National 4
Added Value
Unit Specification

Applications of Mathematics Test (National 4)

SCQF: level 4 (6 SCQF credit points)

Unit code: HV7X 74

Unit outline

This is the Added Value Unit in the National 4 Applications of Mathematics Course. The general aim of this Unit is to enable the learner to provide evidence of added value for the National 4 Applications of Mathematics Course through the successful completion of a Test which will allow the learner to demonstrate breadth and application.

Breadth and application will be demonstrated through the use of mathematical ideas and strategies that can be applied to organising and planning straightforward aspects in personal life, the workplace and the wider world. This will include the application and integration of financial, measurement, geometric and statistical skills in real-life contexts involving reasoning. Numerical skills underpin all aspects of the Unit and the ability to use these without the aid of a calculator will also be assessed.

Learners who complete this Unit will be able to:

1 Apply mathematical skills in straightforward real-life contexts

This Unit is a mandatory Unit of the National 4 Applications of Mathematics Course, and is also available as a free standing Unit. The Unit Specification should be read in conjunction with the *Course Support Notes*, which provide advice and guidance on delivery and assessment approaches. 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. It is recommended that the learner should be in the process of completing, or have completed, the following Units in the National 4 Applications of Mathematics Course:

- Applications of Mathematics: Managing Finance and Statistics (National 4)
- Applications of Mathematics: Geometry and Measures (National 4)
- Numeracy (National 4)

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 *Course Support Notes.*

Standards

Outcomes and assessment standards

Outcome 1

The learner will:

1 Apply mathematical skills in straightforward real-life contexts by:

1.1 Using operational and reasoning skills to determine solutions to real-life situations involving mathematics

Evidence Requirements for the Unit

This Unit will be assessed through controlled assessment which meets the Evidence Requirements below.

The assessment method for this Unit will be a Test in which the learner will draw on, apply and integrate the skills they have developed during the Course. The Test will offer opportunities to demonstrate the breadth of knowledge and skills acquired from across the Course in situations which are likely to be both routine and new to the learner. As an aid to meeting these aims, skills in using a calculator will be developed and a calculator will be permitted in one part of the Test.

The Test is:

- set by centres within the SQA guidelines described below
- conducted under a high degree of supervision and control

Evidence will be internally marked by centre staff in line with SQA guidelines.

All assessment is subject to quality assurance by SQA.

Setting the assessment
The Test will be set by centres within the following guidelines.

The Test will consist of two parts, in one of which a calculator may be used. The Test should have between 43 and 47 marks in total and should offer opportunities to use mathematical operational and reasoning skills in a range of real-life situations, some of which may be new to the learners. Between 50% and 60% of the marks should be for reasoning. The Test should include a range of skills from each of the three Units.

Part 1 will consist of short response questions, based on a selection of knowledge and skills developed in the Course, each of which require the use of number processes in contextualised situations. In this part **a calculator must not be used**, and it should be able to be completed in 20 minutes. This part should have 14 to 16 marks, some of which should be for mathematical reasoning.

Part 2 will consist of short and extended response questions based on a selection of knowledge and skills developed in the Course. In this part **a calculator can be used**, and it should be able to be completed in 40 minutes. This part should have 29 to 31 marks, some of which should be for mathematical reasoning.

The questions for parts 1 and 2 should be in an appropriate context and will be drawn from the list of skills in table 1 below:

Table 1

List of skills	**Code**
Managing Finance and Statistics	
determining a financial position, given budget information	MFS 1.1
investigating factors affecting income	MFS 1.2
determining the best deal, given two pieces of information	MFS 1.3
converting between currencies	MFS 1.4
investigating the impact of interest rates for savings and borrowing in a basic situation	MFS 1.5
using statistics to investigate risk	MFS 2.1
using and presenting statistical information in diagrams	MFS 2.2
using diagrams to illustrate data	MFS 2.3
comparing data sets, using mean and range	MFS 2.4
constructing a frequency table	MFS 2.5
constructing a scattergraph	MFS 2.6
drawing a best fitting straight line on a scattergraph	MFS 2.7
Geometry and Measures	
solving a basic problem involving time management	GM 1.1
calculating a quantity based on a related measurement	GM 1.2
constructing a scale drawing with a given scale	GM 1.3
planning a basic navigation course	GM 1.4
carrying out container packing using a first-fit algorithm	GM 1.5
investigating the need for tolerance in a measurement	GM 1.6
determining the gradient of a slope	GM 2.1
investigating a situation involving perimeter	GM 2.2
investigating a situation involving area	GM 2.3
investigating a situation involving volume	GM 2.4
solving a problem involving the use of Pythagoras' theorem	GM 2.5
using a scale factor on the dimensions of a shape	GM 2.6
Applying numerical skills to solve, straightforward real-life problems involving money/time/measurement	
selecting and using appropriate numerical notation and units	N 1.1
selecting and carrying out calculations	N 1.2
recording measurements using a straightforward scale on an instrument	N 1.3
interpreting the measurements and the results of calculations to make decisions	N 1.4
explaining decisions based on the results of measurements or calculations	N 1.5
Interpreting graphical data and situations involving probability to solve, straightforward real-life problems involving money/time/measurement	
extracting and interpreting data from straightforward graphical forms	N 2.1
making and explaining decisions based on the interpretation of data	N 2.2
making and explaining decisions based on probability	N 2.3

Conducting the assessment
The Test will be conducted under a high degree of supervision and control. This will take the form of supervised, closed book conditions.

