

AQA

Information and advice
about GCSE
Mathematics for
non-specialists and
NQTs

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Maths 2010 Ready Conferences

Seminar: Supporting your non-specialist Maths teachers and NQTs

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Ask AQA, online question and answer bank: aqa.org.uk/askaqa

GCSE Maths online Resource Zone: aqa.org.uk/mathszone

How the examination is structured

There are 3 units

- Unit 1 Statistics and Number
26.7% of the assessment
F and H 1 hour papers of 54 marks
Calculator allowed
- Unit 2 Number and Algebra
33.3% of the assessment
F and H 1 hour 15 minute papers of 66 marks
No calculator allowed.
- Unit 3 Geometry and Algebra
40% of the assessment
F and H 1 hour 30 minute papers of 80 marks
Calculator allowed.

Frequently Asked Questions

Q: Do the units have to be taken in order?

A: *No. Units can be taken in any order. Once the last unit is taken then a certificate is automatically generated but unit 3 will first be available in June 2012. However, 40% of the assessment must be done in the same session as certification so unit 3 would be the most common choice for the final unit.*

Q: When can units be taken?

A: *Because the examination cannot be certificated until June 2012 Unit 3 will first be available in June 2012. Units 1 and 2 will be available from November 2010 and every March and June thereafter. After June 2012 all units will be available in November, March and June.*

Q: Can my students resit?

A: *Yes. Students can resit any unit once before certification. The best mark of the two units is counted for certification.*

Structure of the papers.

Approximate grade breakdown (as a percentage)

Grade	G	F	E	D	C
Tier F	30%	20%	20%	15%	15%

Grade	D	C	B	A	A*
Tier H	30%	20%	20%	15%	15%

Approximate topic breakdown (over all units)

Topic	Number	Algebra	Geometry	Statistics
Tier F	34%	18%	28%	20%

Topic	Number	Algebra	Geometry	Statistics
Tier H	22%	30%	28%	20%

Functional Mathematics Allocation

20 – 30% of the questions at Higher Tier will assess Functional skills in Mathematics

30 – 40% of the questions at Foundation Tier will assess Functional skills in Mathematics

Weighting of Assessment Objectives across the units

AO1 recall and use their knowledge of the prescribed content

AO2 select and apply mathematical methods in a range of contexts

AO3 interpret and analyse problems and generate strategies to solve them

AO	Unit 1	Unit 2	Unit 3	Overall
AO1	40%	60%	50%	45–55%
AO2	40%	20%	30%	25–35%
AO3	20%	20%	20%	15–25%

Frequently Asked Questions

Q: How can I tell the grade of a question?

A: *AQA does not publish the grades of questions, but bearing in mind the grade allocations above, the first 30% of the marks of a Unit 1 Foundation paper for example will be grade G, the next 20% of the marks will be grade F and so on. Some questions have parts at more than one grade so the rule does not work exactly but it will give you a good basis.*

Q: How can I tell what level my students are working at?

A: *QCA publish grades descriptors for Grades F, C and A. These can be found in the specification. Most publishers give an indication of what is expected at each grade. The AQA Teacher's Guide also lists Grade C and grade D topics.*

Q: Why is there a difference between the Algebra and Number allocation between tier F and H?

A: *This reflects the needs of the candidates taking the examination. Foundation students are not good at Algebra and need more number work to progress into further study. Higher candidates, especially those going on to AS level Mathematics need to be competent at more advanced algebraic techniques.*

Q: What is Functional Mathematics?

A: *This is everyday or real-life mathematics. There are many definitions of Functional Mathematics but essentially it is making sure students are prepared for the mathematics they will meet as adults.*

Q: What is the difference between the Assessment Objectives?

A: *Basically AO1 is about showing you can do mathematics so these questions will be straightforward. AO2 is about using mathematics in context and deciding what mathematics is appropriate. AO3 is using mathematics to solve problems which may be unfamiliar or need some abstract thinking.*

Preparing students to do well in the examination

‘Show your working’

You will say this many thousands of times in your career.

Students tend to take shortcuts when they can but in examinations they do generally show working.

What they do not do is show logical working that is easy to follow and mark.

Advice from Chief Examiners

Insist on logical working. Use mathematical linking signs such as therefore (\therefore) and it follows (\Rightarrow). This will give your students some good personal habits and make marking their work a lot easier. It will also help them see their way through a problem and make life much easier for examiners to give credit for working. Often examiners are faced with a mass of unintelligible working and although they will do their best to make sense of it and look for work worthy of credit, it is easy to miss something if work is not logical.

‘Read the question’

You will say this many times as well.

Unfortunately students do not read questions thoroughly.

Advice from Chief Examiners.

Train your students to look for and highlight key words in questions. Tell them to read examination questions two or three times before they attempt them. Get them to plan a strategy before attempting a question that is worth a lot of marks.

Question Paper Terminology

What we say...	What it means...
Estimate	Round numbers to 1 s.f. and use these to obtain an answer. Find the mean of a grouped frequency table. Average speed.
Explain	Use words to explain an answer.
You must show your working	You will be penalised if you do not show your working
Simplify	Collect terms together.
Simplify fully	Collect terms together and factorise the answer.
Show that	Use words, numbers or algebra to show an answer.
Prove	A rigid algebraic, or geometric, proof is required.
Work out	Normally means a calculation is involved but it may be able to do it mentally.
Calculate	Will need a calculation that requires a calculator or a formal (such as column) method.
Measure	Use a ruler or a protractor to measure and length or an angle.
Hence,	Use the previous answer to proceed.
Hence, or otherwise, ..	Use the previous answer but if you cannot see how to you may use another method.
Describe fully in transformations	Reflection – define mirror line Translations – state a column vector Rotations – state centre, angle and direction Enlargement – state scale factor and centre.
Factorise	Take out the common factor or factorise into two brackets if a quadratic.
Factorise fully	Usually means that there is more than one common factor, or that there are at least 2 stages in the factorisation.
Use the graph	Do not calculate, read from the graph. Always worth putting lines on the graph to show where the answer came from.
Give an exact value	Give answer as a square root or surd form (non-calculator).

