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Principal Examiner Feedback

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GCSE

GCSE Mathematics 1380

Higher Calculator Paper (4H)

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1. PRINCIPAL EXAMINER'S REPORT – HIGHER PAPER 4

1.1 GENERAL COMMENTS

1.1.1 This was an accessible paper that gave candidates ample opportunity to demonstrate their understanding. Some very good attempts at the paper were seen.

1.1.2 Questions 2, 4, 5(a), 6, 7 and 13 were answered with the most success. Full marks were gained most often for question 2.

1.1.3 A significant number of candidates were unable to work out the value of the arithmetical expression in question 9 using a calculator and many attempted to work out the standard form calculation in question 17 without using a calculator. Centres are advised to give candidates guidance on the sensible use of a calculator, emphasising particularly its use for standard form.

1.1.4 It was pleasing that many candidates showed working out and were able to gain method marks when the final answer was incorrect. Too many candidates, though, displayed little, if any, working out which meant that method marks could not be awarded if the final answer was incorrect. Centres must continue to encourage candidates to show all stages in their working.

1.2 REPORT ON INDIVIDUAL QUESTIONS

1.2.1 Question 1

This straightforward question was generally answered well. The most common incorrect answer was, not surprisingly, 40, obtained from multiplying the base by the height but failing to divide by 2. Rather than find the area of the triangle, some candidates used Pythagoras to find the length of the hypotenuse.

1.2.2 Question 2

The vast majority of candidates were able to work out the correct probability. A few made basic arithmetic errors such as 1 – 0.88 = 0.22. Common errors were giving the answer as 12 without the percentage sign and subtracting 0.3 from 0.58. Some candidates wrote the correct answer in the table and then decided to put a different answer on the answer line. Candidates with an incorrect answer often showed no working and so failed to gain the method mark.

1.2.3 Question 3

Many candidates gained full marks and very few failed to gain any marks at all. Most worked out that there were 40 beads in box B but mistakes were frequently made with the other two boxes. For box C some candidates worked out ¾ of 40 rather than ¾ of 20 and for box D the most common error was to work out 10% of 20 but forget to add the result to 20. When working out the total number of beads some candidates forgot to include the 20 beads in box A.

1.2.4 Question 4

Part (a) was generally answered very well. A number of candidates who chose to use a unitary method lost a mark because they divided 100 by 6 and then rounded or truncated the result of this calculation before multiplying by 18. This resulted in inaccurate final answers such as 298.8. Candidates were only a little less successful in part (b). Some candidates failed to realise that if the recipe needed ½ lime then 2 limes would make 4 times the amount. Many did work out the '4' but often gave this as the final answer, instead of multiplying it by 6 to find the number of people

1.2.5 Question 5

In part (a) many candidates were able to reflect the shaded shape in the line y = x but a surprising number could not. In the majority of the incorrect attempts the shape had been rotated but some candidates did gain one mark for drawing the shape in the correct orientation but in an incorrect position. Some candidates might have been more successful at reflecting the shape if they had used tracing paper. In part (b) many candidates enlarged the shape by a scale factor of 3 but the enlargement was often in the wrong position. The use of construction lines did help some to gain full marks. Very few candidates failed to gain at least 1 mark.

1.2.6 Question 6

In part (a) most candidates were able to gain at least one mark for either 6x or 5y. For some, the negative sign caused a problem and both 6x – 5y and 8x – y were common incorrect answers. The majority of the candidates were successful in part (b). Some used an algebraic approach to solve the equation whereas others started with 10 and used inverse operations. The most common error was to add 3 to 10 to get 2x = 10 + 3, rather than subtract it, leading to an answer of 6.5. Part (c) was also answered very well with many candidates displaying a good understanding of the index laws. Common incorrect answers were c30 in (i) and e3 in (ii).

1.2.7 Question 7

The majority of candidates were able to work out the correct percentage. Some used equivalent fractions and some worked out 8/20 × 100 although often the answer was given without any working out being shown. Some candidates wrote the answer as 0.4 and did not convert it to a percentage. A common mistake was to work out 8/100 × 20.

1.2.8 Question 8

Part (a) was answered well overall with candidates able to identify the modal class. In part (b) many candidates had difficulty explaining why Luke was wrong. Those who gave a correct explanation usually identified the 30th item as being the median and then showed that this wasn't in the class 30 to 39 or identified the class 20 to 29 as the correct one. Many of the incorrect explanations referred to putting the numbers in order or the frequencies in order and some candidates confused the median with the mode or the mean. Some candidates even contradicted the statement that Luke was wrong and stated that he was correct. In part (c) many candidates plotted their points at the ends of the intervals rather than at the midpoints and a disappointingly high number of candidates for a Higher Tier paper misread the vertical scale and took one small square to represent one unit and consequently gained no marks. Otherwise, the question was well done with most candidates joining their points with line segments although some joined them with a curve and some did not join them at all. A number of candidates drew bar charts.