Judging the evidence
Evidence will be internally marked and verified by centre staff in line with SQA guidelines.

- All assessment is subject to quality assurance by SQA.
- To be awarded this Unit, the learner must demonstrate competence across the Test as a whole.

Re-assessment
In relation to Unit assessment, SQA's guidance on re-assessment for Units applies.

In this case, for re-assessment purposes, learners would be required to re-sit another version of the whole Test.

Further information is provided in the exemplification of assessment in *Unit Assessment Support*. Advice and guidance on possible approaches to assessment is provided in the *Course Support Notes.*

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

Please refer to the *Course Specification* for information about skills for learning, skills for life and skills for work.

Further mandatory information on Course coverage for the National 4 Applications of Mathematics Course

The following gives details of mandatory skills, knowledge and understanding for the National 4 Applications of Mathematics Course. Assessment of this Added Value Unit will involve selecting appropriate skills, knowledge and understanding from those listed below, in line with the Evidence Requirements above. This list of skills, knowledge and understanding also provides the basis for the assessment of all the Units in the Course.

Section A: Mandatory content for Added Value Unit

Managing Finance and Statistics **Financial Outcome**	♦ Determining a financial position, given budget information ♦ Investigating factors affecting income ♦ Determining the best deal, given two pieces of information ♦ Converting between currencies ♦ Investigating the impact of interest rates for savings and borrowing in a basic situation
Managing Finance and Statistics **Statistical Outcome**	♦ Using statistics to investigate risk ♦ Using and presenting statistical information in diagrams ♦ Using diagrams to illustrate data ♦ Comparing data sets, using mean and range ♦ Constructing a frequency table ♦ Constructing a scattergraph ♦ Drawing a best-fitting straight line on a scattergraph
Geometry and Measures **Measures Outcome**	♦ Solving a basic problem in time management ♦ Calculating a quantity based on a related measurement ♦ Constructing a scale drawing with a given scale ♦ Planning a basic navigation course ♦ Carrying out container packing, using a first-fit algorithm ♦ Investigating the need for tolerance in a measurement
Geometry and Measures **Geometric Outcome**	♦ Determining the gradient of a slope ♦ Investigating a situation involving perimeter ♦ Investigating a situation involving area ♦ Investigating a situation involving volume ♦ Solving a problem involving the use of Pythagoras' theorem ♦ Using a scale factor on the dimensions of a shape
Numeracy **Applying numerical skills to solve straightforward real-life problems involving money/time/ measurement**	♦ Selecting and using appropriate numerical notation and units ♦ Selecting and carrying out calculations ♦ Recording measurements using a straightforward scale on an instrument ♦ Interpreting the measurements and the

	results of calculations to make decisions ♦ Explaining decisions based on the results of measurements or calculations
Numeracy **Interpreting graphical data and situations involving probability to solve straightforward real-life problems involving money/time/measurement**	♦ Extracting and interpreting data from straightforward graphical forms ♦ Making and explaining decisions based on the interpretation of data ♦ Making and explaining decisions based on probability

Section B: Mandatory content for component Units

Applications of Mathematics: Managing Finance and Statistics (National 4)	
Financial Outcome ***The learner will use reasoning skills and financial skills linked to straightforward real-life contexts***	
Skills	**Explanation**
Determining a financial position, given budget information	Budgeting and planning for personal use or planning a straightforward event Balancing straightforward incomings and outgoings from a range of sources
Investigating factors affecting income	Investigate and interpret income and deductions for different personal circumstances and career choices. These should include: ♦ basic pay ♦ overtime ♦ bonus ♦ commission ♦ gross/net pay ♦ benefits and allowances ♦ National Insurance ♦ income tax
Determining the best deal, given two pieces of information	Compare at least three products, given two pieces of information on each
Converting between currencies	Comparing costs between two different currencies in either direction
Investigating the impact of interest rates for savings and borrowing in a basic situation	These should include: ♦ loans ♦ saving rates ♦ bank accounts ♦ credit agreements

Statistical Outcome ***The learner will use reasoning skills and statistical skills linked to straightforward real-life contexts***	
Skills	**Explanation**
Using statistics to investigate risk	Investigate the meaning of lifestyle statistics
Using and presenting statistical information in diagrams	Using and presenting straightforward statistical diagrams (technology may be used). These should include: ♦ bar graphs ♦ line graphs ♦ pie charts ♦ frequency tables without class intervals
Using diagrams to illustrate data	Bar graphs, line graphs, pie charts, stem and leaf diagrams
Comparing data sets, using mean and range	Using ungrouped data
Constructing a frequency table	With class intervals
Constructing a scattergraph	From given or gathered data
Drawing a best fitting straight line on a scattergraph	Drawing a best fitting straight line by eye-estimating one variable, given the other

