Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

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Mathematics A (4MA1)
Paper 1F

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Principal Examiner's report

Students who were well prepared for this paper were able to make a good attempt at all questions. It was encouraging to see many students clearly showing their working. Students were less successful in using set theory, polygons and working with prime factors.

On the whole, working was shown and was easy to follow through. There were some instances where students failed to read the question properly. For example, in Q20, most students did not manipulate the ratios correctly. Some students could not recall the conversion that there are 1000g in 1kg

A striking weakness in students was solving problems with areas, finding HCF, applying trigonometry and working out the sum of the interior angles of a pentagon. Overall, problem-solving and questions assessing mathematical reasoning were not tackled well, this was particularly apparent in questions 2, 6, 10, 14, 20 and 23

Question 1

(a) This part was answered well. It was encouraging to see that the majority of students wrote down Hamlet.

(b) This part was answered well. It was encouraging to see that the majority of students wrote down the correct answers as shown in the table.

(c) This part was answered well. Many students showed their working out.

(d) This part was answered well. A common answer was to write 'twenty thousand fifty five'.

Question 2

Students generally answered this question well. Many students multiplied 5 by 1000 and then divided by 350 and then left their answer as 14.28…. or 14. Some students did not multiply 14 by 350 to find the amount of chopped tomatoes used and some did not round down to 14. If the students worked out 14 × 350 to give 4900 gained three marks, however, some students at this stage did subtract this value from 5000 to work out the amount of chopped tomatoes left. Some students did not know the conversion from litres to millilitres as they were multiplying by 100. Most knew to divide by 350, so a common answer was 1 from 500/350. Repeated addition was used often with 350*g* to reach 4900*g*. The alternative method of dividing 5 by 1000 and then using this answer to divide into 5 was rarely seen. Students are encouraged to read the question carefully as they did not subtract 4900 from 5000 to find the answer and give the correct units.

Question 3

This was very well answered with the majority gaining the 3 out of 4bmarks. There were very few errors in parts (a), (b) and (c); if marks were lost, it was usually for a poor explanation

offered in part (d). 'It goes up in 3s' or '42 is not in the 3 times table' were not uncommon incorrect explanations. Quite a number of responses demonstrated logic that would have been incorrect if the sequence had been $3n$ + anything other than zero.

Question 4

(a) Majority of the students gave the answer as 80%. Some students gave the answer as 8%

(b) Many students found this part of the question difficult. Common incorrect answers were thousand or 3000

(c) The most successful strategy seen was to write all the numbers out to 3 decimal places and then compare. A common incorrect answer was to place 0.24 before 0.204 or misplace 0.2

(d) This part of the question was quite challenging for weaker students. Rounding errors were apparent with 25.78 and 25.80 the most common incorrect answers. There were also various answers offered with errors involving the re-positioning of the decimal point such as 257.86

(e) This part was well answered.

Question 5

(a) This question was well done with most students making an attempt at both parts. Students were largely confident with part (i) but struggled more with part (ii).

(b) This part of the question was well answered with nearly all students scoring at least 1 mark. A common error was to write the frequencies as relative frequencies.

Question 6

This question was a multi-step problem, it was pleasing to see many students gaining good marks, often 2 or more. In this question students had to find a quarter of 600 tickets. When performing calculations of this type it is important for students to show their working, eg 600 ÷ 4 or $\frac{1}{4} \times 600$ so that credit can be awarded for correct method if errors are made with accuracy. In solving this problem , most students subtracted 150 from 600 to give 450 tickets and used this to work out the total cost of the adult tickets. Arithmetic errors were seen far too often from students when subtracting from 600. Many students progressed further by subtracting the total cost of the adult tickets from $7200 and then dividing by 150 to find the cost of a child's ticket. A minority of students worked out a quarter of 7200 which gained no marks.

Question 7

(a) Many students gave a correct answer of $45pk$

(b) Many students gained at least one mark for writing 11e. common errors for $2f - 7f$ was to write $5f$ or $9f$.

