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Examiners' Report June 2008

GCSE

GCSE Mathematics (Modular) 2381

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1.1. GENERAL COMMENTS

1.1.1. Most candidates attempted all questions on the paper.

1.1.2. It was encouraging to see that most candidates showed their working.

1.1.3. There was some weakness in reading and interpreting information from graphs and diagrams.

1.2. INDIVIDUAL QUESTIONS

1.2.1. Question A1

The first two parts of this question were well answered with about 99% of candidates giving correct answers. Part (c) proved to be much more of a challenge with a large proportion of candidates giving "6" as their answer. This seemed to indicate confusion between the mean and median or the mean and mode. A small but significant number of candidates gave the sum of the ages (35) as their answer. Some candidates gave "31.8" as their answer here without working, which seemed to indicate a misuse of their calculator.

1.2.2. Question A2

92% of the candidates correctly identified both of the two days when Karen spent more time than Andrew watching television. 5% of the candidates correctly identified only one of the two days. In part (b) most candidates recognised the processes needed to answer the question but many answers were spoilt by careless errors. About 7 in every 10 of candidates were awarded two marks here. A significant number of candidates misread either the question or the graph and attempted to work out the total amount of time Karen spent watching television. A generous mark scheme enabled examiners to award these candidates some credit.

1.2.3. Question A3

About two thirds of candidates scored full marks by giving a fully correct and complete two-way table. 7% of candidates scored 2 marks (for 4 or 5 correct entries) with a further 12% scoring 1 mark (for 2 or 3 correct entries).

1.2.4. Question A4

60% of candidates scored at least one mark for either giving a question with a time frame or for giving at least 3 non-overlapping response boxes. About 2 in every 3 of these candidates scored both marks. Despite there being several similar questions on recent examination papers, there were still a substantial number of candidates who drew up a data collection sheet or frequency table. Vague labels for the

response boxes – for example “rarely”, “quite often”, “often” and “very often” were commonly seen.

1.2.5. Question A5

Just under 60 % of the candidates scored full marks in this question. However, “0.35” was often seen, apparently derived by candidates using a number sequence approach or one based on symmetry. A significant minority of candidates, who did not have access to a calculator or preferred not to use one, and who recorded a fully correct method, were able to gain 1 mark. These candidates were often unable to add the three given probabilities or subtract their total from 1 with accuracy.

1.2.6. Question B1

Over 97% of candidates scored at least half marks in this question. In part (a) completion of the frequency table was done well though a further check might have saved some candidates from losing a mark through inaccuracy. Nearly all candidates were able to either give the correct answer to part (b) or obtain the mark from a follow through from their frequency table. It is encouraging to note that most candidates appeared to realise that the highest frequency was the key to identifying the mode in part (c). However, unfortunately a large proportion gave “7” as their answer and not “USA” as required.

1.2.7. Question B2

Over 60% of the candidates scored all 3 marks available for this question. Whilst the vast majority could match up the first statement with the correct word, a large number of candidates thought it “impossible” for a number less than 7 to be scored when an ordinary six-sided die is rolled once. This may have been due to the candidate’s lack of care in reading the statement given. This question proved to be a good discriminator.

1.2.8. Question B3

This question was often badly answered, even by candidates achieving success in the other four questions in this section. The success rate for each part of the question was about 40%. It seems that some candidates are unfamiliar with using a stem and leaf diagram. Common errors in part (a) included identifying 0 and 9 as the smallest and largest marks rather than 25 and 64, identifying 62 as the largest number and the inability to subtract 25 from 64 accurately. “41” was a commonly seen answer.

In part (b) many candidates tried to find the mode rather than the median and as a result “56” and “6” appeared frequently as incorrect answers.

1.2.9. Question B4

This question was well answered with 70% of candidates scoring 2 marks. A small minority of candidates described the likelihood of taking a black pencil, or gave a word or phrase instead of the answer (⅜ or equivalent) required. It is good to report that few candidates gave the probability in an unacceptable form or as a whole number.

