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Principal Examiner Feedback

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GCSE Mathematics (2MB01) Higher
5MB2H (Non-Calculator) Paper 01

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GCSE Mathematics 2MB01
Principal Examiner Feedback – Higher Paper Unit 2

Introduction

Many candidates were able to make inroads into some of the unstructured questions, whilst still gaining marks on questions which had a more traditional style.

The inclusion of working out to support answers remains an issue for many; it is extremely difficult to track the method used by candidates who present a page of disorganised working spread across the answer space. Presentation of ordered method is key to gaining the many method marks available on this paper.

This was a non-calculator paper and many different ways of performing calculations were seen. Those attempting multiplication and division calculations by addition and subtraction respectively not only paid a time penalty, but were rarely seen to obtain the correct answer. Work with directed numbers could have been improved upon, and many candidates lost marks throughout the paper whenever they had to manipulate either numbers or algebra involving negative signs.

Reports on Individual Questions

Question 1

This was generally well done with the majority of candidates getting full marks. Poor arithmetic spoilt sound method for many.
Common errors included $30 \times 1.3 = £30.90$ and $240 \div 8 = 40$.

Question 2

The order in which calculations were done was an essential part of getting to the answer. In part (a) the most successful candidates found the number of ounces first and converted at the end. Some candidates wasted time by working out all the ingredients. In part (b) many candidates forgot that the original recipe was for 2 people resulting in an incomplete method. Poor arithmetic frequently spoilt their answer.

Question 3

There were various ways of working out the perimeter. Most candidates did so by working out each of the lengths on the diagram; working out was not always clear, but candidates benefitted from writing the lengths of each of the lines considered on the diagram. The most common wrong answer was 144 from the $15+12+9=36$ then $\times 4$. A minority worked with area rather than perimeter. The missing length was too regularly given as 6 instead of 3.

Question 4

In part (a) the most common approach was a factor tree, but some candidates spoilt their answer by showing the factors with "+" signs, or with commas. In part (b) listing multiples was the most common method that usually led to the correct answer. Other methods such as factor trees or venn diagrams were far less successful, since candidates did not know how to link these with finding the LCM. Poor arithmetic in part (b) sometimes meant that the candidate never arrived at a common multiple.

Question 5

The fact there were two different rates was lost on many candidates. Sometimes the first 100 units was shown at £25 but the problem for most was in deciding what to do with the remaining units. These were either costs at the rate of £25, or some multiple of amounts which included the £25 from reading off values from the graph. Some build up methods failed to include the first rare (such as adding readings of 300 and 600 taken from the graph). A very successful approach was to list the cumulative amounts from 100, 200, 300, 400, etc. units, setting up a series that eventually led to the correct answer.

Question 6

This was not well done, with badly organised working. There were many different approaches to finding the area needing tiling or the number of tiles that would fill the wall. There were many arithmetic errors seen, and error relating to units. The result was that some candidates arrived at an absurdly small (or large) number of tiles, which did not appear to bother them. Many candidates attempted to avoid division by using build up methods which rarely gave the correct answer. Some failed to round the number of boxes, working with part boxes, or thought that each tile was £15. The most successful method (though not common) was to consider how many tiles could fit along two sides of each rectangle considered, which avoided complex considerations of area.

Question 7

Since it was rare to see any working shown it was not always clear how an answer had been arrived at.

Parts (a) and (c) were best answered, but there were many wrong answers to part (b), particularly 0.37 or 3.7

Question 8

Part (a) was well done with many gaining full marks. Common incorrect answers included $7n+3$ and $-3n+7$.

Part (b) was less well done. Candidates need to be advised to first show the rule with the number substituted, before they start to do any calculations. There were too many who failed to show 3×4^2 and instead just wrote 12^2 which led to an incorrect calculation. But again there were arithmetic errors which spoilt an otherwise correct solution.

Question 9

The most common approach was 360 ÷ 8 = 45 and 180 – 45 = 135. Candidates felt it useful to write their angles on the diagram, aiding them to work through to a solution. It was clear candidates knew how to calculate interior and exterior angles but many were confused as to *which* angles they were calculating, leading some to write interior angles as exterior on the diagram, or vice versa, even when this meant them showing obtuse angles in the space for an acute angle. *A* common arithmetic error was 360 ÷ 8 = 40.

Question 10

Many candidates remain confused by standard form, but in this case more obtained the correct answers than was the case previously. Most knew what a standard form number looked like, so the only common errors were an incorrect index in part (a), or a misplaced decimal point in part (b).

Question 11

Many candidates started this problem correctly by intending to multiply the three expressions. But few were then able to manipulate the expressions in order to produce a simplification. Over-simplification spoilt some answers that would otherwise have been correct. Candidates earned little credit when adding the expressions, trying to find the surface area, or failing to divide by 2 for a triangle, of which there were a significant number. As with all formulae, there was a need for a left hand side to the formula; very few included “V=” in their stated formula, which regrettably was a mark lost, an issue worth raising with future candidates.

Question 12

3D coordinates remains a weakness for most candidates. In part (a) the point marked was incorrectly positioned in most cases, sometimes not even appearing on a vertex of the cuboid. Part (b) was better answered, though there were occasions when 0s were included for some of the ordinates, or the numbers written down in an incorrect order. Overall few candidates demonstrated an understanding of 3D coordinate work.

Question 13

In part (a) predictably some candidates wrote -16, 16 or $\frac{1}{8}$, amongst other incorrect answers. But the majority answered this correctly.

In part (b) candidates found more success, though 8 featured strongly as the most common incorrect answer.

Question 14

Part (a) was usually answered correctly, probably because of the absence of minus signs, though some candidates did consider by including (x - 1).

In part (b) weaknesses in algebra became clear, with many failed attempts to multiply out the brackets. Errors included $6x$ instead of $6x^2$, misplaced minus signs, and 6 or 4 as the number term. A significant number lost the final mark due to an inability to simplify their four terms.

Part (c) was designed as a discriminator for those working towards grade A, and indeed it was only the more able who were able to show any understanding of what was needed. The x in the denominator caused problems for candidates who knew how to manipulate fractions. A number of candidates added all three fractions, which was unfortunate. Overall few made progress with this question.

Question 15

Most candidates gained some credit in this question. Over time the performance has increased, with candidates becoming more aware of the need to give reasons for statements about angles. In this question not only was it necessary to show the 90° angle or state its position on the diagram, but also to justify it as “the angle between a tangent and radius is 90°”. Many candidates also went on to state further properties such as OMN and ONM being equal. Further than this required working with algebraic expressions, which was beyond the majority of candidates.

Question 16

Few candidates understood what was needed to gain an equation from the information given. Many thought that the question required them to work with the co-ordinates. Some deduced the gradient of AB as 2 (though some stated this as -2). Having taken this step, most of these then wrote down the gradient of the perpendicular line. Unfortunately few were then able to correctly carry out a substitution to find “c”.

Question 17

This question involved multiplying out the brackets, rationalising, and simplifying the surds. Many failed to expand the brackets correctly. Those who multiplied numerator and denominator by $\sqrt{31}$ too early ended up with every term having a $\sqrt{31}$ attached. Many candidates were unable to simplify their answers; some thought that $31\sqrt{\frac{31}{31}}$ could not be simplified any further.

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