A guide to
Edexcel GCSE Mathematics (9-1)

edexcel

PEARSON

Hello and welcome to our guide to Edexcel GCSE Mathematics (9-1).

What's in this guide?

PEARSON

ALWAYS LEARNING

Edexcel GCSE Mathematics (9-1)
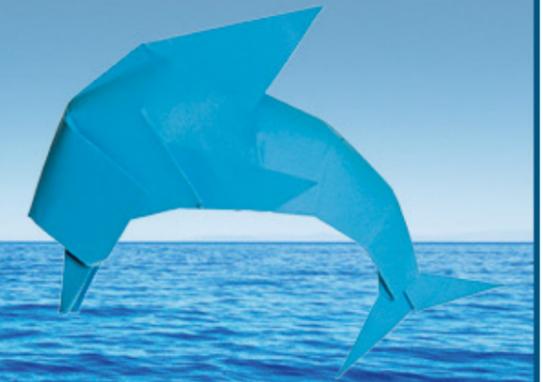
Ocean image © Veer/EpicStockMedia

Dear Colleague,

It's no exaggeration to say I'm pleased that the Edexcel GCSE Mathematics (9-1) specification and specimen assessment materials have now been accredited for first examinations in summer 2017 - you can find them on our website at **www.edexcel.com/gcsemaths2015guide**.

There's never a lot of time available when changes to the examinations are made and this time has been no exception. I hope that those of you who start teaching in September 2015 will have time to adjust. For those of you who have started already in Year 9, we've sent out help to make the transition. You can find them on the Emporium.

As we did in 2010, we'll be following up with plenty of mock papers and assessment guidance; teaching and learning resources and any other support you tell us you need. We'll also be out and about at collaborative network meetings and training events.

Graham Cumming
Edexcel Mathematics
mathsemporium@pearson.com

PS. I asked for the dolphins because they're such clever creatures and just love describing parabolas. It was that or border collies (who love rounding up).

Twitter   YouTube   Contact Us   Website

GCSE Mathematics is getting more demanding

GCSE Maths is going to change and get more demanding for everyone:

- The **volume of subject content** has increased. You may need more time to teach it.

- The **demand of that content** is increasing too, with harder topics being introduced. This is true for both your Foundation Tier students and Higher Tier students.

- The **total time for the examinations** is increasing, from 3 ½ hours to 4 ½ hours. All exams will be sat at the end of the course.

- There are **fewer marks at the lower grades** and **more marks at the higher grades** at both Foundation Tier and Higher Tier.

- A **new grading structure** is being introduced, from grade 9 to 1, to replace the familiar A* to G grading scale.

- In the assessments there's a greater emphasis on **problem solving** and **mathematical reasoning**, with more marks now being allocated to these higher-order skills.

- Students will be required to memorise formulae – **fewer formulae will be provided in examinations**.

Together these changes are designed to help students emerge from GCSE Maths with a level of confidence and fluency that will provide a genuine foundation for the rest of their learning and working lives.

Find all our support on
www.edexcel.com/ gcsemaths2015guide
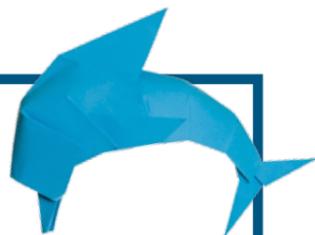
Working with you to meet the demands of GCSE Mathematics

