AQA
Realising potential

Updated

GCSE Maths: Foundation paper improvements

A closer look at the live questions from summer 2022 and beyond

v1.0

At AQA, we strive to give all students the opportunity to realise their potential.

Live summer 22 questions from page 7

That's why, as part of our commitment to continuously review our assessments, we made some refinements to our GCSE Maths Foundation papers for summer 2022 and beyond.

To make sure our low demand questions are accessible to all students, including the lowest attainers, we:

- adjusted the demand of our multiple choice questions
- adjusted the numbers used in some of the questions
- simplified the wording in some of the questions
- reviewed the number of steps in our multistep questions
- removed contexts from some questions.

This booklet looks at these improvements for some specific questions from the summer 22 series, giving you a better understanding of why we've made them and how they'll have a positive impact on your students' exam experience.

Remember:

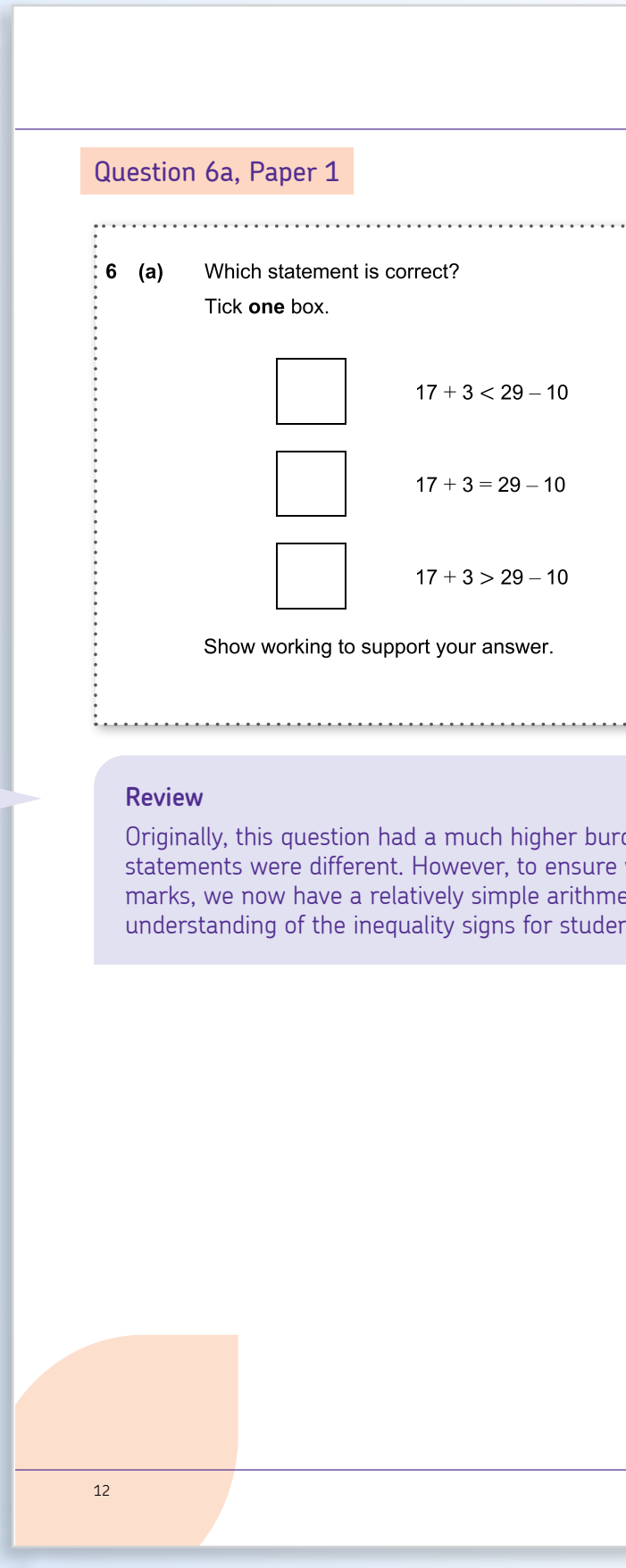
- these changes only affected Foundation papers, and only the first 40% of each paper
- we didn't change the Higher papers
- we didn't change the format and style of our Foundation papers.

