Principal Examiner Feedback

Summer 2010

GCSE

GCSE Mathematics (1380)

Higher Calculator Paper (4H)

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1. PRINCIPAL EXAMINER'S REPORT – FOUNDATION PAPER 1

1.1. GENERAL COMMENTS

1.1.1. Many candidates presented their working well, in particular showing the work to be computed before they reached for their calculator. There were fewer instances of candidates failing to show working out.

1.1.2. Questions in which explanations are required are normally poorly answered. It was pleasing to note that this year there was a slight increase in use of geometric terms and notation in the explanations given. There still remains a dependence on terms such as "Z" angles which are not strictly geometric terms, and centres need to emphasis that the use of these will soon be penalised, unless the correct terms "alternative" and "corresponding" are used.

1.1.3. Rounding is a problem for some, particularly when the calculator display shows many digits and candidates choose not to write down all the numbers. Thee were still too many instances of premature rounding: candidates should continue using the most accurate numbers taken from their calculator until they reach the final answer, when the accurate answer should also be shown before any rounding takes place.

1.2. REPORT ON INDIVIDUAL QUESTIONS

1.2.1. Question 1

Most candidates at all abilities gained the full 3 marks for this question. Where candidates only gained 2 marks it was usually down to arithmetic error. Some candidates identified the 180 with a "divide and add" method that was then incorrectly applied to the other values. When seen, the most common method was to divide by 4 and multiply by 6. The weakest merely added a constant to each value.

1.2.2. Question 2

This popular questions was also well answered, usually scoring full marks. It was disappointing to see some careless errors on part (a), with the point either plotted more than a square sway from where it should have been, or a failure to plot the point at all. In part (b) a common error by a few was to describe the relationship, rather than the type of correlation as the question asked. Part (c) was usually well answered, though it was disappointing to find some omitting the decimal point from their answers.

1.2.3. Question 3

Part (a) was generally well answered, the most common mistake being dividing by 1.25 Many scored full marks on part (b), but many mistakes were also made, including calculating the cost in Euros in Italy (€2.5), calculating the cost in Euros in Italy and subtracting the cost in £ (€12.5). Care needs to be shown in presenting working out for this question, as there were some cases where alternative and ambiguous working was presented that examiners found difficult to award method marks to.

1.2.4. Question 4

The most common error on this question was failing to join their plotted points to make a straight line. Some failed to plot the point (-2,-2) correctly.

1.2.5. Question 5

The angle was usually correctly calculated; it was not uncommon to find 68° given as the answer. Two reasons were expected, and these were well expressed in most cases. However, there were many cases of poor explanation and a lack of clarity in expressing geometrical terms. The terms “alternate” and “corresponding” were rarely seen; centres need to be aware that the use of the terms “Z” and “F” angle will no longer be acceptable for explanations in the new specification. Merely showing working out was not acceptable since it did not show an understanding of geometrical justification. “Because the lines are parallel” of=r “because of the straight line” were insufficient. Overall it was felt that responses were an improvement on previous series.

1.2.6. Question 6

Most candidates used their calculators correctly to obtain the correct decimal. However, several of these then rounded incorrectly to get 0.50. Those who typed in 2/1.5+2.45 got 3.78333.. but most of these did gain the rounding mark. The most common errors in part (b) was rounding to 1 decimal place, or truncating to give 0.50.

1.2.7. Question 7

There was the usually and predictable confusion between the two circle formulae, with too many candidates incorrectly using a formula involving r^2. Of those who chose to use the correct formula, there were a minority who used double or half the correct value for substitution. Rounding to 3 significant figures caused problems for some.

1.2.8. Question 8

Weaker candidates lost marks through substituting into the wrong equation, performing incorrect operations, or not showing the result of their evaluations. It is important to organise their work on the page so it is clear what has been done: candidates are asked to clearly demonstrate they understand the trial and improvement method. Some candidates failed to give their answer to 1d.p., and some gave the final evaluation instead of the value of *x*. There remain too many cnaidates who fail to check an intermediate value at the last stage.

1.2.9. Question 9

This question was usually well answered. The common errors included attempts to find 84% of 350 and divisions of 84 by 3.5 Trial and improvement methods were also in evidence, which usually led to the wrong answer.

