



General Certificate of Secondary Education

Use of Mathematics

9350

Pilot Specification

2008

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We will notify centres in writing of any changes to this specification.

You can get further copies of this specification from:
The GCE subject office.
mathematics-gce@aqa.org.uk

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1 Introduction

1.1 Why choose AQA?

It's a fact that AQA is the UK's favourite exam board and more students receive their academic qualifications from AQA than from any other board. But why does AQA continue to be so popular?

Specifications

Ours are designed to the highest standards, so teachers, students and their parents can be confident that an AQA award provides an accurate measure of a student's achievements. And the assessment structures have been designed to achieve a balance between rigour, reliability and demands on candidates.

Support

AQA runs the most extensive programme of support meetings; free of charge in the first years of a new specification and at a very reasonable cost thereafter. These support meetings explain the specification and suggest practical teaching strategies and approaches that really work.

Service

We are committed to providing an efficient and effective service and we are at the end of the phone when you need to speak to a person about an important issue. We will always try to resolve issues the first time you contact us but, should that not be possible, we will always come back to you (by telephone, email or letter) and keep working with you to find the solution.

Ethics

AQA is a registered charity. We have no shareholders to pay. We exist solely for the good of education in the UK. Any surplus income is ploughed back into educational research and our service to you, our customers. We don't profit from education, you do.

If you are an existing customer then we thank you for your support. If you are thinking of moving to AQA then we look forward to welcoming y

1.2 Why choose GCSE Use of Mathematics?

- GCSE Use of Mathematics binds together Intermediate and Foundation level Free-Standing Mathematics Qualifications (FSMQ) with Functional Mathematics to create a recognised GCSE certificate.
- Use of Mathematics offers an alternative route to a numerate GCSE for those who have been unsuccessful with the mainstream GCSE Mathematics qualifications. The different approach of this course means that post-16 students will experience a fresh start in their study of Mathematics, encouraging them to pursue the subject after the end of compulsory education. Use of Mathematics strives to be both practical and relevant to the real world, training students not only in arithmetic skills but also in problem-solving and modelling. GCSE Use of Mathematics will be recognised as the equivalent of GCSE Mathematics by UCAS.
- The qualification provides an alternative pathway to GCSE-standard recognition from the traditional algebra- and geometry-dominated courses. It can also be completed with or without portfolio work, depending on your choice of units, allowing a wider range of students to access a GCSE in Mathematics. Portfolio work can contribute up to 33.3% of the total GCSE Use of Mathematics.
- GCSE Use of Mathematics will not contribute points towards centre performance tables. Nor will it contribute towards schools' DCSF targets, eg "5 grades A to C including Mathematics". It is intended for post-16 students only. However, the individual FSMQ units of which the GCSE is composed *are* accredited for pre-16 use and *do* still contribute to centre performance tables. It is only the GCSE certification which is restricted to post-16s. AQA has been instructed to enforce this constraint strictly throughout the pilot.
- Students completing GCSE Use of Mathematics can progress to AS and A level Use of Mathematics. (However, it is unlikely that GCSE Use of Mathematics will provide a good foundation for traditional AS and A level Mathematics.)

1.3 How do I start using this specification?

- This is a restricted pilot. Contact the subject office for more information at mathematics-gce@aqa.org.uk

1.4 How can I find out more?

Ask AQA

You have 24-hour access to useful information and answers to the most commonly-asked questions at <http://www.aqa.org.uk/rn/askaqa.php>

If the answer to your question is not available, you can submit a query for our team. Our target response time is one day.

Teacher Support

If you need to contact the Teacher Support team, you can call us on 01483 477860 [or email us at teachersupport@aqa.org.uk](mailto:teachersupport@aqa.org.uk)

2 Specification at a glance

GCSE Use of Mathematics

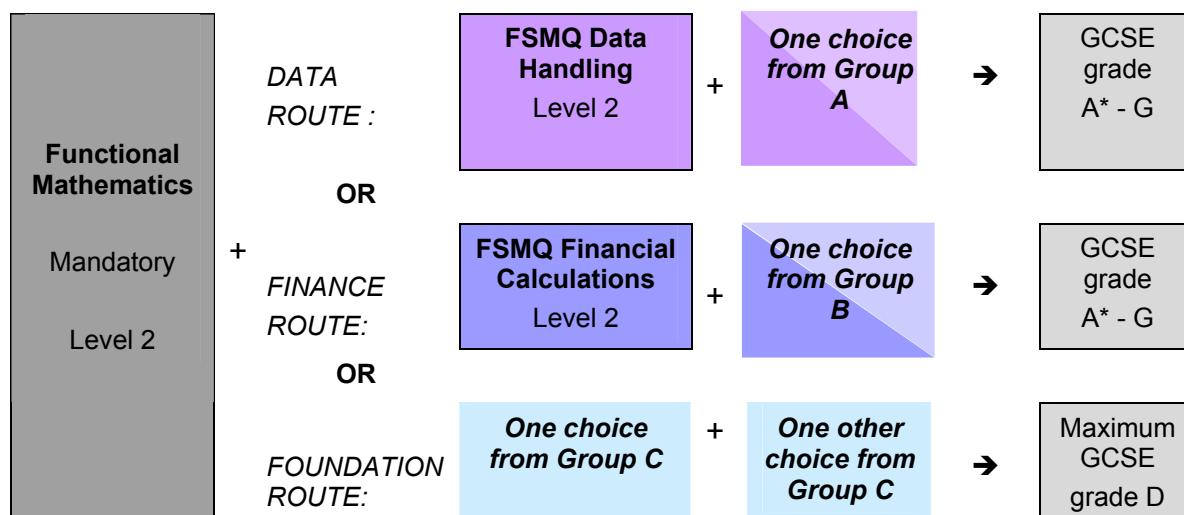
(including Functional Mathematics and Free-Standing Mathematics Qualifications)

There are three possible routes to GCSE Use of Mathematics.

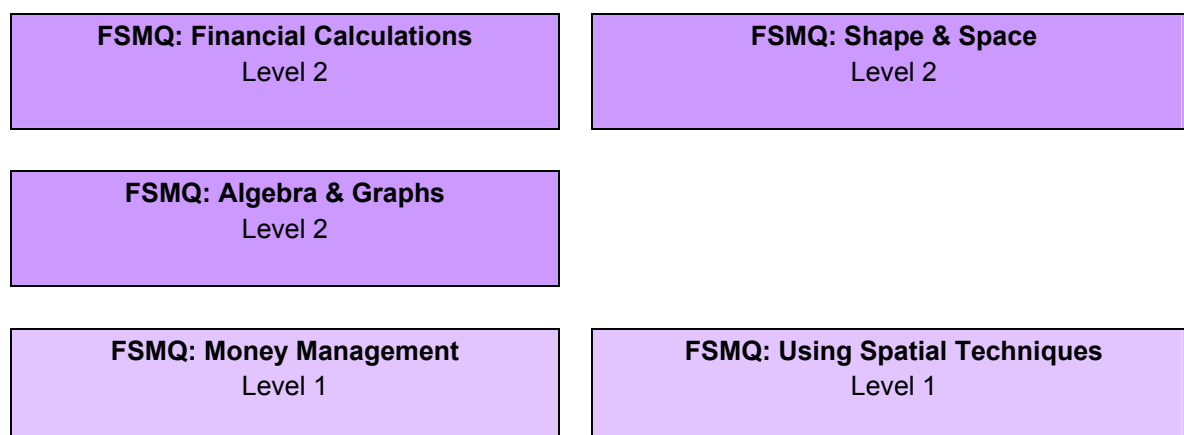
The first route comprises Functional Mathematics and Data at level 2, plus a third option at either level. The full GCSE grade range A* to G is available on this route, though it is harder to attain a grade C where level 1 FSMQs are included.

The second route comprises Functional Mathematics and Finance at level 2, plus a third option at either level. The full GCSE grade range A* to G is available on this route, though it is harder to attain a grade C where level 1 FSMQs are included.

The last route comprises Functional Mathematics plus two level 1 options, limiting the candidate to a maximum GCSE grade D.



Group A: Data Route



Group B: Finance Route

FSMQ: Data Handling
Level 2

FSMQ: Shape & Space
Level 2

FSMQ: Algebra & Graphs
Level 2

FSMQ: Using Data
Level 1

FSMQ: Using Spatial Techniques
Level 1

Group C: Foundation Route

FSMQ: Money Management
Level 1

FSMQ: Using Spatial Techniques
Level 1

FSMQ: Using Data
Level 1

See section 5.7 for more information regarding the impact on GCSE grading of using Foundation (level 1) units.

None of the units available in this specification are tiered.

There are therefore 12 possible combinations of units for GCSE Use of Mathematics certification. No other combination will be permitted.

Functional Mathematics Level 2	+	Data Handling Level 2	+	Algebra & Graphs Level 2
Functional Mathematics Level 2	+	Data Handling Level 2	+	Shape & Space Level 2
Functional Mathematics Level 2	+	Data Handling Level 2	+	Money Management Level 1
Functional Mathematics Level 2	+	Data Handling Level 2	+	Using Spatial Techniques Level 1
Functional Mathematics Level 2	+	Financial Calculations Level 2	+	Algebra & Graphs Level 2
Functional Mathematics Level 2	+	Financial Calculations Level 2	+	Shape & Space Level 2
Functional Mathematics Level 2	+	Financial Calculations Level 2	+	Using Data Level 1
Functional Mathematics Level 2	+	Financial Calculations Level 2	+	Using Spatial Techniques Level 1
Functional Mathematics Level 2	+	Data Handling Level 2	+	Financial Calculations Level 2
Functional Mathematics Level 2	+	Using Data Level 1	+	Using Spatial Techniques Level 1
Functional Mathematics Level 2	+	Money Management Level 1	+	Using Spatial Techniques Level 1
Functional Mathematics Level 2	+	Using Data Level 1	+	Money Management Level 1

Unit Descriptions

Functional Mathematics

Paper 1: Competency Test

One non-calculator written paper or on-screen test

40 minutes

Level 2 examination

25% of the Functional Mathematics assessment

8⅓% of the total GCSE assessment

And

Paper 2: Functionality Test

One calculator written paper with pre-release material

1¼ hours

Level 2 examination

75% of the Functional Mathematics assessment

25% of the total GCSE assessment

FSMQ Intermediate: Financial Calculations

One calculator written paper with pre-release material

1¼ hours

Level 2 examination

33⅓% of the total GCSE assessment

FSMQ Intermediate: Data Handling

One calculator written paper with pre-release material

1¼ hours

Level 2 examination

33⅓% of the total GCSE assessment

FSMQ Intermediate: Algebra & Graphs

One calculator written paper with pre-release material

1¼ hours

Level 2 examination

33⅓% of the total GCSE assessment

FSMQ Intermediate: Shape & Space

One calculator written paper with pre-release material

1¼ hours

Level 2 examination

33⅓% of the total GCSE assessment

FSMQ Foundation: Money Management

Written paper **And** Portfolio

One calculator written examination with pre-release material

1 hour

Level 1 examination

Approximately 12 hours

Level 1 portfolio

16⅔% of the total GCSE assessment

16⅔% of the total GCSE assessment

FSMQ Foundation: Using Spatial Techniques

Written paper **And** Portfolio

One calculator written examination with pre-release material

1 hour

Level 1 examination

Approximately 12 hours

Level 1 portfolio

16⅔% of the total GCSE assessment

16⅔% of the total GCSE assessment

FSMQ Foundation: Using Data

Written paper **And** Portfolio

One calculator written examination with pre-release material

1 hour

Level 1 examination

Approximately 12 hours

Level 1 portfolio

16⅔% of the total GCSE assessment

16⅔% of the total GCSE assessment

3 Subject content

It is important to note that GCSE Use of Mathematics only covers roughly 60–70% of the full *Programme of study: Mathematics (Key stage 4)*. (It is for this reason that GCSE Use of Mathematics does not count towards DCSF A*–C targets.)

