Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

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In Mathematics A (4MA1) Paper 2FR

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Students who were well prepared for this paper were able to make a good attempt at most of the questions. It was encouraging to see some good attempts at topics new to this specification. Of these new questions, students were particularly successful in the question assessing pressure, force and area but less successful in finding the increase in a sum of money due to compound interest over 3 years.

On the whole, working was shown and easy to follow through. Students generally read the question and attempted an appropriate method to answer the question. In general, problem solving questions and questions assessing mathematical reasoning were tackled well.

Algebra provides areas of strength and weakness for these students. The three part question on expressions was answered well by most students; the two part question on equations rarely saw full marks being awarded. Questions involving time continue to be a problem as do rounding to a given degree of accuracy.

1 For part (a) almost all students were able to rearrange the digits to give an answer of 8543. Part (b) also saw most students gaining the correct answer; some repeated digits and others misunderstood the question and gave the first 4 multiples of 5. It was disappointing to see only a few students managed to score a mark in part (c). Common errors seen were the smallest number made (3458, ignoring the odd aspect) and a different odd number made (e.g. 1357).

2 Part (a) was answered well with students able to convert the fraction into a decimal. Students clearly did not know the meaning of a mixed number, as part (b) saw very little success with the most common incorrect answer being an equivalent decimal. In part (c) students were more successful with most giving the correct simplified fraction. Part (d) again saw little success, with common errors being to place 4.02 at the start of the list or 4.807 at the end. Part (e) was answered well with the majority of students picking up 2 marks for a correct decimal. For those that didn't, most gained no marks as they misunderstood the sum as the product leading to an incorrect method of $\frac{13}{20} \times 0.72$.

3 Part (a) was answered well with most students able to interpret the pictogram for Uganda. Students were also successful in using the pictogram to find the difference between India and China in part (b). Finally, part (c) brought success with almost all students picking up 1 mark for a correct picture. The few students that didn't get the mark ignored the key and drew 6 big squares, one for each million tonne.

4 In part (a) students were successful in converting 0.4 to a percentage, although a small number gave 4 as their as answer. Part (b) saw the majority of students correctly finding the required percentage of 52.5. A method was rarely seen, the common incorrect answer was 525. Part (c) again saw 2 marks gained for most students, with $72 \div 350 \times 100$ being the most commonly seen incorrect method.

5 It was pleasing to see a large proportion of the students gaining full marks for a fully correct table in part (a). Most students did not show their method but filled their

values directly in the table. Of those students who did not gain 3 marks, most gained 2 marks for 4 or 5 correct values in the table. Part (b) also saw plenty of students gaining 2 marks for an answer of $\frac{22}{120}$ or equivalent. Those that didn't were able to recognise that the numerator should be 22 or the denominator should be 120 and gain 1 mark.

6 Part (a) saw students successfully rounding to the nearest hundred although a few did round down to 1700 or to the nearest thousand. In part (b) there was less success with many students missing the 0 in the hundreds column to give an answer of 3245. Part (c) saw students needing to explain the mistake made in a calculation, most managed to pick up the mark by explaining that Billy should have multiplied before adding. It was not enough to say that BIDMAS had not been used, students needed to specify what the mistake was. In part (d) the correct answer of 2 added to any even number was given by approximately half the students, with those not picking up the mark unable to grasp the concept of what the question was asking.

7 Part (a) was not answered well with most students gaining B0. Common incorrect answers were hexagon and prism but with an incorrect adjective before it. Part (b) saw most students gain 1 mark for knowing the number of faces, however in (c) around half of the students gave an incorrect answer of 10, presumably confusing edges with vertices.

8 Many students were not able to convert between 24-hour clock and 12-hour clock in part (a), with the most common incorrect answer being 1845. Part (b) saw more success with around half of the students gaining 2 marks. Of those that didn't, the most common incorrect method was to attempt subtraction e.g. 1110 – 0725, which led to 0 marks as the student is assuming there are 100 minutes in an hour.

9 Part (a) saw mixed fortunes for students as around half gave the correct answer. The most common incorrect answer was 1, presumably as it appeared twice in the frequency column. Part (b) was very poorly done with very few students achieving the correct answer. The most common incorrect method was to attempt to find the mean or find the median of the six values from the frequency column in the table. Part (c) saw some success with most students gaining at least 1 mark; those that didn't gain 2 marks either calculated 0×6 as 6 or 4×0 as 4 or went on to find the mean once they had found the total.

