



National Unit specification: general information

Unit title: Mathematics for Interactive Computing (SCQF level 5)

Unit code: FN84 11

Superclass: CB

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Summary

This Unit is intended primarily for candidates who wish to develop their knowledge and understanding of Mathematics at SCQF level 5 with a view to supporting and underpinning their studies in a computing (games) discipline. Delivery of the Unit should be set within the context of the award to which it contributes. The Unit is designed to develop aspects of the candidate's skills in numeracy, geometry, graphical communication and algebra and to apply these skills in the appropriate computing context.

This Unit is an optional Unit in the National Certificate in Computer Games Development, but is also available for candidates wishing to study the Unit on its own.

Outcomes

- 1 Define different number sets and perform base conversions.
- 2 State basic geometric properties of 2D and 3D shapes and calculate areas, perimeters volumes and surface areas in a computing (games) context.
- 3 Calculate vectors in two dimensions and create visual representations of information.
- 4 Simplify and solve computing (games) problems using algebraic techniques.

Recommended entry

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following, or equivalent:

- ◆ Standard Grade Mathematics at General level
- ◆ Intermediate 1 Mathematics

National Unit specification: general information (cont)

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Credit points and level

1 National Unit credit at SCQF level 5: (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

Achievement of this Unit gives automatic certification of the following Core Skills component:

- ◆ Using Number at SCQF level 5
- ◆ Using Graphical Information at SCQF level 4

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

National Unit specification: statement of standards

Unit title: Mathematics for Interactive Computing (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 SQA.

Outcome 1

Define different number sets and perform base conversions.

Performance Criteria

- (a) Identify number sets using appropriate mathematical symbols.
- (b) Convert binary numbers to decimal and vice versa.
- (c) Convert hexadecimal numbers to decimal and vice versa.

Outcome 2

State basic geometric properties of 2D and 3D shapes and calculate areas, perimeters volumes and surface areas in a computing (games) context.

Performance Criteria

- (a) Calculate the size of interior angles of polygons.
- (b) Calculate areas and perimeters of simple 2D shapes.
- (c) Calculate volumes and surface areas of simple 3D shapes.

Outcome 3

Calculate vectors in two dimensions and create visual representations of information.

Performance Criteria

- (a) Carry out calculations involving vector algebra.
- (b) Resolve two dimensional vectors graphically.
- (c) Construct a flow chart to graphically represent information.

Outcome 4

Simplify and solve computing (games) problems using algebraic techniques.

Performance Criteria

- (a) Simplify algebraic equations using the laws of indices.
- (b) Express numbers in the form 2^n or 2^n-1
- (c) Simplify probability problems by applying algebraic techniques.
- (d) Calculate probabilities in a computing (games) context.

National Unit specification: statement of standards (cont)

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Evidence Requirements for this Unit

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

Evidence should be produced under closed-book, supervised conditions in response to an appropriate set of questions.

Outcome 1

- ◆ Identify two different sets from the following — natural, integers, rational and real numbers.
- ◆ Carry out four calculations converting bases and meeting the requirements outlined in PC (b) and (c).
- ◆ Base conversions should be simple and appropriate working should be shown by a candidate before credit is given.

Outcome 2

- ◆ Calculate the size of at least one interior angle of a polygon given other angles (angles can be adjacent, exterior, interior) from the following list:
 - triangle
 - parallelogram
 - rhombus
- ◆ Select correct formulae and demonstrate correct strategy for calculating the area and perimeter/circumference of at least two from the following list:
 - square
 - rectangle
 - triangle
 - circle
- ◆ Select correct formulae and demonstrate correct strategy for calculating the volume and surface area of at least 2 from the following list:
 - cuboid
 - cylinder
 - prism
 - sphere

Outcome 3

- ◆ Carry out two calculations involving vector algebra, one of which must be multiplying by a scalar.
- ◆ Resolve two dimensional vectors graphically. Candidates should demonstrate the ability to add vectors graphically and obtain a resultant vector.
- ◆ Construct a flow chart to graphically represent information clearly. The flow chart should illustrate a simple system, have clearly stated start and termination nodes and should have at least one instruction and one decision node.

