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# GCSE Mathematics

## For first teaching in 2015

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Summer 2014

# Structure of the session

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## **Overview of the new specification**

- Summary of content and assessment objectives
- Underlying principles and key features
- AQA Specification at a glance

## **Break**

## **Specimen question papers**

- Examples from the Foundation and Higher tier specimen question papers

## **Support and resources**

# Objectives

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- To understand the structure and key elements of the specification, teaching content and assessment
- To start thinking about the implications for teaching and learning
- To review the resources and support available from AQA
- To enable you to ask any questions about the specification

# Context

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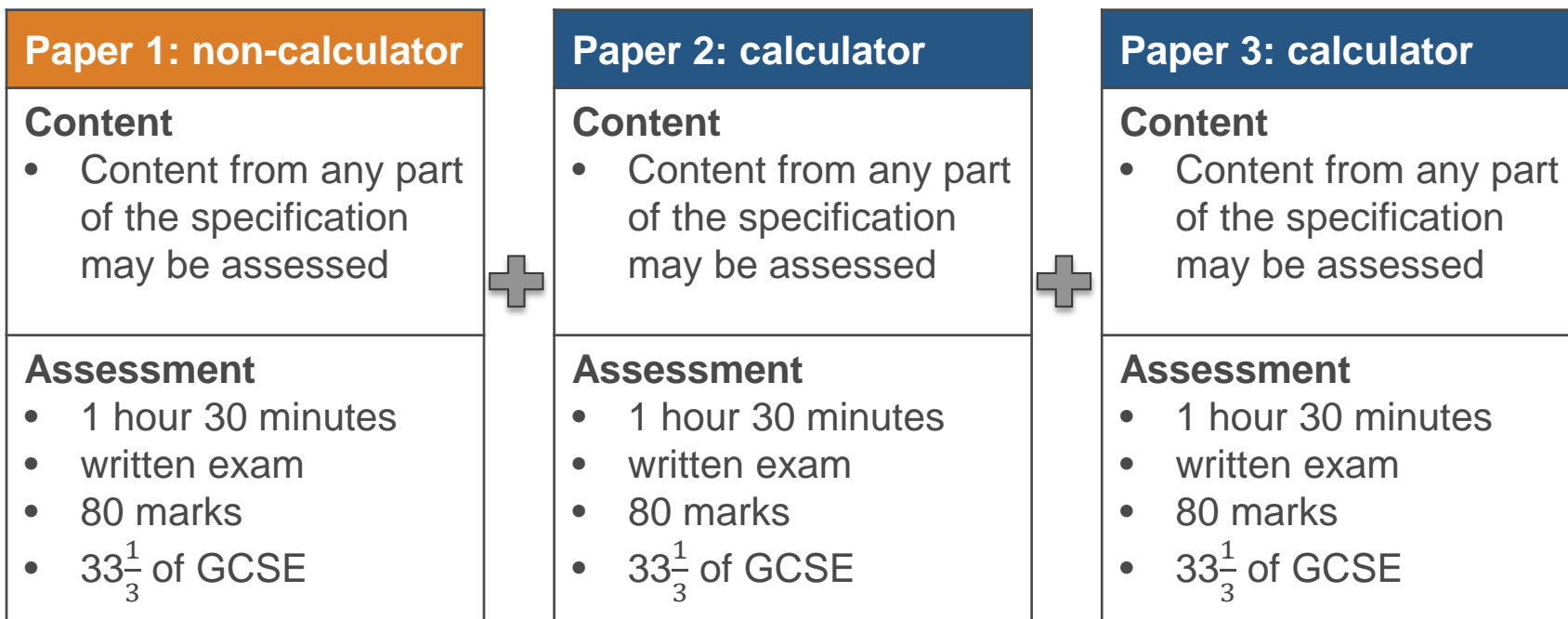
- Developed by an experienced team of teachers and examiners
- Designed to engage young people in this subject and provide effective assessments across the ability range
- Submitted to Ofqual for accreditation. Approval expected by September 2014
- The new specification is for first assessment in summer 2017

# Requirements for all GCSEs in Mathematics

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- Written papers only
- Linear assessment – all exams must be taken in the same series
- Summer exams for all
- November opportunity for students who were 16 on 31 August in that year
- Minimum assessment time of  $4\frac{1}{2}$  hours
- $33\frac{1}{3}$  - 50% non-calculator assessment
- Foundation and Higher tiers
- New grading structure 1-9, with 9 being the highest
  - Foundation tier      1 – 5
  - Higher tier            4 – 9
- Will carry a double weighting in the new accountability measures

