

# GCSE Mathematics

## Post-16 1-year resit: Preparing to teach

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Julia Smith  
Autumn 2017

# Agenda

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- Welcome
- The context of GCSE resits in a post-16 setting
- An overview of the new GCSE
- Key features of a revision year approach
- Top tips, key resources and revision techniques
- Using the AQA practice papers, sample assessment material, topic tests and milestones
- Identifying next steps
- Support from AQA

# The context of a post-16 GCSE resit



# The Wolf Report

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## **Recommendation 9**

Students who are under 19 and do not have GCSE A\*–C in English and/or Maths should be required, as part of their programme, to pursue a course which either leads directly to these qualifications, or which provides significant progress towards future GCSE entry and success.

## **Recommendation 10**

DfE should continue and, if possible, increase its current level of support for CPD for mathematics teachers, and give particular attention to staff who are teaching post-16 students in colleges and schools.

# Considerations

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- Results
- Attendance
- Recruitment
- Class size
- Behaviour
- CPD
- Ofsted
- The new GCSE

# The students

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- They have seen all the maths before over a number of years.
- They can do some maths but they can't do other bits.
- They will have forgotten stuff since June.
- Some will have resat multiple times.
- Some will have grade 3 and some will have grade D.
- They don't feel too good about this.

# Who will you be teaching?

- Condition of funding has been agreed.
- Students achieving grade 3 are required to resit.

However:

- grade 5 is a good pass for school
- a good pass is potentially required for university
- grade 4 students may want/need to resit
- grade 3 students are more E grade ability.

Ofqual

Grading new GCSEs from 2017

New grading structure	Current grading structure
9	A*
8	A
7	A
6	B
5	B
4	C
3	D
2	E
1	F
1	G
U	U

*This graphic is lifted directly from Ofsted's Grading for new GCSEs from 2017, available in full at: [gov.uk/government/publications/your-qualification-our-regulation-gcse-as-and-a-level-reforms](https://www.gov.uk/government/publications/your-qualification-our-regulation-gcse-as-and-a-level-reforms). This contains public sector information licensed under the Open Government License v.3.0.*

# The new GCSE specification





# Philosophy from DfE/Ofqual

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- New content (all tiers).
- Longer assessment time (4.5 hours).
- Additional content in the Foundation tier.
- Students need to know more formulae.
- Less assessment of straight recall.
- Change in assessment objectives to make papers more demanding.

# AQA specification at a glance

Paper 1: non-calculator	Paper 2: calculator	Paper 3: calculator
<b>Content</b> <ul style="list-style-type: none"><li>• Content from any part of the specification may be assessed</li></ul>	<b>Content</b> <ul style="list-style-type: none"><li>• Content from any part of the specification may be assessed</li></ul>	<b>Content</b> <ul style="list-style-type: none"><li>• Content from any part of the specification may be assessed</li></ul>
<b>Assessment</b> <ul style="list-style-type: none"><li>• 1 hour 30 minutes</li><li>• Written exam</li><li>• 80 marks</li><li>• 33.3% of GCSE</li></ul>	<b>Assessment</b> <ul style="list-style-type: none"><li>• 1 hour 30 minutes</li><li>• Written exam</li><li>• 80 marks</li><li>• 33.3% of GCSE</li></ul>	<b>Assessment</b> <ul style="list-style-type: none"><li>• 1 hour 30 minutes</li><li>• Written exam</li><li>• 80 marks</li><li>• 33.3% of GCSE</li></ul>

- Students will be required to answer all questions on all papers.
- The assessment structure will be the same for Foundation and Higher tiers.

# Specification content

The mathematical content is defined by the DfE's *GCSE subject content and assessment objectives* document.

Subject area	Foundation tier weighting	Higher tier weighting
Number	25% (35%)	15% (17%)
Algebra	20% (17%)	30% (35%)
Ratio, proportion and rates of change	25% (subsumed in other areas)	20% (subsumed in other areas)
Geometry and measures	15% (28%)	20% (28%)
Probability and statistics	15% (20%)	15% (20%)

(Figures in brackets show approximate weightings for the current qualification)

# Assessment objectives

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- AO1: Use and apply standard techniques.
- AO2: Reason, interpret and communicate mathematically.
- AO3: Solve problems within mathematics in other contexts.

