Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

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Mathematics A (4MA1) Paper 1F

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4MA1 1F January 2022 Principal Examiner's Report

The cohort sitting this foundation paper performed in a similar to way to previous cohorts for this January session. The earlier questions were answered well and towards the end of the paper many blank or completely incorrect answers were seen. Most answers saw full workings out which is pleasing to see so that incorrect answers could be award method marks where appropriate.

1 The first question on this paper saw a familiar start with students extracting information from a table. Part (a) was answered very well with almost all gaining B1, incorrect spelling was condoned as long as the intention was clear. In (b) many gave a correct answer of 1700 but some rounded down by mistake, gaining B0 for 1600. Parts (c) and (d) were also answered well with most students gaining 1 mark for each; the most common errors were to use the incorrect operation e.g. 867 – 283 in (d) rather than 867 + 283 or to read the incorrect values from the table.

2 Part (a) of this pictograms question was answered very well with almost all gaining the correct answer of 20 for B1. Part (b) also saw lots of success as most were able to interpret the diagram correctly and add together the totals for Monday to Thursday for an answer of 92. Common errors seen were a mistake in the adding such as missing off a value or including the text messages sent on Friday in their addition. Part (c) was answered very well with most able to draw a correct diagram; some did an extra square for the part symbol e.g. 3 complete symbols and a half symbol instead of a quarter.

3 The first part of this decimals question was not answered well. Many were not able to work out that 14 squares needed to be shaded; the most common incorrect answer was to see 7 or 12 squares shaded. Part (b) also saw very few correct answers; incorrect answers included 200, 0.2 and hundredths. Part (c) saw more success as many were able to convert 5/8 to 0.625. Ordering decimals in part (d) also saw mixed results with many students only ordering 4 out of 5 correctly and gaining one mark – it was either 2.8 which tended to be put in the wrong place, usually at the end or 2.083 and 2.83 were given in the incorrect order.

4 In part (a) both a value in range and units were needed for 2 marks and most students achieved this. Some lost one mark as they managed to give a value in range but gave incorrect units or the units were absent. For those that were able to use a protractor, many gained B1 for an answer in range on part (b). Any value in the range 27 – 31 was acceptable for the mark. It is clear some do not know how to use / did not have a protractor as wild guesses such as 45 and 180 were seen. Part (c) saw students having to mark on two parallel sides on the diagram, some were able to do this but there were also plenty of incorrect answers seen. Names of polygons is also an area for this cohort to work on as very few were able to give the name of a 5-sided polygon.

5 For this 4 mark costings question is was pleasing to see students using methodical steps in their solutions. Workings were generally well-presented and easy to follow and most students gained full marks for an answer of 3.65. Of those that didn't gain full marks, the following errors were seen; failing to divide 14.6 by 4, arithmetic errors when adding the cost of the seeds and the compost and a misinterpretation of the information in the question and working with one packet of seeds and one bag of compost instead of 3 and 2 respectively. This latter approach could gain one mark for a value of 25.7 or two marks for evaluating this value divided by 4.

6 In part (a) for this question students were successful in completing the two-way table with most gaining 3 marks. Occasional errors led to a mark or two dropped with the 24, 107 and 105 most frequently filled in incorrectly. Part (b) and (c) needed students to extract information from the table to give a probability. (b) was answered better than (c), probably because the latter question required the probability to be from a subset rather than the universal set.

7 It was very pleasing to see most students gain B1 in parts (a) and (b) for correct answers of 6 and 19. There was less success in part (c) with the correct answer of $5h$ and the incorrect answer of h^5 seen in equal measure. Part (d) caused confusion for some students as they mixed up the signs and the terms, some were unable to correctly add or subtract the like terms; $-3a$ and $-11f$ were seen often. There were also a good number of correct answers seen.

8 The first of the 3 marks in this question was for a correct conversion for one of the lengths and most students favoured converting the 2 metres to centimetres. This was generally done well although some converted the length of string incorrectly to 2000 cm. The second mark was for working with their converted lengths and a variety of methods were seen here, including dividing 200 by 35, adding 35's until reaching 200 and subtracting 35's from 200. Many students opted to divide the 200 by 35 to get 5.71… Unfortunately they did not know what to do with the 0.71… The correct answer of 25 was not seen too often with around half of students able to gain full marks.