# AQA Specification at a glance



- Students will be required to answer all questions on all papers
- The assessment structure will be the same for both foundation and higher tiers

# New accountability measures

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From summer 2016 there will be four key measures:

- Students' progress across 8 subjects between KS2 and KS4 compared to their expected progress (Progress 8)
- School's average grade across the same suite of 8 subjects (Attainment 8)
- % of students achieving a C grade or higher in English and Maths
- % of students gaining the Ebacc

# New accountability measures: Attainment 8

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- Grades will be converted into points
- Measured across a suite of eight subjects:

Core (x2) 20% each	EBacc (x3) 10% each	Other (x3) 10% each
<ul style="list-style-type: none"><li>• English Language or English Literature</li><li>• Maths</li></ul>	<ul style="list-style-type: none"><li>• Sciences</li><li>• Computer Science</li><li>• Geography</li><li>• History</li><li>• Languages</li></ul>	<ul style="list-style-type: none"><li>• English Literature or English Language</li><li>• Other EBacc subjects</li><li>• Approved non-EBacc subjects</li></ul>

- Only first entry in each subject counts



# New accountability measures: Progress 8

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- Progress 8 = actual Attainment 8 minus expected Attainment 8
- Presented as average number of grades above/below expectation
- A positive Progress 8 score shows more progress than expected
- School average Progress 8 is then calculated
- This is the only measure to have a floor target

# Underlying principles of mathematics at AQA

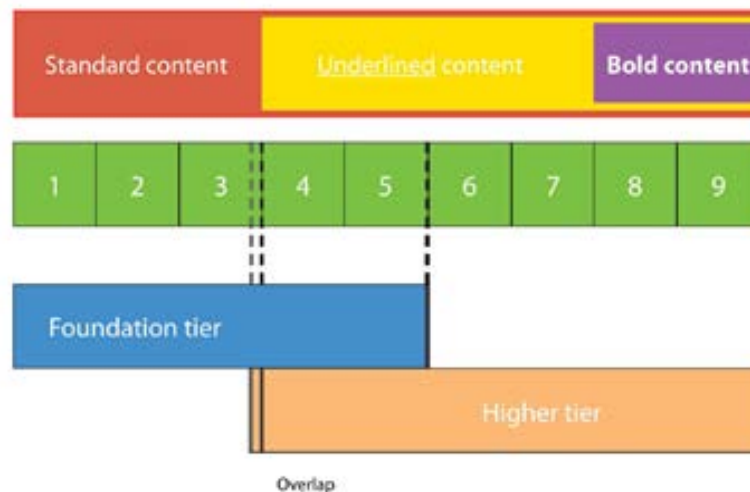
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- Mathematics is for everyone
- Develop qualifications and support to enable students to engage, enjoy and succeed in maths
- Our qualifications equip students with the appropriate skills, whatever their chosen pathway
- Our question papers are accessible, allowing students to demonstrate their knowledge and understanding to achieve the results they deserve
- Work with teachers to develop resources and support materials that are of genuine help in the classroom

# Overview of specification content 1

The DfE has split the subject content into three groups:

- content that all students should master
- content that should be taught, but higher achieving students should master
- content that will be taught only to higher achieving students and mastered by the highest achievers (those likely to go on to A-level study in maths)



# Overview of specification content 2

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%) nMa : Ma	30% (35%) nMa : Ma No stipulation
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 weightings for the current qualification

# Key changes from the existing specifications

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- New content
- Additional content in the foundation tier
- New assessment objectives

# Assessment Objective 1

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## Use and apply standard techniques

### Students should be able to:

- accurately recall facts, terminology and definitions
- use and interpret notation correctly
- accurately carry out routine procedures or set tasks requiring multi-step solutions

**Weighting: F 50% H 40%**

# Assessment Objective 2

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## Reason, interpret and communicate mathematically

### Students should be able to:

- make deductions and inferences and draw conclusions from mathematical information
- construct chains of reasoning to achieve a given result
- interpret and communicate information accurately
- present arguments and proofs
- assess the validity of an argument and critically evaluate a given way of processing information

**Weighting: F 25% H 30%**

# Assessment Objective 3

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## Solve problems within mathematics in other contexts

### Students should be able to:

- translate problems in mathematical or non-mathematical contexts into a process or a series of mathematical processes
- make and use connections between different parts of mathematics
- interpret results in the context of the given problem
- evaluate methods used and results obtained
- evaluate solutions to identify how they may have been affected by assumptions made