1.2.10. Question B5

Almost a half of the candidates scored full marks on this question. Parts (a) and (b) of this question were well done with a good proportion of candidates able to express the relationship between height and weight in words or describe the relationship as "positive correlation". Some candidates gave "positive" or "positive relationship" as their answer. This was insufficient. Lines of best fit were usually drawn within the acceptable tolerance and only a small number of candidates joined the points. Part (c) was quite well answered though many candidates appeared not to have fully understood the vertical scale on the graph and gave 158 cm as their answer when 156.5 was indicated by marks they had made on the graph.

2. PRINCIPAL EXAMINER'S REPORT – HIGHER PAPER 6

2.1. GENERAL COMMENTS

2.1.1. Candidates appeared to be able to complete both sections of the paper in the time allowed.

2.1.2. It is heartening to report that most candidates showed their working in the space given.

2.1.3. Many candidates lost marks in questions involving graphs because of a lack of care or understanding of the scale used on the vertical axis.

2.1.4. In section B of the paper the more able candidates usually scored full marks on the first 3 questions but few were able to gain full credit for their answers to the last question.

2.2. INDIVIDUAL QUESTIONS

2.2.1. Question A1

This question was well answered. In part (a) the vast majority of candidates (94%) were successful with only a small minority of weaker candidates extending a perceived number sequence to give "0.35" as their answer. Other candidates were unable to add probabilities or subtract their total from one accurately and so did not gain full credit for their answer to this part of the question. Not quite as many candidates (77%) successfully completed part (b). Some candidates gave the answer "25" apparently either dividing the total frequency into 4 equal parts or using the answer to part (a) rather than the "0.35" required from the table. "35/100" appeared fairly frequently and was awarded one mark.

2.2.2. Question A2

This question was answered well with 76% of candidates securing both marks. The main errors seen included overlapping response boxes and questions which did not focus on asking "how often people shop at Valerie's supermarket". Data collection sheets were seen frequently and received no credit. The most successful answers centred upon a simple set of response boxes such as "0-2, 3-4, 5-6" , etc, rather than wordy ones. Some responses seemed to allow for the possibility of the shopper visiting the supermarket many times each day. Students should be discouraged from using inequality signs in a question which requires a discrete answer.

2.2.3. Question A3

It appears that many candidates are not familiar with the context of moving averages. Part (a) was answered correctly by over 70% of candidates but a surprising number used the 3-point moving averages already given to calculate the moving average required. A few candidates treated the problem as a sequence and attempted to find a pattern in the moving averages given. Answers to parts (b), (c) and (d) were disappointing. Most candidates plotted the moving averages though a significant minority failed to understand the vertical scale and plotted the points incorrectly. Many candidates did not understand the need to draw a straight line in part (c) despite a similar question appearing on a recent examination paper. Often candidates mistakenly thought that joining the points would suffice. In part (d) the meaning of the word "trend" was missed by many candidates who merely described the fluctuation in the moving averages rather than the overall trend. Any answer indicating an "increase" or "upward trend" was acceptable here. A description of correlation was often given. This, on its own, was not acceptable.

2.2.4. Question A4

Just under half of candidates gained some credit for their answers to this question. Either 6 or 7 were accepted for full marks. A surprising number of candidates worked out how many girls there should be in a sample of 50 year 9 students (27). Even more found how many girls there should be in a sample of 50 girls from the school (12) rather than meeting the requirement of the question. Absurd answers such as 167 were not uncommon.

2.2.5. Question A5

More able candidates with a good understanding of histograms found this question straightforward. Over 40% of candidates were awarded full marks. However many candidates cited "34" as their answer suggesting that they had used the height of the bars as proportional to the frequencies. Incorrect answers of 17, and 7 (from adding how many 2 block bar widths there were), were also often seen.

2.2.6. Question B1

All parts of this question were very well done with 87% of candidates scoring all three marks. There were some candidates who didn't understand the concept of a 'line of best fit' and instead, joined the points in part (b). A few candidates gave only 2 digits (e.g. 55) as their answer to part (c) of this question.