1.2.10. Question 10

This was a well answered question, with only the occasional arithmetic error to spoil an answer in part (a). Most candidates also gained full marks in part (b), but some gave their answer as a probability, or chose the wrong probability from the table.

1.2.11. Question 11

In part (a) candidates were expected to communicate their explanation mathematically. Phrases such as "parallel sides" and "equilateral" therefore spoilt such answers, since they became incorrect statements. Many other explanations were ambiguous or incomplete, such as "two angles the same", "isosceles triangles have equal sides". Centres need to provide further opportunities for candidates to have practice at answering questions in which explanations using geometrical knowledge and notation are needed. In part (b) many gained full marks, but the main weakness was an inability to rearrange equations. $4x$=40 or $2x$=20 were common.

1.2.12. Question 12

In part (a) there were many correct answers. Only a minority failed to halve their answer. In part (b) again the majority appeared to know exactly how to apply Pythagoras, and the correct answer was common. Common errors included subtraction of 36 from 196, or finding the difference as part of Pythagoras. It is worth noting that a significant minority of students presented confusing working for this question. This included a calculation for Pythagoras in part (a), which the candidates then realised was needed for part (b), returning to part (a)later, but with arrows or comments relating the working to each other part. This was sometimes ambiguously presented to the point where the examiner could not clearly identify what was going on. It was not unusual to see trigonometry incorrectly applied in part (b).

1.2.13. Question 13

Most candidates gained some marks for this question. Many managed to draw the 4×2 rectangle in part (a), but either omitted to add the break it in to two 4×1 rectangles, or included an additional rectangle. In part (b) incorrect rectangles were more likely to have a width of 4 with an incorrect height. Side elevations or trapeziums earned no marks. In both parts some candidates could not resist adding additional lines which turned the 2D diagram into a partial 3D sketch, thereby losing marks. The many nets earned no credit.

1.2.14. Question 14

Many candidates knew what to do, and worked through the problem to gain full marks. Errors seen are those that are normally expected for this type of question: not using the midpoints, division by 5, and use of cumulative frequency values.

1.2.15. Question 15

Part (a) was well done. Some drew an inequality number line to help. The most common error was the inclusion of the -4, or the exclusion of the 1. A few were seen not to include the 0. Part (b) was done less well. Candidates who changed it into an equation for rearrangement frequently forgot to re-insert the inequality sign on the answer line. Weaker candidates were unable to manipulate the algebraic terms correctly in rearranging the inequality.

1.2.16. Question 16

This was understood by most candidates. Some attempted the question as if it was a construction, but usually gave the correct locus for full marks. Equally use of a protractor could lead to the right answer, but there were many attempts which suggests candidates merely drew the line in "by eye", thereby introducing a line which fell outside acceptable tolerances. Some candidates read the question incorrectly as requiring a locus of points equidistant from AB and a locus of points equidistant from AC.

1.2.17. Question 17

Earning marks was largely dependent on the desire of the candidate to square both sides before carrying out any further manipulation. This was rare. Some earned a method mark by multiplying both sides by $\surd 3$, but usually they then failed to understand how to complete the process. Frequent wrong answers included $\surd(3r)=A$ and $A=r\times 3^2$. Manipulation of formulae involving square root signs is clearly a weakness.

1.2.18. Question 18

All three parts of this question were usually answer well. In part (a) there were a few answers which were not fully in standard form notation. In part (b) the main problem, predictably, was the placing of the decimal point. In part (c) it was again the standard form notation that candidates found difficult. Most could write down answers involving the digits 196, but getting the ×10 notation correct was a problem too far for some.

1.2.19. Question 19

There were many fully correct answers in part (a), but equally many with incorrect signs, or answers such as $x(x-7)+10$. In part (b) many candidates knew to use their answers in part (a), but a minority got the signs wrong. It was disappointing that so many failed to see the link between part (a) and part (b), choosing to start again. Even though there was 1 mark involved, there were many lengthy attempts at soling the quadratic using the formula or other methods, usually resulting in the wrong answer, or left as an incomplete method. Trial and improvement methods usually only led to one of the answers.