National Unit specification: statement of standards (cont)

Unit title: Mathematics for Interactive Computing (SCQF level 5)

Outcome 4

- ◆ Simplify two expressions using the laws of indices.
- ◆ Express one even number in the form 2^n
- ◆ Express one odd number in the form 2^n-1
- ◆ Simplify one probability problem of either the intersection of two independent events or the union of two mutually exclusive events given appropriate formulae.
- ◆ Calculate one probability in a computer games context.

National Unit specification: support notes

Unit title: Mathematics for Interactive Computing (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

This Unit aims to build on and extend the candidate's mathematical knowledge and skills. It is envisaged that the content of each Outcome is delivered and assessed with specific reference to the candidate's computing specialism, where appropriate

It is envisaged that this Unit is delivered in a computing games development context appropriate to the candidate, whether as part of the National Certificate in Computer Games Development or as a free standing Unit.

Applying the mathematical skills of the Unit in a Games Development scenario will enable the candidate to appreciate that those skills are essential tools in games development. For example, problems in Outcome 2 and the vectors aspect of Outcome 3 could relate to the field of computer games graphics. Problems in outcome 4 could relate to working with probabilities required in computer games such as random number generation or rolling dice.

Guidance on learning and teaching approaches for this Unit

Due to the essentially progressive nature of mathematics learning and teaching, every opportunity should be taken to revise and consolidate prior knowledge.

Delivery of the Unit can be an appropriate mixture of lecturer-led/student-centred activities; individual/group work; classroom/computer laboratory assignments. Use of online resources could be included to support and underpin learning.

The sensible and correct use of calculators should be demonstrated and encouraged where appropriate. At the same time, candidates should be guided and encouraged to identify when working without a calculator is more appropriate.

National Unit specification: support notes (cont)

Unit title: Mathematics for Interactive Computing (SCQF level 5)

Guidance on approaches to assessment for this Unit

Candidates could benefit from the incorporation of formative assessments into the learning and teaching process.

Achievement of this Unit requires the Evidence Requirements to be met.

Evidence for this Unit may be gathered:

◆ in a single, end-of-Unit assessment

or

◆ on an Outcome by Outcome basis

or

◆ by a combination of Outcomes

If each Outcome is assessed individually, evidence for all the Performance Criteria in the Outcome will be provided by an assessment taken at a single assessment event lasting no more than one hour, carried out under closed-book conditions.

If a single, end-of-Unit assessment is used, evidence for all the Performance Criteria in all the Outcomes will be provided by an assessment taken at a single assessment event lasting no more than 2 hours.

Candidates should be provided with appropriate formula sheets and the use of scientific calculators is permitted. Sufficient working must be shown to demonstrate the method of solution.

An alternative assessment should be provided where re-assessment is required.

For Outcome 4, the simplifying and calculating probabilities requirements could be combined in one question.

Opportunities for the use of 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 e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*, *SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

National Unit specification: support notes (cont)

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Opportunities for developing Core Skills

In this Unit candidates develop skills in using numeracy, geometry, graphical communication and algebra in a computing context.

Candidates will:

- ◆ use Numeracy in practical situations
- ◆ interpret and apply a wide range of numerical and graphical information in computing contexts
- ◆ select the number and order of operations which require to be carried out to solve practical problems
- ◆ carry out sustained complex calculations using numerical, statistical and graphic data.

This Unit has the Core Skill of Numeracy embedded in it, so when candidates achieve this Unit their Core Skills profile will be updated to show they have achieved Using Number at SCQF Level 5 and Using Graphical Information at SCQF Level 4 . In addition, as candidates are doing this Unit they will be developing aspects of the Core Skills in Problem Solving and Information and Communication Technology.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website www.sqa.org.uk/assessmentarrangements

History of changes to Unit

Version	Description of change	Date
02	Core Skills Components Using Number at SCQF level 5 and Using Graphical Information at SCQF level 4 embedded.	08/08/2011

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