National Unit Specification

General information

Unit title: Network Literacy (SCQF level 6)

Unit code: J6B7 46

Superclass: CB

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Unit purpose

This is a non-specialist unit for those who wish to develop their skills and knowledge in computer networks and cloud-based software applications. It is expected that learners will be able to apply these skills in a variety of non-technical environments such as at home or on-the-move. Study of the unit may also facilitate the use of technologies that support remote, hybrid or collaborative working within a contemporary business environment.

The unit aims to educate learners in the productive, secure, and responsible use of network-based technologies. Consideration is given to the potential impact of computer networks on the environment, including the benefits and risks of cloud computing. Overall, it is anticipated that learners undertaking the unit will enhance their digital skills and become active participants in communities and teams that use networks.

In the context of this unit, network literacy relates to a range of 'hard' and 'soft' skills and underpinning knowledge and understanding. The 'hard' skills relate to technical competencies linked with understanding the principles of networking, including end-user devices such as computers and smartphones network devices such as routers and switches, and understanding different types of networks and their associated protocols and standards. At this level, 'hard' skills also extend to network security and monitoring, including firewalls, the significance of authentication and authorisation, and network monitoring tools. In addition, consideration is given to how 'traditional' network technologies map to modern cloud-based equivalents.

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The 'soft' skills addressed relate to the configuration and use of a range cloud-based collaborative and communication tools that support people who use networks to communicate and work with others. Specific skills include using shared calendars and collaborative software to schedule and conduct meetings, setting up and taking part in group video conferencing, the use of advanced file sharing and related productivity tools. It is anticipated that these skills will be transferable, meaning that learners can apply them in different contexts and environments, and that this network literacy can extend to new technologies as they emerge.

On completion of this unit, learners will possess intermediate-to-advanced digital skills in networking principles, network security and monitoring, and in the effective use and configuration of cloud-based collaborative software for teams. This might form the basis for further study of computing science, or simply provide learners with the skills required for secure and effective cloud-based collaboration within a modern workplace, or more generally in our contemporary society at large.

Outcomes

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

1 Describe the principles of computer networking.
2 Describe computer network security and monitoring.
3 Configure cloud-based network applications.

Credit points and level

1 National Unit credit at Scottish Credit and Qualifications Framework (SCQF) level 6:
(6 SCQF credit points at SCQF level 6).

Recommended entry to the unit

Entry is at the discretion of the centre. It is recommended that the learner has achieved Network Literacy at SCQF level 5 or equivalent.

Core Skills

Achievement of this Unit gives automatic certification of the following:

Core Skill component Accessing Information at SCQF level 6

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of this Unit specification.

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.

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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

Describe the principles of computer networking.

Performance criteria

(a) Describe the common uses and structure of everyday networks.
(b) Describe how networks facilitate communication and collaboration.
(c) Describe the different types of devices used in a network.
(d) Describe wireless networking standards and their characteristics.
(e) Describe how core components map to cloud networking.
(f) Explain the benefits and risks of cloud computing for the environment.

Outcome 2

Describe computer network security and monitoring.

Performance criteria

(a) Describe the client-server network model.
(b) Explain basic network protocols and network standards.
(c) Describe the difference between authentication and authorisation.
(d) Explain software-based firewalls and anti-virus tools.
(e) Explain the tools used to monitor network performance and security.

Outcome 3

Configure cloud-based network applications.

Performance criteria

(a) Configure a cloud-based workspace for real-time collaboration and communication.
(b) Collaborate with others by scheduling and conducting one-to-one and group video conference meetings using a cloud-based workspace.
(c) Configure cloud-based file storage and sharing.
(d) Configure peripheral devices for online collaboration.
(e) Apply maintenance and troubleshooting procedures for peripheral devices.

National Unit Specification: Statement of standards (continued)

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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. Assessors can best achieve this by concentrating on the most common and current technologies in use today.

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 full domain.

The evidence for this unit may be written or oral or a combination of these. Evidence may be captured, stored, and presented in a range of media (including audio and video) and formats (analogue and digital). Consideration should be given to digital formats and the use of multimedia. It is recommended that evidence is collected for the unit as a whole and is a naturally occurring by-product of teaching and learning, and that holistic assessment (within and across outcomes) is encouraged where possible.