3.1 Functional Mathematics

Rationale

This specification includes functional mathematics at level 2 as a component of the overall GCSE Use of Mathematics. This component, like the others, will be reported and awarded separately. Candidates reaching the required standard will be awarded a level 2 qualification. Candidates who do not meet the standards for Level 2 may be awarded Level 1. Candidates who do not meet the standards for Level 1 will be reported as Unclassified. At present, it is intended that a pass in functional mathematics will be required before a grade C or better can be awarded at GCSE when functional skills become a national requirement. This pilot specification will **not** impose this hurdle.

Functional mathematics, as defined in *The functional skills standards: mathematics*, requires learners to have the skills and confidence to apply, combine and adapt their mathematical knowledge to new situations in their life and work. It has been described as applying straightforward mathematics in complex contexts.

In the standards, it is envisaged that differentiation is achieved not just through the technical demand of the mathematics required but also through the complexity and familiarity of the context in which the mathematics is presented, and the independence shown in tackling problems.

Process skills and content

The functional mathematics standard at level 2 has as the underpinning basis the following process skills.

Representing: Making sense of situations and representing them

Analysing: Processing and using the mathematics

Interpreting: Interpreting and communicating the results of the analysis

Further details can be found in the *Functional skills standards: mathematics*

At level 2 it is expected that the learner can

- understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations
- identify the situation or problem and the mathematical methods needed to tackle it
- select and apply a range of skills to find solutions
- use appropriate checking procedures and evaluate their effectiveness at each stage

The content and skills required are equivalent to national curriculum mathematics levels 1–6.

Specifically, the *Functional skills standards: mathematics* at level 2 require that the learner can:

- understand and use positive and negative numbers of any size in practical contexts
- carry out calculations with numbers of any size in practical contexts
- understand, use and calculate ratio and proportion, including problems involving scale
- understand and use equivalences between fractions, decimals and percentages
- add and subtract fractions; add, subtract, multiply and divide decimals to a given number of decimal places
- understand and use simple equations and manipulate simple formulae involving one or two step operations
- recognise and use 2-D representations of 3-D objects
- find area, perimeter and volume of common shapes
- use, convert and calculate using metric and, where appropriate, imperial measures
- collect and represent discrete and continuous data
- use and interpret for discrete and continuous data, statistical measures, tables and diagrams
- use statistical methods to investigate situations
- use a numerical scale from 0 to 1 to express and compare probabilities

Assessment structure Level 2 functional mathematics is assessed wholly within the Functional Mathematics unit of this specification.

The assessment is in two parts, Paper 1 and Paper 2.

Paper 1 is a competency test assessing the content above in a straightforward manner with little or no context. It consists of 30 single-mark questions in a question paper of 40 minutes duration. The use of a calculator is **not** permitted in Paper 1.

Paper 2 is a functionality test assessing the content and process skills with questions placed in contexts which may be unfamiliar and may be drawn from everyday life, the workplace or educational settings. It consists of 2 questions worth a total of 30 marks where the context is presented in advance on pre-released data sheets, and 3 or 4 questions also worth a total of 30 marks where the contexts are less complex and presented as part of the examination. The question paper is of 75 minutes duration. The use of a calculator is expected in Paper 2.

Further support Support for the preparation of candidates for this new aspect of the specification will be provided by AQA and its partners.

3.2 FSMQ Intermediate: Financial Calculations

Before you start this qualification

You must:

This includes:

be able to order numbers

decimal, fractional, large, small and negative numbers

be familiar with the idea and basic use of percentages

be able to carry out basic calculations involving money

be familiar with common units of time

for example 12 months in a year

What you need to learn

Using calculators and computers

You should learn to use a calculator effectively and efficiently. A basic calculator with a memory facility will be sufficient for you to use with this qualification. However, any calculator may be used in this qualification provided that it conforms with the AQA Regulations.

Whenever you use a calculator you should record your working as well as the result. For this reason you may prefer to use a calculator that has at least a two-line display that shows your calculation as well as the answer.

It is important that you are also able to carry out simple calculations without using a calculator.

You should learn to use spreadsheet software running on a computer.

You should learn to use a spreadsheet to:

This includes:

record processed data in tables

- inserting column and row headings
- formatting cells so that all information is clearly visible

record financial transactions

using columns to record

- types of transaction
- credits
- debits
- running totals by using spreadsheet formulae

carry out calculations

- using spreadsheet formulae such as "=E3+C4+D4" to calculate a running total in cell E4
- using the 'fill down' facility
- using relative and absolute cell referencing

check calculated values using another method to reach an answer

for example using

balance carried forward + total credits + total debits = new balance

to check a final balance calculated using a running total.

Collecting and recording data

You should learn to:

This includes:

select relevant information from text and tables

two-way and more complex tables

select factors that are relevant and that you need to take into account when making financial decisions (for example age, number of years, variable rates, tax payable)

draw by hand, produce spreadsheets and use tables to record

- initial data
- steps towards a final calculation
- results of calculations

- two way and more complex tables
- using formulae in spreadsheets

use negative numbers to represent debits, debts, negative credit, etc.

Carrying out calculations

You should learn to:

This includes:

understand and use decimal notation

- the usual notations for money

select and carry out appropriate calculations involving the addition, subtraction, multiplication and division of money

- the use of negative numbers to represent debts, negative credit, etc.
- the use of fractions, percentages, ratios for example finding $\frac{1}{8}$ of £500, finding $2\frac{1}{2}\%$ of £750

express one quantity as a fraction of another

for example

- using percentages to make comparisons
- using fractions in work with pie charts

express two quantities as a ratio

reducing to simplest form

divide a quantity in a given ratio

for example, dividing £50 in the ratio 2:3

carry out calculations that involve finding fractions or percentages of quantities

for example, finding 17% of £250, $\frac{1}{4}$ of £12.52

carry out calculations involving percentage increases and decreases

for example, calculating 'mark-ups' on goods for sale

find an initial value, when given a fraction of this value

for example, finding the total cost to the customer if the profit of £4.50 is one third of this cost

carry out reverse percentage calculations (for example finding a cost before a tax is added, when given the final cost and the rate of tax)

for example, calculating the original price of an item given that its new cost, after an increase of 30%, is £260

carry out complex calculations that include fixed and variable charges/rates

using exchange rates

express general methods for carrying out calculations using formulae

calculate interest that is compounded over a number of stages

for example, in the case of income tax allowances and tax rates (two tax rates are required)

for example, a jacket costs \$80. The exchange rate is \$1.95 to £1. Find its cost in pounds.

- in words
- using symbols
- in a spreadsheet
- the use of formulae is not required
- use of Annual Percentage Rate (APR)
- use of Annual Equivalent Rate (AER) to compound interest over a number of years
- comparison of interest rates using APR and AER

Comparing and interpreting data

You should learn to:

This includes:

use fractions and percentages to make comparisons

use ratios to make comparisons

interpret diagrams in terms of real situations

two or three values that are being compared

- statistical diagrams
- line graphs that show you how a quantity varies with time
- using graphs to make sense of rates of change
for example recognising when inflation is greatest from a graph plotting price against time.

Accuracy, estimating and checking

You should learn to:

This includes:

round values of money to the most appropriate value (for example the nearest penny, pound or £100)

check calculations using inverse operations

check calculations using estimates

check calculations by reaching a final value using another method

by hand and mentally

by hand and mentally

Using and understanding financial terms

There are many terms that have particular meanings in the world of finance. Some of the most important are given below. You should learn, understand and use these and others that you encounter in your studies.

It is important that you understand the mathematics that underpins each of these, for example

- monthly wage is annual salary \div 12
- net pay is 'gross pay – deductions'

General Terms	Terms related to earnings	Terms related to savings
<ul style="list-style-type: none"> ▪ gross ▪ net 	<ul style="list-style-type: none"> ▪ wage ▪ salary ▪ overtime ▪ commission ▪ income tax (and its different levels) ▪ PAYE (pay as you earn) ▪ national insurance 	<ul style="list-style-type: none"> ▪ interest rates ▪ compound interest ▪ AER (Annual Equivalent Rate)
Terms related to borrowing	Terms related to insurance	
<ul style="list-style-type: none"> ▪ interest rates ▪ compound interest ▪ handling charges ▪ commission ▪ APR (Annual Percentage Rate) 	<ul style="list-style-type: none"> ▪ insurance tax 	

3.3 FSMQ Intermediate: Shape & Space

Before you start this qualification

You must:

This includes:

be able to measure lengths in and understand common metric and imperial units

millimetres, centimetres, metres, inches, feet

be able to use a protractor to measure angles

understand basic ideas of area and volume

use of correct units such as cm^2 and cm^3

be able to use basic plans and elevations drawn to scale

interpreting drawings given to you

What you need to Learn

Using calculators and computers

You should learn to use a calculator. Any calculator used must conform to AQA Regulations.

Whenever you use a calculator you should record your working as well as the result. For this reason you may prefer to use a calculator that has a two-line display that shows your calculation as well as the answer.

You should learn to use your calculator effectively and efficiently. This will include learning:

- to use memory facilities
- to find percentages and fractions.

It is important that you are also able to carry out simple calculations without using a calculator.

You are encouraged to use available computer software when developing some drawings and when considering transformations.

Reading and Recording measurement

You should learn to:

This includes:

read and record, using correct notation, measurements of lengths and angles (and other quantities appropriate to your work) accurately from continuous and digital scales

(Your work may require you to use measurements of other quantities such as those of mass, time and temperature)

understand the accuracy of your data and how this affects its subsequent use

calculate upper and lower bounds to problems involving the addition, subtraction and multiplication of lengths

selecting

- the measuring device for the task
- appropriate units to use
- the appropriate degree of accuracy

giving both magnitude and units associated with measurements

recognising that measurements expressed to a given unit can have a maximum error of half a unit

Carrying out calculations with measurements

You should learn to:

This includes:

convert measurements within and between metric and imperial systems

- use of correct prefixes in the metric system
- common units of length in the imperial system:
 - inches
 - feet
 - yards
 - miles
- other units in both metric and imperial systems
- the use of conversion factors
- the use of formulae
for example to convert l metres to L feet: $L = 3.28l$

carry out calculations with measurements of lengths and angles

- deciding on the correct arithmetic to use with measurements when solving problems
- addition, subtraction, multiplication, division of one length by another
- addition, subtraction, multiplication, division of lengths and angles by a number

carry out calculations involving scaling

- between scaled (drawing or model) and real situation and vice-versa
- using scales represented in the forms
 - $a:b$
 - a to b
 - $\frac{a}{b}$for all a and b

use measurements of lengths, in both metric and imperial units to calculate

- perimeters
- areas
- surface areas
- volumes

giving values in correct units

- finding circumferences of circles using the formula $C = \pi \times d = 2\pi r$
- using the π button on your calculator or the approximate value $\pi = 3.14$ (to 2 decimal places)
- finding the area enclosed by a circle using the formula $A = \pi r^2$
- finding the area of sectors of circles
- finding the arc length of circles for fractions of a circle
- finding perimeters and areas of
 - rectangles
 - triangles
 - parallelograms
 - trapezia
- finding perimeters and areas of composite shapes involving two or more of rectangles, triangles, trapezia, parallelograms, sectors of circles
- using formulae for perimeters and areas expressed in words and symbols
- finding surface areas and volumes of
 - cuboids
 - prisms (inc. triangular)
 - cylinders
 - spheres and hemispheres
 - cones
- finding surface areas and volumes of composite solids involving two or more of cuboids, prisms, cylinders, hemispheres, cones (but not frustums of cones)

use formulae (for single plane shapes or solids) for perimeters, areas and volumes, together with known values to find one unknown length

for example, given $V = l \times b \times h$
and $V = 24 \text{ cm}^3$, $l = 1.5 \text{ cm}$,
 $h = 4 \text{ cm}$, find b

calculate for a given scale factor for length the effect on

- area
- volume

or vice versa

use Pythagoras' theorem to calculate unknown lengths

- fractional scale factors

using the formula

$$c^2 = a^2 + b^2$$

in 2-dimensional problems

Using and developing drawings

You should learn to:

- use drawings involving plans and elevations to
- interpret real situations
 - represent real situations by
 - drawings and sketches
 - models
 - reality

draw plans and elevations of 3-dimensional situations

use scale drawings to solve problems

This includes:

- use of scales, for example, 2:5, 1:150, 10:1, 2 to 5, $\frac{1}{3}$
- use of hidden detail
- use of cross-sections
- understanding that scaling alters lengths but not angles
- use of dashed lines for hidden detail
- use of shading for cross-sections
- giving sufficient dimensional information to allow your drawings to be correctly interpreted

Drawing with instruments

You should learn to:

use a straight edge and a pair of compasses only to construct

- a line that is perpendicular to a given line, through a given point
- the mid-point of a line segment
- the perpendicular bisector of a line segment
- the bisector of an angle
- a regular hexagon inscribed in a circle
- an equilateral triangle inscribed in a circle

use a ruler, a pair of compasses and a protractor to construct

- triangles from information such as two base angles and length of the base or from three lengths

Using geometrical terms and ideas

You should learn to:

This includes:

use geometrical terminology correctly

- parallel
- perpendicular
- bisect
- perpendicular bisector
- mid-point
- horizontal
- vertical
- line segment, line
- similarity
- congruence
- regular
- polygon
- pentagon
- hexagon
- octagon

understand ideas of similarity in terms of enlargement and scale factors

recognise and classify reflection and rotational symmetry in both 2 and 3 dimensions

- using lines and planes of symmetry
- defining order and centre of rotation

understand and use ideas of tessellation

for two similar shapes, use ratio to find the lengths of unknown sides

recognise and classify plane shapes

- quadrilaterals (including rectangle, square, parallelogram, rhombus, trapezium, kite)
- triangles
(including obtuse angled, acute angled, right angled)
(including equilateral, isosceles, scalene)
- irregular and regular polygons including their special cases
(for example parallelograms, trapezia, rhombi, kites, etc. as special quadrilaterals)

know and use internal and external angle sums of triangles, quadrilaterals and other polygons

features of regular polygons

Using transformations as operations on geometrical shapes

You should learn to:

This includes:

recognise, visualise, specify and transform geometrical shapes by means of

- enlargement
- reflection
- rotation

- use of negative, fractional scale factors for enlargement
- use of centre of enlargement
- use of centres of rotation and positive (anticlockwise) and negative (clockwise) rotation

and combinations of these

**Accuracy,
estimating and
checking**

You should learn to:

check your work using estimation techniques

- check your work using inverse operations

This includes:

carrying out estimation calculations both on paper and mentally

3.4 FSMQ Intermediate: Data Handling

Before you start this qualification

You must be able to:

understand and use decimal notation

express one quantity as a

- fraction
- percentage

of another

round values

calculate with

- fractions
- decimals
- percentages

substitute into formulae

This includes:

large numbers and fractions

to the nearest whole number, 10, 100, 1000, $\frac{1}{10}$ (0.1), $\frac{1}{100}$ (0.01) etc.

expressed in

- words
- symbols

What you need to Learn

Using calculators and computers

You should learn to use a calculator effectively and efficiently. A basic calculator with a memory facility will be sufficient for you to use with this qualification.

You may find a calculator with statistical facilities useful but you should also be able to calculate statistical measures from first principles. Any calculator used must conform to AQA Regulations.

Whenever you use a calculator you should record your working as well as the result.

It is important that you are also able to carry out simple calculations without using a calculator.

You should learn to use a spreadsheet to:

This includes:

draw tables and record data

sort data into increasing and decreasing order (for example, when finding the range of data values)

draw charts and diagrams

calculate totals and averages

pie charts, bar charts, line graphs

Using spreadsheet formulae such as:

- "=MEAN (A1:A10)"
- "=MEDIAN (A1:A10)"
- "=MODE (A1:A10)"

Setting up the parameters of your investigation and designing a data collection form

You should learn to:

This includes:

understand what is meant by the term 'hypothesis'

define an hypothesis that you wish to test

select the sample that you need to study

identify appropriate variables to measure

design a clear data collection form

considering in general terms what would be the appropriate characteristics of a suitable sample

- questionnaire design that ensures that questions are not
 - biased
 - leading
 - offensive
 - complex
- designing other data collection forms that you can use to collect data by observation and measurement

Recording and processing data

You should learn to:

This includes:

transfer data from data collection forms to tables you produce both by hand and spreadsheet

group data

using tally charts and frequency tables

using equal and unequal intervals

Calculating statistical measures

You should learn to:

This includes:

understand the differences between discrete and continuous data

choose appropriate measures of location for raw data values and be able to calculate these

calculating

- mean
- median
- mode

using formulae for the mean expressed in

- words (mean = $\frac{\text{sum of observed values}}{\text{number of observations}}$)
- symbols $\left(\bar{x} = \frac{\sum x}{n} \right)$

choose appropriate measures of location for grouped data and be able to calculate estimates of these

calculating

- mean
- median
- modal group

using formulae expressed in

- words (mean = sum of (mid-value of group × frequency) / number of observations)

symbols $\left(\bar{x} = \frac{\sum(xf)}{n} \right)$ (where $n = \sum f$)

choose and calculate appropriate measures of spread for

- raw data
- grouped data

calculating

- range
- interquartile range
- standard deviation (using a calculator)

use measures of location and spread to make sense of, and to compare, data sets

Representing data

You should be able to use the following diagrammatic representations of data drawn by hand and spreadsheet where possible:

This includes:

pictograms

bar charts

pie-charts

comparative pie charts

scatter graphs using Cartesian co-ordinates

understanding ideas of

- positive correlation
- negative correlation
- strength of correlation
- no correlation

This includes drawing a line of best fit by eye through the point representing the mean values and using the line of best fit to estimate missing values

histograms

with equal and unequal class widths

cumulative frequency diagrams

- indication of range, median, quartiles, inter-quartile range, percentiles
- use to estimate values

stem and leaf diagrams (ordered)

back-to-back stem and leaf diagrams

box and whisker diagrams

comparison of two data sets

Using probabilities

You should learn to:

- understand that the probability that an event occurs lies between 0 and 1
- understand that if the probability that an event, A, occurs is $p(A)$, then the probability that it does not occur is $1 - p(A)$
- express probabilities as
- fractions
 - decimals
 - percentages
- estimate probabilities from real data
- use probabilities from small data sets to project to larger populations

This includes:

- understanding numerical values associated with events having low, equally likely, and high probabilities
- understanding the idea of, and limitations of, probability as relative frequency for simple situations
- understanding the limitations your projections may have due to factors such as sample profile, when the data was collected etc.

Accuracy, estimating and checking

You should learn to:

- round values appropriately
- check calculations using inverse operations
- check calculations using estimates

This includes:

- by hand and mentally
- by hand and mentally

Interpreting findings

You should learn to:

- use measures of location, spread and probability together with statistical and probability diagrams to come to conclusions about the data from which they have been derived

This includes:

- comparison with other data of a similar nature

Critically examining the work of others

You should learn to:

- consider the use of diagrammatic representations of data in order to bias findings
- question if the data set used has been selected to strengthen a case
- consider whether alternative measures and diagrams would have been more or less useful to highlight the findings
- identify what you are not able to conclude from data

This includes:

- considering the use of techniques such as
- manipulation of the axes of graphs
 - using area to exaggerate findings
- consideration of whether a sub-set of data has been used or whether certain data has been discarded (for example data may have been used over the last 6 months as opposed to the last 12 months)
- consideration of what extra information or data you might need

3.5 FSMQ Intermediate: Algebra & Graphs

Before you start this qualification

You must be able to:

This includes:

understand and use fraction and decimal notation

- large and very small numbers;
- converting decimals to fractions and vice versa

carry out calculations involving decimals

express one quantity as a fraction of another

round values

to the nearest whole number, 10, 100, 1000, $\frac{1}{10}$ (0.1), $\frac{1}{100}$ (0.01) etc.

calculate with fractions and decimals

percentages

substitute into formulae

expressed in

- words
- symbols

calculate with numbers by carrying out operations in the correct order

working both by hand and with a calculator

What you need to learn

Using calculators and computers

You will find a standard scientific calculator most useful for this unit. You will need to learn to use either a graphic calculator or function plotting software on a computer to assist you when fitting functions to data.

You should learn to use your calculator effectively and efficiently. This will include learning to use:

- memory facilities
- function facilities (for example x^2 , $\frac{1}{x}$, ...)

It is important that you are also able to carry out simple calculations without using a calculator, using both written methods and 'mental' techniques (calculations in your head).

Whenever you use a calculator you should record your working as well as the result. For this reason you may prefer to use a calculator that has at least a two-line display that shows your calculation as well as the answer. A graphics calculator will allow you to do this easily.

Any calculator used must conform to AQA Regulations.

Collecting and handling data

You should learn to:

This includes:

use tables to record and present data

grouping data

average your data if necessary

mean, median, mode for discrete data

use standard form for large and small values

- using correct notation
- using a calculator to perform calculations with numbers expressed in standard form

use appropriate units for measurements and results of calculations

- use of correct notation
- knowledge of commonly used prefixes for units in the SI system
- conversion within and between systems using both conversion factors and formulae

choose and use an appropriate degree of accuracy with which to record data

rounding to an appropriate number of significant figures or decimal places

identify errors in data

by inspection of the data set and by graphical means

recognise the accuracy of your data

recognising that measurements expressed to a given unit can have a maximum error of half a unit; using notation such as 300 ± 50 to express errors

process data by substitution into algebraic expressions

Plotting and interpreting graphs

You should learn to:

This includes:

plot accurate graphs of data pairs

- plotting by hand and using either a graphic calculator or function plotting software on a computer.
- ensuring that your graphs are
 - correctly scaled
 - correctly labelled

use co-ordinates in all four quadrants

use functions to find data pairs

$$y = mx + c$$

$$y = kx^2 + c$$

$$y = ax^2 + bx + c$$

$$y = ax^3 + bx^2 + cx + d$$

$$y = \frac{k}{x}$$

- functions in terms of variables other than y and x for example

$$\left(s = 5t^2, P = \frac{k}{V} \right)$$

- other functions that are useful to your work
- using tables to display results and where appropriate stages of calculations

use function notation

for example $f(x) = kx^2 + c$

fit by eye, lines, both straight and curved, as appropriate, as an approximate fit to your data

find the intercepts of linear and non-linear graphs with axes and where appropriate understand their physical significance

using trace facilities with graphic calculators or function plotting software where possible

calculate the gradients of linear graphs in appropriate units and understand their physical significance

calculate estimates of the areas under graphs and understand their physical significance (if any)

using the formula for the area of a trapezium (and triangle if necessary)

Fitting functions to data

You should learn to:

This includes:

recognise the main features of direct proportional ($y = mx$) and linear ($y = mx + c$) models and be aware of their differences

- being aware of the patterns that data fitting these models have
- having a graphical understanding of the main features of these models

recognise the main features of quadratic models of the form $y = kx^2$

- being aware of the patterns that data fitting these models have
- having a graphical understanding of the main features of these models

be able to recognise the graphs of proportional, linear, quadratic and inverse proportional models

be able to predict the general shapes of graphs of direct and inverse proportion, linear and quadratic functions, given an algebraic statement of these

use the gradient and intercept of a straight line you have fitted to data to find an algebraic statement for it

understand when it is appropriate or not to use a particular function to model data

by consideration of

- intercepts
 - long term behaviour etc.
- in real world terms

find a function to fit data

using substitution of values into a given expression for the model

$$\left(y = mx + c, y = kx^2 + c, y = \frac{k}{x} \right)$$

to find unknown constants

use graphs to determine a value of a when you know $f(a)$

use graphs to solve equations

$$y = mx + c$$

$$y = kx^2 + c$$

$$y = kx^3$$

$$y = \frac{k}{x}$$

- other functions that are useful to your work

find the approximate solution of linear simultaneous equations by finding the point of intersection of two straight lines

