Examiners' Report
Principal Examiner Feedback

Summer 2019

Pearson Edexcel International GCSE
In Mathematics A (4MA1) Paper 1F

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PE report for 4MA1 paper 1F Summer 2019

Students who were well prepared for this paper made a good attempt at the majority of the questions. The questions involving multi-stage calculations, for instance question 8 and question 17, were often not completed by students who generally showed a lack of understanding on how to proceed.
On the whole students tended to show their working but for some students the need to show all stages must be stressed to enable them to maximise their mark gaining potential.
Some students still get mixed up with methods and for instance, in question 20 where students needed to find the volume of a cuboid, some found the surface area or the total length of the edges.

Question 1
This question had a high success rate with most students scoring the full 4 marks or 3 marks. The most frequent value to be incorrect was the multiple of 12 with those who got it wrong usually giving a factor of 12
Students that wrote down multiple correct answers for any of the 4 parts to this question were not penalised as long as all values were correct.

Question 2
The vast majority of students knew that a pentagon has 5 sides, the angles in an equilateral triangle are 60^o and that there are 1000 metres in a kilometre, and so scored full marks. The main errors seen were 90^o, 180^o, 45^o or 30^o in part (b) and 100 metres in part (c)

Question 3
Almost all students were successful in parts (a), (b) and (c), being able to select the largest number in a table of lake areas, write 6450 in words and write 68,879 correct to the nearest thousand. Part (d), where they had to decide if Lake Malawi's surface area is 5½ times that of Lake Albert, proved more problematical, mainly because a reason had to be given for their answer. A relevant and accurate calculation needed to be seen for the method mark and the result of this calculation had to be shown. This was frequently achieved, but the value of their calculation needed then to be related back to either the appropriate lake or its surface area value. While a good number did so, many others failed to make the link. Interestingly, a very small but noticeable minority interpreted 5½ as 5 halves and calculated with a value of 2.5; this gained no credit.

Question 4
Again the success rate for this question was very high, with students understanding the basic language of probability and the concept of an even

chance and an impossible event and they were able to mark the probabilities of such on a probability scale.

Question 5
Students were given a question that required several steps to work out the number of girls at a concert; these steps were not explicitly given. It was pleasing that so many students could readily interpret the question and find the correct answer. Where full marks were not awarded, a good number scored two marks for working out the number of boys or one mark for the number of children.

Question 6
In part (a), only a small number of students were not able to multiply two algebraic terms. Collecting like terms in part (b) was also well done, although the directed number aspect is still an issue for some. The most commonly seen error was simplifying $7k + k$ to give $7k^2$ In part (c) a large majority could solve the equation, with an algebraic method seen regularly, as was a simple numerical calculation. A few misinterpreted $5y$ as meaning $5 + y$ and worked accordingly to find a value for *y* that fitted their invented equation, scoring no marks.

Question 7
While some students continue to muddle mode, range and median, the majority know which is which and were able to score the full five marks for parts (a), (b) and (c) A few worked out the mean in one of the parts, even though this was not asked for within this question. When finding the median, answers of 10 were noticeable, which is the middle value of the shoe sizes as given in the question, rather than when put in numerical order. In part (d), many students struggled to give a reason in a form that was sufficiently unambiguous for the award of the mark. The minimum acceptable involved either working out and giving the correct mean for the afternoon and stating this was higher than the morning mean, implying that the overall mean was higher. A minority explained that in the afternoon the cost of the cheaper pair of shoes was only a little below the morning mean whereas the cost of the more expensive pair was much more above the morning mean. Working out the mean of the 3 values shown in the question did not gain credit, neither did failure to incorporate the answer 'more' – just giving an answer of "yes" was not enough, as this could be applied to either less or more.

Question 8
There were a high number of responses that showed little understanding of how to proceed in this multi-step question to find the size of an angle on a diagram. Some basic misconceptions appeared regularly, such as assuming that the line *DB* bisected angle *ABC* and angle *ADC*. Working that developed from this was inevitably flawed. Encouragingly there were also many students who competently reached the correct answer for the size of the angle. Of these, a significant number lost one or both of the remaining two marks, as they failed to give any reasons or gave reasons that were not sufficient. For example, "a triangle is 180^{o}" could not gain credit; there needs to be some kind of reference to the *angles* in the triangle

adding up to 180°. Likewise, "angles in a circle are 360°" did not receive credit as we needed to see this expressed with reference to the angles at a *point* adding up to 360° – this and the omission of any mention of isosceles were the main reasons for the small number of students being awarded the full five marks. Students should also be aware that showing their working, however detailed, is not the same as giving reasons.