# Formulae

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- Restrictions on which formulae can be given (see specification appendix and formulae poster for details).
- AQA have decided that formulae that can be given will be given in the question and not in a separate formulae sheet.

# Content changes



# Content changes

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Five types:

- modified (eg up to 12 times table)
- added to Foundation tier (eg standard form)
- new to Foundation and Higher tiers (eg frequency trees)
- new to Higher tier only (eg area under a curve)
- gone (eg stem and leaf).

# Modified content

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Some content:

- is more explicitly stated, but may have been implied previously
- results from more assumed knowledge from earlier key stages.

For example:

- Key Stage 2 requires knowledge up to 12 times table
- unique factorisation theorem
- limits of accuracy
- acceleration
- sequences of triangular, square and cube numbers
- ideas of randomness
- outliers
- expansion of more than two binomials.



# Content added to Foundation tier

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Some content:

- was previously Higher tier only
- is new content.

For example:

- calculations and answers in terms of  $\pi$  standard form
- inequality notation in error intervals
- surds
- reciprocal graphs
- expanding and factorising quadratic expressions
- solving quadratic equations by factorising
- equations of parallel lines
- simultaneous equations
- density
- direct and inverse proportion (including graphical and algebraic representations)
- similar shapes (including trig ratios).

# Content added to Foundation tier continued

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- trigonometry
- congruence (SSS, SAS, ASA, RHS)
- enlargement with fractional scale factors
- surface area and volume of spheres, pyramids, cones and composite solids
- arc length
- area of a sector

# Content new to Foundation and Higher tiers

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Some content is new to both tiers.

For example:

- systematic listing strategies
- Fibonacci type sequences
- quadratic sequences
- simple geometrical progressions
- pressure
- functions
- frequency trees
- Venn diagrams.

# Content new to Higher tier only

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Some content is completely new but in the Higher tier only.

For example:

- inverse functions
- composite functions
- graph of  $y = \tan x$
- velocity-time graphs
- areas under graphs
- equation of a circle/tangent
- quadratic inequalities
- other sequences
- $n$ th term of a quadratic sequence
- rates of change
- iterative processes
- invariance
- equation of perpendicular line.

# Content not in the specification

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Some content is no longer included in the specification.

For example:

- stem and leaf diagrams
- questionnaires and surveys
- 'chance' words
- imperial to metric conversion factors
- trial and improvement
- reference to the data handling cycle
- named sampling methods
- transformations  $y = af(x)$  and  $y = f(ax)$
- 3D coordinates.

# Key features of a revision year

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The scheme of work has to have some key features and be presented in a different way.

What didn't work before will not work again!

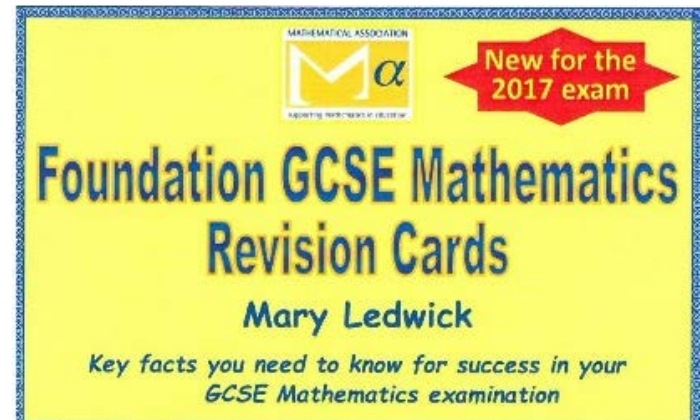
It has to look different.

