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Examiners' Report March 2008

GCSE

GCSE Mathematics (2381)

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1. PRINCIPAL EXAMINER'S REPORT – PAPER 5 (FOUNDATION)

1.1. GENERAL COMMENTS

1.1.1. The great majority of candidates entered for this paper found it accessible.

1.1.2. The vast majority of candidates attempted nearly all the questions, as blank responses were only seen often in Section A Question 5.

1.1.3. It was great pity that a significant number of candidates did not seem to turn up to the examination with rulers and protractors as graphs were often drawn freehand and the lack of a protractor meant that few complete solutions were seen in the pie chart question.

1.1.4. Questions 1, 2, 3 in Sections A and B were tackled with the most success.

1.1.5. Question 5 in Section A was only rarely successfully completed whilst candidates struggled with the pie chart question 4 also in Section A.

1.2. INDIVIDUAL QUESTIONS

1.2.1. Question A1

This question was well understood and 99% of candidates scored full marks.

1.2.2. Question A2

This question too was well understood with 62% candidates obtaining fully correct solutions and a further 26% scoring 3 marks. Common mistakes were miscounting for tallies... though some did not do any tallies, multiplying by the frequency (possibly creating an extra column). A significant number of candidates put 13 tallies in the tally column, and another 13 in the frequency column and then did the same for 14, 15 etc. These candidates were allowed a follow through in parts (b) and (c).

Almost all candidates obtained the answer 3 in part (b) but there were many follow through marks. In part (c) the answer of 14 for the mode was almost always correct again often with a follow through but some candidates did try to calculate the mean. Only 2% of candidates failed to score any marks in this question.

1.2.3. Question A3

This question was again well understood and almost always completely correct; 82% success rate for (a) and 90% success rate for (b). A few candidates misunderstood the scaling on the horizontal axis and read the data at the end rather than from the middle of each section.

1.2.4. Question A4

44% of candidates had a reasonable attempt at this question and scored 2 or 3 marks. 50% of candidates scored no marks though very few candidates did not attempt the question, but a significant number of candidates did not have protractors and/or rulers. Quite a few candidates had no idea of how to calculate the angles and most showed no working such as 360÷40 or 45÷5 or even 9 ×... The accurate use of the protractor was not always evident and many could not draw the obtuse, 144º, and drew its supplement instead. Some candidates managed to get the mark for the angles in the table and many gained 2 marks for one angle correctly drawn and labelled. It was pleasing to see that almost all candidates labelled their attempts at the bar chart. Candidates should also be encouraged to work in a soft pencil so that incorrect work can be erased there were many instances of indecipherable pie charts where candidates had tried to correct work that couldn't be rubbed out.

1.2.5. Question A5

This question was not very well understood and there were many very poor attempts, 79% of candidates scored no marks. This type of question has been set on many Data Handling Module tests but the multistage process seemed beyond the competence of many of the candidates. The total of the frequencies, 80 was often divided by the number of the categories, 5, giving 16 as the most common response. Of those who did have some understanding of the method only about half of them used the mid-values. Working showing 1070 (the lower end of the interval × frequency) or 1870 (the upper end of the interval × the frequency) was not uncommon, as was 1470 (the correct response at this stage - the mid point of the interval × the frequency). Having got this far most candidates were unsure as to how to proceed and many divided these figures by 125 (the sum of the frequencies), or 5 (the number of class intervals). Many then went on to add the frequency and their mid range value. There were a disappointing number of good candidates who rounded to 18.3 or 18 without showing intermediate steps thus losing the final accuracy mark. Only 6% of candidates scored all the marks in this question.

1.2.6. Question B1

This question was well understood with 94% of candidates obtaining the correct answer for part (a) and 88% of candidates for part (b). In part (c) wrong answers were only seen occasionally mostly for drawing the '9' bar too inaccurately whilst only a few drew the '6' bar wrongly.

1.2.7. Question B2

This question too was well answered with 80% of candidates writing down the 8 missing combinations. A few wrote all the combinations but with the order reversed and an even smaller minority wrote only two other combinations mainly L,A and S,B and one or two wrote some combinations that weren't allowed A,B or L,S etc. Even more occasionally about half a dozen in total consisted of advise on appropriate menu combinations, suggestions about which were the healthiest meals – or even the cost of each item! Only 11% of candidates scored no marks.