The gathered evidence must span a range of device types and network usage. To facilitate this, learners will require to carry out a range of practical activities using commonly encountered devices and network services. The hardware and software to be used is at the discretion of the assessor but must be current.

Evidence is required for two types of competence: evidence of cognitive competence (knowledge and understanding) and evidence of practical competence (practical abilities). In certain circumstances, the evidence of cognitive competence may be sampled; the sample must be sufficiently random and robust to clearly infer competence in the entire knowledge domain. For example, if a traditional test is used to assess a learner's knowledge and understanding, this test may sample across the knowledge domain; however, if a portfolio approach is taken then it would not be appropriate to sample, and evidence of every cognitive competence would be required. Evidence of practical competence cannot be sampled; however, the amount of evidence is left to the professional judgement of the assessor and should be the minimum compatible with the requirements of this unit. Evidence of practical competence may be produced over an extended period in open book conditions, for example through completion of a manual or digital logbook, video diary or e-portfolio. Learners should have access to help files and notes as well as appropriate online resources. At this level, assessor assistance should be limited.

Evidence must be produced under controlled conditions. However, the amount of control will vary from context to context. For example, evidence of cognitive competence could take the form of a test, which would permit highly controlled conditions (which would include closed book assessment). Alternatively, evidence could be generated using a web log, written over an extended period at varying locations, which would not permit such close control. In every case, assessment must be controlled to some extent. Where the amount of control is low, the amount of authentication should rise. It is not acceptable to produce evidence in lightly controlled conditions with little authentication.

National Unit Specification: Statement of standards (continued)

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Authentication may take various forms including, but not limited to, oral questioning and plagiarism checks. Some forms of evidence generation (such as video recordings) have intrinsic authentication and would require no further means of verification. Where evidence is not generated under closely controlled conditions (for example, out of class) then a statement of authenticity should be provided by the learner to verify the work as their own and state any necessary sources and permissions. The Guide to Assessment provides further advice on methods of authentication.

Evidence for this unit should be generated naturally, as a by-product of teaching and learning, and integrated into as few assessment tasks as possible. The Guidance on approaches to assessment of this unit (in the National Unit support notes section of this specification) provide specific examples of instruments of assessment that seek to do this.

National Unit Support Notes

Unit title: Network Literacy (SCQF level 6)

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 general context for this unit is the 'Internet of Things' (IoT) — the idea that a wide range of devices can now be connected to the internet. Younger learners may not have experience of the pre-network age; more mature learners may not appreciate the scale of networking that is presently taking place — particularly in cloud-computing — and neither category may appreciate the effects of these changes at an individual, group, or societal level. Using historical context for each outcome may reinforce the scale of change currently taking place.

The purpose of this unit is to deliver intermediate to advanced knowledge and skills in the use of network resources and network devices. This unit is intended for non-specialists and should be delivered in that context.

At this level (SCQF level 6) treatment of most topics should be relatively straight-forward, albeit with an appropriate level of challenge, particularly for those learners who have completed this unit at SCQF level 5. However, in addition to configuring and using the technology comfortably, learners are required to understand routine maintenance and troubleshooting procedures.

Outcome 1: Describe the principles of computer networking

This outcome is designed to provide an understanding of the principles, importance, and effects of modern computer networking in everyday life.

Performance criterion (a) enables learners to describe the common uses and structure of everyday networks. They should be able to describe the difference between Bluetooth connections, 4G/5G, Wi-Fi, and simple home-based Local Area Networks (LANs), and their essential components. They should also be able to describe the basic components of LANs and Wide Area Networks (WANs), and how they are are used within a simple business context.

Performance criterion (b) enables learners to describe how networks facilitate communication and collaboration. Learners should be able provide specific examples of how networks, and in particular cloud-based workspaces, can facilitate real-time collaboration and communication. It is expected that detailed reference would be made to the facilities provided within workspaces such as Microsoft Teams, Microsoft 365 and Outlook.