Using this booklet

We've collated and annotated a selection of questions from the summer 2022 exam series to give you a better idea of the improvements we've made.

On each page, you'll find a question from the summer 2022 series with our review of the question and details of how we improved the question.

Review: we outline our rationale behind how the final question appeared as it did, occasionally referencing what we were going to do and, where appropriate, how that aligns with our commitment to continuously review our assessments.



Question 6a, Paper 1

6 (a) Which statement is correct?

Tick **one** box.

☐ $17 + 3 < 29 - 10$

☐ $17 + 3 = 29 - 10$

☐ $17 + 3 > 29 - 10$

Show working to support your answer.

Review

Originally, this question had a much higher burd
statements were different. However, to ensure
marks, we now have a relatively simple arithme
understanding of the inequality signs for studer

12

Assessment design

What is assessment design?

Assessment design is about crafting assessments that will allow students of all levels to demonstrate their knowledge and understanding in a particular subject – it's making sure every student has the opportunity to realise their potential.

That's why writing good quality exam questions and mark schemes is at the heart of AQA's purpose as an educational charity.

Why is assessment design so important?

We need to create well written questions and mark schemes to make sure we can differentiate between students, mark reliably, maintain standards and award accurate grades. This is not only fundamental for us as an exam board, but also for the students taking our qualifications.

Key assessment design principles

There are lots of key principles to assessment design but, for the Foundation paper changes, we're talking about **differentiation** and **validity.**

Differentiation:

is achieved when an exam paper gives students across the ability range the opportunity to show what they know, understand and can do. This can be done:

- by **outcome**, where different students respond at different identifiable levels to the same task
- by **task**, where different students succeed on tasks pitched at different levels.

In the following examples, we've identified where we've improved the accessibility of our papers so that we can better differentiate between grades 1, 2 and 3.

Validity:

in simple terms, is whether a question or assessment is testing what it's supposed to test.

In the following examples, we indicate how we're improving validity to make sure students aren't confused about what a question is asking them to do.

All questions are taken from the 2022 summer exam series.

MCQ stands for 'Multiple choice question'.

Foundation Paper 1

Question 1a, Paper 1

1 (a) Circle the answer to 150 ÷ 5

[1 mark]

3 30 300 3000

Review

A first question to genuinely settle the students. We believe that the vast majority will get this correct and will know they have it correct, so this will give students a good start. In earlier drafts, we were going to use a multistep calculation of 24 ÷ 4 + 2, but felt this was too complex for the very first question.

Question 1b and 1c, Paper 1

1 (b) Circle the answer to $5 - 7$

[1 mark]

-12 -2 2 12

1 (c) Circle the answer to -3×3

[1 mark]

-9 -6 6 9

Review

Straightforward testing of negative number work to continue to build student confidence at the beginning of the paper. Earlier drafts had both values as negative in both questions, but this was deemed too demanding for an early question. This meets with our aim to 'adjust the demand of our multiple-choice questions'.

Question 3, Paper 1

3 By rounding each number to the nearest 10, estimate the value of 31×18

[3 marks]

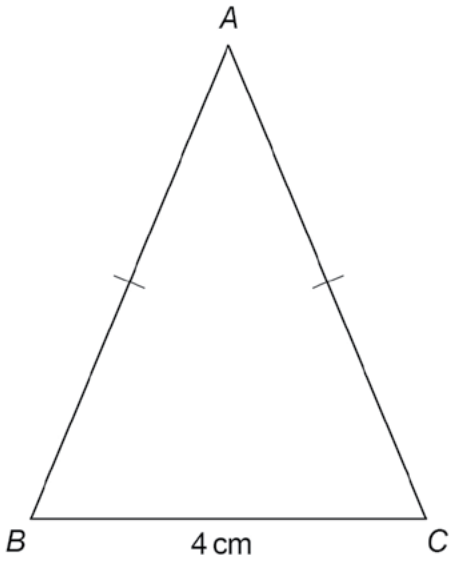
Review

This question is designed to test knowledge of using rounding to obtain an estimate without making arithmetic a big issue. Therefore in the final version, we reduced the numbers from 3-digit to 2-digit and the rounding from nearest 100 to nearest 10. This meets with our aim to adjust the numbers used in some of our questions, so that we can focus on the skills required instead.

