Advanced Higher
Unit Specification

Methods in Algebra and Calculus (Advanced Higher) Unit

SCQF: level 7 (8 SCQF credit points)

Unit code: to be advised

Unit outline

The general aim of the Unit is to develop advanced knowledge and skills in algebra and calculus that can be used in practical and abstract situations to manage information in mathematical form. The Outcomes cover partial fractions, standard procedures for both differential calculus and integral calculus, as well as methods for solving both first order and second order differential equations. The importance of logical thinking and proof is emphasised throughout.

Learners who complete this Unit will be able to:

1 Use mathematical operational skills linked to methods in algebra and calculus

This Unit is a mandatory Unit of the Advanced Higher Mathematics Course and is also available as a free-standing Unit. The Unit Specification should be read in conjunction with the *Unit Support Notes*, which provides 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*.

The *Course Assessment Specification* for the Advanced Higher Mathematics Course gives further mandatory information on Course coverage for learners taking this Unit as part of the Advanced Higher Mathematics Course.

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 one or more of the following or equivalent qualifications and/or experience:

- Higher Mathematics Course or relevant component Units

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 Use mathematical operational skills linked to methods in algebra and calculus by:

1.1 Applying algebraic skills to partial fractions
1.2 Applying calculus skills through techniques of differentiation
1.3 Applying calculus skills through techniques of integration
1.4 Applying calculus skills to solving differential equations

Evidence Requirements for the 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. They should ensure there is sufficient evidence of competence in algebraic, calculus and reasoning skills from the Outcomes and Assessment Standards to allow a judgement to be made that the learner has achieved the Unit.

Assessors should use their professional judgement when giving learners credit for an appropriate degree of accuracy. This may mean giving credit for incomplete solutions or numerically incorrect solutions which show correct methodology, therefore demonstrating required knowledge and understanding of the algebraic and calculus processes involved.

Evidence may be presented for individual Outcomes or it may be gathered for the Unit as a whole through integrating assessment in a single activity. If the latter approach is used, it must be clear how the evidence covers each Outcome.

A calculator or equivalent technologies may be used.

For Outcome 1, learners will be required to provide evidence for each of the Assessment Standards by drawing on the following:

Algebraic skills (1.1)

- Expressing proper rational functions as a sum of partial fractions (denominator of degree at most 3 and easily factorised).

Calculus skills (1.2)

- Differentiating functions using the chain rule.
- Differentiating functions using the product rule.
- Differentiating functions using the quotient rule.
- Differentiating inverse trigonometric functions.
- Finding the derivative of functions defined implicitly.
- Finding the derivative of functions defined parametrically.

Calculus skills (1.3)

- Integrating expressions using standard results.
- Integrating by substitution.
- Integrating proper rational functions.
- Integrating by parts.

Calculus skills (1.4)

- Solving a first order differential equation with variables separable.
- Solving a first order linear differential equation using the integrating factor.
- Solving second order differential equations.

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

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
2.2 Money, time and measurement
2.3 Information handling

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 as 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.*

Administrative information

Published: April 2013 (version 1.0)

Superclass: to be advised

History of changes to National Unit Specification

Version	Description of change	Authorised by	Date