Using algebraic techniques

You should learn to:

This includes:

substitute data into formulae and functions to calculate secondary data

- using correct order of operations
- using formulae that include multiples and fractions of
 - linear terms
 - powers (including positive and negative integers and fractions)
 - brackets

rearrange formulae

to include examples such as

- to give u if $v = u + 10t$
- to give I if $P = 1000I^2$ or $P = I^2 R$
- to give P if $A = P + \frac{PRT}{100}$

rearrange algebraic expressions by

- collecting like terms

- sums and differences of terms such as
 - na
 - nab
 - na^2

- expanding brackets

- expressions such as $2(x + y)$, $a(2a + 3b)$, $\frac{1}{2}(4x^2 + 6x)$

- extracting common factors

- expressions such as $(4x + 6x^2)$, $(16y - 8xy)$

form and solve exactly equations where the unknown appears in only one term

where the unknown is squared for example,
 $2x^2 + 14 = 20 \Rightarrow x = \sqrt{3}$ or $-\sqrt{3}$

form and solve equations where the unknown appears in two terms, each of the same power

equations such as: $4x - 2 = 2x + 8$,
 $3x^2 + 4 = 20 - x^2$

form and solve quadratic equations of the form

$$ax^2 + bx + c = 0$$

- factorising with $a = 1$
- completing the square
- using the formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

form and solve pairs of linear simultaneous equations by an algebraic method

interpret solutions geometrically

Accuracy, estimating and checking

You should learn to:

This includes:

check your work using estimation techniques

carrying out estimation calculations both on paper and mentally

check your work using inverse operations

3.6 FSMQ Foundation: Money Management

Written paper

There are no specific requirements for this qualification in respect of prior learning.

What you need to Learn

You will need to use the following knowledge, skills and understanding to carry out your investigations.

Using calculators and computers

When completing work for this qualification you may use a calculator. You should therefore learn to use your calculator effectively and efficiently.

A basic calculator with a memory facility will be sufficient for you to use with this qualification. However, any calculator may be used in this qualification provided that it conforms with the AQA Regulations.

Whenever you use a calculator you should record your working as well as the result.

It is important that you are also able to carry out simple calculations without using a calculator.

You should learn how to use a spreadsheet.

You should learn to use a spreadsheet to: This includes:

draw tables and record data	<ul style="list-style-type: none">▪ formatting column widths so as to input headings and data▪ formatting cells, when necessary, so that data is expressed correctly
record processed data in tables	
record financial transactions	<p>using columns to record</p> <ul style="list-style-type: none">▪ details of transactions▪ credits▪ debits▪ running totals
carry out calculations	<ul style="list-style-type: none">▪ using spreadsheet formulae such as "=E3+C4+D4" to calculate a running total in cell E4▪ using the 'fill down' facility
draw charts and diagrams	<ul style="list-style-type: none">▪ pie charts▪ bar charts▪ line graphs (using scatter graph facilities)

**Reading,
recording and
classifying
financial
transactions**

You should learn to:

This includes:

read and use information given in tables

use tables to record financial transactions

- by hand
- by spreadsheet
- using separate columns to record credits, debits and running total
- using negative numbers for debits, debts and negative credit

timetables

- Reading and using timetables given in 24 and 12 hour clock
- finding the length of time of a journey

classify transactions of one type (for example debits) into different categories (for example spending on leisure, travel, food, etc.)

using tally charts

**Carrying out
calculations**

You should learn to:

This includes:

understand and use decimal notation

the usual notations for money

carry out calculations based on credits and debits to calculate a current balance

- by hand
- with a calculator
- by spreadsheet using spreadsheet formulae such as "=E3+C4+D4"

carry out calculations involving the addition, subtraction, multiplication and division of money

debits and debts expressed as negative numbers

express one quantity as a fraction of another (for example total spent on travel as a fraction of all debits)

- as a decimal
- reducing to simplest form

express one quantity as a percentage of another

express two quantities as a ratio

reducing to simplest form

divide a quantity in a given ratio

for example dividing £50 in the ratio 2:3

convert between fractions, decimals and percentages

knowing common equivalencies:

$$\frac{1}{2} = 0.5 = 50\%$$

$$\frac{1}{4} = 0.25 = 25\%$$

$$\frac{1}{3} = 0.\dot{3} = 33\frac{1}{3}\%$$

$$\frac{1}{10} = 0.1 = 10\%$$

$$\frac{1}{5} = 0.2 = 20\%$$

and multiples of these.

use decimals and percentages to make comparisons

- putting decimals and percentages in order of size
- finding 'best buys'

use ratios to make comparisons

carry out calculations that involve finding fractions or percentages of quantities (for example finding 15% of £250, 25% of £400, $\frac{1}{4}$ of £12.80)

working without a calculator for fractions involving a whole-number denominator less than or equal to 10

exchange rates

calculate prices using exchange rates

calculate increases and decreases given a starting value and the percentage rate (for example when 250 is increased by 10% the increase is 25)

calculate new values given a starting value and a rate of percentage increase or decrease

calculate (simple) interest over a single time period

calculate interest which is compounded over at least two time periods

use of multi-stage calculations only rather than using formulae

Accuracy, estimating and checking

You should learn to:

This includes:

round values of money to the most appropriate value (for example the nearest penny, pound or £100)

check calculations using inverse operations by hand and mentally

check calculations using estimates by hand and mentally

check calculations by using another method (for example reaching a total in two different ways)

Displaying information

You should learn to:

This includes:

use tables to display data you have found and explain the results of your work

using tally charts

use charts to show financial data

pictograms, pie charts and bar charts drawn by hand and spreadsheet

draw line graphs to show how a quantity (for example current balance) varies with time

- by hand
- by spreadsheet

Portfolio

The portfolio is based on the same content as the written paper. Candidates must complete six tasks.

	What you need to produce:	You must:
1	<p>Records to show how you have used calculations to inform and make decisions about what is a 'best buy' for two different types of product.</p> <p>Each record should show</p> <ul style="list-style-type: none">▪ a comparison of at least two different products of a similar type but sold in different quantities▪ an appropriate way of making comparisons (for example price per litre or volume per £)▪ a conclusion as to which is the 'best buy'	<ul style="list-style-type: none">▪ present your findings clearly using tables where appropriate▪ use correct notation to record your findings▪ come to correct conclusions
2	<p>A completed order form showing the total cost of products or services. Your work should include</p> <ul style="list-style-type: none">▪ the gathering of data▪ discounts and/or supplements and/or V.A.T. to be involved▪ at least three different components to be involved <p>You should provide evidence of all calculations involved</p>	<ul style="list-style-type: none">▪ find the relevant information to complete your order form▪ show separately and clearly any calculations you carry out to help complete your order form

- 3 An explanation of the calculations involved in two different bills or invoices for different products or services
- Each bill or invoice should include at least three different elements for which charges are made (for example unit costs, standing charge, V.A.T., delivery charge)
- At least one bill or invoice should include V.A.T.
- show clearly how values have been calculated at each stage of preparing each bill
-
- 4 A report that shows the interest earned when a sum of money is invested
- over a single time period
 - over two or more time periods and shows an appreciation of the idea of compound interest
- show in full all calculations you carry out
 - present your findings clearly, using tables if appropriate
 - show an awareness of why the amounts earned are different using each method
 - write brief comments about what your calculations tell you
-
- 5 A report of an investigation into how percentage and fractional increases or decreases affect a sum of money (for example price, wage, interest earned)
- This must include
- calculations based on at least three different percentage rates and at least three different starting values
 - calculations involving fractions
 - a brief summary of your findings
- show in full any calculations you carry out
 - present your findings clearly, using tables where appropriate
 - write brief comments about what your calculations tell you
-
- 6 A report based on at least 10 financial transactions. This must include the use of a spreadsheet to show
- a record of credits, debits and current balance over a period of time
 - an analysis of this using tables and charts showing how the credits or debits can be classified into different categories
 - a graph that shows how the balance varies over the time period
- Your report should include a brief written summary of what your chart(s) and/or graph(s) tell you about the financial transactions you have investigated
- have records that are clear and accurate
 - ensure that diagrams and graphs are correctly scaled and adequately labelled
 - interpret, briefly and correctly, the results of your calculations, drawings and graphs

3.7 FSMQ Foundation: Using Spatial Techniques

Written paper

There are no specific requirements for this qualification in respect of prior learning.

What you need to Learn

You will need to use the following knowledge, skills and understanding to carry out your investigations.

Using calculators and computers

When completing work for this qualification you may use a calculator. You should therefore learn to use your calculator effectively and efficiently.

A basic calculator with a memory facility will be sufficient for you to use with this qualification. However, any calculator may be used in this qualification provided that it conforms with the AQA Regulations.

Whenever you use a calculator you should record your working as well as the result.

It is important that you are also able to carry out simple calculations without using a calculator.

You are encouraged to use available computer software when developing some drawings and plans.

Reading and recording measurements

You should learn to:

This includes:

select the appropriate instrument to make measurements of lengths and angles

for lengths selecting from

- ruler
- tape measure
- micrometer

use a

- ruler, tape measure, micrometer
- protractor

to make measurements to

- the nearest whole unit
- an appropriate level of accuracy

reading to the nearest whole unit selected as appropriate

for example to the nearest centimetre if appropriate even if the scale allows you to measure in millimetres

use and understand metric and common imperial measurements of

- length
 - mm
 - cm
 - m
 - km
 - inches
 - feet
 - yards
 - miles
- angle

use and understand metric measurements of

- area
 - mm^2
 - cm^2
 - m^2
- volume

use the most appropriate units for measurements

record measurements on diagrams or in tables as appropriate

- length
 - mm
 - cm
 - m
 - km
 - inches
 - feet
 - yards
 - miles
- angle
 - degrees

- area
 - mm^2
 - cm^2
 - m^2
- volume
 - mm^3
 - cm^3
 - m^3

- use of correct notation
- use of commonly used prefixes for units in the metric system for example centi-, milli-, kilo

giving both magnitude and units associated with measurements

Carrying out calculations with measurements

You should learn to:

This includes:

convert measurements within a system of measurement

- the metric system
- imperial system
- use of correct prefixes in the metric system
- conversion using scale factors

decide on the correct arithmetic (addition, subtraction, multiplication, division) to use with measurements in problems

problems involving more than one stage

carry out calculations with measurements you have found

- for lengths
 - adding and subtracting lengths
 - multiplying and dividing a length by a number
- for angles:
 - adding and subtracting angles
 - multiplying and dividing an angle by a number

carry out calculations involving scaling

- from real to scaled situation (either drawing or model)
- from scaled (either drawing or model) to real situation

with scaling represented in the forms

- 1: n
- 1 to n
- $\frac{1}{n}$

where n is 2, 5, 10, 50, 100, 500 or 1000 (or other common scaling used in your area of work)

use measurements of length to calculate

- perimeters
- areas
- surface areas
- volume

giving values in correct units

- understanding circumference of a circle as perimeter
- finding circumferences of circles using the formula
circumference = $\pi \times \text{diameter}$
- using the π button on your calculator or the approximate value $\pi = 3.14$ (to 2 decimal places)
- finding areas of
 - rectangles
 - triangles
 - shapes formed by combinations of at most two rectangles or triangles or one of each
- using formula for area of rectangles: area = length \times width

- using formula for area of triangles
area = $\frac{1}{2} \times \text{base} \times \text{perpendicular height}$
- finding the area enclosed by a circle using the formula
area = $\pi \times \text{radius}^2$
- finding surface areas and volumes of
 - cuboids
 - triangular prisms
 - cylinders
- using formula for volume of cuboids, prisms, cylinders
volume = area of cross-section \times length

Working with drawings and plans

You should learn to:

use plans and elevations to visualise simple situations

draw

- plans
- elevations

of simple 2- and 3-dimensional situations

This includes:

- appreciation and use of simple scales, $1:n$
- where n is 2, 5, 10, 50, 100, 500 or 1000 (or other common scaling used in your area of work)
- understanding that scaling alters lengths but not angles
- appreciation and use of simple scales, $1:n$
- where n is 2, 5, 10, 50, 100, 500 or 1000 (or other common scaling used in your area of work)
- understanding that scaling alters lengths but not angles

Drawing with instruments

You should learn to:

use rulers, set squares, protractors to draw plane shapes accurately

use compasses to draw circles accurately

use a straight edge and a pair of compasses to construct accurately

- a line that is perpendicular to a given line, through a given point
- the mid-point of a line segment
- the perpendicular bisector of a line segment
- a regular hexagon inscribed in a circle
- an equilateral triangle inscribed in a circle.