2.2.7. Question B2

79% of candidates were able to give a fully correct answer to this question. Some candidates may have avoided careless errors by using the space provided to construct an unordered stem and leaf diagram before presenting their answers in the framework given. Some candidates did not give a correct key.

2.2.8. Question B3

This question proved to be a good discriminator. A majority of candidates were able to identify that the question involved non-replacement and secured the first available mark for sight of "$\frac{2}{7}$". Over a third of candidates went on to give the correct answer $\frac{6}{56}$ or equivalent. However, for others, the inability to manipulate fractions let them down. For example, candidates often used a correct method but ended their answer with "$\frac{3}{8} \times \frac{2}{7} = \frac{5}{56}$" Some candidates accounted for several different outcomes in their answer.

2.2.9. Question B4

29% of candidates scored full marks on this question. This is a pity on a question involving standard procedures. The cumulative frequency table in part (a) was completed successfully by nearly 90% of candidates. However, it is a pity that there were still many candidates who did not check that their table was consistent with the information given in the stem of the question – in this case that there were 100 cars in total. The cumulative frequency graph was quite well done but there were still a good number of candidates who did not plot the data at the upper boundary of each interval. Attempts to find the median and inter-quartile range were disappointing, with little working seen in part (d).

3. PRINCIPAL EXAMINER'S REPORT – FOUNDATION PAPER 9

3.1. GENERAL COMMENTS

3.1.1. The paper proved to be accessible to most candidates with the majority of the candidates attempting all questions.

3.1.2. Candidates appeared to be able to complete the paper in the allotted time.

3.1.3. It was disappointing to note that many candidates did not show the stages in their working. Candidates would probably have scored many more marks had they done so, particularly on question 4, 6 and 9. Candidates should be advised to write down whatever numbers they put into their calculators to ensure all working is shown.

3.1.4. It was very noticeable that many candidates did not have access to a calculator or did not use it properly. Quite a few candidates have their calculator set in fraction mode. They were not penalised for this but when they had to round their answer to 1 significant figure in question 6, they then encountered an insurmountable hurdle.

3.2. INDIVIDUAL QUESTIONS

3.2.1. Question 1

This question proved to be accessible to most candidates with 86% writing the correct answer of 17%. The most common incorrect response was 27%, which indicates that many candidates did not use their calculators when answering this question.

3.2.2. Question 2

In part (a) 73% of the candidates were successful. Many candidates wrote 5×5 which did not score the mark. Other common incorrect responses were 625 where candidates found the square rather than square root, whilst others wrote $\sqrt{25}$ and then did not work out the answer.

Candidates were far less successful in part (b) with only 31% scoring the mark. Although some showed their working by writing $2 \times 2 \times 2$ they then went on to write 6 as their answer. Another very common incorrect response was 4.

3.2.3. Question 3

It was evident that many candidates were not familiar with the terminology associated with the circle. Many confused the radius with the diameter. Quite a few candidates took no notice of the given line and proceeded to draw another line from the 2nd diagram, often leaving out a line from the first diagram. Only 31% scored all 3 marks with 29% scoring 2 marks for getting 3 or 4 correct of the 5 diagrams correctly associated with their label whilst 21% scored 1 mark for getting 2 of the 5 diagrams correctly labelled.

3.2.4. Question 4

It was disappointing to note how many candidates did not read the question properly. Many thought Grace only bought one pen, even though the drawing on the page clearly showed 2 pens. Many others found the total cost but then stopped at that and did not work out the change. Candidates should be encouraged to show all working clearly including 10 – their total. Where candidates added incorrectly and then subtracted from £10 incorrectly, they could not score any method marks unless they showed they had subtracted from 10 in their working. It was also of some concern that many candidates clearly had not used their calculators by all the arithmetic errors seen. 61% of the candidates got this fully correct with 14% scoring 2 marks for a fully correct method and 12% scoring one mark either for attempting to add all 4 items or for subtracting their sum (after having added at least 2 items) from £10.

3.2.5. Question 5

75% of the candidates were successful in part (a) with h^3 being the most common incorrect response.

In part (b) 75% wrote the correct answer. Some added the two terms whilst other wrote 5 on its own or $5k^2$.