What we say...	What it means...
Give your answer in terms of μ	Give answer in terms of μ . (non calculator).
Give answer to a sensible degree of accuracy	Normally no more accurate than the values in the question. If question has values to 2 s.f then give answer to 2 s.f or 1 s.f. Trig answers accepted to 3 s.f as this is what is taught.
Give answer to (2 d.p.)	Give answer to required accuracy. You will lose marks if you do not.
Not drawn accurately	By a diagram to discourage measuring.
Use an algebraic method	Do not use trial and improvement. Working will be expected.
Do an accurate drawing	Use compasses to draw lengths, protractors to measure angles (and a sharp pencil).
Do not use trial and improvement	An algebraic method is expected. Any sign of trial and improvement will be penalised.
Expand	Multiply out using distributive law.
Multiply out	Use distributive law.
Expand and simplify	Multiply out using distributive law and then collect terms.
Multiply out and simplify	Use distributive law and then collect terms.
Give a counter-example	Give a numerical, or geometrical, example that disproves a statement.
Solve	Find the value(s) of (x) that makes the equation true.
Make (x) the subject	Rearrange a formula.
Express, in terms of,	Use given information to write an expression using only the letter(s) given.
Write down	Answer is clear and does not need any working.
Use a ruler and compasses	A ruler may be needed to measure but more often than not we mean use a straight edge and compasses. Used in constructions and loci problems.

Advice from Chief Examiners

Use the terminology lists on the previous pages as a poster or give a copy to all students. Make sure they know what is meant by certain key phrases that start questions. For example, 'Factorise' will mean take out one common factor or factorise a quadratic expression, whereas 'Factorise fully' means that there is more than one common factor or two steps to a quadratic factorisation.

Factorise $x^2 + 3x$

Factorise $x^2 + 5x + 6$

Factorise fully $2a^2b - 6ab^2$

Factorise fully $3x^2 - 27$

The formula sheet

Do not assume that students know, or are even aware, that some formulae are given on the examination paper. Very often

examiners will see $V = \frac{4}{3}\pi r^2$ as the volume of a sphere. This could

be down to miscopying, but many times it is due to the student trying to recall a formula and not looking it up from the formula sheet.

Advice from Chief Examiners

The formula sheet is only given in Unit 3. If a geometric formula was needed in Unit 2, for example, it would be given in the question. Prior to Unit 3 you are advised to go through the formula sheet with your students. For example, for a cone you are given the volume and the surface area. Brainstorm what questions could be asked about a cone. There are not that many – volume, total surface area, height using Pythagoras and volume of a frustum.

Poorly done topics

Advice from Chief Examiners

There are many topics that are not well done. These tend to be universal across the country and students make the same mistakes year after year. Clearly some pupils reach their 'mathematical limit' and no matter what you do they cannot progress beyond this. If your students can score marks on these topics then they are doing better than the majority of other students taking the same exam and will be higher in the rank order, thus making the chance of a grade C or higher better. In particular poor numeracy is a cause of lost marks. Continually stressing the basics will improve performance.

Starters and activities

Advice from Chief Examiners

Any starters, games or activities that reinforce basic numeracy are useful. Carelessness causes many errors. $3 \times 4 = 7$ or $-2 + 5 = -7$ are common as is $(-3)^2 = -9$. Ideas for starters etc. can be found on the internet and in most textbooks.

Encouraging thinking and process skills

Advice from Chief Examiners

The new GCSE, for first teaching from 2010 will have at about 25% of the assessment via AO3, which is problem solving. This is traditionally badly done at the moment, although there is concrete evidence that schools where these skills are taught get better pass rates. Developing these skills in students should not be a year 10 or 11 'bolt on' but should start in year 7 and be part of the majority of lessons. Encouraging class discussion to allow pupils to develop their own methods. You should teaching pupils to break problems down, record results, test generalisations and check their results. Some questions will be open ended and have a high mark tariff. It is vital to show a clear strategy when answering such a question if any partial credit is to be given.

Encourage the use of Algebra rather than Trial and Improvement

Advice from Chief Examiners

Many students when faced with problem solving questions resort to Trial and Improvement. T&I is not accepted as a valid method unless it leads to a fully correct answer. If it does lead to a fully correct answer then it gets full marks unless the question says "Do not use Trial and Improvement" (for example solving simultaneous equations). However, T&I is often messy and time-consuming.

The use of Algebra is quicker, neater and will get credit even if the correct answer is not found.

Websites

These are good websites, but there are many more out there:

<http://www.transum.org>

Useful for 'Starter of the Day'

<http://www.1000problems.org>

Some good problem solving questions at all levels. Useful to prepare students for AO3 questions.

<http://www.amathsdictionaryforkids.com>

This is an Australian site so you will see lots of kangaroos. Definitions of all the mathematical words and terms you can think of (and a lot you didn't even know existed).

<http://users.argonet.co.uk/oundlesch/mlink.html>

A link to just about every useful mathematics teaching resource there is.