This includes:

- rectangles (including squares)
- triangles

Using geometrical terms and ideas

You should learn to:

This includes:

use correctly the geometrical terms

- parallel
- perpendicular
- right angle
- bisect
- mid-point
- line segment
- line
- regular
- polygon
- pentagon
- hexagon
- octagon
- prism
- chord
- radius
- congruent

know and use the angle sums

- at a point
- at a point on a straight line
- of quadrilaterals
- of triangles

recognise and classify plane symmetry

- single lines of symmetry
- rotational symmetry including the idea of centre and order

recognise and classify plane shapes

- quadrilaterals (including rectangle, square, parallelogram, rhombus, trapezium, kite)
- triangles (including obtuse angled, acute angled, right-angled) (including equilateral, isosceles, scalene)
- understanding of properties (limited to equal sides and angles) associated with regular polygons

Accuracy, estimating and checking

You should learn to:

This includes:

check your calculations using estimation techniques

carrying out estimation calculations on paper

check your calculations using inverse operations

Portfolio

The portfolio is based on the same content as the written paper. Candidates must complete five tasks.

What you need to produce:	You must:
<p>1 Evidence of your use of a plan/elevation(s) of a 2- or 3- dimensional situation to</p> <p>(a) sketch realistically, or</p> <p>(b) construct a model to scale, or</p> <p>(c) develop a situation to actual size</p>	<ul style="list-style-type: none">▪ include sketches or photographs (if you have made a model or developed a real situation) that show clearly the main features of the situation▪ ensure that it can be seen that the proportions of the situation are of the right order
<p>2 The drawing of appropriate plans and/or elevations of two different 3-dimensional situations.</p> <p>At least one should involve scaling.</p> <p>One of these may be drawn using computer software but at least one situation should be fully represented by drawings done by hand.</p>	<ul style="list-style-type: none">▪ include evidence of scaling calculations▪ draw clearly and accurately and include key dimensions
<p>3 Solutions to at least one problem where you have:</p> <ul style="list-style-type: none">▪ used a measuring instrument to take at least 5 readings of different lengths▪ used your readings to carry out at least 5 different calculations that involve areas and volumes (and perimeters if appropriate).	<ul style="list-style-type: none">▪ show clearly all stages of your calculations▪ record clearly the results of your work▪ include units of measurement
<p>4 A written description of a 2-dimensional situation, using geometrical terms and ideas, that includes:</p> <ul style="list-style-type: none">▪ the use of terms such as parallel and perpendicular▪ the classification of shapes▪ symmetry▪ if appropriate, the classification of angles (acute, right angle, obtuse, reflex).	<p>identify and use on your own the appropriate and correct geometrical terms</p>
<p>5 Two constructions for which you have used different techniques.</p>	<p>leave sufficient detail of your construction work so that it can be assessed</p>

3.8 FSMQ Foundation: Using Data

Written paper

There are no specific requirements for this qualification in respect of prior learning.

What you need to Learn

You will need to use the following knowledge, skills and understanding to carry out your investigations.

Using calculators and computers

When completing work for this qualification you may use a calculator. You should therefore learn to use a calculator effectively and efficiently.

A basic calculator with a memory facility will be sufficient for you to use with this qualification. However, any calculator may be used in this qualification provided that it conforms with the AQA Regulations.

Whenever you use a calculator you should record your working as well as the result.

It is important that you are also able to carry out simple calculations without using a calculator.

You should learn how to use a spreadsheet.

You should learn to use a calculator to:

This includes:

sum data

use of memory facility

calculate averages

use of memory facility

carry out basic calculations such as finding a fraction of quantity

It is important that you are also able to carry out simple calculations without using a calculator, using both written methods and 'mental' techniques (calculations in your head) where appropriate.

You should learn to use a spreadsheet to:

This includes:

draw tables and record data

- formatting column widths so as to input headings and data
- formatting cells, when necessary, so that data is expressed correctly
- using a tally chart

draw charts and diagrams

pie charts, bar charts, line (scatter) diagrams

carry out calculations including finding averages

using spreadsheet formulae such as

- `"=A1+A2+A3"` to sum values in cells
- `"=2*X"` where column A has been named "X"
- `"=Sum (A1:A10)"`
- `"=MEAN (A1:A10)"`
- `"= MEDIAN (A1:A10)"`
- `"= MODE (A1:A10)"`

sort data into increasing and decreasing order (for example, when finding the range of data values)

Drawing up tables and recording data

You should learn to:

This includes:

identify the data that is appropriate to your investigation

select categories into which you will sort data

draw up tables

- labelling headings accurately
- giving units for data when necessary

use methods to check that your tables include all data

Carrying out calculations and finding statistical measures

You should learn to:

This includes:

calculate the sum (total) of data values

- using the memory facility on a calculator
- using spreadsheet formulae (including for example, `"=A1+A2+...A10"`
`"= Sum (A1:A10)"`)

express one quantity as a proportion of another

for example one data value as a proportion of the total

- as a fraction
- as a decimal
- as a percentage
- converting fractions to percentages
- using spreadsheet formulae, for example, `"=A1*100"`, `"=A1/A15"`

express two quantities as a ratio

reducing to simplest form

divide a quantity in a given ratio

for example dividing £50 in the ratio 2:3

know common equivalencies for simple fractions, decimals and percentages

$$\frac{1}{2} = 0.5 = 50\%$$

$$\frac{1}{4} = 0.25 = 25\%$$

$$\frac{1}{3} = 0.\dot{3} = 33\frac{1}{3}\%$$

$$\frac{1}{10} = 0.1 = 10\%$$

$$\frac{1}{5} = 0.2 = 20\%$$

and multiples of these

calculate average values

- mean
- median
- mode

- using the memory facility on a calculator
- using spreadsheet formulae for mean, median, mode
- using a spreadsheet to sort data into increasing or decreasing order to find the median

calculate the range for a set of data

using a spreadsheet to sort data into increasing or decreasing order

Drawing statistical diagrams and graphs of data pairs

You should be able to draw the following by hand and where possible using a spreadsheet:

This includes:

pictograms

bar charts

pie charts

- calculating size of a sector using a fraction of 360°
for example $\frac{1}{5}$ of a data set is represented by
$$\frac{1}{5} \times 360^\circ = 72^\circ$$
- using 1% represented by 3.6°

line graphs of data pairs

- choosing axes for each set of data
- scaling axes (for data not necessarily starting at zero)
- plotting points accurately
- joining data pairs with line segments where appropriate
- showing a trend in data by drawing a straight line where appropriate
- using a spreadsheet (to draw a scatter diagram to obtain a line graph)

Understanding situations involving direct proportion

You should learn to:

This includes:

recognise when one set of data is directly proportional to another by considering step sizes in both sets of data

understanding that with data from real situations the step lengths may only be approximately equal

recognise the graph of data that is directly proportional as

- giving a straight line
- passing through the origin

understanding how a step of fixed size in one set of data always gives steps of a fixed size in the other as shown by such graphs

give the equation that represents a situation involving direct proportion

- from information given in words
- from a graph of the situation

Interpreting statistical diagrams and graphs of data pairs

You should learn to:

This includes:

be able to express in words what statistical diagrams tell you about the situation they represent

- pictograms
- bar charts
- pie charts

be able to express in words what, in general, a line graph tells you about the situation it represents

make sense of what is happening in the real situation where the graph of data pairs cuts the axes

make sense in general terms of the gradient of graphs of data pairs

the idea of steep, shallow, horizontal and vertical gradients only, i.e. calculation of gradients is not included except in situations involving direct proportion

be able to find the gradient of a graph of a situation involving direct proportion and understand what this represents

be able to use and interpret timetables

- Reading and using timetables given in 24 and 12 hour clock
- finding the length of time of a journey

Accuracy, estimating and checking

You should learn to:

This includes:

check your work using estimation techniques

carrying out estimation calculations on paper

check your work using inverse operations

by hand, mentally, using a calculator, using a spreadsheet

check mentally the approximate size of a calculated result

Portfolio

The portfolio is based on the same content as the written paper. Candidates must complete six tasks.

What you need to produce:

- 1 Two tables of data that you have drawn up arising from two different situations
One of your tables should be drawn using a spreadsheet, the other by hand

You must:

- select which data to put in your table
- decide on the table headings to use
- complete your table accurately using *all relevant* data
- use methods of checking to make sure that you have included all data

<p>2 Two different types of statistical diagrams and two different statistical measures that illustrate data from up to two different situations</p> <p>The data you use can be the result of your work towards 1 above, or can be taken from another source such as a newspaper article, book or the internet</p> <p>One of your diagrams should be drawn using a spreadsheet, the other by hand. One of your measures should be calculated using a spreadsheet, the other not</p>	<ul style="list-style-type: none"> ▪ use only diagrams that are relevant ▪ present diagrams that are clear, accurate and fully labelled ▪ show the calculations you carry out
<p>3 Two different graphs of data pairs representing two different situations, and a brief written description of each graph.</p> <p>The data pairs you use can be the result of your work towards 1 above, or can be taken from another source.</p> <p>One of your graphs should be of a situation involving direct proportion.</p> <p>One of your graphs should be drawn using a spreadsheet; the other should be drawn by hand.</p>	<p>for each graph</p> <ul style="list-style-type: none"> ▪ select the data you need ▪ present the data in a table ▪ choose the graph's axes and scale ▪ plot the points accurately <p>for each written description explain, if relevant, what</p> <ul style="list-style-type: none"> ▪ any intercepts with the graph's axes ▪ gradients <p>tell you about the real situation</p>
<p>4 Two brief written descriptions of what two line graphs drawn by someone else tell you about the situations they represent.</p>	<p>for each written description explain, if relevant, what</p> <ul style="list-style-type: none"> ▪ any intercepts with the graph's axes ▪ gradients ▪ the general shape <p>tell you about the real situation</p>
<p>5 A brief report in which you have interpreted both raw data and at least two statistical diagrams produced by someone else.</p>	<p>draw relevant and appropriate conclusions</p>
<p>6 Printouts from a spreadsheet.</p> <p>You should include two printouts:</p> <ul style="list-style-type: none"> ▪ showing the results of your work; ▪ showing any formulae that have been used, if that is appropriate. <p>This work may be the result of your work towards 1, 2 or 3 above.</p>	

4 Scheme of Assessment

4.1 Aims

GCSE Use of Mathematics aims to promote:

- application of mathematical principles
- the application of mathematics to students' studies, work or interests
- the development of a mathematics curriculum that is integrated with other areas of students' studies, work or interests
- development of skills that enable students to communicate, use and interpret their mathematics
- the solution of substantial and realistic problems encountered by adults
- the ability to solve open-ended problems
- the development of mathematical modelling skills
- the development of mathematical reasoning skills
- appropriate use of ICT
- enjoyment of mathematics and the development of confidence in using mathematics.