Part(c) proved to be the most challenging with $5mp$ being the most common answer. Only 46% wrote the correct answer. Another very popular incorrect response was $2m3p$.

3.2.6. Question 6

Many seemed to have access to a calculator to deal with this question as there were very few attempts at a long multiplication method. Adding the two numbers together, arriving at 5.5 scored a method mark (the 5.5 had to be seen somewhere in the working), but squaring the outcome was not always understood. Evidence of squaring the numbers individually and then performing the addition was the most prolific error along with interpreting the '2' as meaning 'multiply by 2'. There is a need to read and understand the instructions given in the question especially with regard to 'writing down all the figures on your calculator display'. Around a third of the candidates answered

part (a) correctly with about 12% scoring 1 mark, generally for 5.5 seen.

Candidates struggled to write their answer to part (a) correct to 1 significant figure with only around 4% rounding their answer correctly. Where candidates had their calculators set in fraction mode, they were awarded both marks in (a) for $\frac{6897}{40}$. However, they then had no idea how to round this answer in part (b) with the majority just attempting to round the numerator of their fraction.

3.2.7. Question 7

Many candidates (57%) recognised that the required angle was 120º but then failed to explain why this was the case. A few got muddled with the degree sign and last 0 digit writing 12 as their answer to (i). Recognition of parallel lines alone was insufficient to explain the size of the angle. Only 5% scored both available marks even though *F* angles or *Z* angles with angles on a straight line = 180° was acceptable.

3.2.8. Question 8

Quite a few candidates were able to complete the table correctly or get at least one value correct. Most did not recognise that the equation was linear such that they could have checked their values by looking for a pattern in the *y*-values. A significant number also managed to find the values and plot the points correctly but then failed to join up the points to create a straight line thus losing the final mark. Only 27% completed the table correctly and drew the correct line scoring all 4 marks with 9% scoring 3, 15% scoring 2 and 18* scoring 1 mark.

3.2.9. Question 9

Calculating the deposit of 30% was generally not well handled with only 36% gaining full marks. A range of methods was used to calculate the percentage. However, it was clear that the majority did not understand how to work out the deposit with many answers of £420 (450 – 30) and £150 (450 ÷ 3).

3.2.10. Question 10

It was pleasing to note that over 60% of the candidates got the last question on the paper fully correct. Again, candidates are encouraged to show their working as most candidates just wrote the answer. Some wrote 430 which showed they knew that they had to divide 3456 by 8 but without this being shown they could not be given any marks. The most common incorrect response was to multiply the two numbers writing that the average speed of the plane was 27648 miles per hour … quite an achievement! A few converted the hours into minutes and so could not get both marks.

4. PRINCIPAL EXAMINER'S REPORT – HIGHER PAPER 10

4.1. GENERAL COMMENTS

4.1.1. The paper proved to be accessible to most candidates with the majority of the candidates attempting all questions.

4.1.2. Candidates appeared to be able to complete the paper in the allotted time.

4.1.3. It was pleasing to note that quite a few candidates attempted to show the stages in their working although many candidates are still losing marks for not doing so. Candidates should be advised to write down whatever numbers they put into their calculators to ensure all working is shown.

4.1.4. It was very noticeable that many candidates did not have access to a calculator or did not use it properly.

4.1.5. Candidates are to be encouraged to fill in angles calculated on a diagram so that the examiner can follow what they are doing. Candidates might also have scored more marks on question 8 had they done this.

4.2. INDIVIDUAL QUESTIONS

4.2.1. Question 1

Most seemed to have access to a calculator to deal with this opening question as there were very few attempts at a long multiplication method. Adding the two numbers together, arriving at 5.5 scored a method mark, (the 5.5 had to be seen somewhere in the working), but squaring the outcome was not always understood. Evidence of squaring the numbers individually and then performing the addition was the most prolific error along with interpreting the '2' as meaning 'multiply by 2'. There is a need to read and understand the instructions given in the question especially with regard to 'writing down all the figures on your calculator display'.

