "keep one hand in the pocket (behind the back) rule".

Hazardous components (physical risk — tripping hazard, sharp edges etc)

Cables — tripping hazard (includes ESD straps) Sharp edges on equipment — tape on sharp edges, avoiding use of excessive force, use of correct tools to avoid slipping, or creating sharp edges. Suitable clothing to avoid snagging, removal of jewellery. Dirty keyboards — risk of eating at machine.

ESD risks and precautions

Damage to components that can be caused by ESD, static build up and temperature/humidity ES voltages that can be reached.

Working areas

Clean and tidy working areas — avoid stacking or balancing equipment — risks in "reaching over" machines (back strain and etc.) Equipment falling/rolling off workspace.

Higher National Unit specification: support notes (cont)

Unit title: PC: First Line Support

Outcome 3

Task 1

An up-to-date computer system should be used to allowing a candidate to undertake this practical 'commissioning computer hardware' task. (Definition of 'up-to-date' would be manufactured within the last few years)

Tasks 2 and 3

The operating systems used in the practical Outcomes of this Unit are not specified and the Evidence Requirements have been written in a general way. In principle, any operating systems can be chosen, however unless there is a specific reason, it would be most appropriate to use mainstream, industry standard systems rather than those with a more niche appeal.

A candidate is expected to install correctly commercially available systems software systems.

A candidate is expected to install correctly commercially available applications software.

Outcome 4

Candidates can be introduced to use of simple flowcharting techniques, with more models being developed over time. It may be worth using prepared flow charts with gaps as a completion exercise. Candidates should be encouraged to develop a logical approach to fault finding. Attention should be paid to both hardware and software faults and possible remedies. The concept of Field Replaceable Units (FRUs) can be introduced at this point. The more sophisticated models could include escalation of the problem to the next level of support.

Opportunities for developing Core Skills

The achievement of this Unit gives automatic certification of Problem Solving at SCQF level 5.

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February Publication code A1030).

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. For information on these, please refer to the SQA document *Guidance on Alternative Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs,* which is available on SQA's website: **www.sqa.org.uk**.

General information for candidates

Unit title: PC: First Line Support

This Unit is designed to give you an understanding of what to do when a new computer system is delivered or when something goes wrong with the computer.

The first Outcome gives grounding in the major components in a computer system, and how they are physically connected and work together. These components include:

♦   processors
♦   memory
♦   fixed storage
♦   removable storage
♦   printers
♦   scanners
♦   monitors
♦   cables

The second Outcome introduces you to a number of health and safety issues when dealing with computer equipment. This is also concerned with preventing damage to the computer as you work with it. This topic should be introduced first become you are allowed to carry out the practical tasks of this Unit.

The activities in Outcomes 1 and 2 are assessed by a series of questions.

The third Outcome has three separate tasks which introduces the processes of commissioning a computer system which involves taking the components, assembling and testing a new computer system which has just arrived at the organisation.

You will then have to experience the installation of system and application software.

This is assessed by a series of practical exercises.

The fourth Outcome is intended to allow you to develop fault-finding skills so that when a computer fails you will know what steps to take. This includes technical measures such as replacing components, and less technical measures such as asking for advice.

This is assessed by planning, performing and reporting on the efficacy of a troubleshooting exercise.