Question 4, Paper 1

4 In this isosceles triangle,

$AB = AC$



Not drawn accurately

The perimeter of the triangle is 22 cm

Work out the length of AB.

[3 marks]

Review

This early example of shape problem solving has very few words. During the writing process, we reduced both the words and the size of the values in the question. We want lower attaining students to be able to show us what they can do mathematically, and not be constrained by unnecessary words or larger than necessary values to work with.

Question 5, Paper 1

5 After school, Priya will

- go running (R)
- do her homework (H)
- play a video game (V).

Complete the list of the 6 possible orders in which she could do them.

[2 marks]

RHV

Review

A crucial element in lowering the demand of a question, such as this, to an appropriate level for students so early in the paper is to help them structure their answers. We were always going to give them an example, but what evolved during the final drafting was the idea, for low demand, of tabulating and also telling students that there were a total of 6 possible orders.

Question 6a, Paper 1

6 (a) Which statement is correct?

Tick **one** box.

☐ $17 + 3 < 29 - 10$

☐ $17 + 3 = 29 - 10$

☐ $17 + 3 > 29 - 10$

Show working to support your answer.

[2 marks]

Review

Originally, each statement was completely different giving arithmetic skills more weight than was desirable here. To ensure the two marks are for two distinct ideas (arithmetic and inequality notation) we changed it so students had a single calculation to do and then an opportunity to show understanding of inequality signs.

Question 6b, Paper 1

6 (b) Work out $60 \div 2 + 4$

[2 marks]

Review

This question evolved from the original idea for Question 1a, which was going to be a multistep calculation. That was simplified for Question 1a, but this evolved for Question 6b. Most importantly, we chose to give 2 marks and not a 1-mark MCQ for this work, which clearly has two steps and required accuracy. We feel that rewarding each step is an important principle in good assessment design for low demand items.

Question 9, Paper 1

9 Shona has 14 dresses.

50% of these dresses are red.

She gives 5 of her red dresses to a charity shop.

She buys 1 new red dress.

What percentage of the dresses she has now are red?

[4 marks]

Review

In this problem solving question, we've kept the numbers small so the students can focus on the probability problem. We removed a step from the question to ensure it was genuinely of low demand. This meets with our aim to review the number of steps in our multistep questions.

Question 13a, Paper 1

13 (a) The term-to-term rule for a sequence is

multiply by 2

The 3rd term of the sequence is 46

Work out the 1st term.

Give your answer as a decimal.

[3 marks]

Review

Originally, this question used larger values and asked for the answer as a mixed number. However, that would be quite unusual in a question such as this. Therefore, when we reduced the size of the values involved, we also decided to ask for a decimal version of the answer. This ensures outcomes are aligned to the key understanding of this question which is inverse operations.

Question 13b, Paper 1

13 (b) The term-to-term rule for a different sequence is

subtract k

The 1st term is 34

The 4th term is 10

Work out the value of k.

