Examiners' Report November 2009

GCSE

GCSE Mathematics (1380)

Higher Non-Calculator Paper (3H)

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November 2009

1. PRINCIPAL EXAMINER'S REPORT – HIGHER PAPER 3

1.1. GENERAL COMMENTS

Performance of candidates on this paper was mixed. There was evidence of able candidates breezing through the paper, but there were many cases where candidates had difficult showing what they had learned and could do.

The standard of basic techniques was not good with especial weakness in the manipulation of fractions throughout. It was worrying to see a misunderstanding of basic concepts in geometry where area was confused with volume and where bearings where confused with distances, for example. Candidates did show some aptitude in given lucid answers to those questions which required some statistical interpretation.

1.2. REPORT ON INDIVIDUAL QUESTIONS

1.2.1. Question 1

Most candidates were able to answer this question well.

1.2.2. Question 2

The same could not be said for this question however. Candidates gained full marks by using 30 or 31 with 5 and 0.2. The main error was an inability to deal with the division by 0.2 where often the answer 7.5 came from $150 \div 0.2$. Basically, there was a lack of conceptual awareness that division of a positive integer by a number less than 1 gives an answer greater than the numerator.

Some candidates tried to deal with the denominator directly by multiplying the numerator and denominator of the initial expression by 10, but often this resulted in each term of the numerator being made ten times larger. Weaker candidates sought to replace 0.21 by 0.5 or 0 or 1.

1.2.3. Question 3

Generally the table was completed correctly although some candidates thought that the value of y was 2 or 4 at $x = -2$. The straight line graph was well drawn although inexplicably some plotted the points but did not join them. Candidates tended to get the first part of (c) wrong by using $x = 1.5$ rather than $x = = -1.5$

1.2.4. Question 4

Part (a) and (b) were generally well answered. The most common errors in (a) were to get only one side correct (so not an enlargement) or to enlarge by a scale factor of 2 or 4

In part (b) the most common errors were to rotate the shape by 90^o so that the image rested up against the origin in the 4th quadrant. or to miss the correct place by one full square.

1.2.5. Question 5

Part (a) was generally well answered. Most candidates gave a sensible key and the data was generally put in the correct positions with only a few missing out one value. It is always a sensible idea to count the number of leaves when the diagram is drawn to see that it tallies with the number of values given. Most candidates went on to give a correct fraction for the answer to (b) although some gave the answer as a ratio for which they lost a mark.

1.2.6. Question 6

Answers to this question were disappointing. There were several sources of error: many candidates plotted the points at the end of the interval rather than at the middle ; many candidates either did not join their points or joined them with a curve ; many candidates joined the last point back to the first point ;many candidates drew a bar chart.

Part (b) was answered well although some candidates gave the frequency (8) rather than the class interval itself.

1.2.7. Question 7

Part (a) was a straightforward fraction addition question where the most direct method was to change the $\frac{1}{4}$ to $\frac{2}{8}$ and then get the answer in its simplest form of $\frac{5}{8}$. Many candidates changed the fractions to a denominator of 16 or 24 and then even if they added correctly often did not score the second mark because they did not simplify their answer. Many candidates could not add fractions correctly and gave an answer of $\frac{4}{12}$ from adding numerators and denominators.

Part (b) was generally answered more successfully. However, there was a great deal of confusion in evidence where candidates had made the denominators of the fractions the same (usually over 15). They then went on to add the numerators or multiply the numerators but not the denominators. There was also evidence that candidates had cross multiplied.

There were a variety of correct approaches to part (c), with successful techniques shared between traditional setting out, Napier's bones and grid methods. A few candidates attempted to add 423 twelve times and a few worked out 423 times 10 and then 4230 times 2 presumably decomposing 12 into 10 times 2 rather than 10 add 2. There were a significant number of misreads of 423 as 432.

1.2.8. Question 8

There were many good critiques seen in part (a). Most candidates identified that there was a missing time period and then answers were divided between those who pointed out that the given time periods were not fully inclusive of all possible answers and those who noted that the intervals overlapped at the endpoints. Those who did identify such deficiencies were able to give a good solution to part (b)

1.2.9. Question 9

There were too many candidates who either worked out the volume (125 cm^3) of the cube or who worked out 6 times the perimeter of one of the faces. Conversion from cm^3 to mm^3 was even more poorly done, with a usual answer of 1250. Few candidates made the link between the 5 cm as the edge of the cube and its equivalent 50mm. Part (c) was competently answered with the lower bound of 86.5 more often identified than the 87.5 at the top end where often 84.49 was written or some attempt at a recurring decimal.

1.2.10. Question 10

Part (a) was well answered with few errors. Candidates were less successful on (b) where too many candidates could not work out $2y \times y$ and gave an answer of 3*y*. Part (c) was generally well answered although some candidates thought that the answer should be $(x+2)(x-2)$. In part (d), most candidates were able to expand the brackets correctly but then could not go on to simplify the resulting 4 term expression. Answers of $8x-3$ or $8x+6-3$ were commonly seen. Attempts at part (e) were disappointing. The main errors came from those candidate who subtracted 2 from both sides without expanding the brackets and from those who got as far as $3x=2$ but then could not take the next step to $x=\frac{2}{3}$. Some tried to fall back on trial and improvement but got nowhere.

1.2.11. Question 11

Few candidates gave the correct bearing of (0)60^{o}. It was really disappointing to see the number of candidates who gave the answer as 5.5 cm, presumably having no idea what a bearing was. There were corresponding poor attempts at the second part. There were the usual errors of back bearings or from measuring angles from due East or due West rather than due North. A About one in six candidates could not measure out a length of 4 cm correctly.