9 For part (a) of this question it was pleasing to see most students gain a correct answer of 26. In part (b) a good number of students interpreted the information in the question correctly and gave an answer of 3/5 for 2 marks. Some students dropped a mark by either failing to fully simplify their fraction or working with the brown dogs at the kennel and giving an answer of 2/5. Part (c) generally saw students pick up 0 or 2 marks. For those who were aware of the need for a common denominator, converted the fractions to be over 18 or 54 and went on from there. Some got a far as 24/54 + 9/54 but then went straight to 11/18, missing out the intermediatory step of 33/54, losing one mark.

10 It was disappointing to see many students using the incorrect formula or no formula at all to try and find the area of the circle. Many used the circumference formula or used the area formula but with 14 as the radius. This is certainly an area of the specification that this cohort could improve in. A few students who did correctly use the formula lost the final accuracy mark by incorrectly rounding their answer without showing the value of 153.9… Students should be encouraged to write their calculator answer down first before rounding.

11 Part (a) generally saw students gaining 0 or 2 marks. Workings were rarely seen so either the correct answer was gained or it wasn't. For those who did not gain any marks, it would be advisable for them to show steps of their method e.g. working out the denominator first to guarantee themselves at least one mark. Part (b) saw less success with many struggling with the rounding, it was common to see an answer of 0.477 from a correct answer in (a).

12 This question saw the full range of marks awarded. Many were able to make a start and come up with a correct expression for either Jena or Mikael or both. If students could then combine at least two of these in a formula for T in terms of C then 2 marks would be awarded and this was seen often. The one thing that prevented full marks tended to be the expression for Mikael being C^2 instead of $2C$ or a failure to fully simplify the expression in terms of C. On some occasions students misinterpreted the information and gave the expressions for Jena and Mikael as $C - 5$ and $2(C - 5)$ respectively.

13 This area question caused problems for this cohort. Many struggled to get a correct method to find the area of the trapezium. Some attempted to use the formula given on page 2 but confused the different lengths. Others attempted to split the shape into a rectangle and a triangle which was the method that led to most correct values for area. Some students then went on to use 19.5 as the total area that needed painting rather than multiplying by 2. Some students chose to divide their area by 12 but using multiples of 12 was just as common. Several students gained the correct answer from incorrect working and gained no marks as did those who just gave 4 as the answer without any working.

14 This familiar linear equation graph question was generally answered well. Most were able to successfully plot the points and draw a straight line through them between $x = -2$ and $x = 4$. Some plotted the points but failed to draw a line through them, losing one mark. Others did not know how to generate their points but did realise a line of gradient 2 was required so drew one for one mark. There were some blank responses seen as well as answers where random lines were drawn which appeared to be the student having a guess in an attempt to pick up marks.

15 Part (a) was answered well with most students able to rotate the shape correctly for 2 marks. The most common error seen was for the shape to be in the incorrect position but for the orientation to be correct, gaining 1 mark. Part (b) saw less success with many unable to give a correct description. The 'translation' part of the answer was more commonly seen than the vector, with students preferring to use words such as 'right 4 squares, down 2 squares'.

16 The first two parts of this question required students to deal with index laws and the first was answered better than the second. Most were able to gain B1 in part (a) for a^{11} but there were some answers of $11a$ seen. In (b) w^5 was the most common incorrect answer. Part (c) saw very few fully correct answers. Some students gained one mark for correctly dealing with the algebraic terms but not the numerical; answers of $8x^{10}y^6$ and $16x^{10}y^6$ were often seen. It was also the case that many students gained no marks as they failed to deal with the algebraic terms correctly e.g. $64x^7y^5$ was a common incorrect answer. Part (d) also saw little success, although a good number of students did manage to gain one mark for making t^3 the subject, but many then struggled to deal with the power 3 and either gave their answer as $t^3 = c + 8v$ or square rooted both sides or divided by 3.