GCSE Maths may be changing, but the help and expertise that we offer isn't. To support you in making the most of these changes, we'll continue to provide you with:
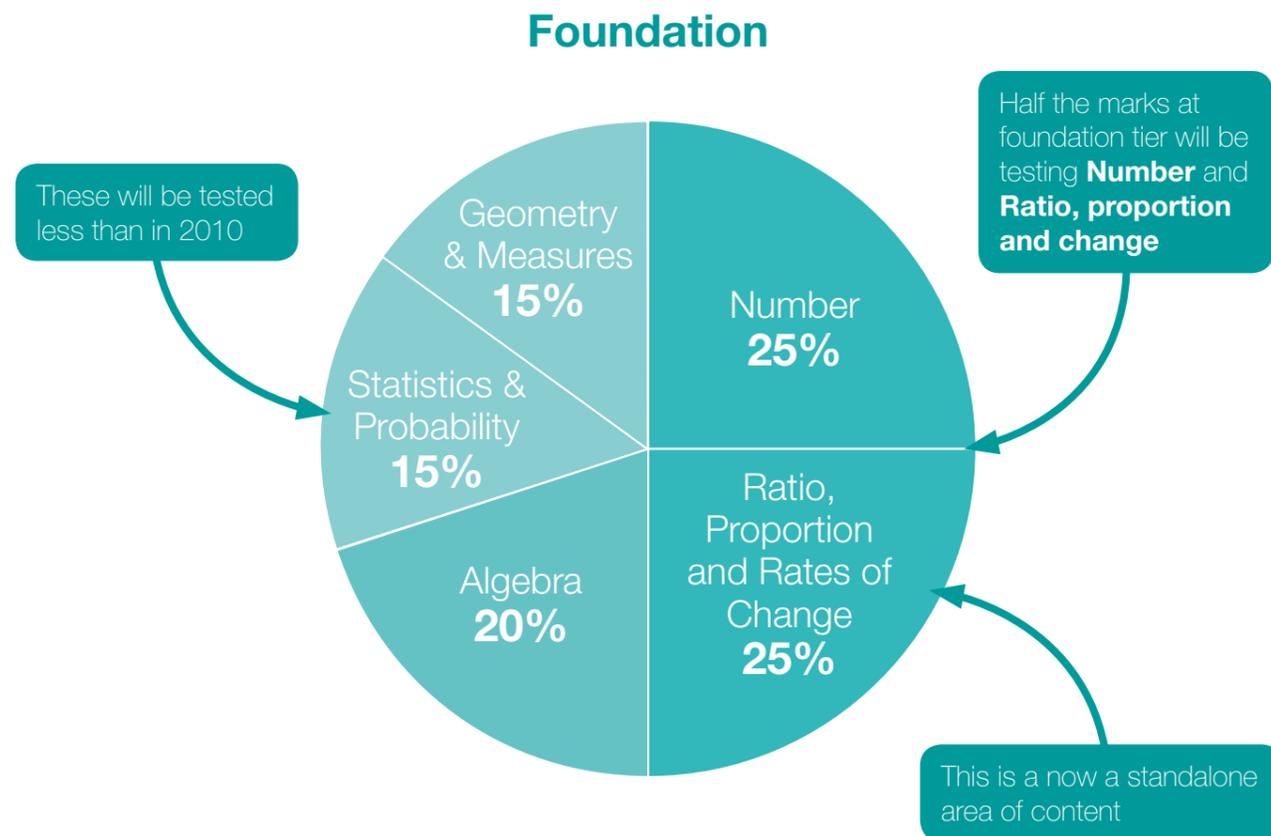
- **Carefully differentiated examination papers**, written in a clear and unambiguous way, with opportunities for students to build their confidence as they progress through the paper.

- **Clear mark schemes** that provide opportunities for students to demonstrate their mathematical ability and that support consistent marking so all students achieve the grades they deserve.

- **Help with understanding the increase in demand** including exemplar student work, examiner commentaries and free training for marking mocks.

- **Teaching and learning support** to meet the demands of the new curriculum including immediate support for your **Year 9 students** to bridge the gap to the new GCSE Maths and differentiated resources that focus on building fluency, reasoning and problem-solving skills **for students across all grades**.

- **Support for tracking your students' progress** including three sets of practice papers and a secure mock papers that your students won't have seen, from 2016 - 2019.

- **Expert and local support** from Graham, the Emporium and our Edexcel Maths team; we're here to listen and help: at the end of a phone, on email, or in person at local network and training events.

Of course, the key to your students' success isn't to be found in a qualification and the help we provide. Instead it's in **what you do every day** to develop their understanding, nurture their confidence and expose them to the range of mathematical experiences that will shape their success.

And we'll do everything we can to support you in doing that, **every step of the way**.

Understanding the changes to content: Foundation

Foundation tier papers will assess the different content domains in these proportions:

Foundation

These will be tested less than in 2010

Half the marks at foundation tier will be testing **Number** and **Ratio, proportion and change**

Geometry & Measures **15%**

Statistics & Probability **15%**

Number **25%**

Algebra **20%**

Ratio, Proportion and Rates of Change **25%**

This is a now a standalone area of content

(It's worth noting that there's a ±3% tolerance for each domain area.)

Changes to content at Foundation Tier

The biggest change to content is at Foundation tier. There are **new topics added** to the Foundation tier for 2015, which in **2010 were assessed at Higher tier only**. The list opposite is not exhaustive but includes all the major changes. Full, annotated tables for this and the following lists can be found on the GCSE Maths **support webpage**.

Find more details, visit
www.edexcel.com/gcsemaths2015guide
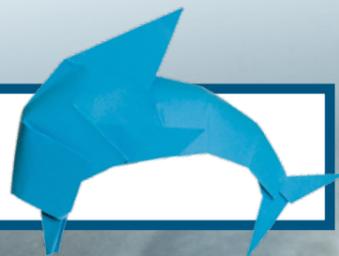
Topics new to Foundation tier (previously Higher tier only in 2010)

