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Principal Examiner Feedback

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GCSE

GCSE Mathematics (2MB01/01)

Foundation Non-Calculator Paper (2H)

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1 PRINCIPAL EXAMINER'S REPORT – HIGHER PAPER 2

1.1 GENERAL COMMENTS

1.1.1 This paper included a number of longer unstructured questions which required candidates to plan a strategy and then set out working in a logical fashion. It would be advisable for students to practise such problem solving activities applying the mathematics they are learning in more unfamiliar contexts.

1.1.2 Alternative methods and approaches could be compared and evaluated so that candidates are prepared to make more informed choices for the methods they apply.

1.1.3 Candidates need to be encouraged to present their working clearly in part to enable them to check it themselves. Answers need to be checked for their reasonableness particularly when dealing with real-life situations.

1.1.4 As this is a non-calculator paper, there were many instances where candidates were let down by inefficient and/or inaccurate methods of calculation particularly when dealing with large numbers and division.

1.2 REPORT ON INDIVIDUAL QUESTIONS

1.2.1 Question 1

Successful candidates either worked out the value of 1 share or used equivalent ratios 3:4, 30:40 and 60:80. Errors occurred when candidates did not initially divide £140 by 7 but divided by either 3 or 4 leading to common incorrect answers of £105 or £35. Some candidates just divided £140 into 2 equal parts. As this was the first question on the paper, it may have been haste to get on that led to some candidates who completed correct calculations not presenting Jack's share alone as the final answer. On this occasion they did gain full credit but centres could encourage candidates to reread a question before moving on to make sure that they have answered the actual demand.

1.2.2 Question 2

Part A was successfully answered with the most common error caused by an arithmetical slip with the numerical terms 4 and 2 most notably leading to 6bc rather than $8bc$. Part (b) was generally well done. The main errors involved combining $6w$ and $-15t$ terms to give $-9wt$ or writing $6w-5t$ on the answer line even if $6w-15t$ was seen in the working space.

Most candidates were able to score at least 1 mark on part (c). Clear working was often presented in a grid or table and this helped ensure that candidates found all 4 terms. Errors occurred dealing with the $-2x$ term when simplifying and $-2x+5x$ led to either $9x$ or $-5x$.

1.2.3 Question 3

The majority of candidates successfully applied non-calculator methods to find 10% then 5%. Where more complicated methods involving fractions were attempted, arithmetic errors often occurred. Weaker candidates either found 50% and then presented 25% as the final answer or 20% rather than 10% first leading to an answer of £24

1.2.4 Question 4

Many candidates were able to secure at least one mark having found a single angle using a straightforward angle rule such as opposite angle or angles on a straight line. Although this particular question did not require explanations, poor angle notation in calculations meant some candidates who did not reach the final answer lost part marks which may have otherwise been awarded. However, others labelled angles on the diagram and so did gain credit. Angle rules involving parallel lines presented more difficulties with many identifying the co-interior angle AFH as 110, equal to CHF rather than 70. Whilst candidates need to appreciate that a diagram such as this has not been accurately drawn, in this case considering whether the geometry would lead to an angle greater than or less than 90° would be a useful check on the reasonableness of an answer.

1.2.5 Question 5

The main difficulty with this question was confusion between factors and multiples with lists of the factors of 8 and 12 leading to the HCF rather than LCM. Many candidates drew factor trees to identify prime factors but then gave 2 or 4 as the final answer. Venn diagrams were often well used to identify the LCM from the prime factors in the union.

1.2.6 Question 6

Where candidates calculated the correct exterior angle, the correct answer usually followed although $360 \div 40 = 8$ was quite common. Some candidates added that the shape was a nonagon. Many candidates chose the less efficient and more error prone strategy of listing multiples of 140 to compare with a list of the multiples of 180. Some did not appreciate that only part of a regular polygon was shown and instead drew horizontal and/or vertical lines to close the shape and form a trapezium or hexagon.

1.2.7 Question 7

Failure to substitute correctly and poor arithmetic led candidates down in part (a). Instead of multiplying 20 by 1.8 for the first part of the formula, many added instead giving a final answer of 53.8. Others had difficulty with multiplying by the decimal 1.8, some rounded this to 2 instead.

The lack of a table for pairs of values in part (b) meant that many candidates were quite disorganised in their working which led to some errors. Where the formula was used correctly, points were generally

well-plotted and joined with a straight line although some candidates lost a mark as their line did not extend all the way from (0,32) to (50,122). Many candidates whose line was incorrect did score 1 mark for drawing a straight line through (0,32).
Values were read accurately for part (c) and candidates were awarded a mark for this even if the straight line was incorrect. Correct substitution into the formula was an acceptable method but several candidates substituted 100 incorrectly as if to convert Centigrade to Fahrenheit as in part (a).

