

## Software Design and Development

**SCQF:** level 6 (9 SCQF credit points)

**Unit code:** J27C 76

### Unit outline

The general aim of this Unit is to develop knowledge and understanding of advanced concepts and practical problem-solving skills in software design and development through appropriate software development environments. Learners will develop their programming and computational thinking skills by designing, implementing, testing and evaluating practical solutions and explaining how these programs work. They will also develop an understanding of computer architecture and the concepts that underpin how programs work. Learners will also gain an awareness of the impact of contemporary computing technologies.

Learners who complete this Unit will be able to:

- 1 Explain how programs work, drawing on an understanding of advanced concepts in software development and computer architecture
- 2 Develop modular programs using one or more software development environments

This Unit is available as a free-standing Unit. The Unit Specification should be read in conjunction with the *Unit Support Notes*, which provide advice and guidance on delivery, assessment approaches and development of skills for learning, skills for life and skills for work. Exemplification of the standards in this Unit is given in *Unit Assessment Support*.

## Recommended entry

Entry to this Unit is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by the following or equivalent qualification and/or experience:

- ◆ National 5 Computing Science Course or relevant Units

## Core Skills

Achievement of this Unit gives automatic certification of the following:

Core Skill component(s) for the Unit	Providing and Creating Information at SCQF level 6
--------------------------------------	--

## 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. For further information, please refer to the *Unit Support Notes*.

# Standards

## Outcomes and assessment standards

### Outcome 1

The learner will:

**1 Explain how programs work, drawing on an understanding of advanced concepts in software development and computer architecture by:**

- 1.1 Reading and explaining code
- 1.2 Describing the purpose of a range of programming constructs and how they work
- 1.3 Describing how a range of standard algorithms work
- 1.4 Describing how programs relate to low-level structures and operations

The range of programming constructs should include sub-programs, parameters user-defined functions and sequential file operations. The range of standard algorithms should include input validation, linear search, finding minimum and maximum and counting occurrences.

### Outcome 2

The learner will:

**2 Develop modular programs using one or more software development environments by:**

- 2.1 Applying contemporary design and development methodologies
- 2.2 Selecting and using combinations of appropriate constructs
- 2.3 Selecting and using appropriate simple and structured data types, including 1-D arrays
- 2.4 Testing digital solutions systematically
- 2.5 Applying aspects of good programming technique — meaningful variable names, internal commentary, indentation

The range of programming constructs should include sub-programs, parameters and sequential file operations. Programs should include at least two data types, including 1-D arrays.

## Evidence Requirements for the Unit

Assessors should use their professional judgement, subject knowledge, 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.

Evidence for Outcome 1 may be oral or written. Evidence of the Assessment Standards for Outcome 2 may be derived from a single, extended software development task, or from a number of shorter tasks; formal documentation is not expected or required.

Exemplification of assessment is provided in *Unit Assessment Support*.

Advice and guidance on possible approaches to assessment is provided in the *Unit Support Notes*.

## Assessment standard thresholds

If a candidate successfully meets the requirements of the specified number of Assessment Standards they will be judged to have passed the Unit overall and no further re-assessment will be required.

The specific requirements for this Unit is as follows:

- ◆ 6 out of 9 Assessment Standards must be achieved.

It should be noted that there will still be the requirement for candidates to be given the opportunity to meet all Assessment Standards. The above threshold has been put in place to reduce the volume of re-assessment where that is required.

# Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Unit. The skills that learners will be expected to improve on and develop through the Unit are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Unit where there are appropriate opportunities.

## 2 Numeracy

- 2.1 Number processes
- 2.3 Information handling

## 4 Employability, enterprise and citizenship

- 4.2 Information and communication technology (ICT)

## 5 Thinking skills

- 5.3 Applying
- 5.4 Analysing and evaluating

Amplification of these is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills should be at the same SCQF level of the Unit and be consistent with the SCQF level descriptor. Further information on building in skills for learning, skills for life and skills for work is given in the *Unit Support Notes*.

Employability, enterprise and citizenship skills shown in this National Unit provide automatic certification of Core Skill component: Providing and Creating Information at SCQF level 6.

# Administrative information

---

**Published:** July 2019 (version 4.0)

**Superclass:** CB

---

## History of changes to National Unit Specification

Version	Description of change	Authorised by	Date
1.1	Additional information on Core Skills added to pages 2 and 5.  Change to text under Outcome 1 to further clarify the range required — 'user-defined functions' and 'sequential file operations'.  Clarification of programming constructs applied to text below Outcome 2.	Qualifications Development Manager	April 2014
2.0	Outcome 3 and Assessment Standard 2.5 'Identifying and rectifying program errors' in Outcome 2 have been removed.	Qualifications Manager	June 2015
3.0	Level changed from Higher to SCQF level 6. Assessment standard threshold added.	Qualifications Manager	September 2018
4.0	Unit code updated	Qualifications Manager	July 2019

This specification 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 can be downloaded from SQA's website at [www.sqa.org.uk](http://www.sqa.org.uk).

Note: readers are advised to check SQA's website: [www.sqa.org.uk](http://www.sqa.org.uk) to ensure they are using the most up-to-date version of the Unit Specification.

© Scottish Qualifications Authority 2018