**Weighting: F 25% H 30%**



# General questions

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# Foundation Tier

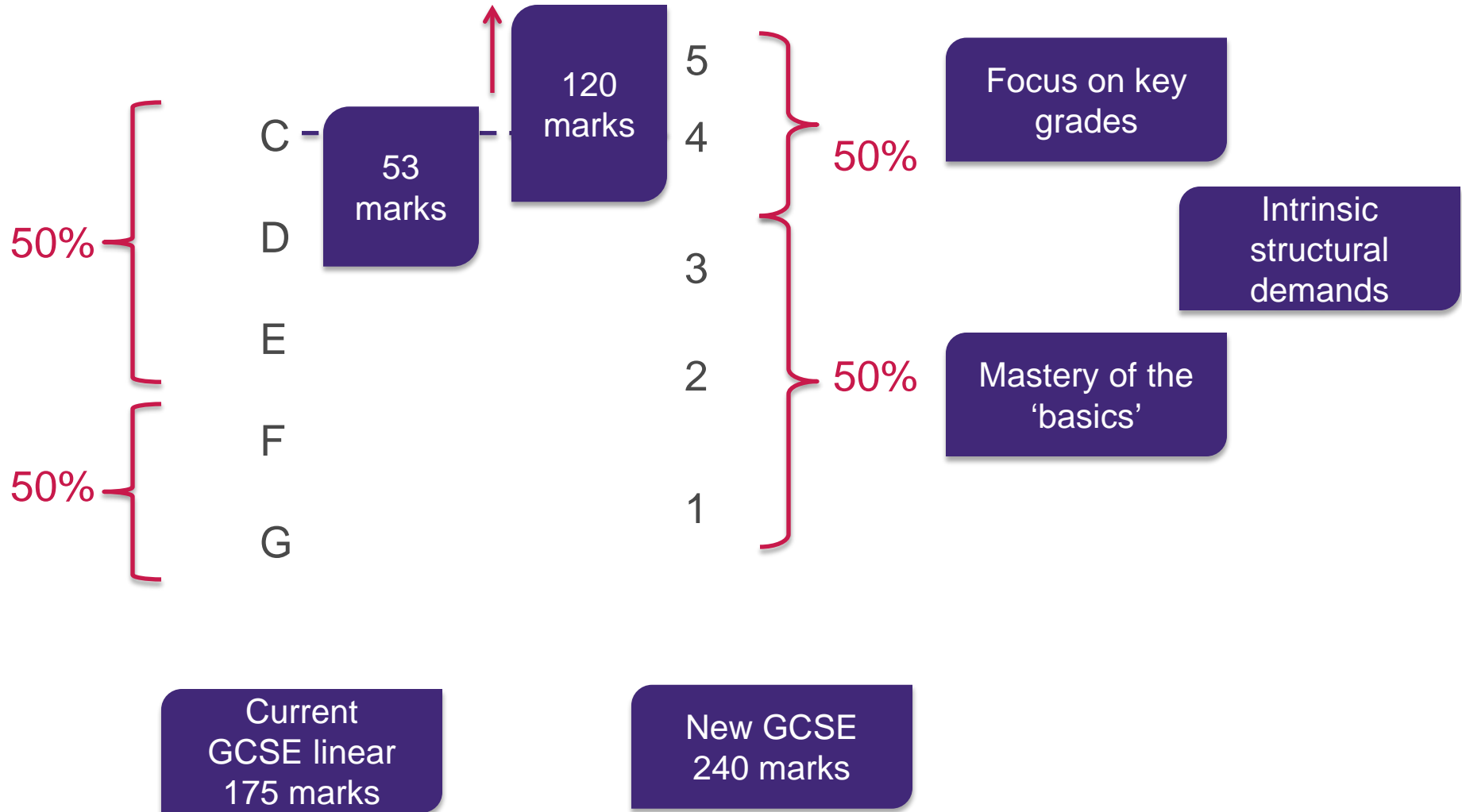


# Structure of Foundation Tier Papers

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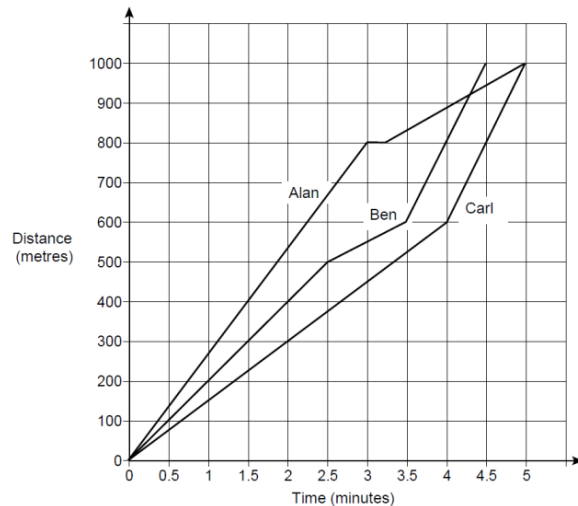
- Each paper will start with 4 multiple choice questions
- 4 further multiple choice questions are spread throughout each paper
- Early questions test the *basic foundation content* in a straightforward way
- As the paper progresses the *basic foundation content* is tested in more complex ways
- Towards the end of the paper *additional foundation content* is included, but is tested in a straightforward way