- Recall
- Routine
- Revise
- Repeat
- Ready

# Recall and Routine

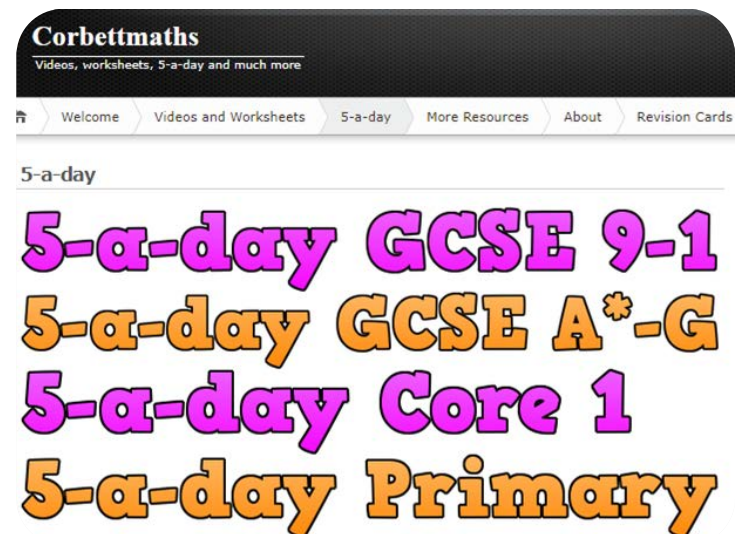
## Recall:

- a fast 'n' furious starter
- name the first 20 prime numbers
- draw the parts of a circle
- sketch and name all the quadrilaterals
- based on Mathematical Association's *48 Killer Facts for a C Grade*.



## Routine

- practise, practise, practise
- Corbett Maths 5-a-day
- JustMaths Bread and Butter
- 30-second challenges
- m4ths.com challenges.



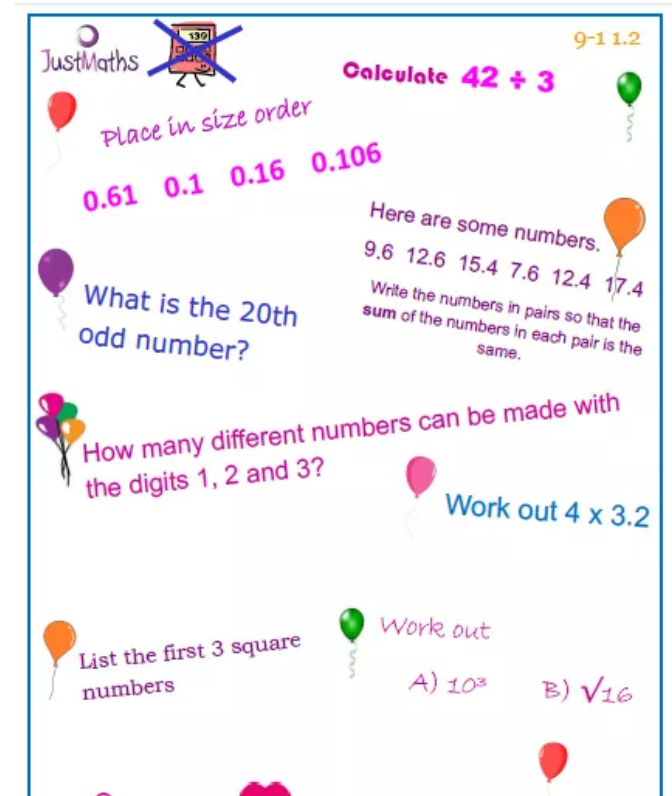
# Revise and Repeat

## Revise

- Key grade borderline topics – common questions
- Hegarty Maths and Corbett Maths videos
- Just Maths Top 40
- m4ths.com Help Sheet
- Resourceaholic.

## Repeat

- prethomework.weebly.com
- Corbett Maths practice questions
- Topic questions
- Studymaths.co.uk.





# Ready?

- Complete a maths passport (shown from Miss B's resources)
- Complete Symbaloo
- Mathematical Association postcards
- Past papers
- Milestones

