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January 2014

Pearson Edexcel International GCSE
Mathematics A (4MA0) Paper 4HR

Pearson Edexcel Certificate
Mathematics A (KMA0) Paper 4HR

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The standard of this paper proved to be appropriate and gave candidates the opportunity to demonstrate their abilities. There were two questions on the paper {Q15(a)(i)) and Q18(a)} where candidates had to establish formulae or equations stated in the question. In these cases it is important that candidates show each stage in their reasoning clearly and do not skip steps.

Question 1

The majority of candidates were able to access part (a). Candidates that failed to gain the marks were those who thought they needed to add 840 to 40 and then divide by 40 giving an answer of 22.

Both parts (b) and (c) required a careful reading of the question. Those that didn't read carefully tended to divide quantities by the incorrect values. Typically 105 was divided by 5 (instead of 3) in part (b) and 105 was divided by 3 (instead of 7) in part (c). Some wrote down 45 : 60 as their final answer without identifying which were the girls.

Question 2

It is unfortunate that quite a number of candidates did not seem to realise that both formulae needed for parts (a) and (b) were on the formula sheet and instead they divided the front face up into rectangles and triangles. In a minority of cases, they applied the trapezium formula incorrectly and multiplied the parallel sides rather than adding them. Other candidates found, or attempted to find, the total surface area of the prism and gained only one mark.

In part (b) a majority of students were able to see how this linked with part (a) and secured full marks.

Question 3

The majority of candidates were able to answer this question in full. The correct expansion of the bracket was shown by most, and hence met the requirement to show algebraic working, although division by 6 to both sides of the equation was also acceptable. Most then moved directly to the correct answer and scored full marks. There were a number of candidates who reached $18y = 9$ but then came to the incorrect answer of $y = 2$ through division of 18 by 9 rather than vice versa. Wholly numerical solutions, which include flowchart methods, trial and error and correct answer with no working did not score any marks as they do not meet the requirement of showing algebraic working.

Question 4

Many correct answers were seen for this question. Candidates who rounded their answer to 2 were awarded full marks, provided evidence of a correct method was seen.
Some candidates made the common error of saying $2 \times 0 = 2$ in their working, but penalised for this by withholding the accuracy mark (meaning they could still access the method marks). Less able candidates often simply tried to find the mean of the frequencies by offering $30 \div 6$ or $64 \div 6$

Question 5

Many candidates were able to identify the **single** transformation as a rotation and correctly described the direction and centre. Those who did not score full marks often omitted either the size of the angle (90° or 270°) or the direction of the turn (clockwise or anticlockwise). There were some who indicated the centre of the rotation as a vector rather than in the standard Cartesian form. A number of candidates indicated more than one transformation, typically a rotation followed by a translation, which resulted in no marks being scored.

Question 6

Overall this was a good source of marks for many able candidates. Failure to deal with signs when multiplying out brackets and gathering up terms were a source of lost marks in both components of part (c).

In part (d) a small minority left their answer as v^{11}/ v^5 instead of proceeding to the final step and bringing the final answer to v^6

Question 7

Many candidates scored full marks by correctly calculating the two areas and subtracting. A number of candidates calculated the perimeter rather than the area of the circle. Another error was to take the radius of the circle as 10cm, when it was actually 5cm.

Question 8

Most candidates chose to draw a factor tree, rather than a division ladder, and many fully correct answers were seen. Some found all the prime factors correctly but failed to write them as a product thereby losing the accuracy mark.

Some failed to realise that 33 was not a prime number and left their answer as 5 x 5 x 33. This gained no marks as the product had to contain two different prime numbers. Those that included 1 in their final answer lost the accuracy mark but usually scored 2 marks for a correct factor tree (where the use of 1 was condoned).

Question 9

Parts (a)(i) and (ii) were mostly answered correctly with most common error in (ii) being the inclusion of 1 and/or 13

In part (b) a majority gained the one available mark but a significant number failed to read the information about the universal set and therefore thought 14 did belong to the set A as it was an even number.

Question 10

Those candidates who realised that they could find the sum of the four numbers by multiplying 2.6 by 4 usually went on to obtain the correct answer. Those that failed to realise this usually tried to find numbers that fitted the given data and were often unsuccessful. If they chose the latter approach and they found four numbers including 5 with a total of 10.4 or three numbers with a total of 5.4, they gained the first method mark.

Question 11

For part (a), virtually all candidates were able to identify the country with the largest land area.

As also seen in previous standard form questions, some candidates chose to change their numbers from standard form into ordinary numbers before adding. As the answer was required in standard form there was no need to do this and many candidates introduced errors by attempting this. Some candidates may benefit from being reminded how to use the standard form button on their calculators.

Question 12

Very few candidates gained full marks for this question. Those that managed to reach the correct answer of "$2x$" usually scored 3 out of the 4 available marks because the two required geometric reasons were either missing or insufficient. The most common mistake was to omit the essential words "base" or "bottom" from their statement regarding the equal angles in an isosceles triangle.

A few managed to obtain 2 marks by correctly finding angles DBC and BDC as $60 - x$. These marks were also awarded if these were seen on the diagram. The algebra then required to complete the question proved too challenging for many.

Many tried to use completely numerical methods and gave answers such as 30° or 60° even though the question asked for an answer in terms of x. This approach usually resulted in no marks although correct reasons, if stated, could still gain one mark.