10 It was pleasing to see a large number of students show a fully correct method and gain 3 marks in this question. There were a significant number who gained 1 mark for an incomplete method, usually as far as 2kg = £1.90 but then failed to divide by 2 to get the final answer. A small number of students misunderstood the question and assumed that the carrots and potatoes were equal in cost and divided £4.15 by 7.

11 In part (a) very few students did not understand the meaning of finding the cube root and therefore scored 0 marks. The most common incorrect methods were to cube 421.875 or to find the square root. Part (b)(i) saw more success with many students

gaining 2 marks. It was pleasing to see many writing down their method so for those that did not gain 2 marks, some gained 1 mark for 57.9121 or 18.2. Knowing the difference between decimal places and significant figures continues to be an issue, with around half of the students giving their answer to 2 decimal places in part (b)(ii).

12 Part (a)(i) saw varying degrees of success with some students gaining B1. For those that didn't, the most common incorrect answer was to not include the intersection and give 2,6,7,8. Part (a)(ii) was more successful with most students understanding the meaning of the intersection symbol and giving a correct pair of values. Interpretation of compliment notation is clearly something these students need to work on as almost all students gained B0 on this part. The most common incorrect answers were to list the elements of A or $A \cap B'$. Part (b) was a 2 mark question with many students gaining at least 1 mark. For those that didn't gain 2 marks, the most common incorrect answers worth 1 mark were $\frac{3}{9}$ (presumably not including 9 in the universal set) and $\frac{4}{10}$ (presumably including 9 in the set B). A small number of students did not grasp the question and listed values from the Venn diagram.

13 Parts (a)(i) and (a)(ii) were answered very well with almost all students achieving 2 marks. Some students misread the second reading from their conversion graph; common incorrect values were 60.3 or 60.4 or 62. In part (b) some students did manage to gain 3 marks for a correct method, the most common being to use their conversion from (a)(i) to convert euros to Australian dollars then to dirhams. However many students picked up 0 marks on this question with the commonly seen incorrect method being 500×2.7 leading to an answer of 1350.

14 This familiar linear graphs question saw a large number of students gain 3 marks. Of those that didn't, 2 marks being gained was seen for plotting all the points correctly but not joining them, and also for plotting 3 or 4 points and joining them. Around a quarter of students gained 0 marks and did not seem to appear to know how to start the question.

15 Part (a) of this solving equations question saw mixed results for the students. Students struggled to deal with nature of the algebraic term, in particular the fact that it was negative, and this lead to many incorrect answers. A common incorrect method was to subtract 8 from both sides but to change the sign of $2p$ in the process to leave students with $2p = 7$, which led to 0 marks. Another incorrect method saw 8 added to both sides instead of subtracted. The equation in part (b) saw very few correct solutions with most students gaining 0 or 1 mark. A correct first step was rarely seen as students often multiplied the $3x$ by 4 or the 1 by 4 but not both $3x$ and 1. Students could still gain 1 mark if they rearranged their equation from the form $ax + b = cx + d$ to have all the x terms on one side and the numerical terms on the other. There were no correct answers seen where students had not shown clear algebraic working, which the question required.

16 This question saw a variety of different methods attempted leading to a wide range of marks given. Some students were able to use either an algebraic or numerical method to gain the correct solution for 2 marks. Many students did pick up 1 mark by either finding a pair of values whose sum was 23 or had a range of 7 ($x = 15$, $y = 8$ was

commonly seen). Of those students who gained 0 marks, many could not grasp the concept of 11 being the mean and not the sum of x, 10 and y. Other incorrect methods included unsuccessfully trying to set up simultaneous equations.

17 It was pleasing to see a large proportion of students gaining full marks on one of the topics new to the specification. Many students were able to find the area of the rectangle and then use the formula correctly to gain 3 marks. Of those that didn't, many gained 1 or 2 marks for finding the area correctly and then substituting it into the formula; a commonly seen error was to divide 42 by 2.5 instead of multiplying. A small number of students failed to work with area, instead calculating the perimeter of the rectangle; this led to 0 marks.

18 This 4 mark number question was answered well with around half the students gaining full marks. Many of the students made a correct first step, although there were a small number who used an incorrect conversion of 1 kilograms = 100 grams, which led to 0 marks. Of those students who did not gain 4 marks, many picked up 2 marks for calculating the cost of the \$13 candles. The difficulty arose in applying the percentage change to find the cost of the reduced candles; reducing 18 instead of 13 by 20% was a commonly seen incorrect method.