Where candidates had their calculators set in fraction mode, they were awarded both marks in for $\frac{6897}{40}$. Generally this proved to be an encouraging start to the question paper with 77% scoring both marks and a further 7% scoring 1 mark, generally for sight of 5.5.

4.2.2. Question 2

There is now more confidence in tackling a geometry question than there has been in the past. The majority (over 90%) recognised that the required angle was 120° and then continued to try to explain the geometrical reason for it to be this value. The idea of a corresponding angle or 'F' angle was much in evidence as well as alternate or 'Z' angle; the latter reason requiring an association with 180° to gain the mark. Many candidates did use the reason as 'Supplementary, co-interior or allied.' all of which gained credit. Recognition of parallel lines alone was insufficient to explain the size of the angle.

Very few tried to argue for the size of the angle through an arithmetical process which is a step in the right direction for this type of question. 42% scored both marks.

4.2.3. Question 3

Completing the table of values and then drawing the graph produced some first class results with accurate values being given and precise points located and joined up to give a straight line graph. Over 75% scored all 4 marks on this question. Some had difficulty in calculating the values to begin with and clearly did not recognise that the equation was linear such that they could have checked their values by looking for a pattern in the *y*-values. A significant number also managed to find the values and plot the points correctly but then failed to join up the points to create a straight line thus losing the final mark. Several candidates had errors in their tables but still managed to have a totally correct graph. Perhaps, they did not recognise that the table of values was anything to do with the second part of the question. A significant number also seemed to be able to complete the table of values without difficulty, but then had no idea how to draw the graph and consequently this was left blank. Only around 4% of the candidates failed to score any marks on this question.

4.2.4. Question 4

Calculating the deposit of 30% was generally well handled with 84% gaining full marks. A range of methods was used to calculate the percentage and the sum of £135 appeared in the majority of responses. Following this were calculations of £450 – £135 leading to a final answer of £315 which took the question beyond that which was required but was awarded full marks. In the other direction £450 + £135 = £585 only gained one mark as the value of £585 was meaningless in the context of the question. The most common error was to divide 450 by 30 or by 3. Several of the candidates took 30% to mean 1/3 and gave an answer of £150.

4.2.5. Question 5

Part (a) involved expanding the algebraic expression $3(x - 2)$ to produce $3x - 6$ and this expression appeared in ¾ of the cases.

It was disappointing to find so many candidates at the higher level not getting this question fully correct. The combination of plus and minus signs in part (b) caused some difficulty with only 47% scoring both marks. Grouping together 'like' terms with their respective signs might have helped to overcome the problem. Re-writing the expression as $9x + 2x - 8y - 5y$ was rarely seen yet could possibly have held the key to gaining full marks. A further 35% did manage to score 1 mark for writing one of the terms correctly with its appropriate sign with $11x - 3y$ a common incorrect answer.

The simplification in part (c) proved to be a stumbling block for many with only 22% getting this correct. Expanding both the numerator and denominator was a retrograde step leading to some strange and incorrect cancelling down. Perhaps re-writing the algebraic fraction as $\frac{3x(x+2)}{(x+2)(x+2)}$ should have been seen as the first stage to achieving the correct simplification; it was rarely seen in the working.

4.2.6. Question 6

Finding the mass of the prism needed a strategy to obtain the correct result. Only 29% reached the correct answer of 612 grams. Calculating the area of the right-angled triangle followed by multiplying by the length was the first stage to obtain the volume of the prism. Multiplying this volume by the density the second stage to achieve the final answer. There were various attempts at calculating the volume of the prism but a significant number used the dimensions to find the volume of a cuboid using $8 \times 12 \times 15 = 1440$ and forgetting to halve this result. There were also many candidates who calculated the surface area of the shape.

The second method mark was for the realisation that 'their' volume needed to be multiplied by 0.85 to produce the mass. For others it was somewhat of a gamble as to whether they should multiply or divide by 0.85. There were some very well written and organised solutions to this question in which each detail of the process was clearly shown. Around 40% scored 1 mark for either ½ ($8 \times 12 \times 5$) or, more commonly, multiplying their volume by 0.85 A few candidates tried to cube 0.85 and multiply this by their volume. Several found the surface area of the shape rather than the volume and others just added together the dimensions of the prism.