- Index laws: zero and negative powers (numeric and algebraic)
- Standard form
- Compound interest and reverse percentages
- Direct and indirect proportion (numeric and algebraic)
- Expand the product of two linear expressions
- Factorise quadratic expressions in the form $x^2 + bx + c$
- Solve linear/linear simultaneous equations
- Solve quadratic equations by factorisation
- Plot cubic and reciprocal graphs, recognise quadratic and cubic graphs
- Trigonometric ratios in 2D right-angled triangles
- Fractional scale enlargements in transformations
- Lengths of arcs and areas of sectors of circles
- Mensuration problems
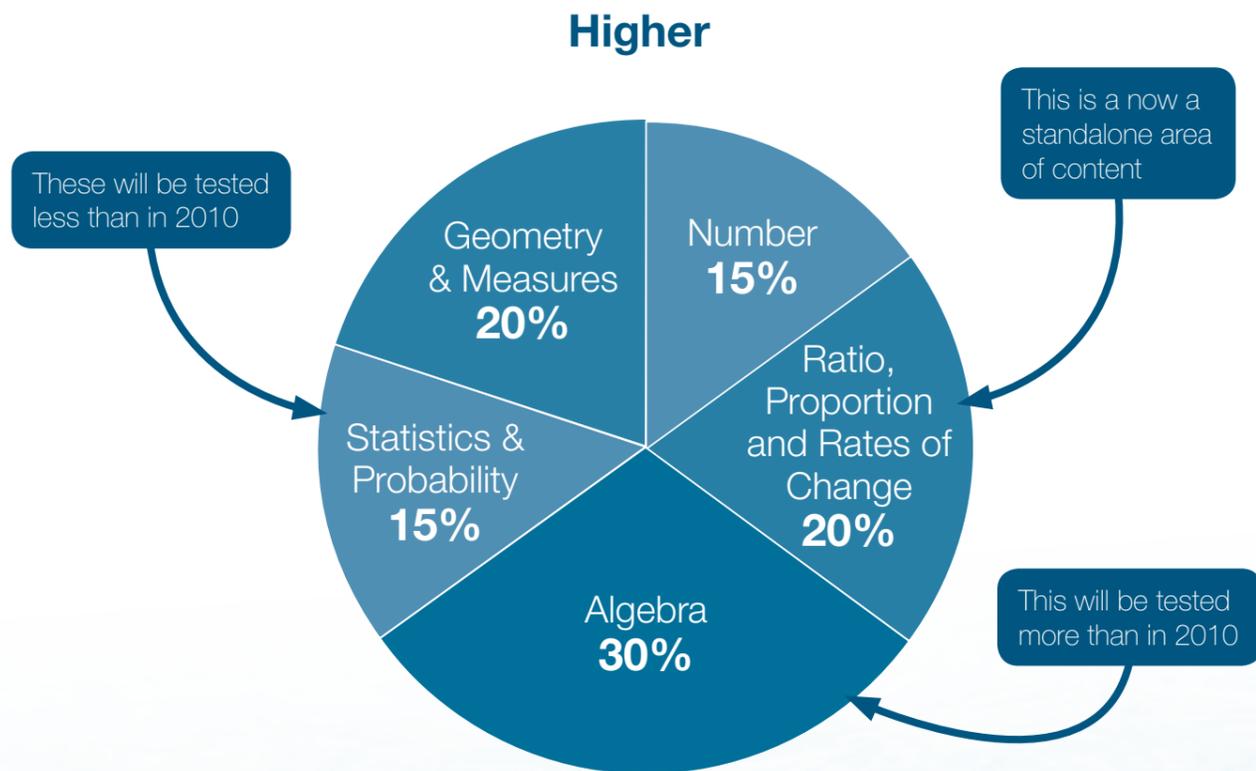- Vectors (**except** geometric problems/proofs)
- Density
- Tree diagrams

For **both tiers**, there will be **new knowledge, skills and understanding** that your students will be assessed on in the new GCSE Mathematics (9-1).

Topics new to both tiers

- Use inequality notation to specify simple error intervals
- Identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically
- Fibonacci type sequences, quadratic sequences, geometric progressions
- Relate ratios to linear functions
- Interpret the gradient of a straight line graph as a rate of change
- Know the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60°

Understanding the changes to content: Higher

Higher tier papers will assess the different content domains in these proportions:

Higher

These will be tested less than in 2010

Geometry & Measures **20%**

Number **15%**

This is a now a standalone area of content

Ratio, Proportion and Rates of Change **20%**

Statistics & Probability **15%**

Algebra **30%**

This will be tested more than in 2010

(It's worth noting that there's a ±3% tolerance for each domain area.)

More content has been added to Higher tier in order to **stretch and challenge** the most able students and better prepare them for studying A level Mathematics, so we'll see the introduction of new **knowledge, skills and understanding** that will be assessed at **Higher tier only**.

Topics new to Higher tier

- Expand the products of more than two binomials
- Interpret the reverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function' (using formal function notation)
- Deduce turning points by completing the square
- Calculate or estimate gradients of graphs and areas under graphs, and interpret results in real-life cases (**not** including calculus)
- Simple geometric progressions including surds, and other sequences
- Deduce expressions to calculate the nth term of quadratic sequences
- Calculate and interpret conditional probabilities through Venn diagrams

Some content previously assessed in the current GCSE Mathematics has been omitted from the new GCSE Mathematics (9-1).