National Unit Support Notes (continued)

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Performance criterion (c) requires learners to describe the purpose and functionality of different types of devices used in a network. This could include home-based hardware such internet Wi-Fi routers and Wi-Fi extenders, and their basic configuration. Business network devices such as routers and switches should also be discussed, along with examples of various client-side devices (smartphones, laptops, internet enabled smart devices) that can be connected within a home or business network.

Performance criterion (d) requires learners to describe wireless networking standards and their characteristics. Learners will discover how Wi-Fi enables devices such as computers, mobile devices (smartphones and wearables), and other equipment (printers and video cameras) to interface with the internet. Learners will learn how the IEEE 802.11 standard defines the protocols that enable communications with current Wi-Fi-enabled wireless devices, including wireless routers and wireless access points. Learners will also learn how smartphone tethering features can be used for ad hoc wireless hotspots.

Performance criterion (e) enable learners to describe how cloud-based networks differ from traditional IT infrastructure. Learners should understand how cloud-based networks, software and applications are rapidly overtaking traditional in-house systems. Learners should understand how cloud-based networks differ from traditional infrastructure in terms of resilience and elasticity, flexibility and scalability, automation, security and running costs. Although an in-depth practical knowledge is not required at this level, learners may also be introduced to the basic concepts and purpose of a public cloud computing platform, such Azure, or AWS.

Performance criterion (f) requires learners to describe the environmental benefits and risks of cloud-networking. At the time of writing, the impact of cloud-computing on the environment is an emerging area of research, however learners should be able to describe environmental advantages, and possible disadvantages, of cloud-based networking. For example, although cloud computing reduces the need for people to commute by enabling remote working (therefore decreasing emissions), cloud data centres require large amounts of electricity to power servers and keep them cool. It is recommended that these topics are delivered in a balanced and objective manner using reliable sources, and it should be left to the learner to decide if the benefits outweigh the actual (or potential) drawbacks.

Outcome 2: Describe computer network security and monitoring

This outcome introduces learners to the main principles of maintaining and monitoring computer networks for security. It provides an awareness of common network structures, protocols, authentication methods and security tools. Although learners will be able to describe and discuss these concepts, in-depth technical knowledge is not required.

Performance criterion (a) enables learners to describe how computers connect over a network using the client-server model. Learners should understand the basic concepts of how client devices request information and services from server computers, and that this relationship can be organised in different ways. This could be illustrated through the example of a client web browser accessing information from a website, or by a client device accessing web services and applications via the cloud. Learners should have an awareness of the significance of security, that access to resources must be carefully managed, and that users normally require authorisation to access information and services from servers.

Performance criterion (b) requires learners to describe, in simple terms, the key network protocols and network standards that govern how information is exchanged on a network. Learners should understand that a protocol sets out the rules that define how communication occurs on a network, and that protocols allow internet enabled devices to connect regardless of their design, internal structure, or manufacturer. Learners should be aware of the general purpose of common protocols such as ethernet (802.3x), Wi-Fi (802.11x), and Internet Protocol (IP), although an in-depth technical knowledge is not required at this level.

Performance criterion (c) enables learners to describe the concepts of authentication and authorisation in relation to network security. Although neither in-depth knowledge nor practical application is required at this level, learners should be aware of the role of the network administrator in terms of maintaining user access control through authorisation and authentication. Learners should understand the purpose of an access control list (ACL), which is a list of rules that specifies which users or systems are granted or denied access to a particular resource, and the purpose of systems such as Active Directory for managing users, groups, and authentication rules.

Performance criterion (d) requires learners to describe the significance and purpose of software-based firewalls and anti-virus tools and how they can help secure internet enabled devices and networks. Learners will understand the role of a firewall on a device or network and how it can enhance security by restricting internet traffic in, out, or within a home or business network. Learners will also be able to describe how anti-virus software scans data — web pages, files, software, applications — traveling over a network to devices, flagging or blocking suspicious activity. At this level learners should be able configure and maintain anti-virus software, particularly regarding keeping it up to date. Windows Defender and appropriate third-party anti-virus tools may be used to illustrate key learning points.