4.2 Assessment Objectives (AOs)

Assessment Objectives (AOs) in FSMQ

The Assessment Objectives are common to GCSE Use of Mathematics and both Foundation and Intermediate FSMQ. (Functional Mathematics has different objectives, see below.) The assessment units will assess the following objectives in the contexts of the content and skills set out in Section 3 (Subject Content).

The portfolios and written examinations of this GCSE will assess a candidate's ability to apply mathematical principles to analyse and make sense of situations, to solve problems and to draw conclusions. Candidates should be able to develop and use mathematics as a model of reality and have an awareness of any limitations this may introduce into their analysis of a situation.

In particular the assessment units will assess a candidate's ability to:

1. select and organise data in a form that allows ease of analysis
2. select when it is appropriate to use ICT to work with data and to be able to work competently with such ICT

3. select, recall and use mathematics appropriate to the situation, giving solutions to an appropriate degree of accuracy
4. interpret what their mathematics tells them about the situation they are analysing or the problem they are solving, using this information to summarise and draw conclusions
5. communicate clearly using logical reasoning and appropriate notation
6. work independently and follow their own line of enquiry.

The tables below show the approximate weighting of each of the Assessment Objectives in the FSMQ assessments.

	% of Intermediate FSMQ units
AO1	10 – 20
AO2	0
AO3	50 – 65
AO4	10 – 20
AO5	10 – 20
AO6	0

	Level 1 Unit Weightings (%)								
	FSMQ Foundation: Money Management			FSMQ Foundation: Using Spatial Techniques			FSMQ Foundation: Using Data		
	Portfolio	Paper	Total	Portfolio	Paper	Total	Portfolio	Paper	Total
AO 1	6 – 10	5 – 10	11 – 20	8 – 12	5 – 10	13 – 22	5 – 8	5 – 10	10 – 8
AO 2	6 – 10	0	6 – 10	0 – 5	0	0 – 5	10 – 20	0	10 – 20
AO 3	6 – 10	25 – 33	31 – 43	8 – 12	25 – 33	33 – 45	5 – 8	25 – 33	30 – 41
AO 4	6 – 10	5 – 10	11 – 20	6 – 10	5 – 10	11 – 20	5 – 8	5 – 10	10 – 18
AO 5	6 – 10	5 – 10	11 – 20	6 – 10	5 – 10	11 – 20	5 – 8	5 – 10	10 – 18
AO 6	6 – 10	0	6 – 10	6 – 10	0	6 – 10	6 – 10	0	6 – 10

Assessment Objectives (AOs) in Functional Mathematics

The Functional Mathematics specification requires candidates to

- AO1 Demonstrate knowledge, skills and understanding
- AO2 Apply knowledge and understanding using appropriate terms, concepts and methods in abstract and real-life contexts
- AO3 Demonstrate strategies for problem solving

	% of Functional Mathematics
AO1	37
AO2	51.5
AO3	11.5

Quality of Written Communication (QWC)

This specification does not formally assess the quality of written communication.

4.3 National Criteria

This specification complies with the following.

- The Code of Practice for GCSE
- The GCSE Qualification Criteria
- The Arrangements for the Statutory Regulation of External Qualifications in England, Wales and Northern Ireland: Common Criteria

4.4 Prior learning

There are no prior learning requirements for Foundation FSMQ (level 1) units.

Prior learning requirements for the Intermediate FSMQ (level 2) units are detailed in section 3 of this specification.

It is expected that candidates will have reached the required level of literacy through study at Key Stage 3.

However, any requirements set for entry to a course following this specification are at the discretion of centres.

4.5 Pre-release data sheets

Data sheets for pilot FSMQs should be opened and issued to candidates 1 to 3 weeks before the examination. Candidates will be able to work with their teachers in familiarising themselves with the contexts, clarifying any specialised vocabulary and considering the possible mathematics in the situation presented. Teachers will need to provide reasonable class time for this to happen. This should be at least one lesson but there is no upper limit on the time candidates can spend considering the data sheets (provided, of course, they remain sealed until the date for release printed on the packet label).

The pre-release data sheets cannot be taken into the examination room. A clean copy of the data along with any further data required for the other questions will be issued to all candidates at the start of the examination. This sheet will not be collected in and marked so candidates should ensure that all working is presented in the question paper/answer book.

(Please note that if you teach any non-pilot FSMQ or Use of Maths units, the data sheets should still only be opened and issued 1 to 2 weeks before the examination.)

5 Administration

5.1 Availability of Assessment Units and Certification

Examinations and certification for this specification are available as follows:

		January 2008	June 2008
Availability of units	Functional Mathematics	✓	✓
	FSMQ Foundation: Money Management	x	✓
	FSMQ Foundation: Using Spatial Techniques	x	✓
	FSMQ Foundation: Using Data	x	✓
	FSMQ Intermediate: Financial Calculations	x	✓
	FSMQ Intermediate: Shape & Space	x	✓
	FSMQ Intermediate: Data Handling	x	✓
	FSMQ Intermediate: Algebra & Graphs	x	✓
Availability of certification	GCSE Use of Mathematics	x	✓

Examinations and qualifications in Functional Mathematics will continue to be available on this pilot until a national qualification in GCSE Mathematics (including Functional Mathematics) becomes available. At present this is expected to be in 2012.

The continued availability of these specifications for individual Foundation and Intermediate FSMQ units will be reviewed after each year of the pilot. This specification is correct for 2008 only. It is expected to run, with revisions, until Summer 2010.

5.2 Entries

Please refer to the current version of *Entry Procedures and Codes* for up to date entry procedures. You should use the following entry codes for the units and for certification.

GCSE Use of Mathematics certification

FSMQ Foundation: Money Management 9981

Portfolio 9981/C Written paper 9981/W

FSMQ Foundation: Using Spatial Techniques 9982

Portfolio 9982/C Written paper 9982/W

FSMQ Foundation: Using Data 9983

Portfolio 9983/C Written paper 9983/W

FSMQ Intermediate: Financial Calculations 9984**FSMQ Intermediate: Shape & Space 9985****FSMQ Intermediate: Data Handling 9986****FSMQ Intermediate: Algebra & Graphs 9988**

**Functional Mathematics 93001P (written paper) or
93001S (on-screen test)**

The **subject code** for entry to the GCSE Use of Mathematics award is **9351**.

5.3 Private Candidates

This specification is not available to private candidates.

5.4 Access Arrangements and Special Consideration

We have taken note of the provisions of the Disability Discrimination Act (DDA) 1995 in developing and administering this specification.

We follow the guidelines in the Joint Council for Qualifications (JCQ) document: *Access Arrangements and Special Consideration: Regulations and Guidance Relating to Candidates who are Eligible for Adjustments in Examination GCE, AEA, GCSE, Entry Level & Key Skills*. This is published on the JCQ website (http://www.jcq.org.uk/access_arrangements/) or you can follow the link from our website (http://www.aqa.org.uk/admin/p_special_3.html).

Access Arrangements

We can make arrangements so that candidates with disabilities (under the terms of the DDA) can access the assessment. These arrangements must be made **before** the examination. For example, we can produce a Braille paper for a candidate with a visual impairment.

Special Consideration

We can give special consideration to candidates who have had a temporary illness, injury or indisposition at the time of the examination. Where we do this, it is given **after** the examination.

Applications for access arrangements should be submitted to AQA by the Examinations Officer at the centre.

5.5 Language of Examinations

We will provide units for this specification in English only.

5.6 Qualification Titles

Qualifications based on this specification are:

- AQA Level 1/Level 2 GCSE in Use of Mathematics
- AQA Functional Mathematics at Level 2
- AQA Foundation Level Free-Standing Mathematics Qualification: Money Management
- AQA Foundation Level Free-Standing Mathematics Qualification: Using Spatial Techniques
- AQA Foundation Level Free-Standing Mathematics Qualification: Using Data
- AQA Intermediate Level Free-Standing Mathematics Qualification: Financial Calculations
- AQA Intermediate Level Free-Standing Mathematics Qualification: Shape & Space
- AQA Intermediate Level Free-Standing Mathematics Qualification: Data Handling
- AQA Intermediate Level Free-Standing Mathematics Qualification: Algebra and Graphs

5.7 Awarding Grades and Reporting Results

The GCSE qualification will be graded on an eight-grade scale: A*, A, B, C, D, E, F and G. GCSE candidates who fail to reach the minimum standard for grade G will be recorded as U (unclassified) and will not receive a qualification certificate.

Candidates on the Data and Finance routes may enter Data and Finance units at both levels 1 and 2. The final grade awarded will be the best grade available based on the allowed combinations of units for these routes and their UMS points.

Upon completion of the Functional Mathematics unit, candidates will be awarded a pass or fail in functional mathematics at level 2.

Individual FSMQs will be reported on a five-grade scale: A, B, C, D and E. These certificates are awarded irrespective of performance in the GCSE Use of Mathematics.

FSMQ candidates who fail to reach the minimum standard for grade E will be recorded as U (unclassified) for the FSMQ and will not receive a qualification certificate.

Determination of candidates' final grades

For each unit, candidates' results will be reported on a *Uniform Mark Scale* which is related to grades as follows.

	UMS awarded for:	
	Intermediate (level 2) FSMQ	Foundation (level 1) FSMQ (combined portfolio and written paper)
Maximum UMS for qualification	200	119
FSMQ Grade		
A	180 -200	100 -119
B	165 -179	85 - 99
C	150 -164	70 - 84
D	135 -149	55 - 69
E	120 -134	40 - 54
N	113 -119	
U	0 -112	0 - 39

	GCSE Use of Mathematics
Maximum UMS for qualification	600
At GCSE grade:	
A*	540-600
A	480-539
B	420-479
C	360-419
D	300-359
E	240-299
F	180-239
G	120-179
U	0-119

A candidate's uniform mark is calculated from his/her raw mark for the unit by using the grade boundaries set by the awarding committee. For example, a candidate who achieves the minimum mark required for a grade B in functional mathematics receives a uniform mark of 140 for that unit.

A candidate's overall uniform mark is then calculated by adding together the UMS from the component units of the GCSE.

	Functional Mathematics
Maximum UMS for qualification	200
At GCSE grade:	
A*	180-200
A	160-179
B	140-159
C	120-139
D	100-119
E	80-99
F	60-79
G	40-59
U	0-39

A candidate on the Foundation route to certification- that is, using two Foundation (level 1) FSMQs cannot obtain a grade C, even if he or she achieves 360 UMS. Grade D is the maximum available on this route, regardless of UMS.

On individual Intermediate (level 2) units, there is a small 'safety net' for candidates who fail to pass the unit with a grade E. For example, a candidate entering the Intermediate unit Financial Calculations who just fails to attain a grade E in the FSMQ does not obtain zero uniform marks towards the GCSE.

5.8 Re-Sits and Shelf-Life of Unit Results

Unit results remain available to count towards certification, whether or not they have already been used, as long as the specification is still valid.

Candidates may re-sit a unit any number of times within the shelf-life of the specification. The best result for each unit will count towards the final qualification.

A Foundation FSMQ counts as a unit of the GCSE Use of Mathematics and the FSMQ result remains available towards certification of a future GCSE Use of Mathematics. However, individual Foundation written paper and portfolio results are lesser components of a GCSE unit and are treated differently. Written paper results alone do not remain available to count towards future FSMQ Foundation certifications. Candidates repeating the Foundation written examination may

carry forward their moderated portfolio mark within the shelf-life of the specification. Where a candidate is absent for one of the two components of a Foundation FSMQ, the candidate will be graded with a contribution of zero marks for that component.

Candidates who wish to repeat a qualification may do so by re-taking one or more units. The appropriate subject award entry, as well as the unit entry/entries, must be submitted in order to be awarded a new subject grade.

There is no facility to decline a GCSE Use of Mathematics or FSMQ award once it has been issued.