(c) Few part marks were awarded in this part as both formal solution and inverse operation methods generally reached the correct fraction answer 4.5or equivalent and scored both marks. Some students attempted trial and improvement methods but as this question had not indicated that this method was to be used, they were unable to gain method marks for working which did not reach the correct final answer.

Question 8

Most students appeared to know what was required in this question and most of them were able to give the difference between actual distance and the straight line distance within the tolerance accepted by examiners. Part marks were available for either a correct measurement from the map or for the method of multiplying their measurement by 80. Surprising, some students made errors in measuring the distance, some errors suggesting students did not have a ruler. Some students did not understand what was required and merely divided 590 by 80 and making no further progress, although still gaining one mark using the alternative mark scheme.

Question 9

The first part of this question required students to find the product of the possible pairs of numbers that two spinners could land on and enter them into a table, which had been started for them. While most were successful, it was concerning that for this relatively straightforward task, seemingly random numbers were entered, or the table left blank by some of the students. Part (b) asked for the probability of an odd number to be worked out from the values in the table and over half the students gained one mark. Some benefitted from the follow-through marks if their table was incorrect. It is pleasing that almost all students now give probabilities in one of the acceptable forms, a fraction, decimal or percentage, although ratios and words were still seen.

Question 10

Its was quite surprising that some students found this question challenging. Most of the students could work out the amount of orange juice for carton Q by subtracting 160 from 250 to obtain 90. Some students worked out 30% of 250 by giving the answer as 75. Some of the students worked out both values, 90 and 75, but did not know the next step to find the difference. Common errors was to find 70% of 250 using the figures from carton Q. The more able students gained full marks and showed their method clearly.

Question 11

There was a mix of blank responses and fully correct responses for this question. For those who attempted the question, a fully correct graph was often seen. Although it's disappointing to see a number of students who plot the correct points and don't put a line through them. A few students made errors such as wrongly plotting one of the points, but these were generally able to gain 2 marks for a correct line through at least three of the correct points. A small minority gained just one mark for a line drawn with a negative gradient going through (0, 1) or for a line in the wrong place, but with the correct gradient. Some students did not extend their lines through the full range of values specified, losing one mark as a result.

Question 12

(a) Students were asked to show that the subtraction of one given fraction from another led to a given fraction. The success rate in this style of question seems to have improved, with a pleasing number of candidates showing fractions with a common denominator, the result of that subtraction and concluding with the given answer. One mark was regularly lost by missing out either the interim fraction or by not showing the concluding step. However, conversion to decimals, ambiguous statements and random working (usually multiplication) with the numbers in the question were often seen.

(b) Many students understand 'factors' and can either list factors of given numbers or show their prime factorisation, which they did to gain the method mark. However, the concept of HCF is less well understood; although the award of the accuracy mark for giving the HCF as 26 was quite common, it could often not be gained as students chose a lower common factor or used the prime factors to find multiples of the two numbers. Some scored no marks for simply listing common multiples. Some students used factor trees or 'ladder' diagrams and then tried to draw a Venn diagram which they tried to use and lost the final mark. Generally, this question was not answered well as many students could not gain the second mark as they had no understanding of the meaning of HCF's.

Some students confused HCF and LCM.

Question 13

(a) Many students knew that they had to substitute in the expressions for the values of *t*, *a* and *c*. those students wrote down 18 – – 3× 5 tended to obtain the correct answer of 33. However, many students wrote down 18 – 3× 5 and gave a common incorrect answer of 3. Generally, this part of the question proved to be more of a challenge because of the difficulty some had with a negative number.

(b) This part was poorly answered by most students. Many chose to try to simplify the expression, ending up with 13*x*. Some felt they should simply swap the *d* with the *x* to get $x = 3d + 10$. Of those who realised it required inverse operations to rearrange, most were unable to perform these in the correct order. $x = \frac{10 - d}{3}$ or $x = \frac{d}{3} - 10$ were common, or an answer written ambiguously such as $x = d - 10 \div 3$. Most frequently students obtained no marks on this question due to the error in their first step. Function machines were used by a small number of students but even when these were used correctly, the students could not then write the equation with *x* as its subject.