## Scan for Success

**Maths Topic**

**Help Video**

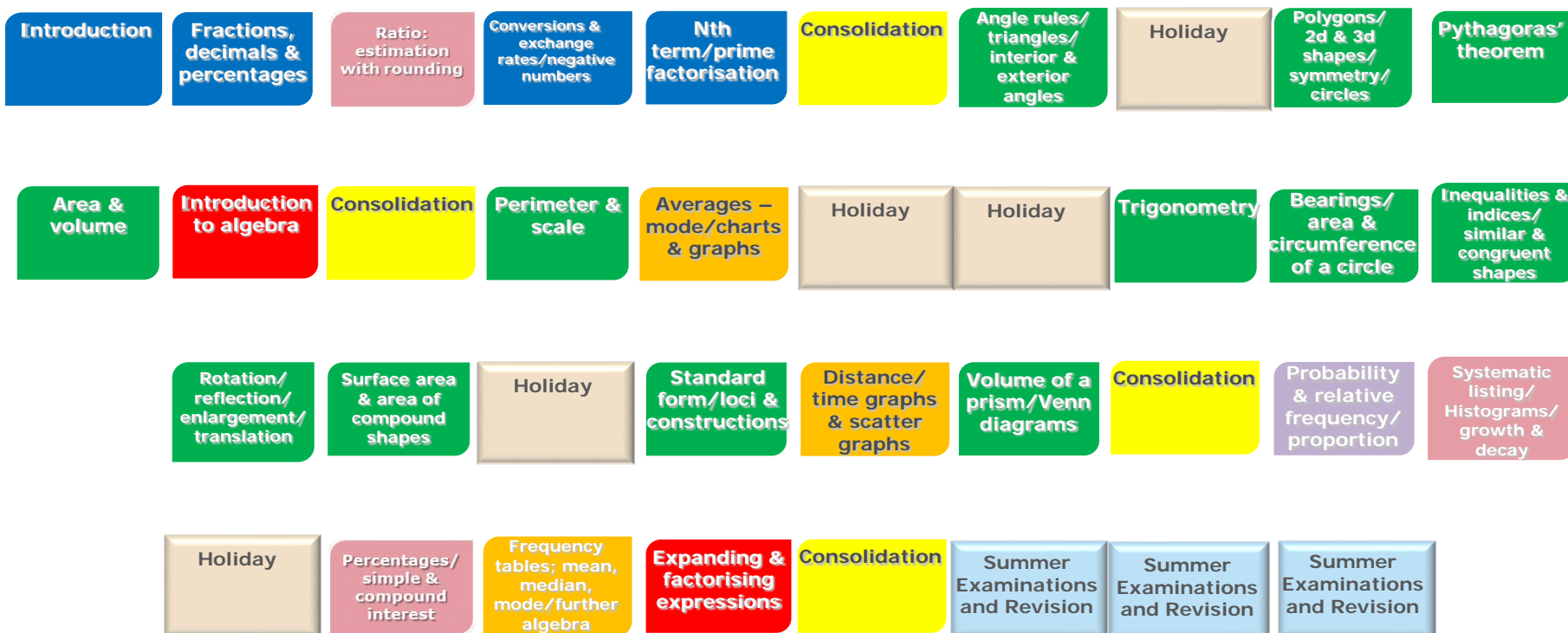
**Exam Question Practise**

**Exam Question Evidence**

Topic	Video	Practise	Exam Question Evidence
<b>Substitution</b> To be able to identify when quantities are proportional to estimate an amount without a calculator. <a href="https://openupit.co.uk/">https://openupit.co.uk/</a> <a href="https://openupit.co.uk/">https://openupit.co.uk/</a>			
<b>Exam Question</b> 41 Estimate the value of $2.4 \times 2786.3$ (3.37.17)			
<b>Probability</b> To be able to calculate the probability of an event occurring. <a href="https://openupit.co.uk/">https://openupit.co.uk/</a> <a href="https://openupit.co.uk/">https://openupit.co.uk/</a>			
<b>Exam Question</b> There are twelve marbles in a bag: a) What is the probability of choosing a white marble? b) What is the probability of not choosing a white marble?			
<b>Best Buy</b> To be able to solve functional problems involving money. <a href="https://openupit.co.uk/">https://openupit.co.uk/</a> <a href="https://openupit.co.uk/">https://openupit.co.uk/</a>			
<b>Exam Question</b> Four donuts cost £3.30 and two donuts cost £1.50. Which quantity is cheaper to buy?			


