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Principal Examiner Feedback

Summer 2010

GCSE

GCSE Mathematics (2381)

Higher Calculator Paper (14H)

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1. PRINCIPAL EXAMINER'S REPORT – HIGHER PAPER 14

1.1. GENERAL COMMENTS

1.1.1. There was no evidence to suggest that candidates had difficulty completing the paper in the given time.

1.1.2. The vast majority of candidates completed their answers in the spaces provided.

1.1.3. It was good to see so many candidates showing the various stages in their working.

1.1.4. The loss of accuracy in the working of many candidates was due largely to premature rounding. Candidates should be advised to work to a degree of accuracy in excess of that required by the accuracy of the answer.

1.1.5. Poor algebra continues to be an issue for many candidates. Candidates should be advised to show their algebraic process on *both sides* of the equation.

1.1.6. Solution of algebraic equations by trial and improvement continues to be an all or nothing strategy for many candidates.

1.2. REPORT ON INDIVIDUAL QUESTIONS

1.2.1. Question 1

This question was done well by virtually all the candidates and proved to be a very gentle introduction to the paper. The most common mistake here was to calculate one of the ingredients incorrectly. A few candidates multiplied the ingredients by the wrong scale factor, typically by 2 or by 4.

1.2.2. Question 2

Part (a) was generally done well. Most candidates were able use the given conversion to convert £620 to euros. The most common incorrect method here was to divide 620 by 1.25. Some of those candidates who did not use their calculator to work this out were unable to put the decimal point in the correct place. Part (b) was done well by most candidates. The vast majority gaining at least one mark for a single conversion to either 42 or 52.5. A relatively small but significant number of candidates seemed unaware that they needed to convert to the same units. The weakest of these simply worked out $50-42$, whilst others converted *both* amounts before finding the difference. A common incomplete answer which was awarded 2 marks was 2.50 (euros).

1.2.3. Question 3

Generally this question was done well. Most candidates were able to quote and use the formulae for the circumference and area of a circle and give their answer to an appropriate degree of accuracy. A relatively small number of candidates got these confused and answered parts (a) and (b) the wrong way round. In part (b) the most common incorrect answers were $\pi \times 12^2$, $\pi \times 6^2$ evaluated as $(\pi \times 6)^2$, $\pi \times 6^2$ evaluated as $\pi \times 6 \times 2$, and $\pi \times 12$.

1.2.4. Question 4

This question was generally answered well with the vast majority of the candidates showing some of the stages in their working. Many candidates were able to select at least one of their trials at 1.8 or 1.9 and most gave their answers to a sensible degree of accuracy. A significant number of candidates did not refine their search by attempting a further trial between 1.8 and 1.9, and consequently lost one of the accuracy marks. A small but not insignificant number of candidates did not write their final answer to one decimal place (typically 1.86).

1.2.5. Question 5

Algebra continues to be an issue for many candidates. Only the best candidates were able to show clearly the separate stages required in their solutions. A significant number of candidates abandoned any attempt at algebra at all and adopted a trial and improvement approach. A common incorrect answer in part (a) was $8x - 3 = 17$, so $8x = 14$, so $x = 1.75$. Candidates should be advised to show the process on *both sides* of the equation, e.g. $8x - 3 + 3 = 17 + 3$, as this is sufficient to score the method mark. In part (b) many candidates were unable to deal with the denominator in $\frac{2y}{3}$ = 9. Common incorrect methods here were $6y = 27$, $2y = 3$ and $2y = 9 - 3$.

1.2.6. Question 6

Part (a) was not done well. Despite being given the necessary words in the rubric to the question only the best candidates were able to put these all together for a correct explanation. Common incorrect answers involved the omission of key words such as regular and exterior, or the substitution of their answer to part (b) into the equation to show that both sides are equal. Part (b) was done quite well, but many candidates demonstrated the same inability to solve algebra as was shown in question 5. Very common but incorrect first stages in the algebra were $5x = 60$ and $3x = 20$.

