AQA
Realising potential

GCSE
Mathematics

8300: Paper2 (Calculator) Higher

Report on the exam

Published: June 2023

Contents

The below table is interactive. You can press the control button click on the title of the question to go directly to that page.

Contents	Page
Summary	3
Individual questions	4
Further support	10

Summary

This was the first series with changes made to the assessment. Multiple-choice questions were removed from the start of the papers and efforts were made to ensure that more of the beginnings of the papers were accessible to all at higher tier. We have worked hard to ensure that ramping of demand, wording of questions and the contexts used are appropriate. This has led to an increase to some of the grade boundaries. As a result we feel students were better able to demonstrate their mathematical knowledge and appeared to have a more positive examination experience.

Overall performance compared to last year

The paper was accessible to most students with only a few questions having a significant number of non-attempts. The start of the paper was very straightforward. The questions common with paper 2F were generally well answered which was also the case last year. This year's paper overall is of a similar standard to last year.

There were a number of questions where some students did not show clear or sufficient working to be awarded marks and there were a number of responses seen where the writing was very poor indeed. Questions requiring reasoning and explanations were not well answered overall.

Topics where students excelled

- simple ratio
- triangular numbers
- money and ratio problem
- probability spinner problem
- showing that rectangles are similar
- expanding brackets
- calculating an angle at the circumference.

Topics where students struggled

- statistical explanations
- explanation involving circle theorems
- probability cards problem
- describing a transformation of a graph.

Individual questions

Question 1

This question was very well answered.

Question 2

This question was very well answered.

Question 3

Many correct answers were seen. Common wrong answers were $-\frac{7}{4}$ and $-\frac{4}{7}$ while others gave a decimal approximation to $\frac{4}{7}$.

Question 4

A majority of students recognised the 'reverse' nature of the question and most of these were awarded both marks. Some identified 112.5% but then decreased £19.53 by 12.5% which was the most common wrong method.

Question 5

Most students scored 3 or 4 marks on this AO3 question. After getting to £6 some could not get a ratio in its simplest form or worked out a ratio of numbers of coins instead of their values. Weaker students worked out there were 360 2p coins but then divided by 2 instead of multiplying to find their value.

Question 6(a)

Many correct answers were seen but some gave the exterior angle of 135°. A significant number of students did not know how to approach this standard AO1 question.

An error on this question in the A3 36pt and A4 24pt modified question paper versions meant that this question could not be answered. The small number of students who sat one of these papers were given full marks for this part and also in part (b).

Question 6(b)

This question was well answered. The most common incorrect answer was to tick the first box.

Question 7(a)

This question was very well answered.

Question 7(b)

A large majority of students gave a correct answer with most writing their probability as a fraction.

Question 7(c)

This part was also well answered. Some gave their answer as $\frac{316}{711}$ and only scored one of the two marks.

Question 8

Identities is a topic that is difficult for a significant number of students. Those familiar with the concept were usually able to work out both values correctly by equating coefficients. Others had a lot of incorrect working and made little or no progress.

Question 9

This question was a good discriminator in the early part of the paper. Those who drew parallelograms generally were more successful than those who just plotted points. Some only attempted one parallelogram and others identified correct vertices but thought these were the answers to the question. A small number did not notice the word horizontal or did not know the meaning of it.

Question 10

Some gave their answer as coordinates but the most common wrong answer was $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$

Many fully correct answers were seen. Students often leave brackets out and/or include a line between the top and bottom numbers in vectors.

Question 11

This multistep AO3 problem was a good discriminator. Most worked out the volume of the sphere correctly with only a few not using the given formula correctly. A variety of methods were used with the most common being to compare 70% of the volume of the hemisphere with ($325 \times 8 =$) 2600. Working only with the sphere rather than the hemisphere was a common error but these students could still score two marks. Decisions were usually made and were usually clearly communicated and correct.

Question 12

This AO2 question was answered very well. Various equivalent approaches were used with most using a scale factor of 1.6 in their answers.

Question 13

This AO2 question was more challenging and a significant proportion of the students did not work with algebra at all. In this type of question it is especially important that students set their working out clearly and show working that leads to the required expression.

Question 14(a)

A variety of valid approaches were used. The alternative methods in the mark scheme allowed many students to score full marks. Some students answered part (c) or even part (b) here. A small number did not show sufficient working. Following the instructions in the question is an important feature, especially in this type of AO2 problem.