Performance criterion (e) enables students to explain simple tools to monitor network performance and security. Learners should be aware that home and business users can use performance monitoring tools to monitor network problems, anticipate potential disruptions, and address potential issues before they escalate. Learners should develop a basic familiarity with options available for securing, configuring, and monitoring a home network using standard tools available through the operating system such as Windows Network and internet settings. They should also understand the importance of having a secure Wi-Fi connection, and what they can do if problems occur, including simple troubleshooting steps and contacting their service provider.

Outcome 3: Configure cloud-based network applications

This outcome provides learners with essential skills in the use of cloud-based networks for home, remote and/or hybrid working.

Performance criteria (a) and (b) require learners to configure and use a cloud-based workspace for real-time collaboration and communication. At the time of writing, popular cloud-based workspaces include Microsoft Teams, Zoom, Slack, and Google Workspace. Learners should be familiar with how a collaborative workspace can be accessed from a web browser, a desktop application, or a mobile app. They should also demonstrate that they can schedule meetings, conduct one-to-one or group audio and/or video calls, share screens during web conferencing, record meetings, and use breakout rooms. Learners should also create a collaborative ‘team’ work area where text-based ‘chat’ communication can be established with other team members.

National Unit Support Notes (continued)

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Performance criterion (c) enables learners to describe computer network security and monitoring to configure cloud-based file storage and sharing. At the time of writing popular cloud-based file hosting services include Microsoft OneDrive, Dropbox, and Apple iCloud. Learners should be aware that cloud-based file storage services can be used to access a variety of different files from any device. They should demonstrate that they can set up cloud-based file storage to store and protect files and share them with others. They should also demonstrate that they can manage and organise their files and folders (for example, editing, copying, or downloading), and delete files when they are no longer required.

Performance criterion (d) requires learners to configure peripheral devices for online collaboration. Peripheral devices that learners should be familiar with include webcams, microphones, and headphones/headsets. Learners should demonstrate that they can use the configuration features within a cloud-based workspace (for example Microsoft Teams or Zoom) to configure and test audio and video equipment. They should perform adjustments where necessary. Performance criterion (e) requires learners to demonstrate routine maintenance of peripheral devices, including the application of basic troubleshooting techniques to rectify simple audio, video, and connectivity issues.

Guidance on approaches to delivery of this unit

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 learners commence these activities. Outcome 3 is designed to complement the teaching of outcomes 1 and 2. Teaching should be delivered so that learners acquire transferable skills and should not overly focus on particular devices, network types, or types or brands of hardware or software.

At this level, it is expected that learning will be a mix of assessor-led and self- or peer-learning. New concepts should be introduced by the assessor, and self- or peer-learning should be carefully devised and monitored. Opportunities can be taken to motivate learners by using new and emerging technologies including smart devices for home or business. For outcomes 1 and 2 this could include a wide range of internet enabled devices such as smartphones, smart speakers, and home voice control. For outcome 3 collaborative cloud-based applications should be introduced, including collaborative workspaces, video conferencing, and social-networking. Technology can be a great motivator for people of all ages and many of the competencies in this Unit can be delivered in that context, for example cloud-based workspace platforms that permit sharing and collaboration.

The distribution of time over the three outcomes is at the discretion of the centre and thus will be influenced by several factors such as the actual technologies utilised. However, to emphasise the need for a ‘learn by doing’ approach, a possible distribution is as follows:

- Outcome 1: 12 hours.
- Outcome 2: 12 hours.
- Outcome 3: 16 hours.

National Unit Support Notes (continued)

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Throughout this unit, activities should relate to the personal or vocational interests of learners, and they should be encouraged to become confident with as wide a range of network devices and services as possible.

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.

A traditional approach to assessment would involve the testing of knowledge through a closed book selected response test spanning outcomes 1 and 2. It is recommended that if this approach is adopted then all the knowledge and understanding from outcomes 1 and 2 are combined into a single test that samples from the knowledge domain, with an appropriate pass mark.

The remaining practical competencies (outcome 3) could be assessed through observation of learner activity throughout the duration of the Unit and recorded on an observation checklist or by learners completing a logbook containing appropriate screenshots, video, or other artefacts as evidence.

Alternatively, when assessing outcome 3, learners could be presented with a themed open-book practical ‘case-study’ style activity. This would provide learners with the opportunity to demonstrate the required practical competencies through the completion of a project; perhaps centred around a realistic home or business scenario.

