Examiners’ Report
Principal Examiner Feedback

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Pearson Edexcel International GCSE
Mathematics A (4MA0/3H) Paper 3H

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Students who were well prepared for this paper were able to make a good attempt at all questions.

Working was generally shown but it was not always easy to follow through. When questions require that students ‘show clear algebraic working’ or ‘show each stage of working clearly’ it is essential that these instructions are adhered to. Failure to do so can result in no marks being awarded even when a correct answer is given. In particular, when using the quadratic formula to solve a quadratic equation, substitution into the quadratic formula should be shown.

Students should be reminded to write their figures clearly. At times it was impossible to distinguish, for example, between a ‘5’ and a ‘3’.

1 It was disappointing to see a significant number of students multiplying 750 by 7.18 rather than the correct 7.3 in part (a). Several students decided that 18 minutes was 1/3 of an hour and used 7.3 recurring as their value for the time. Those who converted 7 hours 18 minutes into 438 minutes tended to show an incomplete method by forgetting to divide by 60 to work out the distance. While many correct answers were seen in part (b) there were a very significant number of students unable to cope with the conversion of compound units. One mark was frequently awarded for multiplication by 1000 or one division by 60 but many failed to pick up any marks. It was disappointing to see that several students thought that 100m made a km. Some students returned to part (a) and used the distance found to work out the speed in m/s – this meant more steps in part (b) but, provided a fully correct method was seen, full marks were awarded.

2 This question was very well done with the vast majority of students giving the correct 3 integers. Most of those who failed to get full marks picked up one mark, usually for showing that the total of the three numbers had to be 21 either by explicitly writing 21 or, more usually, giving three numbers that summed to 21. Occasionally, one mark was given for giving 3 numbers with a median of 5. A common incorrect answer (but still one that gained one mark) was 2, 5, 14 possibly showing a lack of understanding of the phrase ‘the range is 14’.

3 The most common method seen was to convert both fractions into improper fractions. The majority who used this method gained full marks but students should be reminded of the importance of showing all working. For example, $\frac{17}{3}-\frac{19}{5}=\frac{28}{15}$ is not sufficient working as there is an intermediate step missing. Equally successful were those who dealt with the fractional part of the numbers only and so got to $-\frac{2}{15}$; the common missing step this time was to fail to show a conclusion to the given answer. A small number of students incorrectly converted the original numbers to the improper fractions $\frac{10}{3}$ and $\frac{12}{5}$. In questions of this type students should be encouraged to structure their working clearly.

4 This question was generally well answered. Those who failed to gain full marks usually did so due to the fact that they worked with area rather than length. There was some confusion over which circle formula to use but, it was not uncommon to see students working out the area of the square, the area of the circle then adding on four 15 cm lengths – this gained no marks. Others added the lengths of the lines they could see and the diameter of the circle to get their answer.

5 Part (a) was well done. The common error in part (b) was to give the answer $11p - 6$ rather than $11p + 6$ following the correct expansion of the brackets. Some students are still failing to enter negative numbers correctly into their calculator – in part (c) it was reasonably common to see the substitution written as -2^2 rather than $(-2)^2$; this frequently resulted in an answer of −23 rather than the correct 33.

Part (d) was well done; after expanding the brackets correctly a small minority of students failed to take the $-q$ correctly to the left hand side of the equation resulting in $4q$ rather than the correct $6q$. There was some evidence that students occasionally misread their written q as a 9 highlighting the need to write clearly. A minority of students were not able to expand the bracket correctly, or believed that they could add 3 to both sides without addressing the brackets first. The inequality in part (e) proved more problematical than usual due to the $-7t$ in the inequality. A significant number of students failed to deal with the division of an inequality with a negative number correctly which resulted in an incorrect answer of $t \geq -4$ rather than $t \leq -4$.

6 A standard question that was, on the whole, well answered. There was the occasional division by 5 rather than 100. Some students failed to use the mid-interval values and worked with the end of interval values instead meaning they could gain a maximum of two marks. Some students used other values within the interval – these were sometimes consistent e.g. 3, 8, 13, 18, 23 but sometimes were not e.g. 3, 7, 13, 17, 23. Some students used the class widths instead of the mid-interval value.

7 Students generally fell into two categories for this question – those who interpreted the question correctly and so gained full marks for £160 and those who applied a wrong method, gave an answer of £30, and therefore gained no marks. The very common incorrect answer of £30 was seen on numerous occasions. This occurred when students mis-read the question (or failed to read the question carefully enough) and so simply divided £96 into the ratio 4 : 3 : 9. Some of those who used the correct method and so linked £96 with 3 parts, added rather than subtracted their values of £228 and £128.

8 This question was usually very well done. In part (b), it was occasionally difficult to identify the region particularly when students shaded the correct side of each line and then failed to label the region with an R as requested in the question. Students would be well advised to use either shading in or shading out (often easier to interpret) to show their region as well as putting the label in their region. In part (b), some students confused over which lines to draw and for example, drew $y = 1$ for $x = 1$. Part (a) of this question was done better than part

(b). Most students gained full marks on part (a). In part (b), it was not uncommon to see incorrect lines for $x = 1$ and $y = -4$.

9 The use of brackets in algebraic manipulation continues to be a weakness. In this question, the failure to put brackets around the expression that was a result of the expansion of the second pair of brackets meant that a large number of students ended up with 2 rather than 3 marks as they ignored the subtraction sign between the two sets of brackets, resulting in the common incorrect answer of $2x^2 + 5x - 6$. It was also common to observe errors in multiplying out the pairs of brackets, for example $2x \times x$ being expanded incorrectly to give $2x$ or $3x$.