1.2.9 Question 9

Many candidates gave a correct answer. Those who evaluated the numerator and denominator separately were more successful and many were awarded one mark for either 19.56 or 8.0518 even though the final answer was incorrect. Some candidates, unfortunately, showed no working. The most common incorrect answers were 21.013..., obtained by candidates typing the numbers into the calculator without using any brackets, and 24.41149..., from candidates working out the numerator as 19.56 and then keying in ÷ 2.54 × 3.17 with no brackets.

1.2.10 Question 10

Many candidates gained at least one mark in part (a). The most common errors were to leave out one value (most commonly 2) or to give an extra value (most commonly –3). Some candidates clearly confused ≤ and < as they included –3 and omitted 2. The term 'integer' was generally understood. Candidates were less successful in part (b). It would appear that candidates continue to be put off by the inequality symbol and many either replaced it with '=' or lost it altogether. Most of those who gained one mark solved the inequality as an equation and wrote their answer as $x = 15$. Some candidates did not know how to deal with 2/3 in order to isolate x. A significant number wrote 15 on the answer line.

1.2.11 Question 11

The modal mark for this question was zero as many candidates failed to match at least two graphs with the correct containers. Where just one graph was matched correctly this was often graph B with container 2. A slightly smaller proportion of candidates matched two graphs correctly and just over a quarter of candidates matched all four graphs with the correct containers.

1.2.12 Question 12

This question was answered quite well and it was pleasing to see that most candidates understood the difference between an expression and a formula and started their answer with '$T=$'. Marks were often lost through candidates combining $7x + 5y$ to give either $12xy$ or $35xy$. $T = x + y$ was a very common incorrect answer.

1.2.13 Question 13

The majority of the candidates were able to calculate the average speed correctly. The most common error was to multiply the distance by the time. Some candidates decided to work in km/min and usually made mistakes.

1.2.14 Question 14

Part (a) was answered very well with the majority of candidates drawing a correct front elevation. Candidates were not quite as successful in part (b) and some appeared not to understand what is meant by a plan. Drawings of nets and 3D shapes were quite common.

1.2.15 Question 15

In part (a) most candidates were able to identify that the sample was biased because Kamini had chosen only the best students or that the sample was too small. Some mentioned, incorrectly, that she needed to ask all the students to achieve a valid response. Part (b) was also answered very well with the most common answer being that there were no negative response boxes. Many good questions were seen in part (c). The two most common errors were a failure to include a time frame in the question and to give response boxes which were overlapping. A small number of candidates failed to read the question properly and designed a question based on liking maths.

1.2.16 Question 16

Both parts of this question were answered quite well, with part (b) having a slightly higher success rate than part (a). In both parts, incorrect answers often contained the correct three digits in the wrong order.

1.2.17 Question 17

Just under half of the candidates were able to write 82 500 000 in standard form in part (a). Part (b) was not answered quite as well. Candidates who understood how to write a number in standard form often made mistakes with the power of 10 and gave answers such as 1.456×10^{-17}. Lots of answers were not written in standard form and many candidates changed the numbers back to normal numbers and then attempted to multiply them.

1.2.18 Question 18

The question was tackled in many different ways but generally it was done well with many candidates managing to gain at least two of the three marks. Candidates were usually successful at working in litres and millilitres although there were some who converted 19.5 *l* to 1950 m*l*. The most common approach was to divide 19500 by 210 but many of the candidates with correct calculations failed to secure the third mark by explaining that 92 cups could be filled but that the 93rd could not. 92.857… was often rounded to 92 without an explanation as to why. Some candidates worked out both 210×92 and 210×93 and explained that the latter was more than 19.5 *l*.

1.2.19 Question 19

Most candidates were able to complete the cumulative frequency table correctly in part (a) and many went on to draw an accurate cumulative frequency graph in part (b). However, plotting at the midpoints of the intervals was quite common and some candidates who plotted the points correctly then drew a line of best fit. Part (c) was also answered well with many candidates able to find the median. Candidates were less successful in part (d). Those who failed to show any working out, e.g. a vertical line from age 56 or 57 to the graph, could not be awarded a method mark if their answer was incorrect.

1.2.20 Question 20

In part (a) many candidates managed to gain one mark for attempting prime factor decomposition. Most used factor trees rather than division. Some candidates went on to write their answer as 2, 2, 2, 7 or 2 + 2 + 2 + 7 instead of writing it as a product. In part (b) the most common incorrect answer was 7 although some candidates identified 2 as a common factor and gave this as the HCF. Many candidates gained one mark for finding the prime factors of 42, usually by using a factor tree, but often they didn't know how to use the two sets of prime factors. Some wrote the prime factors in a Venn diagram but did not go on to give the answer as 14. Many confused HCF with LCM and answers of 168 were quite common.