1.2.8. Question B3

Again this was a well-understood question with 91% of candidates able to complete the two-way table using the information given in the question. There was less success in part (b) though 53% of candidates scored both marks and 23% gained partial credit for writing 4 over a denominator or a numerator over 11. When candidates wrote the probability as "4 out of 11" they scored no marks. Fortunately these occurrences are becoming less common though it was alarming to see many candidates writing the probability as "4"!

1.2.9. Question B4

Candidates understanding of stem and leaf diagrams is improving over time and there were fewer pictures of plants with leaves and numbers put on the leaves. Some included the stem digit on the right e.g. 2|23, 24 etc., some did not even bother to order the numbers. 66% of candidates scored at least 2 marks with the Key being a problem some simply put a number like 2|3 in the key but did not show 2|3 **=** 23 whilst others left the box empty. Some of the weaker candidates arranged the amounts correctly in order whilst others failed to order the leaves.

2. PRINCIPAL EXAMINER'S REPORT – PAPER 6 (HIGHER)

2.1. GENERAL COMMENTS

2.1.1. The great majority of candidates entered for this paper found it accessible.

2.1.2. The vast majority of candidates attempted nearly all the questions, as blank responses were only seen in Section B Question 5.

2.1.3. It was great pity that a significant number of candidates did not seem to turn up to the examination with rulers as graphs were often drawn freehand.

2.1.4. Questions 1, 2, 3 in Sections A and B were tackled with the most success.

2.1.5. Question 5 in Section B was only rarely successfully completed whilst candidates struggled with the descriptive nature of question 2 and Question 4b in Section B.

2.2. INDIVIDUAL QUESTIONS

2.2.1. Question A1

This question was well understood with 97% of candidates correctly answering the question. A very small minority forgot to take the total probability away from 1 and an even smaller minority forgot to write their working.

2.2.2. Question A2

The responses to this type of question are improving year on year. 63% of candidates gained both marks as they remembered to include a time frame in their question and most were careful to cover both ends of the range of options. There was however still a sizeable group who give overlapping ranges. e.g. 5-10 and then 10-15 etc. A very small and fortunately decreasing minority produced tally charts. The inclusion of at least one end point like 'none' or 'more' was sometimes missing from some candidate's responses thus also losing the mark for the response boxes.

2.2.3. Question A3

The idea of a line of best fit appeared to be well understood in the majority or cases with most candidates being able to draw one to the required degree of accuracy. 94% of candidates were able to describe the relationship with only a few contradicting themselves. Occasionally negative on its own seen, and negative relationship, and sometimes positive. Taking an estimate from the line of best fit was also well handled apart from the fact that there was a tendency to 'round' the result so that the value for age in years would be an integer value.

2.2.4. Question A4

In part (a) there were some very well presented box plots, which had been accurately drawn to indicate clearly the important features. Full marks were obtained by 56% of candidates. In some instances confusion arose over the median value as this was sometimes given incorrectly as the upper quartile. The fact that a box plot had been drawn for the boys' heights on the question paper was obviously a help in guiding the weaker candidates into drawing the correct structure for a box plot.

For part (b) a comparison was required and again there were 23% of fully correct answers and 44% gained 1 mark. However, there were some who simply wrote down a series of values that offered no comparison but merely gave numerical values. The most successful responses were those that made a straightforward statement highlighting the differences in the median value and referring to the spread of heights by reference to the range being greater for boys or the fact that the inter-quartile ranges were the same. Specific mathematical terms were required rather than generalisations such as "girls are/were taller overall than the boys" and offering no justification for this. A few mentioned the skewness of the distributions.

2.2.5. Question A5

The stratified sampling either proved to be a well rehearsed routine or one that was challenging. Many accurate solutions in 47% of cases were seen which lead to the correct rounded answer of '13'. Some found it necessary to work out the sample sizes for each of the four groups, which, although it acted as a check, was also time consuming. They did, however, select the correct result as the final answer. For those less certain a trial and error approach was used in a minority of cases which they attempted to balance out the numbers from each group taking into account the number of boys in each group and aiming for a total of '40'. In many cases, weaker candidates offered 40 / 4 = 10 as their answer. Unfortunately, in about 6% of cases, premature rounding (i.e. 40/132 = 0.3 then 0.3 x 43 =12.9) cost candidates 1 of the 2 marks available.