Candidates will be graded on the basis of the work submitted for assessment.

6 Portfolio Administration

The Head of Centre is responsible to AQA for ensuring that portfolio work is conducted in accordance with AQA's instructions and JCQ instructions.

6.1 Supervision and authentication of portfolios

The Code of Practice for GCSE requires:

- **candidates** to sign the Candidate Record Form (CRF) to confirm that the work submitted is their own, and
- **teachers/assessors** to confirm on the CRF that the work assessed is solely that of the candidate concerned and was conducted under the conditions laid down by the specification.

The completed CRF for each candidate must be attached to his/her work. All teachers who have assessed the work of any candidate entered for each component must sign the declaration of authentication. Failure to sign the authentication statement may delay the processing of the candidates' results.

The teacher should be sufficiently aware of the candidate's standard and level of work to appreciate if the portfolio submitted is beyond the talents of the candidate.

In most centres teachers are familiar with candidates' work through class and homework assignments. Where this is not the case, teachers should make sure that portfolios are completed under direct supervision.

In all cases, some direct supervision is necessary to ensure that the portfolio submitted can be confidently authenticated as the candidate's own.

If teachers/assessors have reservations about signing the authentication statements, the following points of guidance should be followed.

- If it is believed that a candidate has received additional assistance and this is acceptable within the guidelines for the relevant specification, the teacher/assessor should award a mark which represents the candidate's unaided achievement. The authentication statement should be signed and information given on the relevant form.
- If the teacher/assessor is unable to sign the authentication statement for a particular candidate, then the candidate's work cannot be accepted for assessment.
- If malpractice is suspected, the Examinations Officer should be consulted about the procedure to be followed.

6.2 Malpractice

Teachers should inform candidates of the AQA Regulations concerning malpractice.

Candidates must **not**:

- submit work which is not their own;
- lend work to other candidates;
- allow other candidates access to, or the use of, their own independently-sourced source material;
- include work copied directly from books, the internet or other sources without acknowledgement or attribution;
- submit work typed or word-processed by a third person without acknowledgement.

These actions constitute malpractice, for which a penalty (eg disqualification from the examination) will be applied.

Where suspected malpractice in a portfolio is identified by a centre after the candidate has signed the declaration of authentication, the Head of Centre must submit full details of the case to AQA at the earliest opportunity. The form JCQ/M1 should be used. Copies of the form can be found on the JCQ website (<http://www.jcq.org.uk/>).

Malpractice in a portfolio discovered prior to the candidate signing the declaration of authentication need not be reported to AQA, but should be dealt with in accordance with the centre's internal procedures. Details of any work which is not the candidate's own must be recorded on the portfolio cover sheet or other appropriate place.

6.3 Teacher Standardisation

We will hold annual standardising meetings for teachers, usually in the autumn term, for the portfolio components. At these meetings we will provide support in developing appropriate tasks and using the marking criteria.

If your centre is new to this specification, you must send a representative to one of the meetings. If you have told us you are a new centre, either by submitting an estimate of entry or by contacting the subject team, we will contact you to invite you to a meeting. Otherwise, standardisation meetings will be listed on the FSMQ Noticeboard pages of the AQA website.

We will also contact centres to invite them to send a representative if:

- the moderation of portfolios from the previous year has identified a serious misinterpretation of the portfolio requirements,
- inappropriate tasks have been set, or
- a significant adjustment has been made to a centre's marks.

For all other centres, attendance is optional. If you are unable to attend and would like a copy of the materials used at the meeting, please contact the subject team at mathematics-gce@aqa.org.uk.

6.4 Internal standardisation of marking

Centres must standardise marking within the centre to make sure that all candidates at the centre have been marked to the same standard. One person must be responsible for internal standardisation. This person should sign the Centre Declaration Sheet to confirm that internal standardisation has taken place.

Internal standardisation involves:

- all teachers marking some trial pieces of work and identifying differences in marking standards;

- discussing any differences in marking at a training meeting for all teachers involved in the assessment;
- referring to reference and archive material such as previous work or examples from AQA's teacher standardising meetings.

6.5 Annotation of portfolios

The Code of Practice for GCSE states that the awarding body must require internal assessors to show clearly how the marks have been awarded in relation to the marking criteria defined in the specification and that the awarding body must provide guidance on how this is to be done.

The annotation will help the moderator to see as precisely as possible where the teacher considers that the candidates have met the criteria in the specification.

Work could be annotated by either of the following methods:

- key pieces of evidence flagged throughout the work by annotation either in the margin or in the text;
- summative comments on the work, referencing precise sections in the work.

6.6 Submitting marks and sample work for moderation

The total mark for each candidate must be submitted to AQA and the moderator on the mark forms provided or by Electronic Data Interchange (EDI) by the specified date.

Centres will be informed which candidates' work is required in the samples to be submitted to the moderator.

6.7 Factors affecting individual candidates

Teachers should be able to accommodate the occasional absence of candidates by ensuring that the opportunity is given for them to make up missed assessments.

If work is lost, AQA should be notified immediately of the date of the loss, how it occurred, and who was responsible for the loss. Centres should use the JCQ form JCQ/LCW to inform AQA Candidate Services of the circumstances.

Where special help which goes beyond normal learning support is given, AQA must be informed through comments on the CRF so that such help can be taken into account when moderation takes place.

Candidates who move from one centre to another during the course sometimes present a problem for a scheme of internal assessment. Possible courses of action depend on the stage at which the move takes place. If the move occurs early in the course the new centre should take responsibility for assessment. If it occurs late in the course it may be possible to arrange for the moderator to assess the work through the 'Educated Elsewhere' procedure. Centres should contact AQA at the earliest possible stage for advice about appropriate arrangements in individual cases.

6.8 Retaining evidence and re-using marks

The centre must retain the work of all candidates, with CRFs attached, under secure conditions, from the time it is assessed, to allow for the possibility of an enquiry about results. The work may be returned to candidates after the deadline for enquiries about results. If an enquiry about a result has been made, the work must remain under secure conditions in case it is required by AQA.

Candidates re-taking a Foundation FSMQ unit may carry forward their moderated portfolio mark. These marks have a shelf life which is limited only by the shelf-life of the specification, and they may be carried forward an unlimited number of times within this shelf-life.

6.9 Assessment of the portfolio

The portfolio will be given a mark, from 0 to 17, for each of three themes:

- Structuring and presenting work
- Using appropriate mathematics and working accurately
- Interpreting mathematics

The marking grid gives a description for each level under each of these themes for work at 0, 5, 10 and 15 marks.

	<i>Structuring and presenting work</i>	<i>Using appropriate mathematics and working accurately</i>	<i>Interpreting mathematics</i>
0	The work has substantial omissions and is poorly presented.	There is little evidence of using mathematics accurately at the appropriate level.	There is little evidence of relating mathematics to the situations investigated or there are substantial errors in interpretation.
1			
2			
3			
4	The candidate has completed given tasks and presented the Coursework Portfolio clearly so that all pieces of evidence can easily be found.	The candidate has produced a Coursework Portfolio that contains no major errors.	The candidate has interpreted their solutions in terms of each of the situations investigated.
5			
6			
7			
8			
9	The candidate has worked independently on some occasions <i>and</i> each piece of work in the Coursework Portfolio can be followed easily.	The candidate has used, across the Coursework Portfolio, a range of appropriate methods to check their work.	The candidate has used mathematics to help them describe in words the main features of the situations investigated.
10			
11			
12			
13			
14	The candidate has shown that they can work independently on a regular basis <i>and</i> they have structured each piece of work logically.	The candidate has used appropriate, efficient and concise methods of working.	The candidate has used mathematics to summarise and draw appropriate conclusions about the situations investigated.
15			
16			
17			

Incomplete Portfolios

It is one of the fundamental principles of FSMQ that each portfolio component is designed to support that module's written examination unit and vice versa. To this effect, candidates are strongly advised to complete all the requirements of the portfolio. In order to encourage candidates to do so, a substantial down-marking of portfolios occurs when all the requirements of the portfolio are not completed.

As a guideline to centres, for Money Management:

- if only five of the six sections are completed the maximum mark in Theme 1 is 4; and the marks which would have been awarded in Themes 2 and 3 should be scaled down to a factor of two-thirds.
- if only four of the six sections are completed the maximum mark in Theme 1 is 3; and the marks which would have been awarded in Themes 2 and 3 should be scaled down to a factor of one half.
- if only three of the six sections are completed the maximum mark in Theme 1 is 2; and the maximum marks which could be awarded in Themes 2 and 3 are 4 and 4.

For Using Spatial Techniques, which includes five sections:

- if only four of the five sections are completed the maximum mark in Theme 1 is 4; and the marks which would have been awarded in Themes 2 and 3 should be scaled down to a factor of two-thirds.
- if only three of the five sections are completed the maximum mark in Theme 1 is 3; and the marks which would have been awarded in Themes 2 and 3 should be scaled down to a factor of one half.
- if only two of the five sections are completed the maximum mark in Theme 1 is 2; and the maximum mark which could be awarded in Themes 2 and 3 are 3 and 3.

The portfolio must, as a whole, satisfy criteria regarding the use of construction and calculation techniques.

Thus, if no accurate drawings are incorporated into section 2 the maximum mark in Theme 1 is 4; and the marks which would have been awarded in Themes 2 and 3 should be scaled down to a factor of two-thirds.

If no calculations are included in section 3 the maximum mark in Theme 1 is 4; and the marks which would have been awarded in Themes 2 and 3 should be scaled down to a factor of two-thirds.

For Using Data:

As a guideline to centres, for this unit two different situations must be considered. Overall in this portfolio, the candidate needs to include: two tables, two diagrams, two measures, two graphs of data pairs, two written descriptions of graphs, one report and a printout from a spreadsheet, a total of twelve items.

- If only ten of the twelve items required are completed the maximum mark in Theme 1 is 4; and the marks which would have been awarded in Themes 2 and 3 should be scaled down to a factor of two-thirds.
- If only eight of the twelve items are completed the maximum mark in Theme 1 is 3; and the marks which would have been awarded in Themes 2 and 3 should be scaled down to a factor of one half.
- If only six of the twelve items are completed the maximum mark in Theme 1 is 2; and the marks which would have been awarded in Themes 2 and 3 are 4 and 4.

The portfolio must, as a whole, satisfy criteria regarding the use of computer technology. Thus, if a spreadsheet is not used as required, the maximum mark in Theme 1 is 3; and the marks which would have been awarded in Themes 2 and 3 should be scaled down to a factor of one half.

Similarly if all the portfolio is done on a spreadsheet, then the same penalty applies. If only one situation is considered, then the maximum marks which can be awarded are 2, 3, 3.

7 Moderation

7.1 Moderation procedures

Moderation of the portfolios is by inspection of a sample of candidates' work, sent by post from the centre to a moderator appointed by AQA. The centre marks must be submitted to AQA and to the moderator by the specified deadline. We will let centres know which candidates' work will be required in the sample to be submitted for moderation.

Following the re-marking of the sample work, the moderator's marks are compared with the centre marks to determine whether any adjustment is needed in order to bring the

centre's assessments into line with standards generally. In some cases it may be necessary for the moderator to call for the work of other candidates in the centre. In order to meet this possible request, centres must retain under secure conditions and have available the portfolio and the CRF of every candidate entered for the examination and be prepared to submit it on demand. Mark adjustments will normally preserve the centre's order of merit, but where major discrepancies are found, we reserve the right to alter the order of merit.

7.2 Post-moderation procedures

On publication of the GCSE results, we will provide centres with details of the final marks for portfolio components.

The candidates' work will be returned to the centre after the examination. The centre will receive a report giving feedback on the

appropriateness of the tasks set, the accuracy of the assessments made, and the reasons for any adjustments to the marks.

We may retain some candidates' work for archive or standardising purposes.

