



National Unit Specification

General information

Unit title: Computing Foundations (SCQF level 4)

Unit code: J8DW 44

Superclass: CB

Publication date: July 2024

Source: Scottish Qualifications Authority

Version: 01

Unit purpose

The purpose of this unit is to provide learners with a broad overview of fundamental computing concepts. It is designed to give learners a summary of each key area, rather than an in-depth understanding of each one. The unit focuses on essential knowledge and understanding required as a foundation for further study. It is assumed that learners have basic computer literacy and familiarity with common digital devices.

Learners will develop a basic understanding of key areas in computer organisation, logical operators, data storage, operating systems, networking, data science, and emerging technologies including artificial intelligence.

This unit is intended for all learners. No previous knowledge or experience is required. It is particularly relevant to learners with a vocational interest in computing and information technology (IT).

On completion of this unit, learners will be well-prepared to progress to more complex computing units. The broad understanding gained in this unit establishes a basis for further academic study.

Learners may wish to progress to J8DW 45 Computing Foundations at SCQ level 5.

National Unit Specification: General information (continued)

Unit title: Computing Foundations (SCQF level 4)

Outcomes

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

1. Demonstrate knowledge and understanding of computer hardware and systems.
2. Describe simple computer programs.
3. Demonstrate knowledge and understanding of computer networks.
4. State the significance of data in today's society.
5. State emerging digital technologies in society.

Credit points and level

1 National Unit credit at Scottish Credit and Qualifications Framework (SCQF) level 4: (6 SCQF credit points at SCQF level 4).

Recommended entry to the unit

Entry is at the discretion of the centre. No previous knowledge or experience is required, however, learners with basic computer literacy and familiarity with common digital devices will find the content more accessible.

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 unit is the first unit in a family of units relating to computing foundations.

The target cohort is school and college learners, particularly school learners. The unit may also be of interest to adult learners who wish to develop computing and digital skills prior to undertaking further studies.

National Unit Specification: General information (continued)

Unit title: Computing Foundations (SCQF level 4)

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: [Internal Assessment Support Materials](http://www.sqa.org.uk/internal-assessment-support-materials) (www.sqa.org.uk/internal-assessment-support-materials).

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:

[SQA Assessment Arrangements](http://www.sqa.org.uk/assessment-arrangements) (www.sqa.org.uk/assessment-arrangements).

National Unit Specification: Statement of standards

Unit title: Computing Foundations (SCQF level 4)

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

Demonstrate knowledge and understanding of computer hardware and systems.

Performance criteria

- (a) State basic computer hardware components and measures of performance.
- (b) State the purpose of basic logical operators.
- (c) State the purpose of simple data storage and measures of storage.
- (d) State the role of operating systems.

Outcome 2

Describe simple computer programs.

Performance criteria

- (a) State basic programming constructs.
- (b) Predict the output of a simple program.
- (c) Run and investigate a simple program.
- (d) Modify a simple program.

Outcome 3

Demonstrate knowledge and understanding of computer networks.

Performance criteria

- (a) State the benefits of computer networks.
- (b) State types of simple networks topologies.
- (c) State the importance of networks in daily life.
- (d) State the basic principles of how the Internet works.
- (e) State basic network security features.

National Unit Specification: Statement of standards (continued)

Unit title: Computing Foundations (SCQF level 4)

Outcome 4

State the significance of data in today's society.

Performance criteria

- (a) State the role of data in society.
- (b) State the advantages of using data.
- (c) State ethical considerations when sharing data.
- (d) State how to keep personal data secure.

Outcome 5

State emerging digital technologies in society.

Performance Criteria

- (a) State examples of emerging digital technologies including artificial intelligence.
- (b) State the applications of emerging technologies in society.
- (c) State the advantages and disadvantages of emerging digital technologies, including artificial intelligence, to society.

Evidence requirements for this unit

Evidence is required to demonstrate that learners have achieved all outcomes and performance criteria.

Learners are required to provide **knowledge** evidence.

Learners must provide evidence for all outcomes and all performance criteria. Minimal evidence, required to infer competence, is acceptable. A minimum of one computer program must be described. At least two emerging digital technologies must be stated, one of which must be artificial intelligence.

Evidence may be produced in lightly controlled conditions over an extended period of time.

Sampling is permissible when testing is used. The sampling frame must include questions relating to every outcome (but not every performance criterion within each outcome). The sampling frame must include questions on artificial intelligence. Testing must be carried out in controlled conditions in terms of location, time and supervision. At this level, selected (or short) response questions are permissible.

National Unit Specification: Statement of standards (continued)

Unit title: Computing Foundations (SCQF level 4)

When evidence is produced in loosely controlled conditions it must be authenticated. The Guide to Assessment provides further advice on methods of authentication.