1.2.7. Question 7

This question was done well. Many candidates were able to write 84 as a percentage of 350. A common incorrect method here was to work out 84% of 350 or $\frac{(350-84)}{350\times100}$. Very few of those candidates who attempted a break down method, such as 20% (= 70) + 4% (=14) = 24%, were successful. A correct approach which was relatively common was 1% = 3.5, $\frac{84}{3.5}=24$.

1.2.8. Question 8

Generally this question was answered well. Most candidates were able to use Pythagoras' to write down 14^2+6^2 but some were unable to evaluate this correctly. Common incorrect errors here were $'144+36'$, $'28+12'$ and $'196+36=234'$. Some of those candidates evaluating $\sqrt{232}$ wrote down their answer as 15. Candidates should be advised to write down all the numbers on their calculator display before giving a rounded answer on the answer line. A small number of candidates attempted this question by using trigonometry, but few were able to retain sufficient accuracy in their working to achieve the required accuracy.

1.2.9. Question 9

Part (a) was not done well. Most candidates did not appreciate that the sloping side was part of the diagram and simply drew a single 1cm $\times$ 4cm rectangle. Many of those who did include the sloping side, by drawing a 2cm $\times$ 4cm rectangle, did not include the horizontal line. Another common incorrect answer here was to draw a 1cm $\times$ 4cm rectangle together with a 2cm $\times$ 4cm rectangle. Part (b) was generally done better than part (a). The majority of candidates were able to draw a single 3cm $\times$ 4cm rectangle, but common incorrect answers include 4cm $\times$ 4cm and 3cm $\times$ 3cm squares, trapeziums (from the side elevation) and nets.

1.2.10. Question 10

Part (a) was done well by the majority of candidates. Common incorrect answers involved the inclusion of -4 and the omission of either 1 or 0. Part (b) was not done well. Many candidates got confused with the algebra and encountered the same type of difficulties as mentioned in previous questions. A significant number of candidates simply replaced the '>' for an '=' throughout their answer. Some candidates, having correctly arrived at $x>4.5$, then went on to write $x=4.5$ (or just 4.5) on the answer line, and consequently lost the accuracy mark. Trial and improvement proved to be the only method available to some candidates but this rarely led to a correct answer.

1.2.11. Question 11

Most candidates were able to score some marks for this question. The majority treated this as a construction question and correctly bisected the angle using arcs. A surprising number of these candidates did not draw a line through their intersecting arcs to the angle. A common incorrect answer here was to draw the diagonal of the rectangle (often not drawn) formed by the given lines. L-shapes were also popular and generally scored a mark for a parallel line.

1.2.12. Question 12

This question was not done well. Only the best candidates were able to remove the square root by squaring correctly both sides of the equation. Common incorrect first stages in the algebra were $\sqrt{A} = 3r$, $A = \sqrt{\frac{r}{3}}$ (i.e. interchanging the *A* and the *r*) and $r^2 = \frac{A}{9}$. There was little evidence that candidates checked their answer by substituting values into the formula.

1.2.13. Question 13

Many candidates were able to score at least one mark in this question. Working to and working from numbers in standard form proved to be too demanding for some candidates, but many of those who showed the stages in their working were able to score one mark for 196,000,000 seen, i.e. even when the final answer on the answer line was not given in standard form. A very common incorrect answer which scored one mark was 196×10^6.

1.2.14. Question 14

Most candidates realised that they needed to use trigonometry in this question. A very common error here was to use $16 \times \sin 58$. Whether this was as a result of not reading the question carefully or a genuine confusion as to which trigonometric ratio they should be using was hard to determine. Many of those candidates who used trigonometry to find the length of BC and then Pythagoras' to find the length of AB were unable to achieve the required accuracy due to premature rounding. A significant number of candidates attempted to use the sine rule in this question, but few of these attempts involved the use of $\sin 32$,and consequently were unable to score any of the marks. Methods involving radians or gradians were scarce.