Question 13

Candidates did not perform as well on this question as other algebraic questions elsewhere on this paper. Very few factorised efficiently by removing the common factor of $x - 5$. Most instead expanded both terms and then collected like terms. If this was done accurately the method mark was awarded, however many errors were made in this process. Factorising the resulting 3 part quadratic was then required to reach a pair of brackets containing the correct expressions.

Question 14

In parts (a) and (b) many candidates gained full marks. Some added an extra branch from "pass" but this was overlooked. A few forgot to label the branches and this is a requirement to make sense of any tree diagram.

Part (c) was a challenging component to this question and very few fully correct solutions were seen. An occasional error was to use 0.9 and 0.1 for the probabilities on the 3rd driving test, because of a misinterpretation of the information given in the question. The probability of passing after failing remained the same on all subsequent tests and not just after the second test.

Some candidates correctly found 0.048 for the 3rd attempt but gave that as their final answer. Usually those that found 0.048 and 0.0096 correctly were able to continue correctly and thus gain full marks.

Question 15

This multi-part question produced a wide variety of responses from candidates of all abilities. Even the more able candidates sometimes lost some of the available marks. A number of candidates were able to identify the key starting point in part (a)(i) and used the given shape to deduce that the perimeter could be expressed as $3x + 2y = 120$. Nearly all who go this far then manipulated the equation into the required form.

Part (a)(ii) then required the deduction that the area was $60x – 1.5x^2$. This required the substitution of y from the previous result, and most of those who got part (i) fully correct did so too in part (a)(ii). Many candidates who did not score in part(a) did score in part (b) by remembering the mechanical processes involved in differentiation.

In part (c) many candidates correctly equated the derivative to zero, and solved to show that $x = 20$. Many then stopped here and did not use this value to find the required area.

Question 16

It was evident that those who understood the concept of frequency density were able to respond to this question efficiently, almost always achieving a fully correct answer. Other successful methods centred upon using the concept of counting squares (e.g. 1 sq. cm. representing 4 customers or equivalent).

Some tried to go on to find the correct values for the three relevant blocks but many made mistakes in calculating the totals for one or more of these and thus lost 2 of the 3 available marks.

Question 17

This question discriminated well. With weaker candidates, even finding the angle between the two hands of the clock (150°) was too challenging, though a few still gained the next method mark by an application of the cosine rule. It was usually the stronger candidates who made a better attempt at the cosine rule and they normally found the correct answer. There were a range of other attempts from Pythagoras to the sine rule, without success. Some candidates incorrectly treated the triangle as isosceles.

Question 18

For some candidates, part (a) was a challenge. It was mostly the more able candidates who started with $(3x + 2)(2x + 1) = 100$ and it was these candidates that nearly always expanded correctly to gain 2 marks. Others were successful with a variety of partitions, but $6x^2$ was often stated rather than shown as $2x$ x $3x$. This was a requirement of the mark scheme, as was a need to form an equation equal to 100. Some failed to understand what was required and tried to solve the given equation in part (a).

In part (b), the better candidates factorised and quickly found the correct area. Mistakes were more common when using the quadratic formula. Some candidates lost all marks by showing no method for solving the equation, occasionally managing to find 3.5 by trial and improvement.

Question 19

Many correctly identified the number of sides of the polygon by using the given ratio to show that each external angle was 22.5°. Most, but not all, then divided 360 by 22.5. A few used the total angle sum formula to obtain a correct answer. There were two errors that were seen regularly. Firstly, a significant number of candidates did not interpret the ratio 7:1 as meaning that 180 should be divided by 8, and instead divided by 7. Alternatively, some went straight from 7:1 and divided into 360 by 7 or 8.

Question 20

The most successful candidates were those that chose $10x = 0.1515$ and $1000x = 15.1515$ leading to 15/990 etc.

Those that chose x and $100x$, leading to 1.5/99 usually failed to gain the final accuracy mark by not reaching a fraction with integers as the numerator and denominator, merely stating that 1.5/99 = 1/66.

A common error was to divide 1 by 66 on their calculator and this scored no marks.

Question 21

Questions involving the use of upper and lower limits for numbers are regularly set, and are a good source of marks for the most able candidates. The key skills needed are to identify the bounds for each number in the question and then to apply these in the context of the question. This question posed additional challenges, in that both given values were integers and candidates were asked to round to the nearest 100 or the nearest 10 rather than to a stated number of decimal places or significant figures. Here, many identified 165 as the required numerator, but far fewer identified 1250 as the denominator. Many did not obtain either of these and therefore did not score.

Question 22

This question was well answered by the most able candidates with many candidates scoring full marks. Most, wisely, chose to substitute $y = 2x - 7$ rather than $x = (y+7)/2$. Those that chose the latter were often less successful. Later in the question, most candidates preferred to use the quadratic formula rather than factorisation. Candidates who made an incorrect substitution at the initial stage lost all of the marks.

Less able candidates tried to either square both sides of the first equation or to take the square root of both sides of the second equation. Candidates who used calculators to solve their quadratic equation but showed no algebraic working lost the final three marks even if their answers were numerically correct as the questions asked for algebraic working.

Question 23

Many excellent solutions were seen for this 3 dimensional problem. Well annotated diagrams were likely to accompany the best work. Although the solution could have been obtained by the application of trigonometric ratios, most opted to apply Pythagoras twice; once to find the length of half the diagonal of the base and then using this length together with the Pyramid's slant height to find the height from the base. Many full solutions scoring all of the available marks were seen. A few candidates, having found the length of *MC*, then incorrectly applied Pythagoras in the second application or assumed angle *MCT* was 45°.

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