# Foundation tier structure



# Example of testing results Paper 1F Question 27b

- 27 Alan, Ben and Carl ran a 1000 metre race.  
The distance-time graph shows the race.



- 27 (b) Describe the race.

[4 marks]

Part (b) 26% scored 4  
16% scored 3  
13% scored 2  
17% scored 1  
28% scored 0

- 27 (a) Who won the race?  
Give a reason for your answer.

[1 mark]

Answer \_\_\_\_\_

Reason \_\_\_\_\_

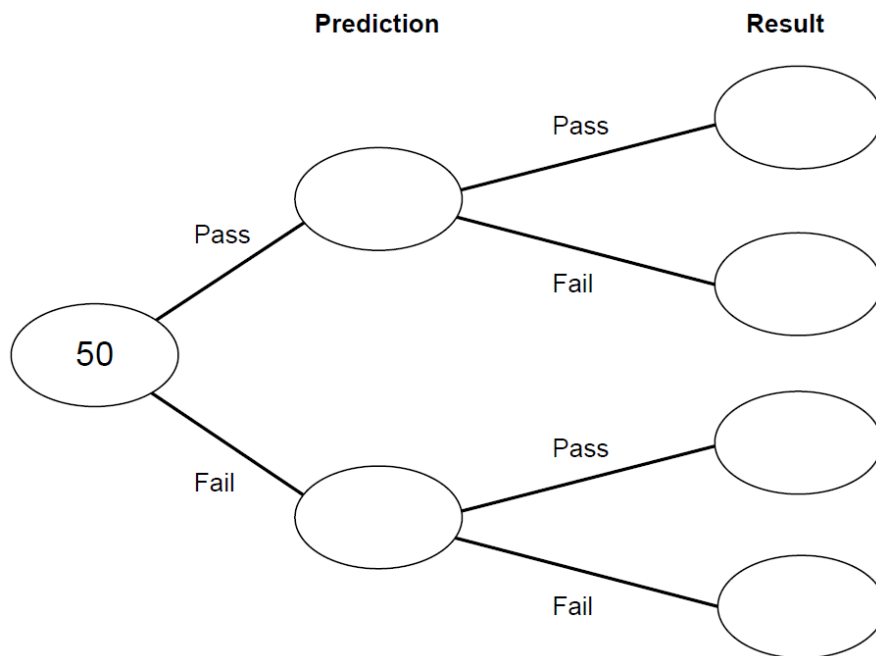
Great discrimination and good source of marks on AO2 at the end of Foundation paper

# Example of testing results Paper 2F Question 24

- 24 50 people took a test.  
Before the test, they predicted whether they would pass or fail.
- 30 people predicted they would pass.
  - 26 of the people who predicted they would pass did pass.
  - 37 people passed altogether.

Complete the frequency tree.

[3 marks



Brand new topic from DfE content.

53% scored 3 marks  
19% scored 2 marks  
16% scored 1 marks  
12% scored 0 marks