Question 9
Writing four fractions in order in part (a) was often correctly answered, with a good number of responses showing conversions to decimals, and far less often, to fractions with a common denominator. There were also many responses with no working; sometimes the given answer was correct but often not, in which case no marks were awarded. The correct conversions would have gained students one mark, even where their answer was incorrect. Regularly seen were three of the four fractions in order, in which case one mark could be gained. The addition of fractions, which was tested in part (b) was understood by many, who gained both marks for their clear working leading to 5/6 as their final value. A few lost one mark for omitting this final step. Equally often ambiguous and creative working was seen incorporating the numbers in the question with a variety of mathematical operations but such attempts led nowhere. In part (c), division of fractions was required and again many could show this in easy to follow working with all the required steps included. Omitting one of the interim steps lost some students the final mark. As with part (b), there were also many very muddled responses and blanks.

Question 10
Working out the mean for the number of emails sent on 5 days required the number for each day to be found by interpreting a pictogram. An encouraging number of students could do this and went on to gain full marks by adding the values and dividing by 5 Even if some of the values from the pictogram were incorrect, if they were used correctly the three method marks could be gained. We also saw responses where the total of 240 had been divided by something other than 5, in which case two marked were awarded. This proved a very accessible question for almost all students.

Question 11
In part (a), almost all students could rotate the given triangle 180° to gain at least one mark; where the required centre of rotation had been used correctly, which was often, both marks were awarded. A few had rotated the triangle 90° Virtually all students did attempt this question and even rotating about a point other than (7,6) gained 1 mark.
Describing the reflection in the line $x = -1$ in part (b) produced many two mark answers. Many gained just one mark, due to the omission of the equation of the line or giving it wrongly, simply as $x – 1$ or as $y = -1$ for example. It was noticeable how many students do not appear to understand the implication of the instruction

regarding a single transformation and answers such as reflected and moved, reflection by a vector and reflected around the point (-1, 0) were regularly seen, gaining no marks. The inclusion of a coordinate in their answer (e.g. -1, 0) implied a transformation such as a rotation and hence gained no credit even if the word “reflection” had been included in their response.

Question 12

In part (a) all but a small number of students could use their calculator to find the correct answer, although a few scored only one mark for part of the calculation worked out correctly, and some gave completely wrong answers, probably from not understanding the order of operations. Giving their answer in part (b) correct to one significant figure was far less successful; instead of 50, the values seen most often were those to 1 decimal place (49.9) or the number 5.

Question 13

This question met with varied success; a straightforward two marks for those who knew to divide 360° by 24° to give 15 sides for the un-named polygon and no marks for those who attempted a range of meaningless calculations, usually attempting to apply a formula based on internal angles of a polygon. Answers of 5 appeared, possibly from those who confuse the word polygon with pentagon.

Question 14

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 in part (a). However, the concept of HCF is less well understood; although the award of the accuracy mark for giving the HCF as 8 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. Part (b) was understood by only a tiny handful of students. They were asked to multiply a product of primes by 8, where the powers were given as letters. A small number were able to gain one mark for making a start by expressing 8 as 2^3 but rarely made any progress beyond this. Multiplying each base by 8 was seen regularly but could gain no credit. Many did not attempt this question.

Question 15

The most straightforward response to part (a) was to state that the gradient of the distance-time graph before the stop was steeper than afterwards, so the speed on the first stage was faster. While this response was seen, it was far more common for students to try to work out actual speeds. If they did so correctly and made it clear that the faster speed was before the stop, they too gained the mark. Where students mis-calculated or did not compare the speeds for a common length of time, no credit could be given. The majority of students were able to gain at least one of the two marks in part (b) for their attempt to complete the graph; the 45 minute stop was nearly always correct, the line for the cycle ride home less often correct, but usually at least ending somewhere on the time axis, potentially allowing some follow through for part (c). However, this last part of the question met with very limited success. Asked to find the average speed for the whole journey excluding the two stops, students mostly started by trying to work out the required length of time from their graph but even this proved a challenge too far for many. 48 divided by a correct time could score the second mark and such responses were occasionally seen. Only the fully correct answer could score the accuracy mark but this was rare.

Question 16

The straightforward algebra questions in parts (a), (b) and (c) produced mostly correct answers. Expanding two brackets in part (d) also produced many fully correct answers, with one mark being awarded often for sight of at least three correct terms or four terms where one or more of the signs was wrong. Other students could provide only two terms or working that showed no understanding. In part (e), it was encouraging to see a fair number of correct responses for factorising a two term expression with common factors. Where full marks were not awarded, others gained one for a correct factorisation with at least two factors outside the bracket. There were also many and varied incorrect attempts, with $36c^4p^5$ being the most commonly seen incorrect answer. There were also many non-responses.