1.2.20. Question 20

The majority of candidates gained full marks for this question, using correct trigonometry that was shown in working. Inevitably there were some attempts at Sine and Tan; some candidates tried combinations of Sine Rule, Cosine Rule and Pythagoras, but these methods were rarely fully successful; some became confused which side they were actually trying to find.

1.2.21. Question 21

There was some reluctance to commit to a figure for the bound. 28.5 was acceptable, and 28.49 as long as recurrence was detailed. In part (b) it was unusual to see the correct upper bounds. It was also disappointing at this level to see so many who were unable to demonstrate a perimeter calculations; methods involving just two sides or an area were all too frequent. Some ignored the need to find the perimeter, and merely stated the upper bound they had calculated.

1.2.22. Question 22

Parts (a) and (b) were well answered, by even the weaker candidates. One unusual error was to change the actual letters in the question. In parts (c) and (d) candidates knew what they had to do, but were not careful enough when working with the letters. For example, in part (c) the most common answer was $2tu$ or $2tu^1$. The correct answer of $2u$ was not often seen. In part (d) the most common (incorrect) answer was $4.5wy^3$, though there were also answers in which the square root sign still featured. Part (e) was usually answered well. The most common error was to put x^0 as the smallest followed by x^{-2} , or $x^{1/2}$ followed by x^0 etc. Some correctly put them in order, but in reverse order.

1.2.23. Question 23

Only the most able candidates were able to make any headway with this question. Most simply found the connection or multiplying factor between the two areas and simply applied it (incorrectly) to the volume given, thus getting 180 and scoring no marks. A few realised they had to square root to get the scale factor for length, and earned a mark for doing so, or squared the are factor to find the volume factor. Many other attempts involved trial and improvement, and sometimes calculations with premature rounding, but overall this was the worse answered question on the paper.

1.2.24. Question 24

The true definition of a random sample was known by only a very few candidates, however, many were able to give a good description of a process of sampling that was random in part (b). Amongst these were some poor answers that were ambiguous, or confused stratified, systematic and quota sampling with a random method. Part (c) is now better understood and the majority of candidates gained full marks for their solution. Whilst a fraction approach was prevalent, some found 95 as a percentage; this was then used to reach the final answer. A significant minority failed to round off their answer, a necessary process since the question was in context and a number of stamps was required.

1.2.25. Question 25

There was little evidence of working shown, perhaps indicating frequency density calculations. Rather all that was seen were two numbers in the table, and an attempt to draw two bars on the grid. The bar fro 5-10 was usually correct, but the bar was 30-50 was rarely drawn to the correct height. The most common incorrect answers in part (a) were the numbers 6 and 3.

1.2.26. Question 26

This question differentiated well at all levels. The best candidates were able to work through the stages and obtain the correct answer. Finding the area of the sector OPRS was often found correctly, though some found the area of the whole circle only. Finding the area of the triangle OPS often proved difficult. Many resorted to using right angled trigonometry to find PS and the length of the perpendicular from O to PS but few could complete this calculation correctly. Most understood a difference calculation was also needed, but it was not uncommon to find premature approximation spoiling the final answer: answers to the sector and the triangle rounded off and then differenced. The most common alternative method involved finding the area of the whole circle and then attempting to subtract 9 × the area of the triangle; final a final division by 9 the correct answer could still be found.

1.2.27. Question 27

In part (a) candidates had a general idea of what the answer should look like, but were unable to give it in its correct format. For example, there were many examples of f(x+5), f(x)-5, f(x)+5, etc. In part (b) many candidates earned 1 mark for having one of the coordinates correct, but full marks was rare.

2. STATISTICS

2.1. MARK RANGES AND AWARD OF GRADE

Unit/Component	Maximum Mark	Mean Mark	Standard Deviation	% Contribution to Award
1380/1F	100	58.4	18.3	50
1380/2F	100	61.8	18.3	50
1380/3H	100	57.5	21.5	50
1380/4H	100	61.7	19.3	50

GCSE Mathematics Grade Boundaries 1380 – June 2010

	A*	A	B	C	D	E	F	G
1380_1F				75	60	45	31	17
1380_2F				78	63	48	34	20
1380_3H	89	69	49	30	18	12		
1380_4H	90	72	54	36	21	13		

	A*	A	B	C	D	E	F	G
1380F				153	123	94	65	36
1380H	176	141	103	66	39	25		

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