Our team know how to assess new and demanding content in an accessible way

# Questions on Foundation Tier

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# Higher Tier



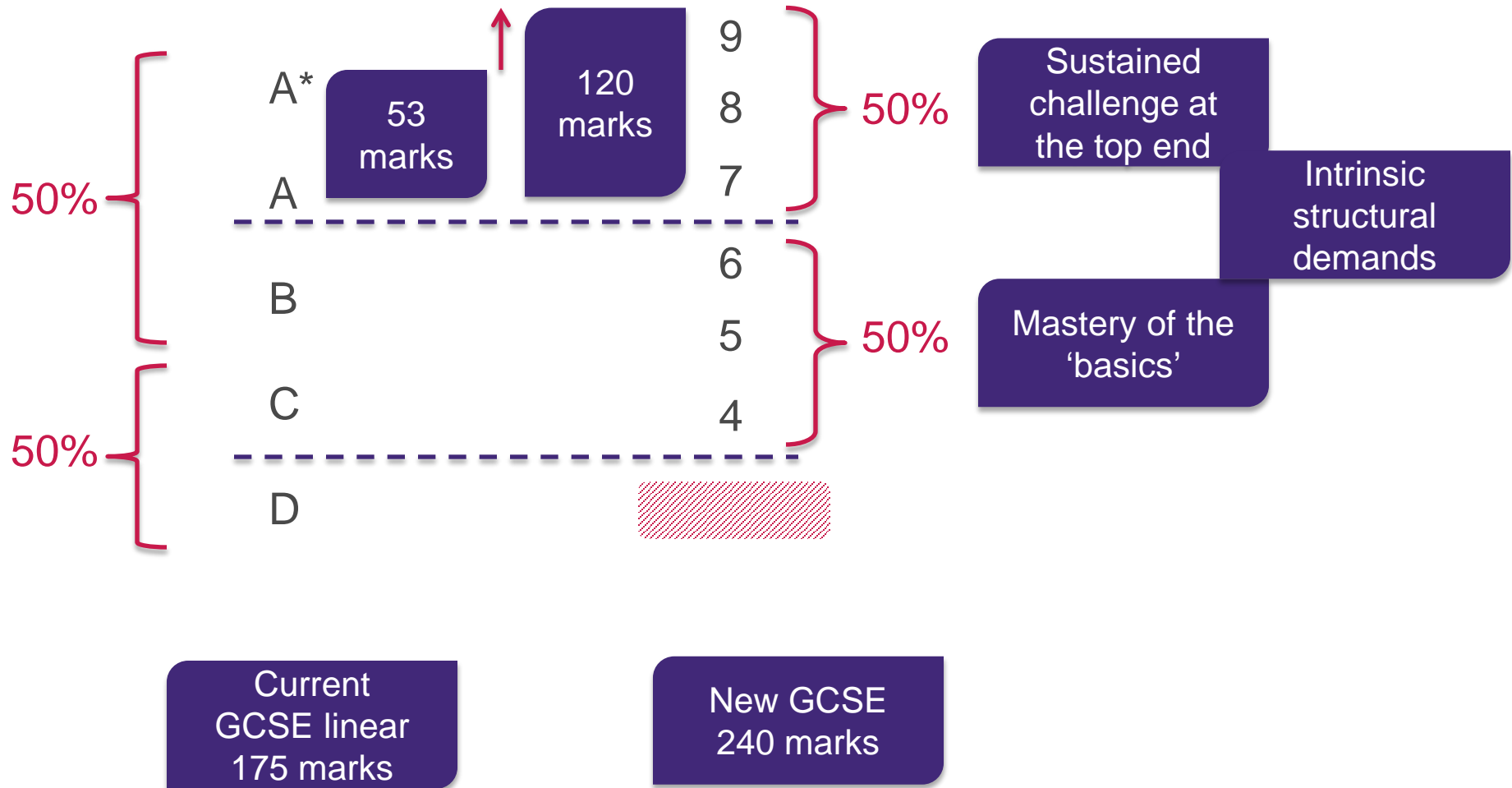


# Structure of Higher Tier Papers

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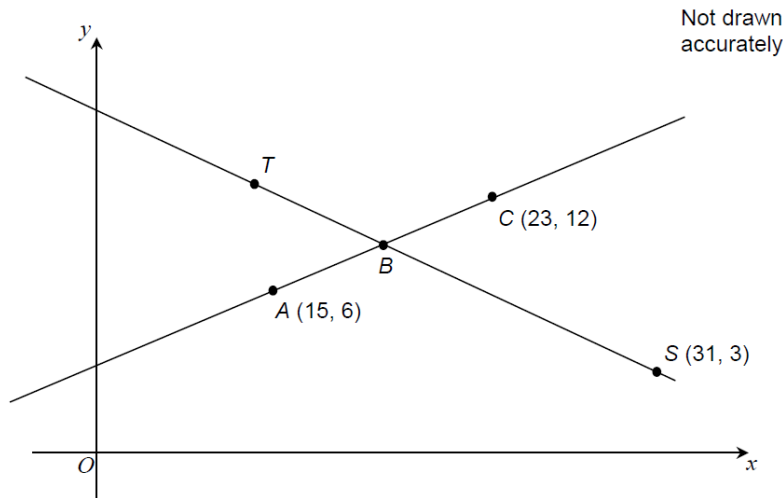
- Each paper will start with 4 multiple choice questions
- 4 further multiple choice questions are spread throughout each paper
- Early questions test the *additional foundation content* in a straightforward way and the *basic foundation content* in a more complex way
- As the paper progresses the *higher content* is tested in a straightforward way and the *additional foundation content* is tested in a more complex way
- At the end of the paper *higher content* is tested in both straightforward and more complex ways

# Higher tier structure



# Example of testing results Paper 1H Question 21

- 21 Two straight lines are shown.  
 $B$  is the midpoint of  $AC$ .  
 $TB : BS = 2 : 3$



Work out the coordinates of  $T$ .

