Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

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In Mathematics A (4MA1) Paper 1H

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Students who were well prepared for this paper were able to make a good attempt at all questions. It was encouraging to see some good attempts at topics new to this specification; the expansion of three brackets in question 11 and the transformation of graphs in question 18.

On the whole, working was shown and easy to follow through although there were some instances when it was very difficult to follow through working due to the seemingly random placing of expressions and equations on the page. It is in students' interests to ensure that working is clearly laid out and flows logically down the page. The removal of the trigonometric ratios from the formula sheet did not seem to concern students unduly as these were seen and used very successfully in question 9.

Premature rounding continues to cause some students to lose accuracy in their final answers and thus the associated accuracy mark; the need to maintain accuracy throughout a solution is something that needs emphasizing in teaching. This sometimes makes it difficult to follow workings as the values used as so heavily rounded.

1 Part (a) was generally correct although some students clearly found the median rather than the mode and thus gave an incorrect answer of $1 < p \leq 2$. It was relatively rare to see a completely incorrect method in part (b). The majority of students attempted a correct method; there was sometimes one incorrect product in the calculation. Other errors included using the end of the interval values rather than the mid-interval values in the calculation and dividing by 5 instead of 40.

2 Many students were able to work through this problem and reach the correct answer. The most common error was to correctly work out the number of children but then find $\frac{3}{5}$ rather than $\frac{2}{3}$ of this number (765) leading to the commonly seen incorrect answer of 306. A significant number of students got as far as the number of people (1275) and gave this as their answer rather than going on to find the number of adults. Using some annotation in working such as 'number of people = 1275" may help to avoid this type of error. A few students used the more sophisticated method of working with fractions to realise that girls made up $\frac{2}{15}$ of the total number of people or used ratios to determine that the ratio girls : adults = 1 : 3 .

3 In part (a) very occasionally the indices were multiplied rather than added. Common incorrect answers in (b) were giving m^7 rather than m^{12} – adding rather than multiplying the indices and failing to raise 2 to the power of 4. $8m^4$ was an all too common incorrect answer. The correct solution to the equation in part (c) was the modal answer. However, errors included getting as far as the correct $2x = -19$ and then giving either 9.5 or $-\frac{2}{19}$ as the answer. Other students made an error when manipulating the terms to isolate the terms in x, often ending up with $2x = 11$. Some students expanded the brackets incorrectly to get $5x + 3$, thus losing the first method mark, but were then able to score the second method mark for correctly isolating their terms in x. It was disappointing to see a number of students factorise to give the correct answer in (d)(i) but then fail to use this to give the correct answer in (ii) whilst a small minority gave the solutions in (i) instead of (ii).

4 It was relatively rare to see an incorrect response in part (a)(i). Misconceptions about set notation became obvious in (ii) with the intersection seen instead or members 1 and 3 omitted from the solution. There were a few blank responses in part (b) and some students that gave the incorrect answer of ‘no’. However, the vast majority of responses were correct. The majority of fractions given as the answer in part (c) had 12 as the denominator but 2 was a popular incorrect numerator from those students presumably giving the probability that the number was in set *C* and rather than in set *C’* as required by the question.

5 It was rare to see an incorrect answer in part (a). Part (b) was done almost as well; occasionally the answer was given as an ordinary number rather than in standard form.

6 On the whole, this question was very well answered. It was, however, disappointing to see some students use Pythagoras’s theorem correctly to find the diameter (or radius) but then use the formula for the area of a circle rather than that for the circumference. Some students used the base of the triangle as the diameter. This is the first year that the formulae for either Pythagoras’s Theorem or the area of a circle have not been given on the formula sheet which may have been a contributory factor to lack of success in this question.

