

## National Unit Specification: general information

<b>UNIT</b>	Mathematics 1 (Higher)
<b>NUMBER</b>	D321 12
<b>COURSE</b>	Mathematics (Higher)

### SUMMARY

*Mathematics 1 (H)* comprises outcomes in algebra, geometry, graphicacy and elementary calculus. It is a mandatory unit of the Higher Mathematics course and provides a basis for progression to *Mathematics 2 (H)*.

### OUTCOMES

- 1 Use the properties of the straight line.
- 2 Associate functions and graphs.
- 3 Use basic differentiation.
- 4 Design and interpret mathematical models of situations involving recurrence relations.

### RECOMMENDED ENTRY

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

- Standard Grade Mathematics Credit award
- Intermediate 2 Mathematics or its component units including *Mathematics 3 (Int 2)*
- equivalent.

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### Administrative Information

<b>Superclass:</b>	RB
<b>Publication date:</b>	May 2007
<b>Source:</b>	Scottish Qualifications Authority
<b>Version:</b>	05

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## National Unit Specification: general information (cont)

**UNIT** Mathematics 1 (Higher)

### CREDIT VALUE

1 credit at Higher (6 SCQF credit points at SCQF level 6\*).

*\*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

This unit gives automatic certification of the following:

**Complete core skills for the unit** Numeracy H

**Additional core skills components for the unit** Critical Thinking H

Additional information about core skills is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

## National Unit Specification: statement of standards

### UNIT Mathematics 1 (Higher)

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 the Scottish Qualifications Authority.

#### OUTCOME 1

Use the properties of the straight line.

##### Performance criteria

- Determine the equation of a straight line given two points on the line or one point and the gradient.
- Find the gradient of a straight line using  $m = \tan \theta$ .
- Find the equation of a line parallel to and a line perpendicular to a given line.

#### OUTCOME 2

Associate functions and graphs.

##### Performance criteria

- Sketch and identify related graphs and functions.
- Identify exponential and logarithmic graphs.
- Find composite functions of the form  $f(g(x))$ , given  $f(x)$  and  $g(x)$ .

#### OUTCOME 3

Use basic differentiation.

##### Performance criteria

- Differentiate a function reducible to a sum of powers of  $x$ .
- Determine the gradient of a tangent to a curve by differentiation.
- Determine the coordinates of the stationary points on a curve and justify their nature using differentiation.

#### OUTCOME 4

Design and interpret mathematical models of situations involving recurrence relations.

##### Performance criteria

- Define and interpret a recurrence relation in the form  $u_{n+1} = mu_n + c$  ( $m, c$  constants) in a mathematical model.
- Find and interpret the limit of the sequence generated by a recurrence relation in a mathematical model (where the limit exists).

##### Evidence requirements

Although there are various ways of demonstrating achievement of the outcomes, evidence would normally be presented in the form of a closed book test under controlled conditions. Examples of such tests are contained in the National Assessment Bank.

In assessment, candidates are required to show their working in carrying out algorithms and processes.

## National Unit Specification: support notes

### UNIT Mathematics 1 (Higher)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the 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**

Each mathematics unit at Higher level aims to build upon and extend candidates' mathematical knowledge and skills. Within this unit, study of coordinate geometry of the straight line, algebra and trigonometry, with the emphasis on graphicacy, is taken to a greater depth. Previous experience of number patterns is formalised in the context of recurrence relations and differential calculus is introduced.

The increasing degree of importance of mathematical rigour and the ability to use precise and concise mathematical language as candidates progress in mathematics assumes a particular importance at this stage. Candidates working at this level are expected to acquire a competence and a confidence in applying mathematical techniques, manipulating symbolic expressions and communicating with mathematical correctness in the solution of problems. It is important, therefore, that, within this unit, appropriate attention is given to the acquisition of such expertise whilst extending the candidate's 'toolkit' of knowledge and skills.

The recommended content for this unit can be found in the course specification. The *detailed content* section provides illustrative examples to indicate the depth of treatment required to achieve a unit pass and advice on teaching approaches.

#### **GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT**

Where appropriate, mathematical topics should be taught and skills in applying mathematics developed through real-life contexts. Candidates should be encouraged throughout this unit to make efficient use of the arithmetical, mathematical and graphical features of calculators, as well as basic non-calculator skills. Candidates should be aware of the limitations of the technology and always apply the strategy of checking.

Numerical checking or checking a result against the context in which it is set is an integral part of every mathematical process. In many instances, the checking can be done mentally, but on occasions, to stress its importance, attention should be drawn to relevant checking procedures throughout the mathematical process. There are various checking procedures which could be used:

- relating to a context – 'How sensible is my answer?'
- estimate followed by a repeated calculation
- calculation in a different order.

Further advice on learning and teaching approaches is contained within the Subject Guide for Mathematics.

## National Unit Specification: support notes (cont)

**UNIT** Mathematics 1 (Higher)

### **GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT**

The assessment for this unit will normally be in the form of a closed book test. Such tests should be carried out under supervision and it is recommended that candidates attempt an assessment designed to assess all the outcomes within the unit. Successful achievement of the unit is demonstrated by candidates achieving the thresholds of attainment specified for all outcomes in the unit. Candidates who fail to achieve the threshold(s) of attainment need only be retested on the outcome(s) where the outcome threshold score has not been attained. Further advice on assessment and retesting is contained within the National Assessment Bank.

It is expected that candidates will be able to achieve the algebraic, trigonometric and calculus performance criteria of the unit without the use of computer software or sophisticated calculators.

In assessments, candidates should be required to show their working in carrying out algorithms and processes.

### **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. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* ([www.sqa.org.uk](http://www.sqa.org.uk)).