Topic	Video	Practise	Exam Question Evidence
<b>Equations</b> To be able to calculate actual and departing times. <a href="https://openupit.co.uk/">https://openupit.co.uk/</a> <a href="https://openupit.co.uk/">https://openupit.co.uk/</a>			
<b>Exam Question</b> 41 School starts at 8:00am and finishes at 3:00pm. How long is the school day? 42 Mr. Tait sets off for school at 7:00am and takes 17 minutes to get to school. What time does he arrive at school?			
<b>Equations</b> To be able to solve two-step equations. <a href="https://openupit.co.uk/">https://openupit.co.uk/</a> <a href="https://openupit.co.uk/">https://openupit.co.uk/</a>			
<b>Exam Question</b> Solve for x. a) $2 + 7x = 93$ b) $\frac{1}{2}x - 5 = -11$			
<b>BODMAS/BIDMAS</b> To be able to apply the rules of BODMAS/BIDMAS when calculating with numbers. <a href="https://openupit.co.uk/">https://openupit.co.uk/</a> <a href="https://openupit.co.uk/">https://openupit.co.uk/</a>			
<b>Exam Question</b> Work out: a) $3 \times (7 + 5) = 6$ b) $27 \div 3^2$			

# AQA route map for a 1-year GCSE Maths resit



# Top tips, key resources and revision

- NCETM PD Module.
- Do not presume students know how to revise.
- Never assume they know the simple stuff.
- Teach them.
- How do you revise?
- What do you revise?
- Where do you revise?
- Why and who do you revise with?
- When do you revise?



National Centre  
for Excellence in the  
Teaching of Mathematics

## Revision

A professional development module

### Overview

This module is designed to help you look at what revision is and how it might be undertaken. It considers revision techniques and offers a number of suggestions for how revision might be made more effective in the mathematics classroom.

### Activity 1a

These questions can be used prior to the module as a preparation or else can be undertaken as a departmental discussion activity. Answers should be collated as a focus for later work on the module

Think about the following questions:

- What does revise mean?
- What do you revise?
- When do you revise?
- How do you revise?

# Top tips

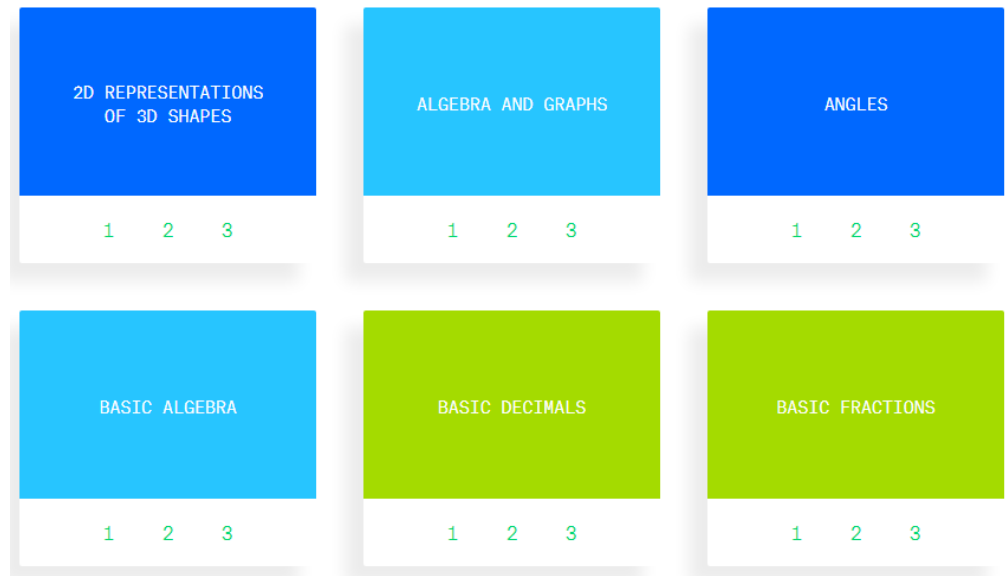
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- Fake results.
- Double mark – once with grade gained, once giving back the marks lost through stupid errors.
- Concentrate on the language.
- Problem solving framework.
- Homework.
- Mathematical Association postcards.
- QR reader for starters.
- Twitter, Moodle and Edmodo, Padlet.
- Whole organisational approach.
- Everyone a Maths teacher.

# Practice papers, sample assessment material, topic tests and milestones

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- Used to past papers.
- All about that grade 4/5.
- Diagnostic questions AQA collections (shown)
- Six milestones.
- Clever marking.
- Common questions.