Omitted topics

- Trial and improvement
- Tessellations
- Isometric grids
- Imperial units of measure
- Questionnaires
- 3D coordinates
- Rotation and enlargement of functions

In the specification, you will see the content has been divided into three levels:

- **Standard**: this content will be assessed at both **Foundation and Higher tier**; all students should be confident and competent with it.
- **Underlined**: this content will be assessed at both **Foundation and Higher tier**; higher-attaining students should be confident and competent with it.
- **Bold**: this content will be assessed at **Higher tier only**; the highest-attaining students should be confident and competent with it.
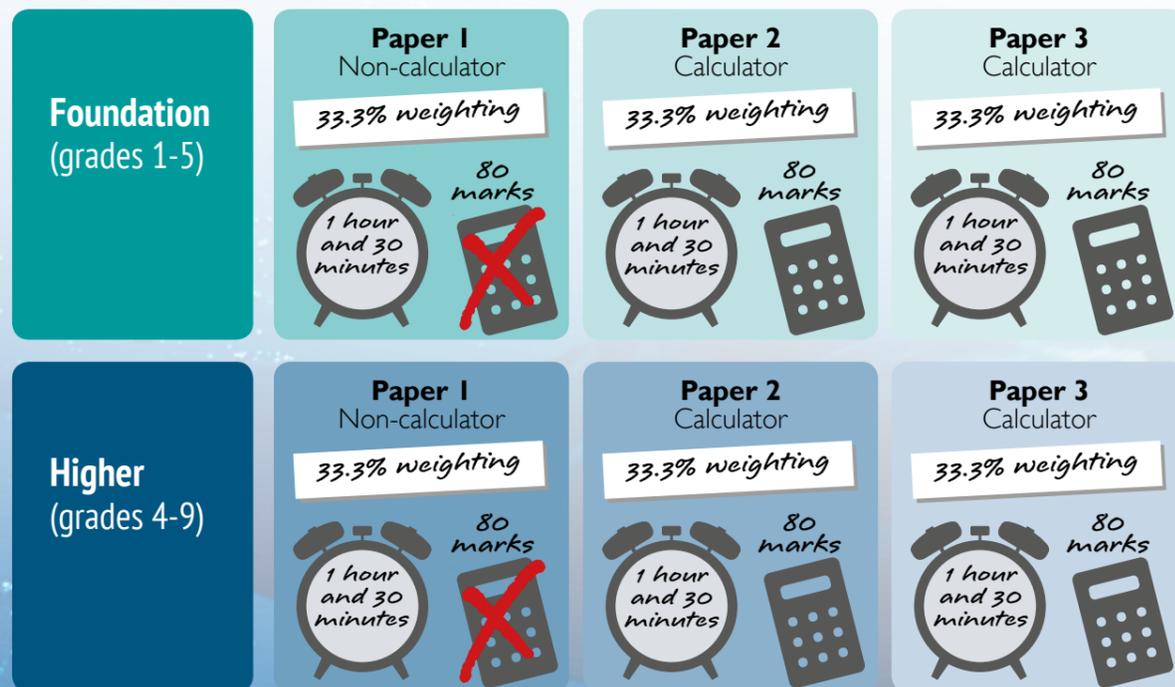
Find more details, visit
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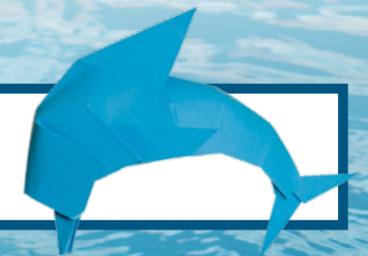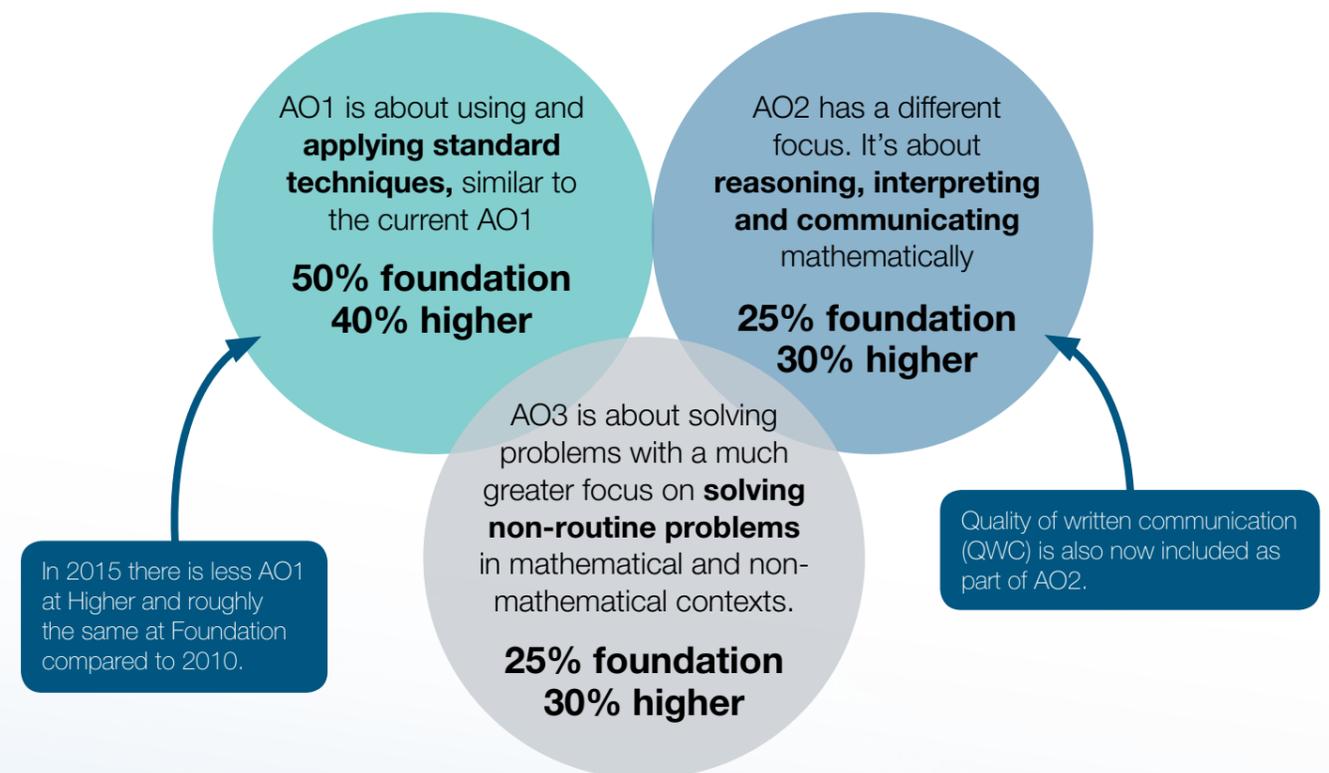
Changes to assessment: summary