1.2.15. Question 15

Only the best candidates were able to do well in this question. Answers involving recurring decimals were relatively scarce in both parts of this question. In part (a), many candidates were able to write down the upper boundary for the width, the most common incorrect answer here was 28.49. In part (b), few candidates were able to write down the upper boundary for the length, the most common incorrect answers here were 150 and 145.5. A significant number of candidates simply worked out $2\times(28+145)=346$ and then changed this to either 346.5 or 350. Many candidates were able to score one mark in this part for using a changed width and a changed length to work out the perimeter of the rectangle. A small number of candidates attempted to work out the upper bound for the area of the rectangle.

1.2.16. Question 16

Part (a) was done well by the vast majority of the candidates. A common, but relatively rare, error here was to multiply the powers instead of add them. In part (b), many candidates were able to score at least one mark for four terms in correct relative order. The most common term that was incorrectly positioned was $x^{\frac{1}{2}}$. There was little evidence of checking terms for the correct order.

1.2.17. Question 17

Only the better candidates were able to score full marks on this question. Many candidates were able to find the area of the sector, but relatively few were able to find the area of the triangle. Most of those candidates who attempted to find the area of the triangle by a multi-step process, e.g. by first finding the height and base length, usually went wrong in the working; generally due to an inappropriate degree of rounding or by incorrect calculations involving trigonometry and/or Pythagoras. A common incorrect area for the triangle was $8\times8\div2$. Most candidates were able to score at least one mark in this question for $\frac{40}{360}$ or for dividing by 9.

1.2.18. Question 18

In part (a), only the best candidates were able to write down the correct equation of graph G. Common incorrect answers here were $y=f(x)-5$, $y=f(x)+5$ and $y=f(x+5)$, but most candidates had little idea of what was required. Again, in part (b), only the best candidates were able to score both marks for the correct coordinates for the maximum point. Many candidates were able to score one mark for either a correct x-coordinate or a correct y-coordinate. Common incorrect answers here which scored one mark were (1, 3) and (4, –3).

2. STATISTICS

2.1. MARK RANGES AND AWARD OF GRADE

Unit/Component	Maximum Mark (Raw)	Mean Mark	Standard Deviation	% Contribution to Award
5381F/05	30	19.2	5.8	20
5381H/06	30	20.3	6.5	20
5382F/07	25	14.0	4.1	15
5382H/08	25	14.6	4.9	15
5383F/09	25	13.2	4.6	15
5383H/10	25	13.5	5.2	15
5384F/11F	60	30.6	12.1	25
5384F/12F	60	36.1	12.4	25
5384H/13H	60	32.8	10.7	25
5384H/14H	60	36.8	11.7	25

GCSE Mathematics Grade Boundaries for 2381– June 2010

The table below gives the lowest raw marks for the award of the stated uniform marks (UMS).

Unit 1 – 5381

	A*	A	B	C	D	E	F	G
UMS (max: 55)				48	40	32	24	16
Paper 5381F				24	20	16	12	8
UMS (max: 80)	72	64	56	48	40	36		
Paper 5381H	29	25	19	13	9	7		

Unit 2 Stage 1 – 5382

	A*	A	B	C	D	E	F	G
UMS (max: 41)				36	30	24	18	12
Paper 5382F				19	15	12	9	6
UMS (max: 60)	54	48	42	36	30	27		
Paper 5382H	23	19	14	10	9	8		

Unit 2 Stage 2 – 5383

	A*	A	B	C	D	E	F	G
UMS (max: 41)				36	30	24	18	12
Paper 5383F				18	15	12	9	6
UMS (max: 60)	54	48	42	36	30	27		
Paper 5383H	22	18	14	10	6	4		

Unit 3- 5384

	A*	A	B	C	D	E	F	G
5384F_11F				44	34	24	15	6
5384F_12F				50	40	30	20	10
5384H_13H	53	43	33	24	14	9		
5384H_14H	59	48	37	27	15	9		

	A*	A	B	C	D	E	F	G
UMS (max: 139)				120	100	80	60	40
5384F				94	74	54	35	16
UMS (max: 200)	180	160	140	120	100	90		
5384H	111	91	71	51	29	18		

UMS BOUNDARIES

Maximum Uniform mark	**A***	**A**	**B**	**C**	**D**	**E**	**F**	**G**
400	360	320	280	240	200	160	120	80

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