The SCQF level of this unit (level 4) provides additional context on the nature of the required evidence and the associated standards. Appropriate level descriptors should be used when making judgements about the evidence.

The Support Notes section of this specification provides specific examples of instruments of assessment that will generate the required evidence.



National Unit Support Notes

Unit title: Computing Foundations (SCQF level 4)

Unit support notes are offered as guidance and are not mandatory.

While the exact time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this unit

The purpose of this unit is to introduce learners to broad computing concepts, providing an introductory understanding in key areas of hardware, software, networking, data science, and emerging technologies.

It acts as a pivotal introductory unit for the National Progression Award in Computing Technologies, aligning seamlessly with the broader curriculum and setting the stage for more advanced computing units. Emphasising essential computing skills, this unit accommodates learners at the introductory stage. It establishes an initial understanding of computing, fostering engagement and developing fundamental academic abilities. It aims to instil confidence in learners, providing a solid foundation for progression within the series and beyond. Upon completion of this unit learners will have acquired a well-rounded understanding of computing essentials, preparing them for more advanced units within the computing series.

In outcome 1 the learner will develop basic knowledge and understanding of computer hardware and systems. This would include understanding the basic role of computer architecture including central processing unit (CPU), memory and backing storage. Learners should be able to describe the simple logical operators AND, and NOT. Learners should know data storage units including bit, byte, Kilobyte, Megabyte, Gigabyte, and Terabyte. Learners would be expected to know that data is stored in binary and be able to convert 4-bit binary to denary and vice versa. Learners should know that text is converted into binary using ASCII codes and that each keyboard character has a unique code. Learners should know the basic role of computer operating system including managing the computer hardware and resources.

National Unit Support Notes (continued)

Unit title: Computing Foundations (SCQF level 4)

Outcome 2 will involve the learner in develop basic knowledge and understanding of computer software. Learners should be able to predict the output of a given program. They should be able to run and investigate them. Learners should be able to conduct simple modifications to existing computer programs. This would support developing programming knowledge that includes basic programming constructs covering data types (string, integer and real/float), variables, inputs and outputs of programs, and basic calculations such as addition and subtraction.

In outcome 3 the learner will develop introductory knowledge and understanding of computer networks. This could include a basic overview of computer networks, their benefits and basic historical and current topologies. This could include Bus, Star, Ring and Mesh. Learners should know the importance of networks today given the reliance on the use and sharing of data. Learners should have a basic understanding of how the Internet works including routers and Internet Service Providers required for access. Learners should know basic network security features such as use of usernames, passwords, and 2-factor authentication.

In outcome 4 the learner will develop basic knowledge and understanding of data science. This could be a new area for many learners and should include an introduction to the topic of data science, the role of data in society including big data, and the ethical considerations to sharing data and how to keep personal data secure.

Outcome 5 will involve learners exploring emerging technologies such as artificial intelligence and the Internet of Things. They will develop and understanding of the role of these technologies in society, and both advantages and disadvantages of them. Learners should develop an awareness surrounding security issues of using emerging technologies.

National Unit Support Notes (continued)

Unit title: Computing Foundations (SCQF level 4)

The unit will cover the following knowledge and skills.

Knowledge	Skills
<ul style="list-style-type: none"> • Hardware and Systems: <ul style="list-style-type: none"> ○ Computer Architecture: <ul style="list-style-type: none"> ○ CPU ○ Main memory ○ Backing storage ○ Logical Operators: <ul style="list-style-type: none"> ○ AND, NOT ○ Data storage: <ul style="list-style-type: none"> ○ Units of storage ○ Number systems (4-bit binary) ○ Storing text ○ Operating systems • Software: <ul style="list-style-type: none"> ○ Data types ○ Variables ○ Inputs and outputs ○ Calculations • Networking: <ul style="list-style-type: none"> ○ Overview of computer networks ○ Types of networks ○ Importance of networks in daily life ○ Internet ○ Network security • Data science: <ul style="list-style-type: none"> ○ Introduction to data science ○ Big data ○ Data ethics and privacy • Emerging Technologies: <ul style="list-style-type: none"> ○ Artificial intelligence ○ Internet of things 	<ul style="list-style-type: none"> • Curiosity • Computational thinking • Application of knowledge • Digital citizenship • Programming skills: <ul style="list-style-type: none"> ○ Predict ○ Run ○ Investigate ○ Modify • Digital literacy • Critical thinking • Sense-making • Focusing • Integrity

National Unit Support Notes (continued)

Unit title: Computing Foundations (SCQF level 4)

The unit will cover the following knowledge and skills.

Guidance on approaches to delivery of this unit

Outcomes are best delivered in sequence. Tasks should be designed to take a learner-centred, participative, and practical approach. It is encouraged to use examples of computer hardware that are familiar to learners. Outcome 2 programs should have an engaging context and be of suitable complexity for level 4 learners.