2.2.6. Question B1

The stem and leaf diagram was fully correct in 81% of cases and a further 14% gained 2 marks, often for leaving the diagram as unordered or omitting the key. Only a small minority of candidates scored zero – they usually wrote down the values without any separation between the stem and the leaves. There were a surprising number of answers with a correct diagram but an incorrect key – often with just the stem value being identified with the tens digit only.

In part (b) 39, the correct answer was seen in 60% of cases, even without working. Of the wrong answers, 38 was the most common and 40 almost as frequent. These answers appeared without working in many cases, though some – in attempting to find the middle number in an even list – seemed unsure how to cope with finding the 6.5^{th} number and opted for the 6^{th} one (38) anyway. Others just halved 12 and looked for the 6^{th} number because of this.

2.2.7. Question B2

This question allowed candidates to be creative in their answers and 47% of them seized the opportunity and gained two marks. There were, of course, many candidates who had good ideas and were able to write them intelligibly. They were able to point out that having only women in a sample would make it biased (Many wrote that men and women may well have different cinema going habits). They were also able to remark on the fact that the people interviewed leaving the cinema must already have been to the cinema at least once. 90% of all candidates were able to score at least 1 mark, usually for identifying that only women were asked, they found it harder to identify that the location was important as well.

2.2.8. Question B3

This question was well understood but it was surprising to see so many candidates making errors in labelling the probabilities for snooker. The Darts "Not win" was almost correctly labelled by 96% of candidates but they often switched the probabilities for "win" and "not win" for snooker.

2.2.9. Question B4

Even though this question is regularly tested on these modular tests many candidates failed to recognise the true nature of a histogram and treated it as though the different bar widths were irrelevant. Hence they thought the frequencies related to the height of the bars. As a result answers of : 70 50, 35, 10 were the most commonly seen response in about 50% of cases. 9% of candidates were able relate frequency, class width and frequency density or managed to show the correct frequency density scale and gained 1 mark. Fully correct solutions were seen in 41% of cases

2.2.10. Question B5

This was a fairly standard, but non-trivial, probability question. Many successful candidates drew correct probability tree diagrams and used them properly. 24% of candidates knew that they had to multiply the probabilities together as they worked along a set of branches starting with the root and were then able to add the resulting 3 fractions correctly to get the right answer. However, there were a large number of errors due to inability to tackle the arithmetic of fractions correctly. These were of the following general types:

- carelessness, exemplified by one of $\frac{3}{9}\times\frac{2}{8}=\frac{5}{72}$ or $\frac{2}{9}\times\frac{1}{8}=\frac{3}{72}$
- confusion over multiplication, exemplified by all of $\frac{3}{9}\times\frac{2}{8}=\frac{5}{72}$, $\frac{2}{9}\times\frac{1}{8}=\frac{3}{72}$ and $\frac{4}{9}\times\frac{3}{8}=\frac{7}{72}$
- confusion over multiplication as exemplified by $\frac{3}{9}\times\frac{2}{8}=\frac{42}{72}$ or $\frac{3}{9}\times\frac{2}{8}=\frac{432}{72}$
- confusion over addition as exemplified by $\frac{6}{72}+\frac{2}{72}+\frac{12}{72}=\frac{20}{216}$

Many candidates made life harder for themselves by calculating the correct fractions for the cases SS, PP and CC, cancelling them and then making an error on the addition of the three fractions with different denominators.

Some candidates treated the problem as one of replacement and were rewarded as they had essentially the correct method.

Some candidates thought the total of yoghurts was 8 rather than 9 and ended up with a fraction over 56 and there were also some candidates who tried to eat 3 yoghurts.

Other candidates gave fractions such as prob.(2nd is S) = $\frac{2}{9}$ rather than $\frac{2}{8}$.

Some candidates drew out the whole equally likely sample space for the case with replacement and obtained the answer $\frac{29}{81}$

There were, of course many candidates who tried to draw a probability tree but could not get its structure correct (generally they did not have 3 branches from every node) and many others who could not get as far as that. 45% of candidates scored no marks.

3. PRINCIPAL EXAMINER'S REPORT – PAPER 9 (FOUNDATION)

3.1. GENERAL COMMENTS

3.1.1. All questions on this paper proved to be most accessible for the greater proportion of the candidature. Only question 7, angles on parallel lines was very poorly answered.

3.1.2. Coverage of the specification was good and most candidates seemed to be entered at the appropriate tier.

3.1.3. It is a concern that many candidates ignored the use of calculators in answering questions 3 and 10. Many marks were lost as a result of indifferent arithmetic.