1.2.8 Question 8

Many candidates gave a correct final answer of 3 supported by the required accurate working. There were some arithmetical errors with 12×7 and many did omit to divide 18 by 2 to get the correct triangle area. Although these errors did allow the correct final answer to be reached, candidates were penalised for their incorrect working. Sensible use was made of repeated addition or subtraction to find the number of boxes rather than attempts at formal division.

1.2.9 Question 9

Candidates need to be encouraged to set their work out in a logical order when tackling a multi-stage problem. Haphazard working led to loss of zeros, incorrect subtraction and candidates seeming to lose track of their method. Often when finding $\frac{2}{5}$ of 14400, candidates found $\frac{1}{5}$ but then did not carry on to double their answer. Many candidates knew how to find the correct proportions but were let down by poor multiplication skills. A significant number did not appreciate the detail of the question and found proportions of £3600 rather than £14400

1.2.10 Question 10

Candidates found part (a) quite challenging. There were a variety of partially factorised answers were given along with some which had correctly identified the 4wy factor but incorrectly dealt one of the terms inside the bracket. In both these cases a single mark was awarded.
In part (b) the incorrect answer m(m + 3) + 40 was often seen. A few used 2 pairs of brackets but the wrong factor pair, typically 4 and 10 but a mark was awarded where the only error was with signs giving (m-8)(m+5). Candidates could be encouraged to multiply out their brackets as a final check – there was little evidence of this taking place.

1.2.11 Question 11

The most successful candidates structured their working clearly, often annotating the diagram to show different sections to match their calculations. Some identified that as the trough was a prism, it was

not essential to consider volume but worked with the cross-section areas instead. Large numbers with zeros led to many arithmetical errors and many candidates did not recognise that they had to consider the rate of leakage. These errors along with problems converting between minutes and hours meant that many candidates presented final answers which were far too large. Candidates need to be encouraged to make use of estimation and consider the reasonableness of any answer reached. Perhaps most importantly, candidates need to practice solving unstructured problems and compare the efficiency of a variety of approaches so that they can select appropriate methods to use.

1.2.12 Question 12

In part (a) m and 0 were commonly seen. In part (b) it was often the numerical part of the expression which caused difficulties with common incorrect answers including $6x^{18}y^{-3}$ and $2x^{18}y^{-3}$ along with a variety of incorrectly executed powers. A number added rather than multiply.

1.2.13 Question 13

Candidates had great difficulty with division even where they used the common strategy of rewriting the calculation using ordinary numbers. Few dealt with the integers and powers of 10 separately but where they did do so, the errors 2.5/5=2 and 5/2.5 were seen. Although the question asked candidates to give their answer in standard form, $0.5x10^6$ was often seen along with an incorrect final step giving $5x10^7$

1.2.14 Question 14

The main problems candidates faced were due to a lack of brackets in their original expressions for area. This invariably led to incorrect multiplication of linear expressions and when dividing the area of the triangular section by 2. A few candidates were let down by errors with signs or arithmetical slips which meant they did not reach the final expression given for the total area. Here Quality of Written Communication was being assessed, a candidate's work needed to be set out in a logical fashion.

1.2.15 Question 15

It was very rare indeed for a candidate to spot that the x^2-1 denominator could be factorised $(x+1)(x-1)$.

Instead many began to use $(x+1)(x^2-1)$ as the common denominator. Whilst a single mark was awarded for this correct process, candidates rarely scored further marks due to difficulties with signs and the lengthy expansion. When using the x^2-1 denominator, candidates were very rarely successful subtracting $(7x-3)(x-1)$ in the numerator as the -3 term was incorrectly dealt with.

1.2.16 Question 16

Many candidates gained a mark for correctly identifying a right-angle at OAT and/or OBT even if they made no further progress. Others assumed CAT or CBT were 90° or even that ACB was. A variety of proofs were attempted but in this question where marks were awarded for Quality of Written Communication, it was essential that theorems were quoted accurately using correct mathematical language.

2. STATISTICS

1.1 MARK RANGES AND AWARD OF GRADE

Unit/Component	Maximum Mark	Mean Mark	Standard Deviation	% Contribution to Award
5MB1F/01	60	30.6	9.2	30%
5MB1H/01	60	28.4	12.5	30%
5MB2F/01	60	28	9.5	30%
5MB2H/01	60	25.9	12	30%

GCSE Mathematics Grade Boundaries 2MB01 – November 2010

	A*	A	B	C	D	E	F	G
UMS (max: 83)				72	60	48	36	24
Paper 5MB1F				39	32	25	19	13
UMS (max: 120)	108	96	84	72	60	54		
Paper 5MB1H	50	39	28	17	12	9		

	A*	A	B	C	D	E	F	G
UMS (max: 83)				72	60	48	36	24
Paper 5MB2F				39	32	26	20	14
UMS (max: 120)	108	96	84	72	60	54		
Paper 5MB2H	47	37	27	17	12	9		

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