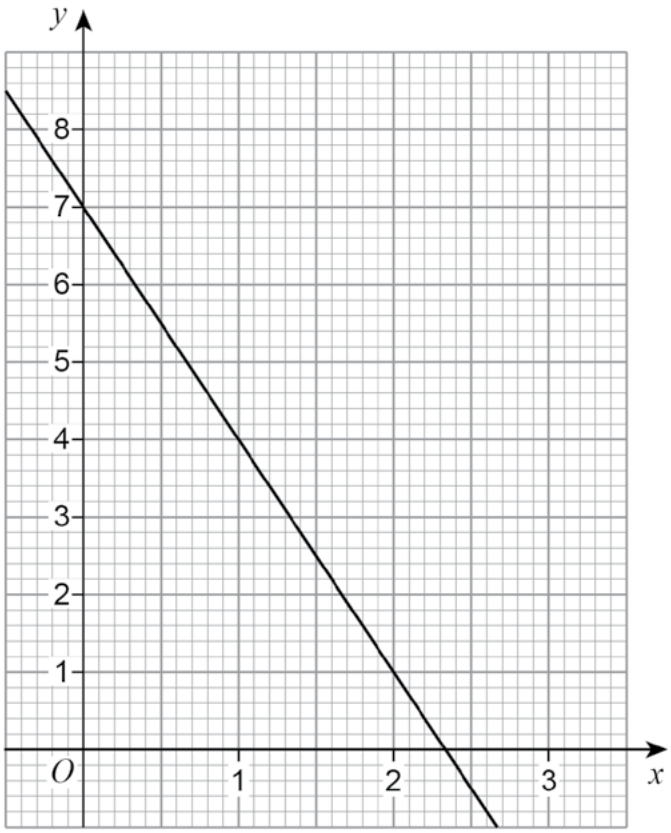
[3 marks]

Review

Again, there was a significant reduction in the size of the values (of the terms) and, additionally, we reduced the second value from being the 6th term to the 4th term. This gives lower attainers a much greater chance to be successful if they choose to use trials to get the value of the common difference. This meets with our aim to adjust the numbers used in some of our questions.

Question 16, Paper 1

16 Here is the graph of $y = 7 - 3x$



Draw the graph of $y = 2x + 1$ on the grid

and then

work out an approximate solution to $7 - 3x = 2x + 1$

[3 marks]

Review

This question is not low demand, but equally, it's not meant to be too high demand as it's only just over half way through the paper. For that reason, we swapped around which line was drawn for the students and which line they had to draw themselves. This means that a greater proportion will be able to display their understanding of how to draw a line and that the solution to the equation is where the lines cross.

No changes were made to the demand of later questions maintaining the necessary stretch and challenge for Grade 4 and Grade 5 students, ensuring they have the opportunity to demonstrate their skills.

Foundation Paper 3

Question 1, Paper 3

What is $\frac{1}{4}$ as a percentage?

Circle your answer.

10% 25% 40% 75%

Review

A first question which we wish to genuinely settle the students. The percentage conversion required was judged to be a well-known one for the vast majority of the students. During the writing process, this question was moved to Q1 to give the best possible start for students.

Question 2, Paper 3

Circle the number that is a factor of 10

7 6 5 4

Review

Straight forward testing of factor work to continue to build student confidence at the beginning of the paper. A good opportunity for as many students as possible to engage with the understanding of factors – we chose not to use the common misconception of a multiple for the distractor this early in the paper. This meets with our aim to adjust the demand of our multiple choice questions as appropriate.

Question 5a, Paper 3

Write a suitable unit for measuring each amount.

One has been done for you.

	Unit
Distance from London to Manchester	kilometres
Length of a pencil	
Mass of a pound coin	

Review

This question is designed to test knowledge of simple units. Using a table and completing the first row is aimed to clarify the requirements as much as possible and allow students to see what is required. Here, minimal context is used, rather than using a full sentence for each scenario. This meets with our aim to minimise words where possible.

Question 5b, Paper 3

Times for the three parts of a journey are

- 20 minutes
- 40 minutes
- 1 hour 30 minutes.

Work out the **total** time for the journey.

Give your answer in hours.

Review

During the writing process we simplified the numbers to be used in this question considerably. This enable us to focus our assessment on exactly the two skills we want to test and nothing else, knowledge of 60 minutes in an hour, and the harder skill of writing half an hour as a decimal. Notice, also, we didn't develop an unnecessary context of a person doing this journey to save a considerable number of words.

Question 6, Paper 3

Pens cost 20p each.