Our Edexcel GCSE in Mathematics (9–1) will be assessed through three equally-weighted written examination papers at either Foundation tier or Higher tier. Paper 1 is a non-calculator paper.

- **Availability:** May/June and November (for post-16 students only).
- **First assessment:** May/June 2017.
- **Tiers of entry:** Foundation and Higher (a student must take all 3 papers at the same tier).
- **Grading:** 9–1 overall, with questions targeted at grades 1–5 at Foundation tier and at grades 4–9 at Higher tier. See page 14 for more on the new grading, including how it relates to the current A*–G grading.
- **Types of questions:** Each paper will have a range of question types, utilising both structured and unstructured questions. Take a look at pages 16 and 17 for examples.
- **Questions in context:** Some questions on the papers will be set in context (both mathematical and non-mathematical).
- **Common questions between tiers:** Grades 4 and 5 are the overlap grades between Foundation and Higher tiers, so common questions targeted at these grades will appear in the respective papers for each tier.

Foundation (grades 1-5)	**Paper 1** Non-calculator	**Paper 2** Calculator	**Paper 3** Calculator
	33.3% weighting	33.3% weighting	33.3% weighting
	1 hour and 30 minutes — 80 marks	1 hour and 30 minutes — 80 marks	1 hour and 30 minutes — 80 marks
Higher (grades 4-9)	**Paper 1** Non-calculator	**Paper 2** Calculator	**Paper 3** Calculator
	33.3% weighting	33.3% weighting	33.3% weighting
	1 hour and 30 minutes — 80 marks	1 hour and 30 minutes — 80 marks	1 hour and 30 minutes — 80 marks

Assessment objectives

The diagram below gives an overview of the **three assessment objectives**. The strands and elements are detailed in the specification. Every **strand and element** must be **assessed in every examination series**. We've shown the marks allocated to these strands and elements clearly in our mark schemes. You can learn more at **www.edexcel.com/gcsemaths2015guide**.

AO1 is about using and **applying standard techniques,** similar to the current AO1

50% foundation 40% higher

AO2 has a different focus. It's about **reasoning, interpreting and communicating** mathematically

25% foundation 30% higher

AO3 is about solving problems with a much greater focus on **solving non-routine problems** in mathematical and non-mathematical contexts.

25% foundation 30% higher

In 2015 there is less AO1 at Higher and roughly the same at Foundation compared to 2010.

Quality of written communication (QWC) is also now included as part of AO2.

In both tiers, there's now more focus on AO3 than in 2010.

2017 school performance measures

The only GCSE Maths qualification that will count in the 2017 secondary school performance tables (due to be published in January 2018) will be the new GCSE in Mathematics.

Neither any earlier (pre-2017) results from the current GCSE in Mathematics nor any results from the Edexcel Level 1/Level 2 Certificate in Mathematics will be included in the 2017 secondary school performance tables.

Changes to assessment: grading

There will continue to be an **overlapping tiers** model at grades 4 and 5. Students who fall slightly below the grade 4 boundary on Higher tier may be awarded a grade 3.

Ofqual have defined 'anchor points' that provide broad proportions and alignments between the old A*–G and the new 9–1 GCSE grading systems, which we've shown below.
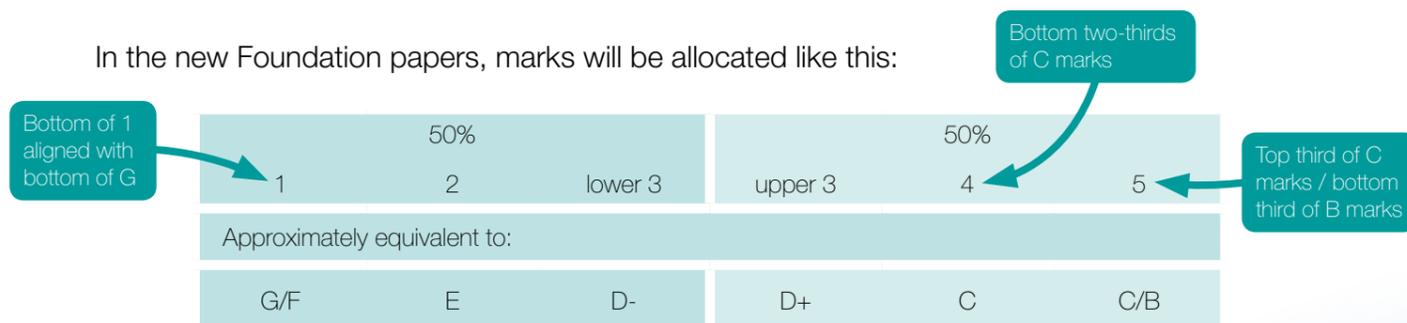
Foundation
Foundation papers now start at, and reach, a higher level.