1.2.12. Question 12

This question was a fairly straightforward way of requiring candidates to write a formula using a familiar situation. The responses were hardly electrifying with many which were shocking. $N = p + b$ or even $N = p \times b$ were often seen indicating no insight into the meaning of the symbols.

1.2.13. Question 13

Many candidates did not know what standard form was. Near misses included 213×10^3 and 1.2×10^{-3} missing out one of the figures.

1.2.14. Question 14

Responses to these index questions showed a greater success rate for part (a) 5^0 then to part (b) where the answer of -2 was the most commonly seen.

1.2.15. Question 15

Most candidates were able to make a good attempt at part (a), in that the answer given was generally a set of integers. There were some who omitted the –1 or included the 3. Part (b) was less successfully dealt with despite the fact that the answer involved another integer. Again many candidates fell back on trial and improvement whilst others turned the task into that of solving an equation.

1.2.16. Question 16

There were many pleasing attempts at this question. Most successful methods started with the expansion of the left hand side. Competent candidates could then see that they could subtract the *p* term off to isolate the term in *q* on the left hand side. A few candidates did start by dividing through by 5, although they were generally less successful.

1.2.17. Question 17

Many candidates scored the mark for part (a). Most got at least one mark for part (b)(by comparing a point statistic for the two distributions. A few went on to make a comparison of the dispersion of the two distributions but most settled for saying the same thing twice. There was a lot of fuzzy thinking going on – answers such as 'there were more marks in the English test' was a common (and unacceptable) response. A significant number of candidates made numerical statements but did not compare.

1.2.18. Question 18

Many candidates managed to score at least one mark, sometimes two. However, the clarity of the reasons for their answers was poor. There was often imprecision in the language – for example 'a tangent is perpendicular to a centre' in both parts. Candidates have to learn the correct technical language and not think that vague descriptions are good enough.

1.2.19. Question 19

Many candidates were able to write down the correct fractions for part (a) and gain their two marks. However, it was clear that some of the entry were completely unfamiliar with the basic idea of a probability tree diagram and wrote in integers or in some cases names of colours. Success on part (b) proved to be more elusive, with many candidates writing down expressions like $\frac{5}{7} \times \frac{2}{7}$ but then failing to multiply the fractions correctly. Again, there was a lack of awareness of the suitability of answers with attempts like $\frac{2}{7} \times \frac{5}{7} = \frac{10}{7}$ sometimes seen.

1.2.20. Question 20

Methods which involved the elimination of *x* and those which involved the elimination of *y* were both common. There was a great deal of erroneous working seen especially with signs for example with the 7 and the –1. It was not uncommon to see candidates getting as far as $16x = 4$ and going on to write $x = 4$. It was very rare to see a candidate checking their values of *x* and *y* in both equations.

1.2.21. Question 21

This surd question was handled rather well although some candidates lost the marks by writing $\sqrt{6}$ instead of $2\sqrt{3}$ in the expansion. Some good candidates lost a mark by not recognising that $\sqrt{9} = 3$ or by inexplicitly leaving their answer as 4 – 3

1.2.22. Question 22

Candidates could often write down the correct expression for the vector *AB*. They were less successful in tackling part (b). Candidates showed confusion in whether they should be adding a fraction of the vector *AB* to a or a fraction of the vector *AB* to b. The use of notation was often unsatisfactory with such an expression as $\frac{2}{3}$ - a + b (no brackets) often seen. It was also apparent that many candidates could not expand $\frac{2}{3}$ (- a + b) correctly. Of course, the topic of vectors is one the few places where such expansions commonly occur.

1.2.23. Question 23

Many candidates had been well coached on how to answer this question by setting *x* , say, to the decimal $0.\dot{3}\dot{6}$ and then subtracting the value of *x* from 100*x* . Since this was a proof some accuracy and rigour was required – sometimes lacking in what could have been a good proof. An alternative was to divide 4 by 11 showing the remainders and then, by considering the reminders giving a reason why the decimal recurs.

1.2.24. Question 24

Both parts were fairly standard tests of knowledge of functional notation and of transformations. A few candidates were able to give the correct answer of (5, -4) for part (a) and fewer still the (-2, 2) required for part (b)

1.2.25. Question 25

Candidate were expected to define a letter (*n* say) to stand for any whole number. They then were expected to add this to $n + 1$ to get $2n + 1$ and then argue that this was an odd number. Many candidates were not precise enough and just gave algebraic expressions without defining what the letter(s) stood for. Many more thought that giving some numerical examples was enough.

2. STATISTICS

2.1. MARK RANGES AND AWARD OF GRADE

Unit/Component	Maximum Mark	Mean Mark	Standard Deviation	% Contribution to Award
1380/1F	100	67.4	16.0	50
1380/2F	100	65.0	18.9	50
1380/3H	100	53.0	20.5	50
1380/4H	100	51.8	22.5	50

GCSE Mathematics Grade Boundaries 1380 – November 2009

	A*	A	B	C	D	E	F	G
1380_1F				78	64	51	38	25
1380_2F				78	64	50	36	22
1380_3H	86	70	52	34	20			
1380_4H	88	71	51	32	19			

	A*	A	B	C	D	E	F	G
1380F				156	128	101	74	47
1380H	174	141	103	66	39	25		

Publication Code: UG022426
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