7 Part (a) was well answered. The majority of students used the multiplier method. Those that didn’t sometimes lost marks due to intermediate rounding or misreading their values. Some students reduced the cost by 12% rather than using a compound method and, very occasionally, a student would increase by 4% rather than decrease. Part (b) tended to deliver either full marks to those who recognised that the given salary was 105% of the original salary and so used the correct method, or no marks to

those who found 95% of the given value and gave the common incorrect answer of HK$239 400.

8 In part (a), (i) was more frequently correct than (ii) but many fully correct answers were seen. In (ii) the most common error was adding the powers of the factors. Many students were able to score at least one, if not two marks in part (b).

9 Those students who were able to use a trigonometric ratio correctly to find one of the missing sides of the triangle generally went on to gain either full marks or three marks. It was disappointing to see a significant number of students find the correct values for the two shorter sides of the triangle but then put these together with the hypotenuse incorrectly and fail to demonstrate a correct method to find the perimeter of the given shape. A common mistake was to find the perimeter of the triangle and multiply by 5. A minority of students failed to gain any marks due to incorrect use of the trigonometric ratios. Some final answers fell outside the allowable range due to premature rounding. A disappointing number were able to give the correct initial trigonometric equations but then were unable to rearrange them to get the missing side.

10 The majority of responses in part (a) were correct. However, some students got as far as giving 20 and 60 in the working space (the values on the cumulative frequency axis that should be used for the lower and upper quartiles) but then subtracted these to get 40 and then read off a value using 40 on the cumulative frequency axis. Part (b) was well done with a variety of methods used. The two most popular were to compare with the number of films or the percentage of films. Other students worked with those of length less than 120 minutes but sometimes failed to give the appropriate reading from the graph or quote the percentage of the films less than 120 minutes long. A number of candidates showed a misconception with cumulative frequency, so used the cumulative frequency for 28 films (106 mins), rather than 52 films. It is essential that when two figures are needed for comparison that these are both quoted in the answer (unless one of the two is given in the question). Students would be best advised to draw vertical and horizontal lines on a cumulative frequency graph to show where readings are being taken from. Care is also needed in reading from scales.

11 In part (a) the vast majority of students were able to demonstrate a correct start to the process of expanding three brackets by first expanding a pair of brackets. Once this was done, success was varied. Whilst many fully correct answers were seen, the second expansion often either led to errors in expansion or else errors when simplifying the resulting terms. Students who simplified the expansion of their first pair of brackets before multiplying by the third set of brackets generally made fewer errors. Attempts to expand all three brackets in one go were poor and should be discouraged.

In part (b) the majority of students did follow the instructions in the question and showed clear working. However, there were some students who gave correct answers with no working and therefore gained no marks. Students who gave working generally gained full marks but some did make errors when using their calculator or failed to give both solutions. Some students did not take enough care when substituting numbers into the formula and scored 0 marks as a result. Candidates need to be aware that simply stating the result produced by a calculator that is able to solve quadratic equations is not sufficient working and in order to gain marks there must be a demonstration of a correct method by the candidate.

12 Errors in part (a) usually arose when students attempted to solve the simultaneous equations algebraically rather than use the graph; there were also a small number of blank responses.

In part (b) the correct region was frequently seen. However, there were a number of students who failed to realise that they needed to draw the line $x + y = 4$ in order to define the required region. Correctly identifying the required region was a struggle for some students who often lost a mark by giving a region that satisfied only 3 or 4 of the inequalities.

13 A common incorrect answer in part (a) was, inevitably, 27^{o}. Some students were able to follow through their incorrect answer to part (a) and still gain the marks in part (b). Those who gave the correct angle in part (a) were generally able to provide the correct reason as well. Lack of precise vocabulary still caused issues for some students with a common error in part (b) being alternate angles rather than alternate segment theorem; students should be prompted to learn correct vocabulary and theorem wording.