The marks on current Foundation papers are allocated like this:

50% Targeted at F/G	25% Targeted at grade E	25% Targeted at grades D/C

In the new Foundation papers, marks will be allocated like this:

Bottom two-thirds of C marks

Bottom of 1 aligned with bottom of G

Top third of C marks / bottom third of B marks

50%			50%		
1	2	lower 3	upper 3	4	5

Approximately equivalent to:

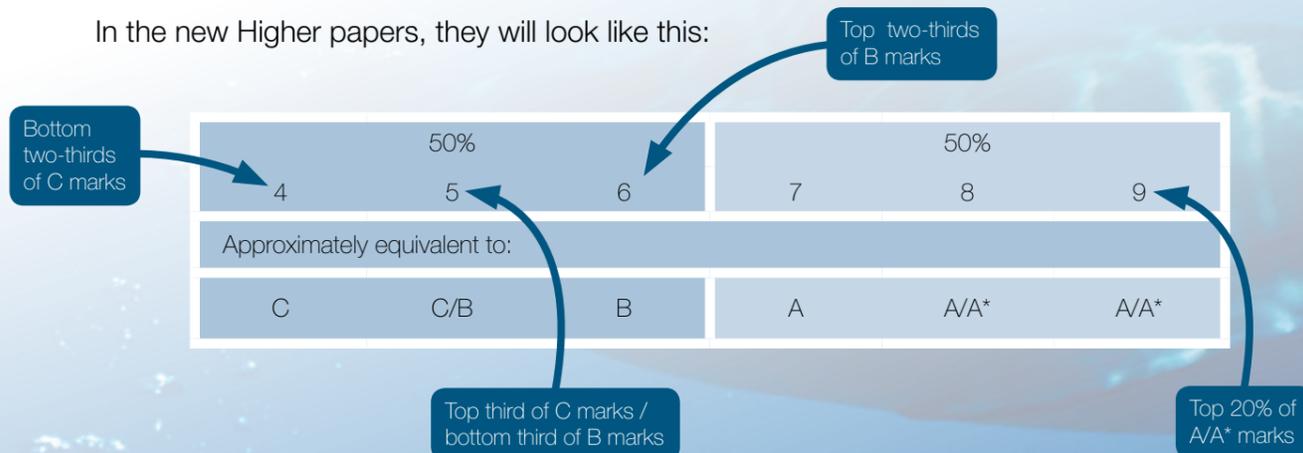| G/F	E	D-	D+	C	C/B

Higher
Higher tier papers now start at a higher level than in the current GCSE, which starts at grade D.

The new Higher tier papers will cover 6 grades instead of 5, allowing for more differentiation at the top end of the grades. Previously, 25% of questions were targeted at A/A*, but now 50% of questions in each paper are targeted at the equivalent grades, 7–9.

In the new Higher papers, they will look like this:

Top two-thirds of B marks

Bottom two-thirds of C marks

50%			50%		
4	5	6	7	8	9

Approximately equivalent to:

C	C/B	B	A	A/A*	A/A*

Top third of C marks / bottom third of B marks

Top 20% of A/A* marks

Formulae sheets

Students will need to memorise many of the formulae currently given in the formulae sheets at the front of the exam papers. These are:

- Volume of a prism
- Area of a trapezium
- The Quadratic equation (Higher tier only)
- The sine rule, cosine rule, and area of a triangle (Higher tier only).

Here's the formulae sheet that will be provided:

Formulae Sheet

Perimeter, area, surface area and volume formulae

Where r is the radius of the sphere or cone, l is the slant height of a cone and h is the perpendicular height of a cone:

Curved surface area of a cone = $\pi r l$

Surface area of a sphere = $4\pi r^2$

Volume of a sphere = $\frac{4}{3}\pi r^3$

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Kinematics formulae

Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time:

$$v = u + at$$
$$s = ut + \tfrac{1}{2}at^2$$
$$v^2 = u^2 + 2as$$

At-a-glance: Sample Assessment Material

Foundation and Higher tier

The new **P mark** is a mark that can be awarded to a proof, a process, a numerical solution to a problem, or for evaluation of AO3.

12 Ashten chooses three different whole numbers between 1 and 50

The first number is a prime number.
The second number is 4 times the first number.
The third number is 6 less than the second number.

The sum of the three numbers is greater than 57

Find the three numbers.

