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Principal Examiner Feedback

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GCSE Mathematics (1380)
Paper 4H

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1. PRINCIPAL EXAMINER'S REPORT – HIGHER PAPER 4

1.1. GENERAL COMMENTS

1.1.1. Candidates appeared to be able to complete the paper in the allotted time.

1.1.2. Candidates made a good effort to attempt questions that involved more than one stage in the working, for example, Q5 and Q7 but were often let down by a lack of standard techniques – finding the area of a right-angled triangle and knowing which order to carry out a division sum.

1.1.3. Candidates need to ensure that they can recall standard formulae such as those needed for finding the circumference of a circle and the area of a triangle.

1.1.4. When asked to give reasons in geometry questions then geometric reasons should be given rather than working.

1.1.5. Candidates need practice in giving clearly expressed written answers, particularly when interpreting data.

1.2. REPORT ON INDIVIDUAL QUESTIONS

1.2.1. Question 1

The majority of candidates were able to give the correct answer to the calculation in part (a). Candidates who choose to work out the numerator and denominator separately before carrying out the division would be well advised to retain accuracy until the final operation. Some who took this approach then divided the denominator by the numerator rather than the other way round. A value of -1.56055013 was the most popular incorrect answer seen, coming from the wrong order of operations.

Part (b) was well done although a common error was to round to 1 rather than 2 decimal places.

1.2.2. Question 2

This question asked for the total amount of simple interest earned. Common errors were to give the total amount in the account and/or to use compound interest. Those who did use compound interest could gain a maximum of 2 marks out of 3. The calculation of 2.5% was generally well done although errors were frequently seen from candidates using the 'build up' approach. Candidates sometimes confused 2.5% with 25% when converting to decimals.

1.2.3. Question 3

In part (a) two of the three possible problems – no time frame, overlapping boxes, no box for zero were given by the majority of candidates. Stating that the ranges under two of the boxes were different was not accepted.

In part (b) most candidates started with a question that included a time frame although this was still missing in some answers. Giving either exhaustive or non-overlapping response boxes was enough to gain the second mark. The use of inequalities in conjunction with response boxes on a questionnaire is not accepted – inequalities were seen on only a small minority of scripts.

1.2.4. Question 4

Part (a) was well answered.

In part (b) the usual confusion between LCM and HCF was evident in responses with 1 given as a common incorrect answer. Candidates who listed multiples of the three given numbers were generally more successful in finding the correct LCM than those who wrote each number as a product of its prime factors. Those who gave a common multiple rather than the LCM were able to gain one of the two marks.

1.2.5. Question 5

Many correct responses were seen. Those candidates who were able to divide the money into the given ratio successfully generally went onto gain full marks. There were, however, a significant number of candidates who either ignored the final statement in the question or who were unable to find $\frac{2}{3}$ of £9.60. Some candidates simply found $\frac{1}{3}$ and did not subtract. The initial stage in the calculation to divide £28 in the ratio 13: 12: 10 confused a number of candidates who divided 35 by 28 rather than the other way round. Candidates who made this early error were still able to gain 2 out of 4 marks provided they went on to complete the question correctly with their incorrect amounts. The focus in this question was on technique so an answer of £6.4 was accepted but candidates should be reminded that this isn't always the case, they should ensure that any answer involving money should have two decimal places when appropriate.

1.2.6. Question 6

When asked to 'show' that a statement is true it is important that this is shown explicitly. In this question the sum of the two algebraic expressions was frequently seen but, in most cases, this was never equated to y. Reasons were often omitted or, if present, were incomplete. It is not sufficient to say 'line is 180^o' the full statement 'angles on a straight line sum to 180^o' should be given.

Part (b) was generally answered better than part (a) although the correct answer was not always given in (bii) despite being evaluated. Candidates would sometimes correctly work out the size of all three angles but then give, for example, 60^o rather than 85^o as their final answer. A very small minority of candidates named the largest angle in the final part rather than giving its value.