3.2. INDIVIDUAL QUESTIONS

3.2.1. Question 1

Part (a) was answered well with over a half of the candidature gaining full marks. In part (b), many candidates clearly failed to understand the term 'cube' when referred to a number.

3.2.2. Question 2

d^5 was the usually incorrect answer here, although most candidates scored full marks.

3.2.3. Question 3

This question was well answered by the majority of candidates. Many candidates, however accurately calculated the cost of 3 magazines, but then failed to subtract this amount from £10. Candidates should be encouraged to take more care when reading questions.
£3.35 was a common error when subtracting £7.35 from £10. Many just found the change (£7.55) from the purchase of just one magazine. This gained one mark only.

3.2.4. Question 4

In part (a), only a few candidates failed to draw/sketch an acceptable example of a right-angled triangle. Many of these merely drew a right-angle; again a result of careless reading of the question. In part (b), success was not as high. Many attempts to draw an isosceles triangle failed due to inaccurate measuring or poor demonstration of the symmetric properties of an isosceles triangle.

3.2.5. Question 5

Both parts (a) and (b) were correctly answered by well over a half of candidates. 8 was a common incorrect answer seen in (a) and in (b) many candidates either tried to halve or square 2.25

3.2.6. Question 6

6(a) - 87% of candidates correctly identified 6 as the number of faces of a cube.

6(b) - Although many candidates successfully computed the volume of the given cuboid, a great many did not. Often the product of 6, 4 and 2 was followed by division by 2 to give an incorrect answer of 24 cm^3. Many found the total or partial surface area. Many candidates also found the sum of the 12 edges. Unfortunately this did also give an answer of 48, however no credit was given.

12 cm^3 (6 × 4 ÷ 2) was a common error.

3.2.7. Question 7

In both parts of this question, the correct angles in the first parts were often seen but rarely accompanied by correct reasons. In general candidates would describe their calculations rather than quoting any geometric theory. Those candidates that did try to explain their angles often showed confusion in their understanding, particularly relating to angles on the parallel lines.

3.2.8. Question 8

This question was not answered well, many candidates failing to get even one correct value in the table of values. Even when the table of values was totally incorrect, many also failed to plot at least 4 points from their table. This would have earned them one mark. A few candidates were successful in drawing an accurate graph despite an inaccurate table of values. These could have gained extra marks by returning to part (a) and reading off values of *y* from their line.

3.2.9. Question 9

It was very pleasing to see so many candidates, of all levels of attainment, deriving correct algebraic expressions.

$3^x + 2^y$ and $x^3 + y^2$ were the most common errors made together with the predictable mistake of attempting to simplify $3x + 2y$ to give $5xy$.

3.2.10. Question 10

This question was quite well answered indeed. Some candidates gave an answer of

30 g, clearly finding the 'extra' amount of plain flour required to make 10 pancakes, instead of the total amount. One mark could be earned if this was clearly seen to be the amount of plain flour required to make 2 pancakes.

A significant number correctly worked the required flour for one pancake (15 g) and just added this to 120 g to give an answer of 135 g.

Some candidates simply multiplied 120 g by 10. This was awarded no marks.

4. PRINCIPAL EXAMINER'S REPORT – PAPER 10 (HIGHER)

4.1. GENERAL COMMENTS

4.1.1. The first seven questions on this paper proved to be most accessible for the greater proportion of the candidature, only question 8, simplifying an algebraic fraction and question 9, the geometric proof, were poorly answered.

4.1.2. Coverage of the specification was good and most candidates seemed to be entered at the appropriate tier.

4.1.3. There is still evidence that some candidates did not have calculators (Q4) and rulers (Q5).

4.2. INDIVIDUAL QUESTIONS

4.2.1. Question 1

In part (a), most candidates found the correct value for x. However a significant number clearly were distracted by other parts of the diagram, failing to recognise and use the 'sum of the angles on a straight line equal to 180 degrees'. Answers of 50^o and 65^o (finding 130 and then dividing by 2) were common errors made. Part (ii) was less well done with many candidates still describing their calculation rather than quoting geometric theory.

Again, in part (b), the correct angle of 50^o was found in (i) by the majority of candidates. Many lost the mark in (ii) by referring to y and 50^o as opposite or corresponding rather than alternate angles.