Question 17

Working with two different ratios, which both involved the number of blue buttons, was not understood by the majority. While many gained one mark for finding the number of blue buttons (24) from a simple 1 : 2 ratio, they mostly made little progress beyond this. Given a red : blue ratio of 5 : 3 the most popular incorrect approach was then to multiply 24 by 5 and give 120 red buttons as the answer. Also seen regularly was ignoring the 1 : 2 ratio, instead adding 5 and 3 to give 8 and then working out 5/8 of 48 However, it was pleasing to see regular responses with easy to follow working and the correct answer, which gained 4 marks. Disappointingly, too many students felt unable to attempt anything.

Question 18

The full range of marks was awarded for this quadratic graph question. There were fully correct tables in (a) and the correct graph in (b) for full marks. For those who can clearly achieve here, and who must have seen numerous quadratic graphs, it is disappointing that some lost a mark for a horizontal line where there should be a minimum point. If not all values in the table were correct, a mark could be awarded if at least two were correct, and almost invariably these would be the y values for the two positive values of x. Where this was the case, most students then gained a mark in (b) for correctly plotting at least 5 of their points. The values in some tables appeared to result from guess work and a good number of 'interesting' but not creditworthy graphs were seen. Many students were unaware of the shape a standard positive quadratic should take.

Question 19

This question, which combined the concept of probability with the use of algebra, produced large amounts of varied and random working, attempting to incorporate the numbers and values given in the table in an assortment of creative ways. Some students though were able to make a start, subtracting the two known probabilities from 1 (to get 0.44) and realising that the remaining 0.56 must equal 8x for the rest of the dice numbers. Once they got this far, they often went on to give the value of *x*, which gained them two marks. While a few worked correctly towards the next step, unless 200 was used, no further marks could be scored. However, there was a small minority who did, and who had shown clear algebraic working, gaining them the full four marks.

Question 20

Correct answers appeared very regularly here, for working out the volume of a wooden cuboid and then it's mass, given the density of the wood. Frequently, however, students divided instead of multiplying by the density value (0.7) and they could only gain one mark for having found the volume of the cuboid. Other errors noted were finding the surface area of the cuboid or adding instead of multiplying the dimensions of the cuboid.

Question 21

Overall, all three parts of this question on standard form were very well answered. In (a) most could write a number given in standard form as an ordinary number, although there were students who were unsure how to deal with the decimal point. Common incorrect answers in part (b), where 0.004 had to be written in standard form, were for the power to be given as 3 instead of -3 or as another incorrect power, an incorrect value that included the digit 4, a fractional equivalent or writing the answer missing out the x 10. Students need to know how to write the calculator display in an acceptable form. A high number of students could use their calculator efficiently, with an understanding of order of operations, to get the correct answer for a calculation given in standard form in part (c). Many therefore showed no working but others first wrote all the values as ordinary numbers and then calculated, often correctly. Where this was not the case, some benefitted from the award of one mark for the numerator correctly evaluated or for an answer with the incorrect power of 10

Question 22

The concept of compound interest, at least when it is not explicitly stated, is not well understood by students at this foundation tier. While many could find 8% of 170000, the resulting value was treated as simple interest, giving the students only one of the three marks. Where depreciation per year was understood, more worked year by year, with scope for numerical errors and for omission of a step, the latter denying them the second method mark. It was rare to see explicitly multiplication by 0.92^3 However, a fair number reached the correct value for three marks, while others made no attempt.

Question 23
At this tier, it was encouraging to see that a significant minority could interpret the need to use Pythagoras' theorem to find the diameter of the semi-circle and did so correctly for two marks. Others assumed that the diameter was 6cm and made little further correct progress. Attempting to use trigonometry instead was rarely successful but very occasionally a student correctly obtained the right value. Using the value to find the area of the semi-circle produced a variety of responses, some correct for the award of another mark, but many wrong due to confusion between the need for radius or diameter. Others used the formula for the circumference of the circle, or overlooked the fact that this was not a whole circle. A surprisingly low number of students were able to find the area of the triangle, probably because they did not recognise that the 6cm lengths given on the diagram were a base and perpendicular height of the triangle; for those who did it was a straightforward method mark. Others used the given diameter as the base and realised, or guessed, that the height is the same as the radius and found the correct area. Where the two correct areas were worked out and added, the full five marks were awarded, a very good achievement for those at this tier on the final question.

Based on their performance on this paper, students should:

- Know the difference between compound and simple interest
- Show clear working at all times
- Work on probability, knowing when to use decimals and fractions and when to use the total of probabilities is 100%
- Know the difference between the formulae for volume and surface area
- Know that if a questions says 'factorise fully' they should look for all common factors to be taken outside the brackets.
- Improve their knowledge of use of the calculator
- Practice non-calculator methods eg for 'show that' fractions questions

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