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Examiners' report

MATHEMATICS

J560

For first teaching in 2015

J560/05 Autumn 2020 series

Version 1

ocr.org.uk/maths

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

	Reports for the Autumn 2020 series will provide a broad commentary about candidate performance, with the aim for them to be useful future teaching tools. As an exception for this series they will not contain any questions from the question paper nor examples of candidate answers.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. The reports will also explain aspects that caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

A full copy of the question paper and the mark scheme can be downloaded from OCR at https://www.ocr.org.uk/qualifications/gcse/mathematics-j560-from-2015/assessment/#gcse-question-papers-mark-schemes-and-reports.

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Paper 5 series overview

There was a small entry for the November Higher tier papers with many more candidates taking the Foundation tier. There were a range of marks received, but most candidates were able to access many parts of the paper. There were a larger number of more able candidates aiming for the upper grades (7 to 9) than in previous November resit sessions.

Work was generally well presented, but some candidates still choose quite haphazard approaches to certain problem solving questions. Question 10 (problem solving with percentage) here was a particular example, where a more structured approach would have benefitted.

On questions involving diagrams (e.g. Question 7), candidates that annotated the diagrams to support their working and answers often had more success.

With questions involving written reasons, answers lines are provided and candidates should use this as a guide as to the amount of work needed. Candidates should use correct mathematical terminology in their reasons and this is often particularly important in geometry (e.g. Question 9, which was a proof of congruency).

In this paper the questions that were answered very well included those on prime factors, simple equations, simplifying algebraic expressions involving brackets, ratio, probability, problems involving lowest common multiples (LCM) and completing the square.

The questions that candidates found challenging included proof involving congruency, problem solving with percentages, trigonometric equations with exact trigonometric values, manipulating expressions involving indices, sketching quadratic graphs and problem solving involving area.

Candidates who did well on this paper generally did the following:	***Candidates who did less well on this paper generally did the following:***
• had a breadth of knowledge across the curriculum. • had secure arithmetic procedures when calculating with ratio, fractions, decimals and percentages. • showed concise well-structured working.	• had a weaker curricular knowledge. • used random unstructured working on multi-mark questions. • were less secure with their arithmetic when performing calculations involving ratio, fractions, decimals and percentages.

Comments on questions

Questions involving reasoning where candidates were asked to comment on a given answer, method or representation showed improved responses. For example, Question 8, where candidates were asked to describe errors on a tree diagram that had been drawn for a probability problem. Most candidates were able to accurately describe at least two errors and the best responses both identified the error and added how the error should be corrected. Similarly, on Question 18(b), where more able candidates made accurate comments about the reliability of previous years' data for crop growth and other factors that may affect the growth (such as weather, disease, etc.).

Candidates showed improvement in their work with problems involving lowest common multiples (LCM), such as question 6. Here the majority were able to identify the LCM relevant to the problem and then used clear listing strategies to reach their solution.

Another area showing improvement is completing the square with a quadratic expression.

Common misconceptions

Although simple equations questions were answered well generally, there were still errors seen. In Question 2(a) several candidates did not use the inverse operation (for example going from $4x + 3 = 13$ to $4x = 16$). Another equation question was question 15 and here there were two common errors. The first was when multiplying both sides by the denominator of the fraction, many did not use a bracket (i.e. getting $x = 5x + 6$ instead of $x = 5(x + 6)$). The second was to cancel the x terms in the fraction (i.e. $\frac{x}{x+6} = 5$).

Several questions involved indices. Question 11(a) was interpreting a negative index and a common misconception lead to an answer of -4 rather than $\frac{1}{4}$. Question 14b asked for the simplification of $\left(\frac{2a^2}{a^{-3}}\right)^3$. Many candidates did not apply the index 3 to the number term 2 in the numerator and ended up with an expression $\frac{2a^6}{a^{-9}}$. There was also some difficulty in applying the laws of indices, e.g. giving a^{-3} instead of a^{15}.

In reasoning questions, candidates should beware giving the same reason twice. For example, in Question 8, saying that Tuesday should have 0.25 on the 'rain' branch and then also that it should be 0.75 on the 'not rain' branch.

When sketching the trig graph $y = \sin x$ in Question 13(a), some candidates thought the whole vertical scale should be used and although their shape was correct, gave a graph with amplitude 2 rather than 1.

When finding an estimate of the mean from a histogram in Question 16(b)(ii), a common error was to find the frequencies 10, 20, 30, 40 and then to divide the sum of the frequencies by 4.

Question 17 was an inequality regions problem. Many drew the correct line for $y < 4 - 2x$, but did not recognise that a dashed line should be used to show that the line was not included in the region.

Most could recall the formula for the area of a trapezium in Question 20. Many however used the slant height of the trapezium rather than using the perpendicular height, which had to be calculated.

?	**Misconception**	In the area formula A = ½ (a + b)h that candidates need to learn (it cannot be given), h is the perpendicular height between the parallel sides, not the slant height.

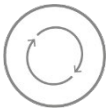
Key teaching and learning points – comments for candidates on improving performance

On questions that state 'show your working', show every step of the method before giving the final answer. Work vertically down the page as far as possible, so that working can be tracked clearly and try to avoid random jottings.

Use the mark allocation for the question as a guide to how much work might be needed to help structure your response.

On questions that provide a diagram, it is advisable to annotate the diagram to help communicate your thinking to the examiner. For example, Question 7 involved finding the coordinates of two points. In the event of final answers being incorrect, marks were available for clearly indicating the lengths of the triangles and on the diagram is a sensible place for this to be done. Adding this information to the given diagram can help students work their way through the question.

When answering questions involving geometrical proof, best practice is to write the statements or conditions concisely, line by line, rather than give an essay-style response. Question 9 this series involved proving angles are equal using congruency.

	**AfL**	When answering questions involving geometrical proof, write short statements or conditions, one after the other. Don't write an essay. For each statement or condition made, always give a reason and use the correct terminology from the syllabus document.

Before answering a question (and again when checking if you have time), always re-read the final line of the question that tells you what you're asked to do, to double-check that you're answering what is being asked.

Guidance on using this paper as a mock

This paper can be used as a good mock assessment with Higher tier candidates, particularly when used to highlight the performance issues raised here. For best assessment practice, it should be used alongside the November 2020 J560/04 and J560/06. A calculator should not be used with J560/05.

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