4.2.2. Question 2

A correct answer of $7c + 7d$ or $7(c + d)$ was the most popular response to this question. A number of candidates, predictably, tried to further simplify $7c + 7d$ to $14cd$ and sometimes to $7cd$, and so lost one of the two marks.

One must question whether candidates giving answers of $7c^2 + 7d^2$, $7c^2 + 6d^2$ and $5c + 3d$, which were the most common incorrect attempts seen, were actually entered at the correct level.

4.2.3. Question 3

This question was very well answered indeed. Some candidates gave an answer of

30 g, clearly finding the 'extra' amount of plain flour required to make 10 pancakes, instead of the total amount. One mark could be earned if this was clearly seen to be the amount of plain flour required to make 2 pancakes.

Some candidates simply multiplied 120 g by 10. This was awarded no marks. Others thought they should add on 20% of the original amount and so gave 144g as their answer.

4.2.4. Question 4

At this level the use of a calculator was usually good. Candidates failing to calculate the denominator (3.25) often used incorrect order of operations and this usually lead to an answer of 15.2….
An answer of 0.2083 recurring was common, given by those giving the reciprocal.

4.2.5. Question 5

Overall both parts of this question were very well done. Correct tables of values were seen more often than not. Errors were usually with the value of y at x + –2, –4 being a common error. Most candidates gained at least 2 marks on this question, failure to score both marks in (b) was often the result of failing to actually join up correctly plotted points. Candidates, whose table was wrong, were still able to gain some credit for their attempt in (b)

4.2.6. Question 6

Although the correct answer was seen many times, answers of 24×10^7, 240 000 000 and 2.4^8 were not uncommon; all receiving just one mark. Many candidates gained one mark for correctly converting 6×10^4 and 4×10^3 to ordinary numbers, however 600000 and 40000 were common mistakes.
Powers were often carelessly written; many time 10^8 appeared as 108 and so lost the mark.
Weaker candidates usually failed to score any marks at all here.

4.2.7. Question 7

A variety of methods to expand a pair of brackets were demonstrated and often very successfully; however careless arithmetic of directed numbers lead to many errors, though some credit for work seen was often possible.
$x^2 - x - 2x - 2$, $x^2 + x - 2x - 1$ and $x^2 + x - 2x + 2$ were typical expansions and $+ x - 2x$ often lead to an incorrect simplification of $+x$ or $\pm 3x$.

4.2.8. Question 8

This question was poorly done with very few candidates realising the need to factorise the algebraic numerator and denominator. Many attempts to simplify by random cancelling were seen, a few actually resulting in the "correct" answer. In such cases no marks were awarded when it was clear that an incorrect method had lead to the required answer. Some candidates recognised the need to factorise but only factorised one of the expressions, usually correctly and so gained partial credit.

4.2.9. Question 9

The first of the four marks awarded in this question was a generous one for recognising or using the fact that the angle between a radius and a tangent is 90^o. Many candidates failed to secure the award of this mark. Of those that did, the great majority attempted their proof by showing the result to be true for a particular value of x, neglecting the required

general approach, and often never giving acceptable geometric reasons. Many candidates tried to use the given value of angle *ROS* and work 'backwards'. This approach usually failed.
A large number of candidates drew the line *RT* and made the assumption of taking *RT* to be another tangent, and then assuming triangle *RST* to be equilateral.
Only a few candidates succeeded in completing a proof for the general case.

5. STATISTICS

5.1. MARK RANGES AND AWARD OF GRADES

Unit/Component	Maximum Mark (Raw)	Mean Mark	Standard Deviation	% Contribution to Award
5381F	30	20.9	4.7	100
5381H	30	20.7	5.7	100
5382F	25	14.0	4.1	100
5382H	25	14.1	5.5	100
5383F	25	14.0	5.5	100
5383H	25	15.2	4.6	100

5.2. GRADE BOUNDARIES

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				25	21	18	15	12
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	24	19	14	9	7	6		

Unit 2 Stage 2 – 5383

	A*	A	B	C	D	E	F	G
UMS (max: 41)				**36**	**30**	**24**	**18**	**12**
Paper 5383F				20	15	11	7	3
UMS (max: 60)	**54**	**48**	**42**	**36**	**30**	**27**		
Paper 5383H	23	19	15	12	8	6		

5.3. UMS BOUNDARIES

	Max	A*	A	B	C	D	E	F	G
UMS	400	360	320	280	240	200	160	120	80