17 This question saw varied success. Some students were able to interpret the information correctly and divide 196 by 4 and then multiply by 3 to gain the correct answer of 147. If a correct start was not made students could still gain one mark by accurately completing a method taking 196 to be the total amount shared or the total for Gabriel and Hadley. There were also a good number of incorrect or blank solutions.

18 For those who managed to correctly set up their trigonometric equation for AB, most went on to gain the full 3 marks. The only exceptions seen were when an answer was given to less than 3 significant figures (e.g. 7.6) or when it appeared the calculator was in radians mode rather than degrees. The majority of students did not make a correct start, either selecting an incorrect trig function or attempting Pythagoras.

19 For this 5 mark problem solving question many students were able to make a correct start by finding the number of small mugs or the number of medium mugs. It was also pleasing to see a good number go onto gain the 2nd and 3rd method marks for finding the number of large mugs and then the total income. Some students decided to work in percentages and obtained 40%, 32% and 28% correctly but then gave these numbers as the number of mugs, gaining no marks. It was at this point that many students then got stuck, unable to continue or producing an incorrect method for the percentage profit – dividing by the income and not the expenditure was a common error.

20 Part (a) saw very few fully correct answers as students struggled to deal with the 4th and 5th cards in particular. Many were able to pick up one mark for correctly giving a list with a mode of 8, and on occasions some managed to give two numbers with a sum of 28 for the 3rd and 4th cards. It was also seen where the 2nd, 3rd and 4th cards were labelled 8, 8, 20 which gained 2 marks but the student was unable to complete the solution by labelling the 5th card 21 or 22 or 23. For part (b) it was also rare to see a correct answer of 33 but some were able to pick up a mark for one correct product, usually 23×6. On both parts of this questions there were many blank / incorrect responses seen.

21 Part (a) saw some success as students gained a mark for a correct first step in rearrangement. Some went on to fully isolate x and reach a value of 1.8 but it was a shame that many who got this far lost the accuracy mark due to giving x with 1.8 and an incorrect symbol or simply an answer of 1.8. Part (b) saw little success although some students did managed to factorise successfully in (i). Part (ii) relied on a factorisation in (i) and as so few achieved it, it was rare to see a mark awarded here. Of those who did manage to factorise in (i), some were able to use this factorisation to gain B1 in (ii).

22 This Venn diagrams / set notation question caused problems for this cohort. It was very rare to see a fully correct solution. Some were able to pick up one mark for either completing the intersection correctly or labelling 4, 6 and 9, 11, 12, 13 in the opposite sections. Each section was marked independently which worked to the advantage of the students, as it was often seen that numbers were repeated in multiple sections.

23 Students were thrown on this standard form question by the fact they could not use their calculator to work out the required product. It was clear that some had attempted to use their calculator as 'math error' was often seen written down; some also attempted to change the values into ordinary numbers but gave up due to the number of zeros required. That said, a good number of students were able to gain one mark for either 12.6×10^{121} or an answer in the form 1.26×10^{n}. For those that did reach 12.6×10^{121}, that next step to reach 1.26×10^{122} generally proved a bridge too far.

24 It was clear that the majority of students did not realise that Pythagoras' Theorem was needed for this question (excluding trigonometric methods). Many used 28 and 17.5 as the base and perpendicular height and attempted to find the area. For those that did use Pythagoras it was pleasing to see it done correctly. Some students were then able to go on to gain the correct answer of 147 although some failed to divide by 2 once they had done 10.5×28, losing 2 marks.

25 In part (a) most students failed to make the correct first step in rearranging the equation. Of those that did, some went no further but others were able to make y the subject and then extract the gradient of -3.5, although this was rarely seen. Very few managed to gain the one mark on part (b), owing largely to the fact that the equation needed to be rearranged correctly to gain the correct y-intercept.

Summary

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Based on their performance in this paper, students should:

- Practise ordering decimals
- Learn how to measure angles using a protractor
- Familiarise themselves with the circumference and area formulae for circles and practise using them
- Work on algebraic skills such as simplifying indices and changing the subject of a formula
- Practise finding the area of compound shapes / trapezia, in particular in a problem solving scenario

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