# Support and resources for GCSE Mathematics



# GCSE Maths resources

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- All About Maths ([allaboutmaths.aqa.org.uk](https://allaboutmaths.aqa.org.uk))
- Teaching guidance (version 2 now available to include more examples and to clarify points raised by teachers from version 1)
- E-library
- Route maps
- Lesson plans – worksheets, activity plans and homework sheets
- Topic tests
- Practice papers (four sets, plus the specimen papers)
- Textbooks
- Enhanced Results Analysis (ERA)

# All About Maths

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Our free dedicated website for Maths resources:

- dedicated section to the new GCSE
- all the new GCSE resources are behind a log in
- current members need to update their details to get the new GCSE resources
- new GCSE resources are in a separate area to current resources.



# Teaching guidance

What is it?

A comprehensive breakdown of the subject content.

What does it do?

- explains what 'students should be able to do' against each spec reference
- illustrates the types of questions that would be asked on a question paper against each spec reference.

A6

Know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments

## Teaching Guidance

Students should be able to:

- recognise that, for example,  $5x + 5 = 16$  is an equation, but  $5x + 5 \equiv 5(x + 1)$  is an identity
- show that two expressions are equivalent
- use identities including equating coefficients
- use algebraic expressions to support an argument or verify a statement.

## Notes

Arguments may use knowledge of odd and even, for example  $\text{odd} \times \text{even} = \text{even}$

Students should understand that, for example, if  $n$  is an integer then  $2n$  is even and  $2n + 1$  is odd.

## Examples

- 1 Work out the values of  $a$  and  $b$  in the identity  $2(ax - 5) + 3(5x + b) \equiv 21x + 2$
- 2 Show that  $3(a - 4) + 2(2a + 5) + 9$  and  $7(a + 1)$  are equivalent.
- 3  $w$  is an even number.  
Explain why  $(w - 1)(w + 1)$  will always be odd.
- 4 Sam says that when  $m > 1$ ,  $m^3 + 2$  is never a multiple of 3  
Give an example to show that she is wrong.

# E-library

Looking for something different?

- hosted on All About Maths
- ever-growing list of free resources from across the web
- search by topic/tier/resource type
- web resources recommended to us by teachers.

## Foundation tier e-library

Refine search:	
Topic:	Probability
Type:	Any
<a href="#">Find</a>	

### CIMT Probability

[Love this](#)

Probability worksheet

[Open link](#)

[e library](#)

Type(s): Worksheets

### Ice Cream Probability

[Love this](#)

Interactive ice cream maker

[Open link](#)

[e library](#)

Type(s): Activities | Game

### Maths dictionary

[Love this](#)

Maths dictionary

[Open link](#)

[e library](#)

Type(s): Miscellaneous

### Number venn diagram

[Love this](#)

Number venn diagram

[Open link](#)

[e library](#)

# Route maps

AQA route maps are flexible planning tools designed to help you:

- organise teaching of the whole specification around your timetable
- find the resources you need to help teach each topic.

The route maps:

- are fully customisable
- break topics down to sub-topics
- are available now for one-, two- and three-year teaching.

Year 9, 2014 - Foundation 3 Year									
September				October				November	
Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10
Basic number	Factors and multiples	Angles	Scale diagrams and bearings	Basic algebra		Review and revision 1	Holiday	Basic fractions	Coordinates and linear graphs
November			December				January		
Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20
Basic decimals	Rounding	Collecting and representing data		Year 9 Examinations and Revision	Holiday		Sequences	Basic percentages	
January		February				March			
Wk 21	Wk 22	Wk 23	Wk 24	Wk 25	Wk 26	Wk 27	Wk 28	Wk 29	Wk 30
Introduction to perimeter and area	Review and revision 2		Holiday	Introduction to circumference and area	Ratio and proportion		Basic probability	Review and revision 3	
April					May				June
Wk 31	Wk 32	Wk 33	Wk 34	Wk 35	Wk 36	Wk 37	Wk 38	Wk 39	Wk 40
Holiday		Equations		Scatter graphs		Review and revision 4		Holiday	Transformations
June			July						
Wk 41	Wk 42	Wk 43	Wk 44	Wk 45					
Summer Examinations and Revision		Pythagoras' theorem		2D representations of 3D shapes					

# Lesson plans and further resources

Under the Plan, Teach and Assess tabs find further support resources for every topic:

- lesson plans
- activities
- worksheets
- homework
- topic tests.