14 Part (a) was well done. There were, however, some students who solved $f(x) = -7$ when they should have worked out f(−7) and some who substituted 7 rather than −7. Those who knew how to find an inverse function generally gained full marks in part (b); very occasionally the inverse function was given in terms of *y* rather than *x*. Part (c) was also well done although some students stopped after finding g(4). Many students identified 19 in part (d) but incorrectly gave this as the answer rather than writing down the inequality to define all the required values of *x*. Another common error was to assume that x only took integer values and so give greater than or equal to 20 as the answer.

15 Part (a) was not done well. Some students were able to score the first mark with a correct first step (either correctly dealing with −1 or ¼). Often, however, a mistake in their working or an incorrectly copied element of the expression prevented this from

being awarded. A common error was to fail to deal with $256^{\frac{1}{4}}$ correctly, often giving this the incorrect value of 64. A common final answer was $\frac{0.25x^{-5}}{y^{-2}}$, gaining one of the two available marks; those who dealt with the negative powers correctly then gained the second mark. The main source of errors in part (b) was in expanding $-(3x - 5)$; it was disappointing to see those who factorised the quadratic and found a suitable common denominator failing in this respect. Students who worked with the lowest common denominator of $2(3x + 5)(3x - 5)$ were more successful than those who used $(9x^2 - 25)(6x + 10)$. The latter generally struggled to correctly factorise the negative quadratic that resulted in the numerator. Although some students knew how to start to combine the fractions, many did not try to simplify and made no attempt to factorise.

16 This question was very poorly done with very few students getting full marks. In order to make any real progress with this question, students had to recognise the fact that the small and large cone were similar and use the volume scale factor to find the length scale factor. Some students managed to recognise the need to work with 27 rather than 98 which gained them the first method mark. Those who introduced new variables for the height and radius of the small cone without using the relationship between the large and small cone were unable to make any progress as were those students who attempted to work with the incorrect scale factor of $\frac{98}{125}$ or $\sqrt[3]{\frac{98}{125}}$.

17 Part (a) was generally well done although there were some basic arithmetic errors seen that spoiled some otherwise correct solutions. The majority of students heeded the instructions in the question and used a vector method in part (b); the minority who used an algebraic method gained no marks. The common error in part (b) was to fail to give a conclusion to explain why their workings showed that *ABE* was a straight line.

18 Transformations of functions is a new topic to this specification. Correct solutions were seen in both parts. It was encouraging to see some students, in part (b), start their solution by drawing the graph of $y = \sin x$.b. Part (a) was particularly well done.

19 Students who got as far as $\frac{11}{20}$, the probability of winning one game then often made the common error of stating this as their final answer or doubling rather than squaring this value. Another common error was to multiply rather than add the fractions $\frac{9}{20}$ and $\frac{2}{20}$, the probabilities for odd, even and even, odd for one game. Listing winning

outcomes was successful for some but the complexity of a tree diagram for two games defeated all but the most determined students. Some who found the probability of each combination of number, for example (2, 3) but often failed to count the correct number of probabilities.

20 An encouraging number of fully correct solutions were seen to this final question on the paper. However quite a few students were able to get to a correct equation, usually $y = -\frac{3}{2}x + 43$ or $y - 37 = -\frac{3}{2}(x - 4)$ but were unable to rearrange this correctly into an equivalent equation with integer coefficients. Common mistakes included incorrectly rearranging the given equation, thus working with incorrect gradients, and using an incorrect process to find their changed gradient with $-^2/_3$ seen fairly often.

Summary

Based on their performance in this paper, students should:

- learn and be able to recall the formulae for the area and circumference of a circle and recognise when to use each
- ensure that working is laid out logically and clearly when tackling longer problem solving questions
- read the question carefully and review their answer to ensure that the question set is the one that has been answered
- maintain accuracy throughout the solution to a question, only rounding the final answer
- ensure that a final conclusion is given when proving a given result
- read and follow the instructions given in a question with regards to showing workings or the methods that should be used.
- understand when simplification is needed and when it has been achieved in indices and algebraic questions.

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