[4 marks]

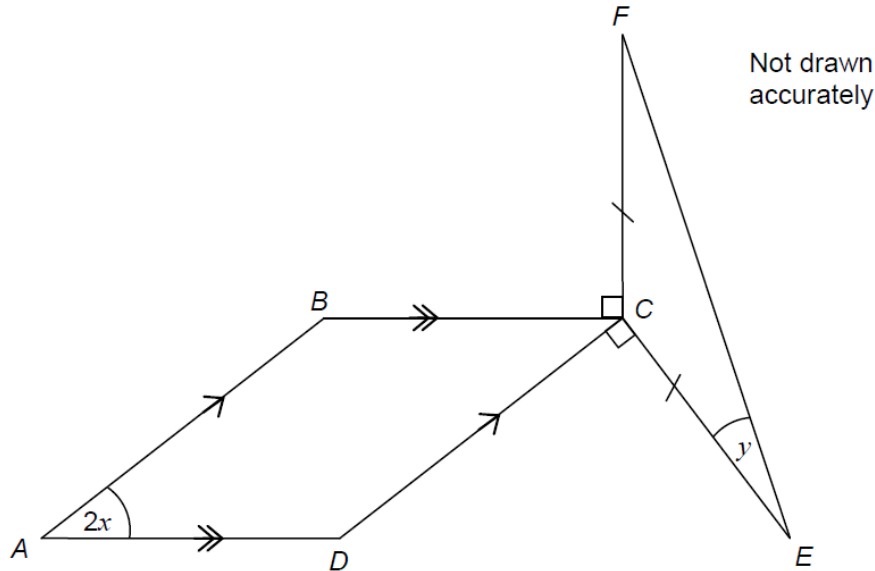
Problem solving  
questions don't need to  
be in context or word-  
heavy

Still a challenge!

10% scored 4 marks  
9% scored 3 marks  
10% scored 2 marks  
22% scored 1 mark  
49% did not score

# Example of testing results Paper 2H Question 18

- 18  $ABCD$  is a parallelogram.  
 $CE = CF$



Prove that  $y = x$

[5 marks]

Testing helps us focus our support for you.

Proof at Higher tier. Good differentiator, but few can fully meet the demands.

3% scored 5 marks  
15% scored 4 marks  
7% scored 3 marks  
35% scored 2 marks  
18% scored 1 mark  
Only 22% scored 0

# Questions on Higher Tier

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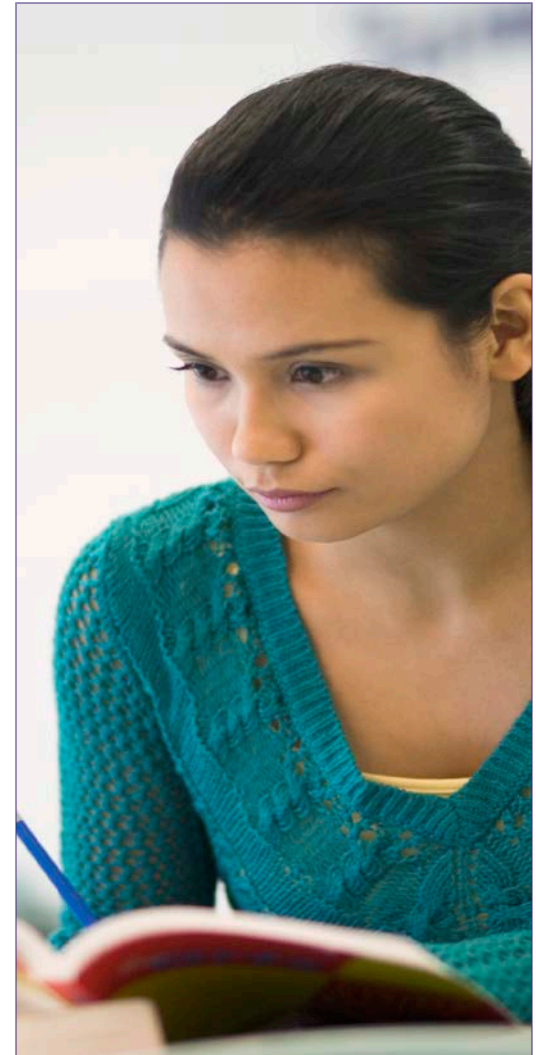