1.2.21 Question 21

Relatively few candidates gained part marks for this question since those who identified the correct trig ratio usually went on to gain full marks. The most successful method was to start with $\cos 37 = x/8$. When an incorrect trig ratio was used it was usually sine. Those who used the sine rule were less successful, with many candidates not using the 53° angle.

1.2.22 Question 22

This question was generally answered well. The majority of candidates completed the table correctly in part (a) and many went on to plot their points correctly in part (b) and join them up with a smooth curve. However the scale on the vertical axis was often misinterpreted and a significant number of candidates lost a mark by joining their points with straight line segments. Some candidates assumed that it was a linear graph and drew a straight line through (–1, –8) and (3, 20) and then read off values to complete the table.

1.2.23 Question 23

This question was not answered well. Many candidates worked out angle x as 52° (from 180° – 128°), presumably taking $ABCO$ to be a cyclic quadrilateral. Both 128° and 232° (from 360° – 128°) were also common incorrect answers. Some of the candidates who used 'the angle at the centre is twice the angle at the circumference' thought that angle x, rather than the reflex angle AOC, was 256°. Although the diagram is not accurately drawn it is clear that angle x is an obtuse angle.

1.2.24 Question 24

This was clearly a topic that was unfamiliar to many candidates and a significant number simply multiplied 35 by 26, leading to an answer of 910. Some then went on to add 0.5 to their answer of 910. Candidates who correctly identified the upper bounds for the length and width usually multiplied them together to gain full marks. Some candidates had difficulty identifying the upper bounds – a few used 26.49 and 35.49 instead of the actual upper bounds and some used 26.4 and 35.4 and gained no marks.

1.2.25 Question 25

Many candidates had no idea how to multiply the two brackets together in part (a). Quite a number of those who did know how to proceed lost the squares, writing $8x$ instead of $8x^2$ and, more commonly, $20y$ instead of $20y^2$. Some made an error simplifying $-10xy + 16xy$. In part (b) just over a third of the candidates simplified the expression fully to '$x + 10$'. Part (c) was poorly answered with many candidates failing to realise they had to factorise. A large amount of incorrect algebra, such as cancelling the x^2 terms in both the numerator and the denominator, was seen. Those who did attempt to factorise were often more successful with the denominator than with the numerator. Many failed to recognise the difference of two squares. Only the best candidates were able to find the value of p and the value of q in part (d). Some gained one mark for

expanding the expression $(x + p)^2 + q$ and some managed to find one of the two values, usually $p = 3$, although it was not always clear where this had come from.

1.2.26 Question 26

This question proved too challenging for the majority of candidates but it was pleasing to see many candidates trying to use tree diagrams. Those who did so often gained the first method mark although some failed to take into account the fact that the first button was not replaced. Another common error was not recognising that a button of each colour could be obtained in two ways which meant that 28/110 was a common wrong answer. Some candidates worked out the probability of taking two buttons of the same colour and failed to subtract the result from 1. Some attempts were spoilt by candidates adding the fractions along the branches rather than multiplying.

1.2.27 Question 27

Many candidates failed to gain any marks at all for this question and both parts of the question were frequently not attempted. When a translation was seen in part (a) it was often 3 squares to the left rather than 3 squares to the right. Some translations were spoilt by inaccurate drawing. In part (b) inaccurate drawing also let down some candidates. Some of those who knew that the curve was reflected in the x-axis drew a curve that did not pass through (–1, 0) and (3, 0). Some candidates reflected the curve in the y-axis.

1.2.28 Question 28

It was pleasing that some candidates were very well prepared for this question and were able to produce 'textbook' solutions but a significant number of answers made no use of trigonometry at all. In part (a) many candidates simply multiplied the 2 given lengths together and divided by 2. Those who realised that they needed to use $\frac{1}{2}ab\sin C$ usually substituted correctly and went on to gain full marks. Some, though, quoted the formula but did not know how to use it. Candidates who recognised the need to use the cosine rule in part (b) were quite often successful although some used an incorrect order of evaluation and subtracted $2\times10.5\times8.3$ from $10.5^2 + 8.3^2$ before multiplying by $\cos62^\circ$. There were many candidates who used Pythagoras' Theorem and attempts using right-angled trigonometry or the sine rule were also seen.

2. STATISTICS

2.1. MARK RANGES AND AWARD OF GRADE

Unit/Component	Maximum Mark	Mean Mark	Standard Deviation	% Contribution to Award
1380/1F	100	58.2	17.1	50
1380/2F	100	64.4	18.5	50
1380/3H	100	46.9	21.6	50
1380/4H	100	55	19.8	50

GCSE Mathematics Grade Boundaries 1380 – November 2010

	A*	A	B	C	D	E	F	G
1380_1F				70	56	43	30	17
1380_2F				77	63	49	36	23
1380_3H	83	65	47	29	16	9		
1380_4H	87	71	55	39	26	19		

	A*	A	B	C	D	E	F	G
1380F				147	120	93	66	39
1380H	170	136	102	68	42			

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