Centres can approach this qualification in a holistic manner, completing the outcomes in whatever order they find appropriate.

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 might involve the use of a test (for all evidence requirements). The test could take the form of a selected response test, comprising 20 questions, with an appropriate pass mark. The test would be undertaken in supervised and timed conditions. An alternative approach to assessment could involve the use of a portfolio, which would be assembled during the life of the unit. If this approach is taken, evidence for all performance criteria would be required.

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 [SQA e-Assessment](http://www.sqa.org.uk/SQA_e-Assessment). ([www.sqa.org.uk/Guide to best practice.pdf](http://www.sqa.org.uk/Guide%20to%20best%20practice.pdf)).

National Unit Support Notes (continued)

Unit title: Computing Foundations (SCQF level 4)

Opportunities for developing Core and other essential skills

Opportunities for developing Core and other essential skills: This unit provides opportunities to develop Core Skills, particularly Information and Communication Technology (ICT) and Numeracy (at SCQF level 4).

This unit immerses learners in the diverse facets of computer science, cultivating essential skills for holistic comprehension and application. Throughout the course, learners will engage in:

1. **Curiosity:** Fostering an inquisitive mindset, learners will explore computer architecture, networks, data science, and emerging technologies, instigating an ongoing curiosity-driven exploration.
2. **Computational Thinking:** Developing systematic problem-solving skills, learners will tackle complex issues, applying computational thinking to dissect problems into manageable components.
3. **Application of Knowledge:** Bridging theory and practice, learners will apply newfound knowledge to real-world scenarios, ensuring practical relevance and competency.
4. **Digital Citizenship:** Emphasising ethical conduct in the digital realm, learners will cultivate responsible practices, promoting integrity, and digital citizenship.
5. **Programming Skills:** From prediction to modification, learners will develop their programming skills, fostering the ability to predict, run, investigate, and modify code.
6. **Digital Literacy:** Enhancing digital proficiency, learners will gain competence in navigating digital tools and technologies.
7. **Numeracy:** is seamlessly integrated, requiring learners to analyse and interpret numerical data inherent in computational processes, further sharpening their competencies in mathematical applications.

History of changes to unit

Version	Description of change	Date

© Scottish Qualifications Authority 2024

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Business Development and Customer Support team, telephone 0303 333 0330.

Unit template: February 2024

General information for learners

Unit title: Computing Foundations (SCQF level 4)

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 provides a basic introduction to computing foundations. It has five outcomes covering hardware and systems, software, networking, data science and emerging technologies.

In outcome 1 you will learn about computer hardware and systems including basic computer architecture, logical operators, computer storage including storing text, and the role of computer operating systems.

In outcome 2 you will learn about computer software by predicting the output from programs, running and investigating these, and modifying given computer programs. You will develop knowledge in data types, variables, inputs and outputs, and calculations used in programs.

In outcome 3 you will learn about computer networks and their importance in today's society. This will include developing knowledge in types of networks, how the Internet works, and basic network security features.

In outcome 4 you will learn about data science. This will include gaining an understanding of what is data science, its importance in today's society, an overview and use of big data, and ethical considerations surrounding the use of data and privacy.

In outcome 5 you will learn about emerging technologies, their importance in today's society along with the advantages and disadvantages of these.

General information for learners (continued)

Unit title: Computing Foundations (SCQF level 4)

The unit covers the following knowledge and skills.

Knowledge	Skills
<ul style="list-style-type: none"> • Hardware and Systems: <ul style="list-style-type: none"> ○ Computer Architecture: <ul style="list-style-type: none"> ○ CPU ○ Main memory ○ Backing storage ○ Logical Operators: <ul style="list-style-type: none"> ○ AND, NOT ○ Data Storage: <ul style="list-style-type: none"> ○ Units of storage ○ Number systems (4-bit binary) ○ Storing text ○ Operating systems • Software: <ul style="list-style-type: none"> ○ Data types ○ Variables ○ Inputs and outputs ○ Calculations • Networking: <ul style="list-style-type: none"> ○ Overview of computer networks ○ Types of networks ○ Importance of networks in daily life ○ Internet ○ Network security • Data science: <ul style="list-style-type: none"> ○ Introduction to data science ○ Big data ○ Data ethics and privacy • Emerging Technologies: <ul style="list-style-type: none"> ○ Artificial intelligence ○ Internet of things 	<ul style="list-style-type: none"> • Curiosity • Computational thinking • Application of knowledge • Digital citizenship • Programming skills: <ul style="list-style-type: none"> ○ Predict ○ Run ○ Investigate ○ Modify • Digital literacy • Critical thinking • Sense-making • Focusing • Integrity

You can be assessed in a variety of ways, which may include a short test of your knowledge.

You may wish to progress to J8DW 45 Computer Foundations SCQF level 5.