Question 14

(a) This question posed some difficulty for students to complete correctly. Students who were able to rotate the shape 90° anticlockwise into quadrant one were rewarded with at least one mark if they were unable to position it or draw it correctly. While uncommon, if students were able to rotate it correctly clockwise into quadrant three with centre the origin were also rewarded with one mark. More often than not students scored no marks due to a variety of errors. Some students rotated 180° rather than 90° or were unable to rotate it anticlockwise by the correct centre (often resulting in the shape not being fully in quadrant one). Candidates would benefit from a better understanding of this assessment objective and perhaps using tracing paper.

(b) Most students recognised the transformation as an enlargement and gave the correct scale factor but correct identification of the centre of enlargement was very rare indeed. Many students lost marks through giving multiple transformations as answers, mostly in an attempt to give information about the position of the image in the absence of a centre of enlargement. Typically, a translation was described, or vector given.

Question 15

Only a minority of students gained the full 5 marks. Many students could work out the area of the rectangle by multiplying 4.8 by 3 to obtain 14.4. Many students had difficulty in finding the area of the triangle. A common error was to multiply 4.8 by 2.5 and then not dividing by 2. Another common method was to multiply 4.8 by 5.5 and then not subtracting the corner area of 2.4. However, once the students obtained an area of 14.4 or 26.4 they then went on to divide by 1.8 to work out the number of tins needed. It was pleasing to see the students round their answer up to find the number of tins and then multiplying by 16.40 to work out the total cost of the tins. The follow through marks gave credit to students who sometimes missed out the area of the triangle.

Question 16

There were a good number of students who were able to make a correct start on this 4 mark mean from a grouped frequency table question. This involved using the mid interval values and the frequencies to find and sum products for 2 method marks. Some were then able to go on to divide by 80 and find a correct answer. Common errors were to divide their sum (= 2160) by 5 or by the sum of the mid interval values. A few students used end points rather than midpoints and could gain M2 if they divided by 80. A few tried to multiply each frequency by 12, the width of the class interval. There were a good number of students who gained no marks as they were unable to make a correct start at all. Unfortunately, there were some students who misunderstood the definitions of mode and mean and despite showing correct workings for the mean next to the table.

Question 17

Few students were able to score full marks on this question, though many were able to score at least one mark for expanding the brackets.

Many students had difficulty in isolating the terms on either side of the equation. Common errors were based on fundamental misunderstandings of algebraic processes, e.g. $5 – 8x$ written as $5x$ or $–5x$ and incorrectly moving terms from one side of the equation to the other side, usually by not changing the sign of the term.

Most of those students who attempted to find the solution by trial and improvement were unsuccessful in their attempts.

Question 18

A clearly constructed perpendicular bisector with two pairs of relevant arcs gave some students two marks; some benefitted from one mark either for showing relevant arcs but failing to draw in the bisector or more usually for producing a perpendicular bisector but with no arcs present. Occasionally an isosceles triangle was offered as a response, with one set of arcs at the vertex. A very high number did not attempt anything for this question while some made seemingly random attempts to use a compass.

Question 19

This was a very challenging question to most students. It is clear though that many students have no understanding of how to find interior angles within polygons. Students should also be reminded that diagrams are not drawn to scale and also be discouraged from making assumptions based on the diagram such as x being equal to the angle in the pentagon. Many students could not work out the total sum of the interior angles in a pentagon. These students made no further progress.

Question 20

In order to make progress, students needed to associate corresponding parts from the two ratios. Those that wrote the ratio 1 : 5 as 3 : 15 were often able to go on and write down the ratio as 2 : 3 : 15. Many students did not understand how to combine the two ratios. A very common incorrect answer was 2 : 3 : 5 from students simply ignoring 1. The students who obtained the correct ratio went on successfully to find the number of green sweets.