4.2.7. Question 7

Standard form questions have always been somewhat challenging but this one appeared to be well within the capability of the student, particularly as they could use a calculator if they wished. Around 42% got this fully correct with a further 16% scoring 1 mark for either 0.05 or 0.5×10^{-2} or 5×10^{n}. Dealing with $3 \div 6$ and $10^{9} \div 10^{11}$ as a first step was often seen. Knowing how to deal with the resulting 0.5×10^{-2}, which scored the method mark, to produce a result in standard form was also generally well handled by those who were familiar with the idea of standard form.

Other methods prevailed with $3000000000 \div 600000000000$ sometimes being seen in the working but not always leading to the correct final result. Many others wrote 5^{-03} or $5\ -03$ clearly not knowing how to interpret their calculator display. There does still seem to be some reluctance to deal with the processing in a standard form way and further practice may be needed as part of the preparation for answering this type of question.

4.2.8. Question 8

This question divided students into two categories, the most fruitful being those who applied geometric principles to finding the angle and, unfortunately, those who didn't.

Drawing in the radii *OB* and *OC* created the quadrilateral *ABOC* and, using the fact that the radius and the tangent meet at right-angles and that angle *BOC* (given) was 130°, allowed the calculation of angle *BAC* as 360°– 90° – 90° – 130° to give 50°. This working earned 2 marks for the complete method. Had the student referred back to the question at this point they would have realised that it was angle *BAO* which was required and not *BAC.* Many candidates had the angle of 25° written on the diagram and in the correct angle but then wrote 50° on the answer line thus confusing the required angle with angle *BAO*. The second most popular method was to use one of the right-angled triangles, either *OBA* or *OCA*, and recognise that line *OA* bisected the angle at *BOC* to give 130° ÷ 2 or 65°. This could then be used in one of the triangles to obtain *BAO* directly.

The isosceles triangle ABC also featured in some solutions as a valid method but seemed to breakdown by focussing the attention on triangle *BOC* rather than the intended one. It is important in this type of question to show stages in the working or to make it clear which angle they have calculated. In this case merely writing 50° (as a result of 180–130) without identifying which angle it was scored no marks. Some were muddled with properties of a circle using "angle at the centre is twice that of the circumference and giving 65 as their final answer.

Overall, 29% scored all 3 marks, 21% scored 2 marks generally for identifying angle *BAC* as 50°, and 11% scored one mark generally for identifying angle *OBA* or angle *OCA* as 90°.

4.2.9. Question 9

The final question on the paper gave students the opportunity to show their ability to cope with simplifying an algebraic fraction. Both the numerator and denominator needed to be factorised in order that any simplification could take place. Writing $6x^2 + 3x$ as $3x(2x + 1)$, perhaps the easier of the two to spot, could have prompted the recognition of the difference of two squares in the denominator to produce $(2x - 1)(2x + 1)$. As it was the cancelling that did take place was incorrect with the x^2's being crossed out top and bottom along with an assortment of other parts of terms. Only 10% scored all 3 marks with 9% scoring 1 mark for correctly factorising one of the expression, generally the numerator. 80% had no idea how to factorise correctly or were unaware that factorising was needed preferring to cancel across the various different signs in the two original expressions.

5. STATISTICS

5.1. MARK RANGES AND AWARD OF GRADE

Unit/Component	Maximum Mark (Raw)	Mean Mark	Standard Deviation	% Contribution to Award
5381F/05	30	21.7	6.0	20
5381H/06	30	20.5	6.0	20
5382F/07	25	13.6	3.9	15
5382H/08	25	13.8	5.7	15
5383F/09	25	13.3	5.3	15
5383H/10	25	14.3	5.4	15

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				27	22	17	13	9
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				18	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				19	15	11	7	3
UMS (max: 60)	**54**	**48**	**42**	**36**	**30**	**27**		
Paper 5383H	24	19	14	10	6	4		

5.3. UMS BOUNDARIES

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