# Ongoing support and resources



# AQA resources

- *All About Maths*
- Maths advocates
- Free Preparing to teach events
- AQA website
- Secure Key Materials
- ERA (Enhanced Results Analysis)
- Training courses



# 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


Topics are broken down to sub-topics for you

Fully customisable

Available at both tiers for 2 and 3 year teaching

## Year 9

SEPTEMBER				OCTOBER				NOVEMBER	
Wk1 Basic Number	Wk2 Factors and Multiples	Wk3 Angles	Wk4 Scale diagrams and bearings	Wk5 Basic Algebra		Wk7 Review and Revision 1	Wk8 Holiday	Wk9 Basic Fractions	Wk10 Coordinates and Linear Graphs
NOVEMBER			DECEMBER				JANUARY		
Wk11 Basic Decimals	Wk12 Rounding	Wk13 Collecting and Representing Data		Wk15 Year 9 Examinations and Revision	Wk16 Holiday	Wk17 Holiday	Wk18 Sequences	Wk19 Basic Percentages	
JANUARY		FEBRUARY				MARCH			
Wk21 Introduction to Perimeter and Area	Wk22 Review and Revision 2		Wk24 Holiday	Wk25 Introduction to Circumference and Area	Wk26 Ratio and Proportion		Wk28 Basic Probability		Wk29 Review and Revision 3
APRIL				MAY				JUNE	
Wk31 Holiday	Wk32 Holiday	Wk33 Equations		Wk35 Scatter Graphs	Wk36 Review and Revision 4		Wk38 Holiday	Wk39 Transformations	
JUNE			JULY						
Wk41 Summer Examinations and Revision	Wk42 Summer Examinations and Revision	Wk43 Pythagoras' Theorem	Wk44 2D Representations of 3D Shapes	Wk45					

Year 10 



# Route Maps

Clicking a sub-topic opens a slide summarising the topic, giving you:



## Rounding

- notes from the Teaching Guidance
- specification content
- links to further resources on All About Maths

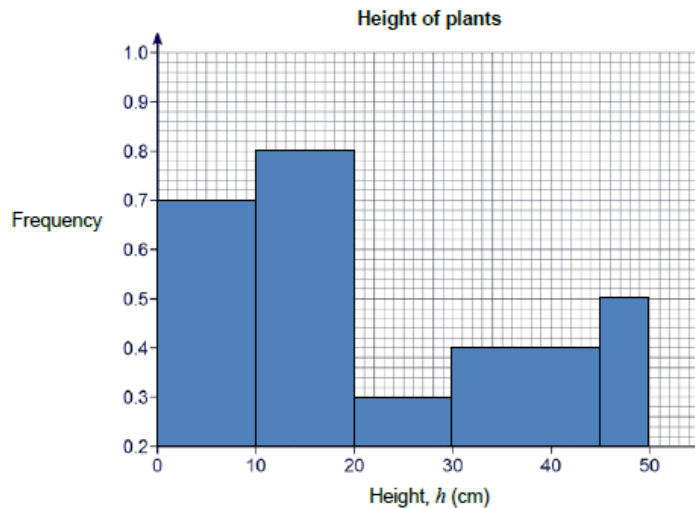
	Students should be able to:	Specification notes:
N15	<ul style="list-style-type: none"><li>&gt;perform money calculations, writing answers using the correct notation</li><li>&gt;round numbers to the nearest whole number, 10, 100 or 1000</li><li>&gt;round numbers to a specified number of decimal places</li><li>&gt;round numbers to specified number of significant figures</li><li>&gt;use inequality notation to specify error intervals due to truncation or rounding</li></ul>	<ul style="list-style-type: none"><li>&gt; round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures) Including appropriate rounding for questions set in context</li><li>&gt; <u>use inequality notation to specify simple error intervals due to truncation or rounding</u> (Students should know not to round values during intermediate steps of a calculation)</li></ul>
N16	<ul style="list-style-type: none"><li>&gt;interpret scales on a range of measuring instruments, including those for time, temperature and mass, reading from the scale or marking a point on a scale to show a stated value</li><li>&gt;know that measurements using real numbers depend on the choice of unit</li><li>&gt;Recognise that measurements given to the nearest whole unit may be inaccurate by up to one half in either direction.</li></ul>	<ul style="list-style-type: none"><li>&gt; <u>apply and interpret limits of accuracy</u></li></ul>

# Example from AO resource booklet

9 Jon uses this data about the heights of plants ( $h$ ) to draw the histogram below.

Height $h$ (cm)	$0 < h \leq 10$	$10 < h \leq 20$	$20 < h \leq 30$	$30 < h \leq 45$	$45 < h \leq 50$
Frequency	7	8	3	6	5

He uses the information to draw this bar chart.