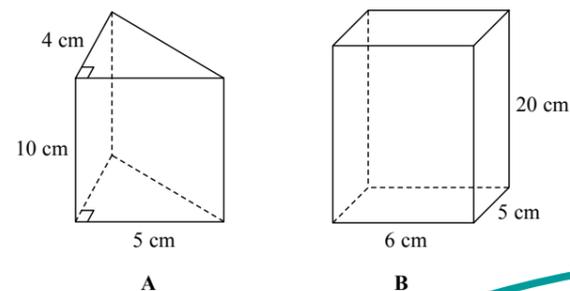| Question	Working	Answer	Mark type	AO	Notes
12	7 + 28 + 22 = 57	11, 44 and 38	P	3.1b	P1 for a correct process to develop algebraic expressions for each number and set up an inequality, e.g. $x + 4x + 4x - 6 > 57$ or for a correct trial with a prime number
			P	3.1b	P1 for a correct process to solve the inequality, e.g. $x > (57 + 6) \div 9 (= 7)$ or for a correct trial with the prime number as 7 resulting in a sum of 57
			A	1.3b	A1 cao

Mark scheme

(Total for Question 12 is 3 marks)

Foundation tier only

7 The diagram shows a right-angled triangular prism **A** and a cuboid **B**.

4 cm
10 cm
5 cm
A

20 cm
5 cm
6 cm
B

Show that the volume of **B** is 6 times the volume of **A**.

The same clear layout of questions you're familiar with

Question	Working	Answer	Mark	AO	Notes
7		Show	M	1.1	M1 for Use of correct formula for volume for triangular prism or cuboid, e.g. $\frac{1}{2} \times 4 \times 10 \times 5 (= 100)$ **or** $6 \times 20 \times 5 (= 600)$
			P	2.2	P1 for beginning to construct chains of reasoning, e.g. $\frac{1}{2} \times 4 \times 10 \times 5 (= 100)$ **and** $6 \times 20 \times 5 (= 600)$
			C	2.2	C1 for completion of chains of reasoning, e.g. $600 \div 100 = 6$

Mark scheme

Higher tier only

12 A rectangular sheet of paper can be cut into two identical rectangular pieces in two different ways.
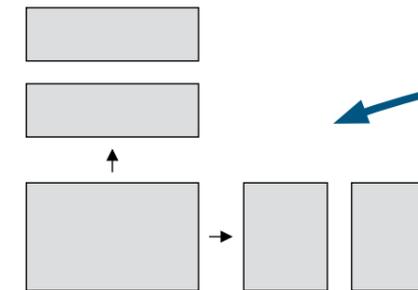
This question shows problem solving in the new AO3

When the original sheet of paper is cut one way, the perimeter of each of the two pieces is 50 cm.

When the original sheet of paper is cut the other way, the perimeter of each of the two pieces is 64 cm.

What is the perimeter of the original sheet of paper?

Straightforward mark schemes to show what's required in student answers

Question	Working	Answer	Mark	AO	Notes
12	Let h and w be the dimensions of the original rectangle	76 cm	P	3.2	P1 for correct process to set up equations, e.g. $\frac{h}{2} + \frac{h}{2} + w + w = 50$ and $\frac{w}{2} + \frac{w}{2} + h + h = 64$
	$h + 2w = 50$ $2h + w = 64$ $w = 12$, $h = 26$		P	3.1d	P1 for correct process to find value of one variable
			P	3.1d	P1 for correct process to find value of other variable
	Perimeter = $2 \times 12 + 2 \times 26$		P	3.1d	P1 for correct process to find numerical value of perimeter, e.g. $2 \times ('12' + '26')$
			A	1.3b	A1 cao

Mark scheme

(Total for Question 12 is 5 marks)

Learn more and download our sample assessment material at **www.edexcel.com/ gcsemaths2015guide**

What you can expect from us

You know us for the support we provide to **thousands of maths teachers** across the UK and in international centres. We're confident the developments we've made to our new GCSE Mathematics (9-1) will help you encourage your students to progress to capable and confident mathematicians, ready for whatever route they decide to take.

Understanding the changes and their impact

We're ready for the biggest change since GCSE Maths began, and you can be too.

- Content mappings from **the current GCSE** to the new GCSE, which clearly set out what new content has come in at both tiers.

- **Examples of the sample assessment materials** to help you understand how the assessment objectives and content relate to the questions.

- **Examples of student work** and **examiner commentaries** taken from the trials we've run with centres.

Getting a head start with your Year 9s

We've produced a bank of **useful documents** to help you with starting to teach your Year 9s the new Edexcel GCSE Mathematics if you want to get started early.

Our handy **3-year scheme of work** will help you plan, as will our **1-year KS3-GCSE transition scheme of work** for Year 9. You'll also find **content mapping** documents, so you can see how the new GCSE compares to the current qualification. We'll also provide:

- **GCSE Baseline test**
  These will help you understand the progress your students have made at Key Stage 3, and assess your students' learning needs before you start teaching the GCSE.

- **End of term tests**
  These tests are aligned to both our schemes of work. They are designed to help you understand the progress your students have made at the end of term and can be used in conjunction with the GCSE baseline test.