1.2.7. Question 7

The overall method needed to solve this problem was clearly understood by the vast majority of candidates. Problems occurred firstly when many candidates were unable to work out the area of the triangle correctly – the most common error being forgetting to halve the product of the perpendicular sides. The other most common error was for candidates to use the perimeter rather than the area of the rectangle.

1.2.8. Question 8

The formulae for the circumference and area of a circle are still either frequently confused by candidates or not known. Candidates who used the correct formula in part (a) generally scored full marks in this part.

From those candidates who attempted part (b) the most popular method, unfortunately incorrect, was to attempt to divide the area of the rectangle by the area of the circle. However, those who did this correctly and then gave their answer as the integer 44 were given one mark. Unfortunately, the majority of candidates who took this route divided the area of the rectangle by the circumference of the circle. Those candidates who realised that part (b) could be answered by considering the diameter of the circle alongside the length and width of the rectangle were more successful. The main error when using this method was to fail to round to integer values before multiplying to find the total number of circles.

1.2.9. Question 9

There was a lot of confusion with exchange rates demonstrated in candidate's answer to this question. The common way to attempt to answer the question was to take an amount of money, usually in pounds, and then use the two exchange rates to convert to Euros. Unfortunately, the majority of candidates using this method with an amount in pounds generally multiplied by both exchange rates rather than multiplying by the exchange rate in London and dividing by the exchange rate in Paris. A minority of candidates realised that all that was needed was to divide 1 by either of the rates given and then compare with the other rate. The most sophisticated correct method seen was to convert from pounds to euros using the London rate and then back into pounds using the Paris rate. It was, however, clear that some candidates using this approach did not necessarily understand their answer as their conclusion was frequently incorrect. It was also noted that many students failed to use units in their working, so it was often unclear what they were attempting to calculate.

1.2.10. Question 10

Those candidates that understand the method needed to estimate the mean from a frequency table were generally successful. The most common error seen here, however, was to divide by 6 rather than by 60. Other errors were mostly arithmetical. There are still many candidates who divide the total of the frequency column by the number of classes or find the mid interval values and sum these before dividing by either the frequency of number of class intervals.

1.2.11. Question 11

Part (a) was answered better by candidates than part (b).

In part (c) common incorrect answers which gained some credit were $2n^{12}$, $8n^{12}$ and $16n^{7}$. Very occasionally $16+n^{12}$ was seen. A common incorrect answer seen was $2n^{7}$.

1.2.12. Question 12

In part (a) the majority of candidates recognised the need to provide a list of integers. Many correct answers were seen, common errors were including 5 or omitting -2 and sometimes 0.

In part (b) 2.5 was seen in the vast majority of scripts but the correct final answer of $x > 2.5$ was not always present. When the requirement of the question is to solve an inequality then the final answer must be the correct inequality.

1.2.13. Question 13

Despite the form of the equation given, part (a) was generally well answered. Weaker candidates did struggle with using the equation.

Success in part (a) generally led to a correct graph in part (b).

However, part (c) was frequently not attempted. When using the graph to find the gradient, the different scales on the axes caused some problems. Those candidates who chose to rearrange the given equation were more successful in finding the correct answer although the answer was often given as $y = -1.5x$.

1.2.14. Question 14

The instruction to factorise an expression is still not understood by a number of candidates. Success was more evident in the easier part (a).

In part (b) candidates had to take out at least two common factors correctly before any marks were awarded. Many answers were left partially factorised; provided this had been done correctly using two factors then the method mark was awarded. A number of candidates tried to factorise into two brackets.

1.2.15. Question 15

The common error from those candidates who knew how to find a moving average was an incorrect use of their calculator with the division button being used before the sum of the relevant three numbers had been found. Although, it is fair to say that this error was not as evident as it has been in previous series.

A common incorrect answer in part (a) was for the candidate to continue what they believed to be an arithmetic sequence with the numbers 41 and 47.