Applications of Mathematics: Geometry and Measures (National 4)	
Measures Outcome ***The learner will use reasoning skills and measurement skills linked to straightforward real-life contexts***	
Skills	**Explanation**
Solving a basic problem in time management	Use time intervals to make plans including across midnight
Calculating a quantity based on a related measurement	Any required formula or relationship will be given
Constructing a scale drawing with a given scale	
Planning a basic navigation course	Use measurement of angles and length to interpret and to plan a straightforward navigation course
Carrying out container packing, using a first-fit algorithm	Filling containers in the order of arrival
Investigating the need for tolerance in a measurement	Accuracy up to two decimal places

Geometric Outcome ***The learner will use reasoning skills and geometric skills linked to straightforward real-life contexts***	
Skills	**Explanation**
Determining the gradient of a slope	Using 'vertical height' and 'horizontal distance'
Investigating a situation involving perimeter	♦ rectilinear ♦ circular ♦ composite shape
Investigating a situation involving area	♦ triangles ♦ kite, rhombus, parallelogram ♦ circle ♦ composite shape
Investigating a situation involving volume	♦ prism (including cuboid, cylinder)
Solving a problem involving the use of Pythagoras' theorem	
Using a scale factor on the dimensions of a shape	Problems involving increase/decrease in an amount or measurement according to a scale factor

Numeracy (National 4)	
Numerical Outcome ***The learner will use numerical skills to solve straightforward, real-life problems involving money/time/measurement***	
Skills	**Explanation**
1.1 Selecting and using appropriate numerical notation and units	Numerical notation should include: =, +, –, ×, /, ÷, <, >, ( ), %, colon and decimal point Units should include: — money (pounds and pence) — time (months, weeks, days, hours, minutes, seconds) — measurement of length (millimetre, centimetre, metre, kilometre, mile); weight (gram, kilogram); volume (millilitre, litre) and temperature (Celsius or Fahrenheit)
1.2 Selecting and carrying out calculations	♦ add and subtract whole numbers including negative numbers ♦ multiply whole numbers of any size, with up to four-digit whole numbers ♦ divide whole numbers of any size, by a single digit whole number or by 10 or 100 ♦ find whole number remainders ♦ round answers to the nearest significant figure or two decimal places ♦ find simple percentages and fractions of shapes and quantities, eg 50%, 10%, 20% and 25%, 33⅓%; ½, ⅓, ¼, 1/10, ⅕ ♦ calculate percentage increase and decrease ♦ convert equivalences between common fractions, decimals and percentages

	♦ calculate rate: eg miles per hour or number of texts per month ♦ calculate distance given speed and time ♦ calculate time intervals using the 12-hour and 24-hour clock ♦ calculate volume (cube and cuboid), area (rectangle and square) and perimeter (shapes with straight lines) ♦ calculate ratio and direct proportion
1.3 Recording measurements using a straightforward scale on an instrument	♦ use measuring instruments with straightforward scales to measure length, weight, volume and temperature ♦ read scales to the nearest marked, unnumbered division with a functional degree of accuracy
1.4 Interpreting measurements and the results of calculations to make decisions	♦ use appropriate checking methods, eg check sums and estimation ♦ interpret results of measurements involving time, length, weight, volume and temperature ♦ recognise the inter-relationship between units in the same family, eg mm/cm, cm/m, g/kg, and ml/l ♦ use vocabulary associated with measurement to make comparisons for length, weight, volume and temperature
1.5 Explaining decisions based on the results of measurements or calculations	♦ give reasons for decisions based on the results of calculations

Graphical data and probability Outcome ***The learner will interpret graphical data and situations involving probability to solve straightforward, real-life problems involving money/time/measurement***	
Skills	**Explanation**
2.1 Extracting and interpretation data from at least two different straightforward graphical forms	Straightforward graphical forms should include: ♦ a table with at least four categories of information ♦ a chart where the values are given or where the scale is obvious, eg pie ♦ a graph where the scale is obvious, eg bar, pie, scatter or line graph ♦ a diagram, eg stem and leaf, map or plan
2.2 Making and explaining decisions based on the interpretation of data	♦ make decisions based on observations of patterns and trends in data ♦ make decisions based on calculations involving data ♦ make decisions based on reading scales in straightforward graphical forms ♦ offer reasons for the decisions made based on the interpretation of data
2.3 Making and explaining decisions based on probability	♦ recognise patterns and trends and use these to state the probability of an event happening ♦ make predictions and use these predictions to make decisions

Administrative information

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Superclass: RB

History of changes to National Unit Specification

Version	Description of change	Authorised by	Date
2.0	Lifeskills Mathematics changed to Applications of Mathematics	Qualifications Manager	October 2017