You can find all this support on our website. Download our accredited specifications and sample assessment materials.
www.edexcel.com/gcsemaths2015guide
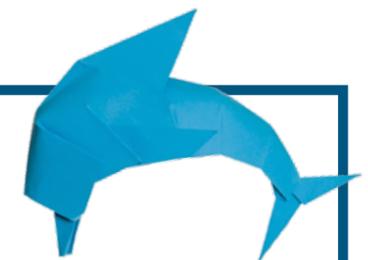
What you can expect from us

Delivering GCSE Maths from September 2015

Designing your curriculum

- **Schemes of work**
  Produced by a group of innovative and forward-thinking teachers, and drawing on recent academic research, you can download a **five-year scheme of work** born out of a five-year curriculum, which combines Key Stages 3 and 4. You'll be able to extract 1, 2 and 3 year schemes of work from this, too.

- **Planning:**
  - We'll provide **Teaching time guidance** to help you plan your timetable allocation for GCSE Maths.

  - Our **Getting Started Guide** will also provide guidance about planning your teaching and learning for our new specification.

Teaching & Learning

- **Formulae posters** will help your students learn the formulae they'll have to remember.

- You're the experts - which is why we'll also have **classroom resources by teachers, for teachers** (take a look at our **videos** online for a quick taster!)

Tracking student progress

- End of term assessments to help you to track your students progress, set targets, and to understand which tier of entry may be most appropriate. We'll provide a varied bank of **new style questions** and **assessments** for Higher and Foundation tiers to help build confidence and motivation.

- New and unseen secure mock papers, complete with mark schemes, will be available to use with your students towards the end of the course.

- **ResultsPlus**

  ResultsPlus provides the **most detailed analysis available of your students' exam performance**. Widely used by teachers across the country, this free online service helps you identify topics and skills where students could benefit from further learning, helping them gain a deeper understanding of maths.

- **examWizard**

  examWizard is a **free exam preparation tool** containing a bank of past Edexcel mathematics exam questions, mark schemes and examiners' reports.
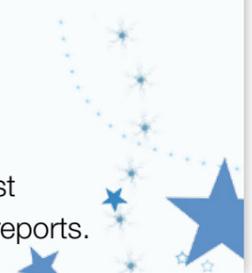
What you can expect from us

The **personal, local and collaborative support** you're used to

Graham and The Maths Emporium

Run by our **in-house mathematics expert Graham Cumming**, our email service tells you what you need to know, when you need to know it. This unique service will keep you updated with the **latest information** about Edexcel GCSE Mathematics (9-1) – direct to your inbox! What's more, you can **access and download documents** (such as specifications, schemes of work and a vast archive of past papers) to support you in teaching our mathematics qualifications – all for **free**.

Launch events

Online or face-to-face, these free launch events will help you learn about the new specification, and the support we're offering to help you make the transition. They're great opportunities to speak to one of our mathematics experts, too.

Collaborative Networks

Our established networks provide you with local opportunities to share ideas and receive support that has a **more personal touch** - from us, and from each other.

Getting Ready to Teach events

Events, delivered by subject experts and practicing teachers, to make sure you have all the **information and ideas** you need to start planning an effective course for your students.

Brand new published resources from Pearson

Confidence – fluency – problem solving – reasoning

Our brand-new paid-for resources are written specifically to tackle the demands of the new GCSE in Mathematics.

They will help you:

- teach **the new Edexcel GCSE in Maths specification** with confidence
- **support** your foundation tier and **challenge** your higher tier students
- **nurture confidence** in maths
- **embed fluency, reasoning and problem solving**.

These **differentiated resources** give you the flexibility to meet the needs of your Foundation and Higher students.

You can find out more and order your free evaluation pack online:
www.pearsonschools.co.uk/ gcsemaths2015guide
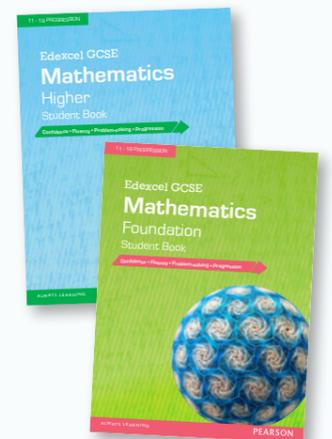
These resources are not yet endorsed and will be subject to change.

Endorsed resources for Edexcel GCSE Maths (9-1)

We're committed to helping teachers deliver our new Edexcel GCSE Maths (9-1) and students to achieve their full potential. To do this, we aim for our qualifications to be supported by a wide range of high-quality resources, produced by a range of publishers, including ourselves.

We are working with a range of publishers who are looking towards getting their resources endorsed.

- Cambridge University Press: GCSE Mathematics for Edexcel
- Collins Education: Edexcel GCSE Maths
- Hodder Education: Mastering Mathematics for Edexcel GCSE
- Oxford University Press: Edexcel GCSE Maths
- Pearson: Edexcel GCSE Mathematics

It is not necessary to purchase endorsed resources, including those published by Pearson, to deliver our qualifications.

Get in touch

The new GCSE Maths: you don't have to face it on your own.

For queries, information and support, we're here to help.

Call us on: **0844 463 2931**

Email us at: **TeachingMaths@pearson.com**

Visit us online: **www.edexcel.com/gcsemaths2015guide**

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