Rulers cost 60p each.

Saj buys some pens and some rulers.

He buys 8 rulers.

The total cost is £10

How many pens does he buy?

Review

This early piece of problem solving has fewer things going on than similar previous questions. This is designed to allow as many students as possible to access it and show that they can solve simple problems. This meets with our aims to review our problem solving at low demand and remove steps if appropriate to make it more accessible and again, to use short snappy sentences.

Question 8, Paper 3

In this question use 1 litre = 1000 millilitres

A mixture is made using white paint and red paint.

amount of white paint = amount of red paint ÷ 7

5.6 litres of red paint will make **more** than 6 litres of the **mixture**.

How much more?

Give your answer in millilitres.

Review

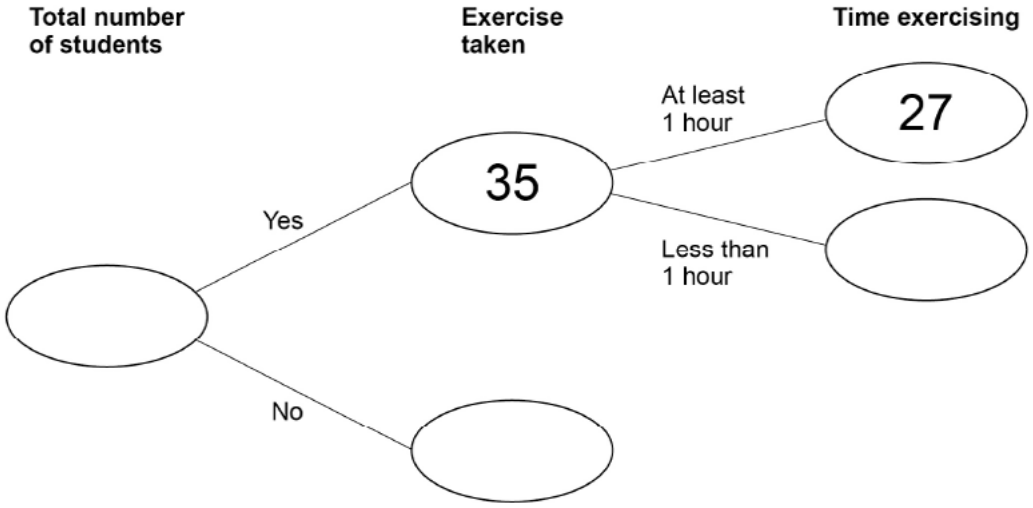
Originally this question had greater difficulty for two reasons – firstly we did not give the conversion, and secondly the boxed statement was given in ratio form. At this low demand level, we decided we wanted to test the skill of solving the problem and not the recall of 1 litre being 1000ml on this occasion. Replacing the ratio statement with a division statement (and putting it into a box) also makes the question more accessible. We can test ratio statement issues later in the paper.

Question 9a, Paper 3

Some students were asked about their daily exercise.

12 **more** students answered Yes than answered No.

Complete the frequency tree.



Review

We simplified the numbers considerably on this question, as, even though this is a calculator paper, we know some students will do the arithmetic in their heads or be put off by large numbers when they are not necessary. This is in no way meant to be a test of arithmetic so we hope now that students' ability to show their knowledge of frequency trees is far less likely to be constrained. All marks are accessible through the application of 'follow through' even if an initial error is made.

Question 12b, Paper 3

Here are two expressions.

$8a$	$a^2 - b$

When $a = 25$ the expressions have the same value.

Work out the value of b.

Review

To enable us to feel confident that this algebra problem solving question was suitable for its place in the paper, we made changes to both expressions including removing reference to b from the first. This ensures students are focussed on the problem and not the ability to set up an equation at this level.

Contact us

Our team of subject experts are here to help and support you as you deliver our specifications.

We're here to provide advice when you need it and respond to queries you might have to make sure you feel confident about guiding your students to fulfil their potential.

We understand the trust you put in us to provide great assessments for your students and we are committed to delivering on this.

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