In part (b) the requirement was to describe the trend. Therefore no credit was awarded to answers that appeared to be attempting to describe a correlation either by the use of the word positive or in a general. Neither was credit awarded to answers that concluded more cars are sold in colder months.

1.2.16. Question 16

The vast majority of candidates could write down the median from the given box plot. There was less success with finding the interquartile range. Errors included just writing down the value of the lower or upper quartile, using an incorrect value for either the lower or upper quartile and leaving the answer as 70 – 47.

There were few errors seen in drawing the box plot in part (c), the most common error was in plotting the median, usually at 64 rather than at 62. When asked to compare distributions it is expected that candidates will compare one value (eg. the median) and one measure of spread (eg. the range). Many statements given did not answer the question as candidates often tried to provide an answer along the lines as to which group provided the best guess rather than comparing the distributions or just stated values without any comparison.

1.2.17. Question 17

A popular incorrect answer was to find the scale factor 2.5 and then use this to multiply 12.5 to give a final incorrect value of 31.25. Candidates who used the scale factor $\frac{21}{15}$ were more successful in generating the correct answer. Many candidates found the value of 5 which is the difference between the two lines using $\frac{6}{15}$ but failed to add this to the 12.5 cm ignoring the obvious fact that the line must be longer than 12.5 cm.

1.2.18. Question 18

The most popular (incorrect) answer seen was 90 showing that candidates still fail to grasp the connection between square units.

1.2.19. Question 19

Candidates who were able to make a start on this question by multiplying through by x were few and far between. Once the correct quadratic equation was obtained however this generally led to the correct solutions. Once exact solutions were seen any attempts to find decimal equivalents were ignored. Candidates who opted to use a trial and improvement method of solution generally gained no marks unless they were successful in finding both solutions to at least three significant figures in which case 2 marks were awarded. A few candidates successfully completed the square to get exact answers. Many candidates seem unaware that their answer involving a surd and fraction was the correct answer.

1.2.20. Question 20

A correct trigonometric statement in part (a) was then often rearranged incorrectly to give no further marks.

Some candidates picked up a mark in part (b) for correctly identifying angle *RPQ* as 62^o but that was as far as most candidates got. The few that did go onto use the cosine rule or some other two stage method were generally successful. Some candidates clearly had their calculator set in grad or rad mode throughout this question. Common errors were to assume angle PRQ was 90 or that SR was 7cm.

1.2.21. Question 21

Those candidates who understood the concept of histograms generally gained full marks. An incorrect answer of 32 (instead of 34) was occasionally seen in the frequency table, possibly arising from a mis-reading of the scale on the vertical axis.

1.2.22. Question 22

Proof involving congruent triangles is not well understood. The best solutions were clearly set out with a reason accompanying each statement and the final reason (eg. SSS) for congruency given. Some candidates were able to pick up a mark for such statements as $AM = MC$. One common incorrect method was to show that all three pairs of corresponding angles are equal and then incorrectly believing that this was a proof for congruent triangles.

1.2.23. Question 23

It was encouraging to see a number of candidates make a start to part (a) by providing a partial factorisation of the expressions but this was often then left as $x(x + p) + q(x + p)$ or $x(x + p)\ q(x + p)$ omitting the required addition sign.

The more able candidates were generally able to gain two marks in part (c) but being unable to cope with the negative sign meant that many incorrect solutions followed on from gaining the two method marks.

1.2.24. Question 24

The formula for the surface area of a sphere was occasionally quoted incorrectly, usually with r^3 rather than r^2. Candidates who provided the correct formula for the surface area of a sphere generally then went on to score 1 mark, frequently the area of the top surface was ignored.

1.2.25. Question 25

Common incorrect calculations included 645 × 400 and 640 × 395 Some candidates were able to gain a method mark for showing that they were attempting to multiply two lower bounds together but rarely were these the correct lower bounds.

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