Write down three different types of mistake that he has made.

[3 marks]

Mistake 1 \_\_\_\_\_

Mistake 2 \_\_\_\_\_

Mistake 3 \_\_\_\_\_

## Mark Scheme

9	(Vertical scale) does not start at 0 or incorrect height bars or vertical scale is incorrect or area not proportional	B1	Any order
	Last bar (should be height 1)	B1	
	Label on vertical scale incorrect eg should be frequency density	B1	

## Commentary

AO2.5b Critically evaluate a given way of presenting information.

This question presents information diagrammatically and requires the student to identify why the histogram is misleading.

Other examples that could be used here include misleading graphs, diagrams or a flawed proof.

Questions covering each bullet of every AO with schemes and commentary.

# Other resources

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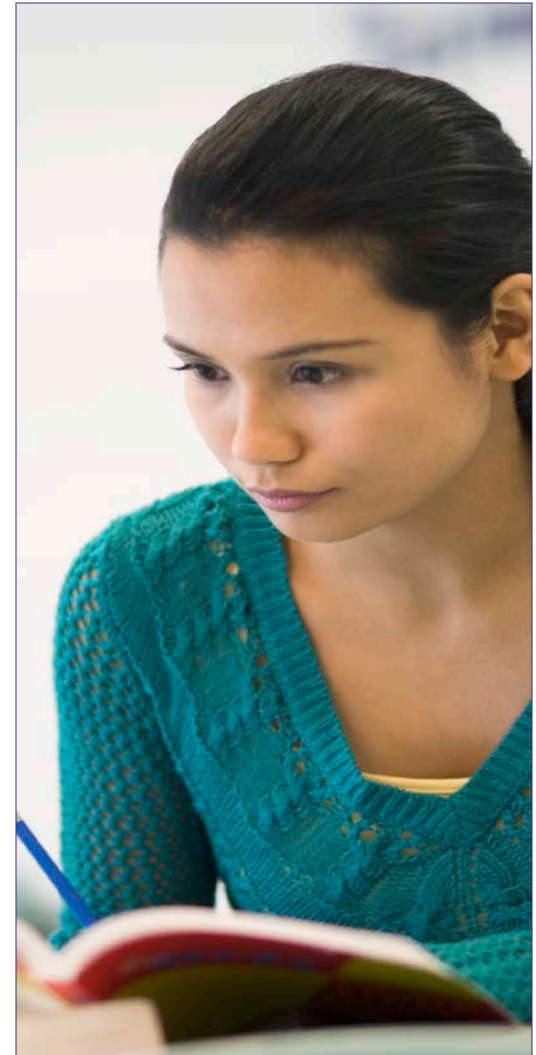
Teach-it

ExamPro

Alfiecloud

Approved textbooks and electronic resources from:

- Collins
- Cambridge University press
- Oxford University Press



# Contact points for more information and guidance

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- Maths Subject Team  
maths@aqa.org.uk  
0161 957 3852
- Teacher Support and CPD Managers  
teachercpd@aqa.org.uk  
0161 957 3646
- AQA Website  
www.aqa.org.uk

# Timeline

## Draft

Specification and specimen Question Papers, and Mark Schemes published

## Accredited

Specification published

**First teaching** of **3-year** course

**First teaching** of **2-year** course

**First assessment** of GCSE Mathematics

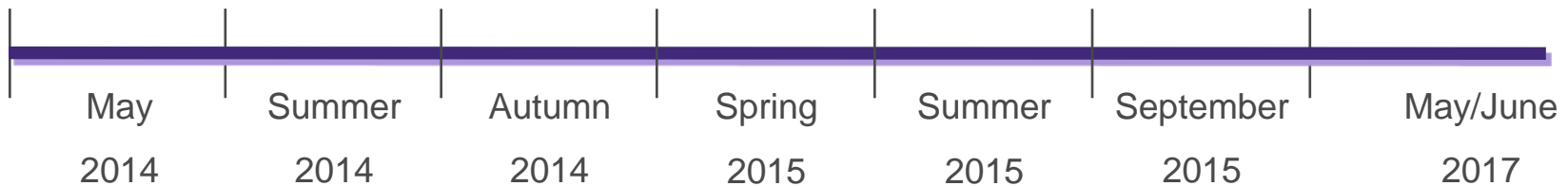
**Teacher and learner resources** published

Additional **teacher and learner resources** published

**FREE Introductory** events online and face to face

**FREE Preparing to teach** events

**Teacher training** courses available



# Final questions

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Thank you

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