Question 14(b)

This question was not well answered with only a minority gaining the mark. Many students did not communicate their reasoning clearly or gave an invalid argument.

Question 14(c)

Mainly full marks or no marks were scored here. Some worked out fx values but made an error with some or all midpoints. Some were unsure whether to use fx values and chose to do a more simple but incorrect calculation such as 123 ÷ 4

Question 14(d)

This question was poorly answered with only a small number of students giving a valid argument that referred to the distribution. Many only referred to the data being grouped or having a large range.

Question 15

Nearly all students expanded to exactly four terms with a majority getting them all correct. There were not many sign errors with most mistakes being made with the terms $2x^3$ (usually $2x^2$) and $-45xy^2$ (often $-45xy$).

Question 16

This was a good discriminator on a topic that is challenging for many students. Many could rearrange the equation of line B correctly but those who didn't usually took the gradient to be 3. Others substituted (7, 13) into the equation of line A correctly but a common error was to have the gradient as $\frac{13}{7}$. Most gave a valid explanation if they worked out the two correct gradients.

Question 17

More students worked with two right-angled triangles than used the sine rule in triangle *ABC* but both approaches were seen often. A common error was to work out *AC* as 4 × sin 37. A few did get the correct answer after using Pythagoras' theorem and trigonometry but these longer approaches often led to errors at some stage. Those using the sine rule sometimes could not correctly rearrange their equation to make $\sin x$ the subject.

Question 18

Multiplying both sides by x was quite often correctly done but only about half of these students were able to progress to the final answer. A significant number had no idea how to approach this standard AO1 question.

Question 19

Many were able to score one mark by working out the second differences which was by far the most common approach. From here many did not know how to proceed. The most common approach for those who could progress was to subtract $5n^2$ from the given four terms although some subtracted in the wrong order. There were a significant number of fully correct answers with most working out the constant term by trial.

Question 20(a)

This question was well answered.

Question 20(b)

This question was not well answered with the bottom box often being ticked.

Question 20(c)

Many thought that Simon's method was correct so this question was not well answered. Most correct reasons involved saying that angle *ACD* was 70° (and/or that y was 55°). Others explained using arguments involving parallel lines.

Question 21

This question was quite well answered. Many used a trial approach, showing their calculations and evaluating, usually correctly. A common error was to work out 60 as a percentage of 500 giving 12% then just dividing this by 3.

Question 22(a)

Although the question clearly stated that x_1 was 4, some students called this x_0 meaning their x_2 value was [4.176, 4.178]. This was awarded SC1. Many students find this a difficult topic and failed to score any marks but roughly the same proportion got both values correct
There were quite a lot of non-attempts.

Question 22(b)

A small majority of students were able to find a value that was needed to score the mark.
There were quite a lot of non-attempts.

Question 23

This question was not well answered. $\frac{3}{8}$ and $\frac{4}{11}$ were often seen in working for Option 1 and others assumed replacement. A little more success was achieved from Option 2 but many did not use probabilities at all, instead trying to consider the number of ways to get a total of 10. A large proportion did not score at all.

Question 24

Some students did not consider bounds at all but many did work out at least one appropriate bound. A significant number wrote 29.5 and 30.5 as the bounds for b. Using 65.5 and 35 in their calculation was a common error. Another incorrect approach seen was to calculate using 65 and 30 and then consider bounds for the answer to their calculation.

Question 25

Some very good well presented answers were seen but others did not embrace the 'show that' element of this AO2 question. Sign errors were made and working often lacked sufficient clarity and detail. There were quite a lot of non-attempts.

Question 26(a)

This question was quite well answered with the most common wrong answers being (2. 0) and (2, 2).

Question 26(b)

This question was answered correctly by a majority of students. The most common wrong answers were $x = y^2$ and $y = \frac{1}{x^2}$

Question 26(c)

This question was poorly answered with quite a lot of non-attempts. Some used transformation rather than translation and others used 9 instead of –3.

Further support

Mark ranges and award of grades

Grade boundaries and cumulative percentage grades are available on the results statistics page of our website.

Enhanced Results Analysis (ERA)

Use our exam results analysis tool to create and customise as many different reports for comparison as you like.

Professional development

Attend one of our feedback courses where you can review example responses from students and commentaries from our examiners.

Contact us

Our friendly team will be happy to support you between 8am and 5pm, Monday to Friday.

Tel: 0161 957 3852

Email: maths@aqa.org.uk

aqa.org.uk