Appendices

A Performance Descriptions

The following grade descriptors indicate the level of attainment characteristic of the given grade at GCSE. They give a general indication of the required learning outcomes at each specific grade. The descriptors should be interpreted in relation to the content outlined in the Functional Mathematics and FSMQ specifications that make up this GCSE

Grade A

Within the context of the Free Standing Mathematics qualifications studied, candidates demonstrate a good understanding and knowledge of the mathematical facts, concepts and techniques that are needed, and select appropriate ones to use in a wide variety of contexts, both familiar and unfamiliar.

qualification; they are not designed to define that content.

The grade awarded will depend in practice upon the extent to which the candidate has met the assessment objectives (as in Section 4.2) overall. Shortcomings in some aspects of the examination may be balanced by better performances in others.

Candidates use mathematical language and symbols effectively in presenting a convincing reasoned argument. Their reports include mathematical justifications, explaining their solutions to problems involving a number of features or variables.

Candidates manipulate mathematical expressions and, where appropriate, use graphs, tables and diagrams with accuracy and skill. They use mathematical language correctly and proceed logically to solve problems and draw conclusions. They give sensible interpretation of their results in the context of the original realistic situation. If

errors are made in their calculations or logic, these are usually noticed and corrected.

Candidates make appropriate and efficient use of contemporary calculator technology and other permitted resources, and are aware of any limitations to their use. They present results to an appropriate degree of accuracy.

Grade C

Within the context of the Free Standing Mathematics qualifications studied, and starting from problems or contexts that have been presented to them, candidates refine or extend the mathematics used to generate fuller solutions. They recall or recognize most of the mathematical facts, concepts and techniques that are needed and usually select appropriate ones to use in a variety of contexts.

Candidates manipulate mathematical expressions and use graphs, tables and diagrams, all with a reasonable level of skill and accuracy. They use

mathematical language with some skill and often proceed logically to solve problems and draw conclusions. They sometimes give sensible interpretations of their results in the context of the original realistic situation. They occasionally notice and correct errors in their calculations.

Candidates usually make appropriate and efficient use of contemporary calculator technology and other permitted resources, and are sometimes aware of any limitations to their use. They usually present results to an appropriate degree of accuracy.

Grade F

Within the context of the Free Standing Mathematics qualifications studied, candidates identify necessary information in order to carry through tasks and solve mathematical problems. They recall or recognize some of the mathematical facts, concepts and techniques that are needed and sometimes select appropriate ones to use in some contexts.

Candidates manipulate mathematical expressions and use graphs, tables and diagrams, all with some accuracy and skill. They sometimes use

mathematical language correctly and occasionally proceed logically to solve problems. They check their results, considering whether these are sensible. They draw simple conclusions of their own and give an explanation of their reasoning.

Candidates often make appropriate use of contemporary calculator technology and other permitted resources. They sometimes present results to an appropriate degree of accuracy.

B Spiritual, Moral, Ethical, Social and other Issues

European Dimension

AQA has taken account of the 1988 Resolution of the Council of the European Community in preparing this specification and associated specimen units.

Environmental Education

AQA has taken account of the 1988 Resolution of the Council of the European Community and the

Report “Environmental Responsibility: An Agenda for Further and Higher Education” 1993 in preparing this specification and associated specimen units.

Avoidance of Bias

AQA has taken great care in the preparation of this specification and specimen units to avoid bias of any kind.

C Overlaps with other qualifications

All FSMQs are stand-alone qualifications in their own right as well as part of GCSE Use of Mathematics.

GCSE Use of Mathematics will naturally contain a significant amount of overlap with traditional GCSE Mathematics. This overlap allows AQA to maintain consistency and comparability between the qualifications and amounts to approximately 2/3 of the GCSE Mathematics programmes of study.

The content of FSMQ Intermediate: Financial Calculations is wholly contained within the Number and Algebra component of GCSE Mathematics, except for Income Tax and National Insurance.

The content of FSMQ Intermediate: Shape & Space is wholly contained within GCSE Mathematics except for drawing elevations.

The content of FSMQ Intermediate: Data Handling is common to the Data Handling material in GCSE Mathematics except for comparative pie charts and the critical analysis of diagrams. The former of these topics is common to GCSE Statistics.

The content of FSMQ Intermediate: Algebra & Graphs on collecting and handling data is wholly contained within unit 1 (Number & Statistics) of the pilot GCSE Mathematics with the exception of knowledge of commonly used prefixes for units in the SI system and conversion within and between systems, which is contained in unit 2 (Geometry and Measures and Algebra). The content on plotting and interpreting graphs is wholly contained within unit 2 of the pilot GCSE Mathematics (Geometry and Measures and Algebra).

The content of FSMQ Foundation: Money Management is wholly contained within Unit 1 (Number & Statistics) of the pilot GCSE Mathematics, with the exception of explicit reference to the use of spreadsheets, timetables and exchange rates.

The content of FSMQ Foundation: Using Spatial Techniques is wholly contained within Unit 2 of the pilot GCSE Mathematics, with the exception of the construction of a regular hexagon inscribed in a circle and of an equilateral triangle inscribed in a circle.

The content of FSMQ Foundation: Using Data is wholly contained within Unit 1 (Number & Statistics) of the pilot GCSE Mathematics with the exception of explicit reference to use of spreadsheets, timetables and pictograms.

D Key Skills - Teaching, Developing and Providing Opportunities for Generating Evidence

Introduction

The Key Skills Qualification requires candidates to demonstrate levels of achievement in the Key Skills of Communication, Application of Number and Information Technology.

The units for the 'wider' Key Skills of Improving own Learning and Performance, Working with Others and Problem Solving are also available. The acquisition and demonstration of ability in these 'wider' Key Skills is deemed highly desirable for all candidates, but they do not form part of the Key Skills Qualification.

Copies of the Key Skills Units may be downloaded from QCA's website (<http://www.qca.org.uk/keyskills>).

The units for each Key Skill comprise three sections:

- What you need to know.
- What you must do.
- Guidance.

Candidates following a course of study based on this specification for Use of Mathematics can be offered opportunities to develop and generate evidence of attainment in aspects of the Key Skills of:

- Communication;
- Application of Number;
- Information Technology;
- Working with Others;
- Improving own Learning and Performance;
- Problem Solving.

Areas of study and learning that can be used to encourage the acquisition and use of Key Skills, and to provide opportunities to generate evidence for Part B of the units, are signposted over the next pages.

Key Skills Opportunities in Intermediate (level 2) FSMQ

	FSMQ Intermediate: Financial Calculations	FSMQ Intermediate: Shape & Space	FSMQ Intermediate: Data Handling	FSMQ Intermediate: Algebra & Graphs
Communication				
C2.1a	✓	✓	✓	✓
C2.1b				
C2.2	✓	✓	✓	✓
C2.3				
Application of Number				
N2.1	✓	✓	✓	✓
N2.2a	✓	✓	✓	✓
N2.2b	✓	✓	✓	
N2.2c	✓		✓	
N2.2d	✓	✓	✓	✓
N2.3	✓	✓	✓	✓
Information Technology				
ICT2.1	✓	✓	✓	✓
ICT2.2	✓		✓	
ICT2.3	✓		✓	
Working with Others				
WO2.1	✓	✓	✓	✓
WO2.2	✓	✓	✓	✓
WO2.3	✓	✓	✓	✓
Improving Own Learning and Performance				
LP2.1	✓	✓	✓	✓
LP2.2	✓	✓	✓	✓
LP2.3	✓	✓	✓	✓
Problem solving				
PS2.1	✓	✓	✓	✓
PS2.2	✓	✓	✓	✓
PS2.3	✓	✓	✓	✓

Key Skills Opportunities in Foundation (level 1) FSMQ (combined portfolio and written paper)

	FSMQ Foundation: Money Management	FSMQ Foundation: Using Spatial Techniques	FSMQ Foundation: Using Data
Communication			
C1.1	✓	✓	✓
C1.2	✓	✓	✓
C1.3	✓		✓
Application of Number			
N1.1	✓	✓	✓
N1.2a	✓	✓	✓
N1.2b	✓	✓	✓
N1.2c	✓		✓
N1.3	✓	✓	✓
Information Technology			
ICT1.1	✓	✓	✓
ICT1.2	✓		
ICT1.3	✓		
Working with Others			
WO1.1			✓
WO1.2			✓
WO1.3			✓
Improving Own Learning and Performance			
LP1.1	✓	✓	✓
LP1.2	✓	✓	✓
LP1.3	✓	✓	✓
Problem solving			
PS1.1	✓	✓	✓
PS1.2	✓	✓	✓
PS1.3	✓	✓	✓

E Summary of changes from existing FSMQ Specifications

In this pilot scheme, portfolio work has been removed from Intermediate FSMQ. This is in response to consultation with centres and the government's decision to remove coursework

from mainstream GCSE Mathematics. Portfolios remain a 50% component of each Foundation FSMQ and can contribute up to 33.3% of the total GCSE Use of Mathematics.

Overlap with existing FSMQ qualifications

Pilot FSMQ	Existing FSMQ assessment on which it is based
FSMQ: Money Management	6981 Timetables added Exchange Rates added
FSMQ: Using Spatial Techniques	6982 Measurement systems other than metric and imperial deleted Terms chord, radius and congruent added Amendments to portfolio tasks 2 and 6
FSMQ: Using Data	6983 Timetables added
FSMQ: Financial Calculations	6984, without portfolio Exchange Rates added Compound interest earned on investments and calculating prices after percentage and fractional discounts will now appear on the written paper.

FSMQ: Shape & Space	<p>6985, without portfolio</p> <p>Added: Calculate upper and lower bounds to problems involving the subtraction of lengths</p> <p>Change: was “other units in both metric and imperial systems if appropriate to your work”, now “other units in both metric and imperial systems”</p> <p>Deleted: “Using scales represented in other forms commonly used within the area of your work”</p> <p>Deleted: Use of Pythagoras’ theorem to calculate unknown lengths using $c^2 = a^2 + b^2$ in 3D problems (2D remains)</p> <p>Deleted: sine, cosine & tangent (and inverses), sine and cosine rules</p> <p>Added: understanding that scaling alters lengths but not angles</p> <p>Added: use a straight edge and a pair of compasses only to construct</p> <ul style="list-style-type: none"> · a line that is perpendicular to a given line, through a given point · the mid-point of a line segment <p>Deleted: terminology- “ray”</p> <p>Added: terminology- “polygon”, “pentagon”, “hexagon”, “octagon”</p> <p>Deleted: be able to test if lines are parallel, perpendicular</p> <p>Added: In understanding ideas of similarity in terms of enlargement and scale factors, now include “for two similar shapes, use ratio to find the lengths of unknown sides”</p> <p>Added: recognise and classify plane shapes</p> <ul style="list-style-type: none"> · quadrilaterals (including rectangle, square, parallelogram, rhombus, trapezium, kite) <p>triangles (including obtuse angled, acute angled, right angled) and (including equilateral, isosceles, scalene)</p>
FSMQ: Data Handling	<p>6986, without portfolio</p> <p>Weighted mean deleted</p> <p>Idea of strength of correlation added</p> <p>Use of line of best fit to estimate missing values added</p> <p>Use of cumulative frequency diagram to estimate values added</p> <p>Use of box and whisker diagram to compare two data sets added</p> <p>Pie charts will now appear on the written paper.</p>
FSMQ: Algebra & Graphs	<p>6988, without portfolio</p> <p>Deleted from “use of functions to find data pairs”: $y = kx^3$, $y = ka^{mx}$, $y = ka^{-mx}$, and $y = ax^3 + bx^2 + cx + d$ added.</p> <p>Gradient by tangent deleted</p> <p>Change: “Form and solve quadratic equations, including factorising” now reads “Form and solve quadratic equations, including factorising with $a = 1$”.</p> <p>Added: completing the square</p> <p>“Form and solve pairs of linear simultaneous equations by an algebraic method” now includes interpreting solutions geometrically.</p>