A number of students achieved the correct answer of 28 sweets by an unexpected wrong method. From the given ratios 2: 3 and 1 : 5 they extracted 2, 3 and 5, added these together to make 10, and divided this value into 280 (scoring zero in the process).

Question 21

(a) Many students gained 2 marks on this question. Most of the students worked out the cost for Theresa's car and then subtracted 32 000 from 34 240 to find the difference of 2240. Most students made no progress after working out 2240 as they had no idea of percentage change. Using the values of 2240 and 32 000, a few students went on to find the correct answer of 7%.

Some common errors were to write $\frac{32\,000}{34\,240}$ or $\frac{2240}{34\,240}$ thus leading to an incorrect answer.

(b) This part was a 'reverse percentage' question but this was not how the large majority of the students interpreted it. By far the most commonly seen, but incorrect, method was to find 15% of the new amount or to increase the new amount by 15% Where students understood the question, they were nearly always able to show the working required and give the correct answer for all 3 marks.

Question 22

Many students could work out the probability of the thriller book by calculating 1 – (0.24 + 0.40) then dividing by 4. It was interesting to see students employ different methods to find the final answer. The common approach was to work out 48 ÷ 0.24 to find the total number of books as 200. Some students who worked out 200 did not know how to work out an estimate for the number of mystery books and gave up. The more able students multiplied 200 by 0.27 to find the final answer of 54. A common incorrect method was to add 0.24 to 0.40 to find 0.64 and then divide by 2 to find 0.32 for the probability of the mystery books or thriller books. This lost the first mark, but they could often recover to find 200 later. These then lost the final two marks by multiplying 200 by 0.32. A few wrote their answer incorrectly as a fraction, (54/ 200) and lost the final accuracy mark.

Question 23

The students read the question carefully generally gained some marks. Many students did not use trigonometry successfully to find the diameter of the semi-circle which was 28 cm. Some students worked out the length *BC* and then went on to use Pythagoras theorem to work out the diameter. After working out the diameter students worked out the circumference of the circle by using πd and obtaining an answer of 88 cm or using $\frac{1}{2}\pi d$ and obtaining an answer of 44 cm. Many students did not go on further to work out the perimeter of the semicircle. The misinterpretation was that the perimeter of the semicircle was just the length of the arc of the semicircle and did not include the diameter. A common error was to add 28 with 88.

The majority of the responses were blank.

Question 24

(a) This part was answered well.

(b) This part was quite challenging to many students, however, a few students only gained one mark. The students who attempted the question forgot to write the figure 25 000 000 in standard for. Some students wrote the final answer as 25×10^6 gaining the first method mark.

Question 25

(a) Many incorrect solutions were seen, and the main incorrect answer was to write the signs the wrong way round in the brackets e.g. $(y – 6)(y + 8)$ or $(y + 6)(y + 8)$ or $(y – 6)(y – 8)$; one mark was awarded for this. Some students tried to use the quadratic formula. Students should ensure they have the correct factors by multiplying back as a useful check for this type of question. Other incorrect answers such as $y(y – 2) + 48$ were seen. A number of students factorised correctly, but then went on to solve the expression as though it were an equation equal to zero. Even though they weren't penalised for doing this, it does show that students should read the question carefully and reflect on whether or not it is an expression that needs factorising or an equation which needs solving.

(b) This part was poorly attempted.

(c) Only the most able students gained some marks on this part of the question. Many students could not collect the *w* terms on one side and the numbers on the other side in other words algebraic manipulation let down many students. There were a number of students who calculated the correct inequality of -1.6 rather than $w < -1.6$; these students were able to gain the method marks for the correct method seen.

Summary

Based on their performance in this paper, students should:

- Recall the conversion that 1kg = 1000g
- learn the difference between LCM and HCF
- learn when and how to apply transformations
- show clear working when answering problem solving questions
- read the question carefully and review their answer to ensure that the question set is the one that has been answered
- make sure that their working is to a sufficient degree of accuracy that does not affect the required accuracy of the answer.

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