19 This standard question on algebraic expressions saw most students pick up marks on all three parts. Part (a) saw a large proportion of students picking up 1 or 2 marks. Students found the simplification aspect of the question difficult, in particular calculating $-21 + 8$. Some students did not expand the brackets correctly resulting in expressions such as $3c - 21 + 6c + 4$. Expanding two brackets is a strength for these students as most managed to pick up the first mark for their expansion in part (b). Around half of these students managed to go on to gain the A mark for a correct simplification. The other half either failed to do so as they made a mistake with their expansion or incorrectly simplified; $x^2 - 9x - 14$ was a commonly seen incorrect answer. It was pleasing to see a large number of students pick up 2 marks for a fully correct factorisation. Of those that did not gain 2 marks, many gained 1 mark for a partial factorisation, with $y(28y - 21)$ being a frequently seen answer.

20 A fully correct 3 mark answer was seldom seen on this speed, distance, time question. A significant number of students were able to gain 1 mark, usually for a correct time conversion (402 minutes was seen most regularly) or for using speed × time but an incorrect time conversion (e.g. 6.42). A large proportion of students used the time in minutes and multiplied by the speed in kilometres an hour e.g. 650 × 402. For the few students that did obtain the correct answer, the most commonly used method was to work in hours and both 6.7 and $6\frac{42}{60}$ were seen.

21 Part (a) saw a mixed set of responses with some students gaining B1 for a correct answer. The incorrect answer seen the most was g^{21}, coming from the common error of multiplying the powers. Part (b) saw similar fortunes with some students answering correctly; the most common incorrect answers were k^8, k^{243} and $15k$. In part (c) students were required to fully simplify an algebraic fraction and many were able to gain 1 mark by simplifying either the terms in x or the terms in y. Many students only gained 1 mark and not 2 as they were unable to simplify the x term correctly; $5xy^4$ was

a commonly seen 1 mark answer. Part (d) saw a range of solutions worth 0, 1 or 2 marks. For those that gained 0 marks, a correct start could not be made; $h + f = 3e$ was commonly seen. The most frequently seen 1 mark answer was when students arrived at $h - f = 3e$ but were unable to make the final step to isolate e.

22 This is the first time compound interest has been assessed at Foundation tier level and clearly this is a weakness for these students. A fully correct answer was rarely seen, with by far the most common incorrect method being to treat the problem as simple interest; this could gain 1 mark for the special case if done correctly. Many students struggled with finding a correct multiplier; many incorrect multipliers were seen such as 1.5, 1.15 and 4.5. Some students attempted a year-by-year method but this rarely resulted in marks being awarded.

23 This Pythagoras question rarely saw students gain any marks. The key to success appeared to be drawing a diagram; those that did realised the nature of the problem and applied Pythagoras' Theorem accordingly. The most common incorrect methods seen were to simply add 200 and 160 or to use Pythagoras' Theorem incorrectly e.g. to subtract the two squares rather than add; both methods led to students gaining 0 marks. It was pleasing to see those few students who achieved the correct show their full method.

24 This interior and exterior angles question proved to be too challenging for the majority of the students on this paper. Many could not make a correct first step in finding either the interior or exterior angle of the pentagon or octagon. Of those that did, some confused the two methods and used the exterior angle calculation to find the interior angles – this led to 0 marks. Of those that did successfully calculate the interior or exterior angle for both shapes, many were able to go on to calculate angle CBF as 117. Getting this far gained 3 marks and there were a small proportion of these students who weren't able to go on to use the isosceles triangle property to find angle x and gain the A mark.

25 In this question students needed to recognise that a right angled triangle should be created, the most efficient method being to drop a perpendicular down from C onto the line AD. The first mark was gained for a method to calculate the missing length on the new triangle; some students picked up this mark. From there students had to use a trigonometric statement to find one of the angles in the triangle, those that did this successfully usually went on to gain 3 or 4 marks for this question. Some students were not able to use the inverse trigonometric functions isolate their variable once they had a correct trigonometric statement. Most students gained 0 marks for this question with the most common incorrect method being to find the area of the trapezium.

Summary

Based on their performance in this paper, students should:

- practise how to round decimals, in particular knowing the difference between decimal places and significant figures.
- understand what the values in a discrete frequency table represent and practise how to interpret them e.g. find averages and the total frequency.
- practise converting between the 12-hour and 24-hour clock and remember that there are 60 (not 100) minutes in an hour.
- practise solving linear equations, including those where the algebraic term is negative and where algebraic term is written over a numerical denominator.
- recognise when to use Pythagoras' Theorem and trigonometric ratios.
- ensure that they are familiar with topics that are new to this specification, for example repeated percentage change (compound interest and depreciation over successive years).

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