## Properties of polygons (8300 - Foundation - Geometry and measures)

**Topic:** Properties of polygons

Plan Teach Assess

Teaching resources

[Add all resources to My AQA Maths](#)

- Lesson Plans
- Activities
- Worksheets
- Homework sheets

AQA e-library

▼ My resources

[Add a resource here](#)

# Specific resources for 1-year teaching

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Available now:

- 1-year route map
- accompanying teaching guidance.

In production, working with experienced teachers from FE, ideas include:

- diagnostic test to use as students start the resit course.

# Other resources

- Teach it
- ExamPro
- Alfiecloud
- Approved textbooks and electronic resources

from:

- Collins
- Cambridge University Press (CUP)
- Oxford University Press (OUP)

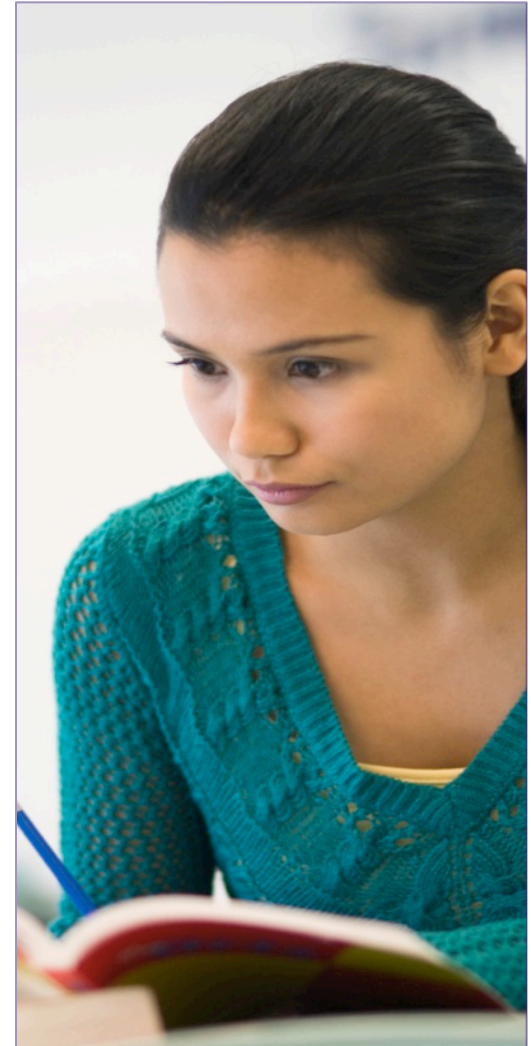


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# AQA approved textbooks

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The following textbooks from the following publishers are approved by AQA:

Collins

- *AQA GCSE Maths: Foundation Student book*
- *AQA GCSE Maths: Higher Student Book*

Oxford University Press (OUP)

- *AQA GCSE Maths Foundation*
- *AQA GCSE Maths Higher*

Cambridge University Press (CUP)

- *GCSE Mathematics for AQA Student Book: Foundation*
- *GCSE Mathematics for AQA Student Book: Higher*

# Contact points for further information and guidance

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## **Maths curriculum team:**

maths@aqa.org.uk

0161 957 3852

## **Professional development training/events:**

events@aqa.org.uk

0161 696 5994

## **AQA website:**

[aqa.org.uk](https://www.aqa.org.uk)

## **Advocates:**

- Remote and on-site support for teaching and learning.
- Contact the Maths curriculum team (above) for details of your local advocate.



# Ready to work with us?

## Join AQA – it's easy to get started

Join thousands of teachers who have already chosen AQA for their Maths GCSE in just three simple steps.

# 1

### Tell us you're with us

fill in this quick form [aqa.org.uk/joiningform](https://aqa.org.uk/joiningform). We'll send you everything you need and the maths team's contact details.

# 2

### Let your exams officer know

we'll send you all the entry information you need to give your exams officer.

# 3

### Access free support and resources

log in to All About Maths, which has everything you need to plan, teach and assess with confidence.

Saying yes to AQA really is as easy as 1, 2, 3.  
Just visit [aqa.org.uk/joinaqamaths](https://aqa.org.uk/joinaqamaths) to get started.

## Thank you

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We are an independent education charity and the largest provider of academic qualifications for all abilities taught in schools and colleges.

Our aim is to enable students to realise their potential and provide teachers with the support and resources they need so that they can focus on inspiring learning.

[aqa.org.uk](http://aqa.org.uk)