10 Students fell into one of two camps – those who used the correct method of division by 0.82 or those who used the incorrect method of multiplication by 1.18. Careful reading of the question would help students realise that the 18% is a percentage of the original price and not 18% of the given price.

11 The vast majority of students completed the table in (a) correctly and then drew a correct cumulative frequency graph. A small minority plotted the points at times 10s, 30s, 50s etc. instead of the correct 20s, 40s, 60s etc. In part (c) it was disappointing to see a significant number of students misread the scale on the cumulative frequency axis and use 30 on this axis rather than 25. Part (d) was generally correct with only a very few forgetting to subtract their reading from 100.

12 Part (a)(i) was generally correct. Following a correct answer of 96 in (a)(i), a common incorrect answer in (b)(i) was 84 from those students who identified *OCDA* as a cyclic quadrilateral rather than *BCDA*. Those who gave the correct angle in (a) were not always able to give the correct reason: a reason along the lines of ‘it is double 48$^{\text{o}}$’ was unacceptable. Occasionally the centre and circumference were confused even when the answer to (a) was correct. The reason was correct less frequently in (b) than in (a). When the reason was nearly correct, the crucial word ‘cyclic’ or ‘opposite’ were frequently missing. For those that worked out the reflex angle at *O* to obtain the correct numerical answer, many students did not state ' The sum of angles at a point is 360$^{\text{o}}$.

13 The most common error in responses to this question was to use simple rather than compound interest. It was disappointing to see a significant number of students who knew how to calculate compound interest work with the incorrect scale factor of 1.275 rather than the correct scale factor of 1.0275. A minority of students gave the interest rather than the value of the investment and some subtracted the interest each year rather than adding.

14 Those who write down a correct initial formula generally went on to gain full marks. Some students just tried to work with the values given for x and T without using an equation; such an approach scored no marks.

15 A significant number of students found the correct length for the missing side but then failed to work out the perimeter – this illustrates the importance of reading the question carefully as well as reviewing the answer to ensure that the question asked has indeed been answered. Having applied the cosine rule

correctly a minority of students arrived at the wrong length for the missing side usually through using the wrong order of operations or from overlooking that $\cos 123^{\circ}$ is negative. A common incorrect answer was 53.1 cm from those who assumed that Pythagoras's Theorem could be applied to the triangle despite the absence of a right angle. Some students also incorrectly applied right-angle trigonometry to the problem.

16 The responses here were split almost evenly between those who recognised the need to use volume and area scale factors, generally giving the correct answers of 12 and 204, and those who used the volume scale factor as a linear scale factor and so gave the common incorrect answers of 27 and 136.

17 The vast majority of responses included working as demanded by the question. This was generally very well answered by those who recognised the need to use the quadratic formula. Some students made errors when substituting into the formula. A minority of students appeared to have used their calculator to solve the quadratic equation for them and therefore did not show any working as required by the question.

18 It was disappointing to see, at this late stage in the paper, students arriving at the correct value for the x coordinate but then entering this negative value in to their calculator incorrectly and so getting the wrong value for the y coordinate; this should have been an easy mark to obtain. Other than this error the question was well answered by those who realised the need to differentiate. Some did use the property of quadratic graphs and knew that the value of $-\frac{b}{2a}$ gave the x coordinate.

19 A significant number of students who successfully got as far as $3ek^2 - 2e = 5m$ were then unable to take out e as a common factor and proceed to the correct answer. Others, who were able to start correctly by squaring both sides, subtracted rather than multiplied by $3e$.

20 The use of bounds within a subtraction (or division) continues to cause problems. A common incorrect answer was 10.5975 from the use of 5.35 rather than 5.25 for the bound for z. There were many responses where bounds were not used with the values given in the question substituted into the given expression. In some of these responses, students got to an answer of 9.21 and then attempted to find the upper bound; this is an incorrect method.

21 This question certainly tested student's knowledge of set language. It was pleasing to see correct identification of the region in (c).

22 Whilst many correct answers were seen it was not unusual to see the correct value for the radius but then the area of the circle given as the final answer rather than the area of the sector. Some students used the arc length as radius in their calculation.

23 Whilst there were many blank responses or attempts to square the linear equation, those who knew the approach to take with this familiar type of question generally gained full marks. Some used trial and improvement to find one of the solutions; this approach gained no marks. A number of students having successfully reached $5x^2 - 32x + 64 = 52$ failed to go further and tried to use the quadratic formula on the left hand side of this equation. When giving their solutions students need to remember to give these as pairs as there were a reasonable number of responses that gave correct x-values and y-values but did not pair these.

24 A common error in this question was to use products of two rather than three fractions. It was pleasing to see a number of correct solutions. Some students did get as far as the correct two products but then found the product of these rather than the sum. A significant number of students gave the product of two or more fractions all of which had a denominator of 9.

Summary

Based on their performance in this paper, students should:

- ensure that they read the question carefully and check that their final answer does answer the set question; at times the answer given, while worthy of some method marks, did not answer the set question
- practise representing time in a decimal format
- use brackets around two term expressions in algebra and when calculating with negative numbers
- ensure that full accuracy is maintained throughout multi-step calculations, only rounding the final answer
- make sure your calculator is in degree mode before the examination

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