When practical activity is recorded as part of a case-study or observation checklist, authentication could involve a photographs, videos or other artefacts demonstrating the learner activity. For example, one relevant piece of evidence could take the form of a screen capture illustrating configuration settings the learner has applied to a webcam device for video conferencing. Not every practical task would require authentication; at this level it is acceptable for some content to be a simple description of appropriate practical activities.

When necessary, separate authentication (such as oral questioning) could be used for verification purposes. The critical aspect is that the work produced is an overall accurate reflection of the required practical activities (and, therefore, the associated skills) obtained by the learner during completion of the unit.

A checklist could be used to verify that learners have achieved the required knowledge and skills as set out in the performance criteria.

National Unit Support Notes (continued)

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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 that 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

The Accessing Information component of Information and Communication Technology at SCQF level 6 is embedded in this unit. When a learner achieves the unit, their Core Skills profile will also be updated to include this component.

This unit provides opportunities to deliver aspects of the following Core Skills at SCQF level 6:

- Communication
- Information and Communication Technology (ICT) (SCQF level 6)
- Numeracy
- Problem Solving

Learners will undertake a range of tasks to enable them to develop these aspects such as:

- Collaborate and communicate with others using ICT hardware and software.
- Configure a range of ICT devices.
- Maintain and troubleshoot ICT hardware and software.
- Carry out research based on a case study and analyse the information collected.
- Present their findings in an appropriate format as set out in an assessment research brief.

In addition to Core Skills, this unit provides opportunities for learners to develop digital citizenship and employability skills.

History of changes to unit

Version	Description of change	Date
02	Core Skills Component Accessing Information at SCQF level 6 embedded.	06/09/22

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 for anyone who wants to develop their skills and knowledge in using computer networks and cloud-based software applications. In our modern society, computer networks are all around us, and you will be able to apply the skills you learn in a variety of different situations at home, on-the-move, or at work.

Studying the unit will also help you understand 'the cloud' better, and you will develop skills in the use of different technologies that support remote or hybrid working. You will also learn about the tools people use to collaborate and work together in modern working environments, like Microsoft Teams and Google Workspace.

The unit also aims to help people learn about the productive, secure, and responsible use of network-based technologies. You will learn about the potential impact of computer networks on the environment, including the benefits and risks of cloud computing. Overall, it is anticipated that people who study the unit will enhance their digital skills and become active participants in communities and teams that use computer networks. There are also opportunities for learners to develop Core and essential skills in in, Communication, Information Communication Technology (ICT), Numeracy and Problem Solving.

Specific knowledge and skills that are in this unit include:

- The common uses and structure of everyday networks.
- How networks facilitate communication and collaboration.
- The different types of devices used in a network.
- Wireless networking standards and their characteristics.
- How these 'traditional' networks relate to modern cloud networking.
- The benefits and risks of cloud computing for the environment.
- The client-server network model.
- Network protocols and standards.
- The significance of authentication and authorisation.
- Software-based firewalls and anti-virus tools.
- Tools to monitor network performance and security.

Practical skills will include:

- How to configure a cloud-based workspace for real-time collaboration and communication.
- Collaborating with others by scheduling and conducting meetings using an online workspace.
- Setting up a cloud-based video conferencing service for one-to-one meetings and group video conferencing.
- Configuring cloud-based file storage and sharing facilities.
- Setting up, troubleshooting, and maintaining peripheral devices (for example webcams, headsets, and microphones) for online collaboration.

General information for learners (continued)

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To pass the unit, you will be asked to complete an assessment. This might include taking a multiple-choice exam and/or completing a case-study or project style activity where you demonstrate the knowledge and skills you've learned. Your assessor will be able to provide you with more information about this.

When you complete the unit, you will have intermediate-to-advanced digital skills in networking principles, network security and monitoring, and in the effective use and configuration of cloud-based collaborative software. Going forward this could form the basis for further study of computing science, or simply provide you with the skills required for secure and effective cloud-based collaboration at home or within a modern workplace.

The Accessing Information component of Information and Communication Technology at SCQF level 6 is embedded in this unit. When you achieve the unit, your Core Skills profile will also be updated to include this component.