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Principal Examiner Feedback

Summer 2012

GCSE Mathematics (2MB01)
Paper 5MB2F_01 (Calculator)

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GCSE Mathematics 2MB01
Principal Examiner Feedback – Higher Paper Unit 2

Introduction

Candidates appeared well prepared for functional questions and often showed clear well-practised strategies deciding better value for money and costing edging for a lawn. Students need to be encouraged to present their working clearly in part to enable them to check it themselves. Diagrams such as time lines or clocks appeared to help some organise their thinking. Answers need to be checked for their reasonableness particularly when dealing with real-life situations.

Centres should encourage more familiarity with correct mathematical symbols and geometrical language especially rules associated with angles. On this non-calculator paper, candidates often had to resort to inefficient methods, particularly for multiplication. Students need to be encouraged to formalise their written calculations to ensure a higher degree of accuracy and to attract method marks when arithmetical slips are made.

Centres should encourage students to use their time effectively, not rush through early questions and take care to check their work. Careful initial reading will ensure that crucial details in the demand of questions are not overlooked.

Reports on Individual Questions

Question 1

The majority of candidates correctly identified 68 as the number marked by the arrow in part (a). The most common error was to assume that the small markings were tenths and give an answer of 60.8. Two thirds of candidates were successful in part (b) with most using commas or spaces correctly. The incorrect answers generally gave an insufficient number of zeros, suggesting a lack of place value knowledge. Less than 5% of candidates gave a correct response in part (c) with many giving 700 or 7 hundredths, again showing a lack of understanding of place value. Some gave tenths rather than 7 tenths or simply rewrote 0.7.

Question 2

Just under half the candidates identified the trapezium in part (a) although misspellings were common. Those that failed to name the shape correctly gave a wide variety of other quadrilateral names instead with rhombus and parallelogram most frequently seen. Part (b) was poorly answered with less than 5% of candidates giving chord and others using all other names for circle parts demonstrating poor knowledge of these terms.
In part (b) candidates had more success counting faces than vertices. Several omitted to count one or both end faces so a response of 5 or 6 was common but candidates were clearly less confident with vertices and a wide variety of responses were seen.

Question 3

Candidates were most confident with simplifying linear expressions with about 85% awarded the mark in part (a) and a similar proportion getting at least one of the 2 marks in part (c). Students need to be encouraged to write clearly and ensure that $5p$ or the unconventional but acceptable $p5$ are not written as if 5^p or p^5. In part (b) candidates who did not simplify correctly retained one of the multiplication signs or introduced indices. In part (c) the $-b$ term caused some difficulties leading to many answers of $7a + 4b$ or $7a - 2b$. Some tried to simplify $7a + 2b$ to obtain $9ab$ or $7a+3$.

Question 4

Over half of candidates gained full marks on this question although a few calculated the correct total bill but did not go on to calculate change. Where change was found, there were often mistakes with subtraction typically leading to answers of 10.65, 8.65 or 9.75. Students need to be reminded to set out working clearly in order to secure method marks. In this question, a mark was awarded for subtracting the total bill from £20 but, unless the calculation was clearly shown, the mark could not be awarded if the answer was wrong.

Question 5

In part (a) over 70% of candidates gained one of the two marks, usually for identifying the parallel lines but not a pair of perpendicular lines. Many lost a mark by indicating more than one pair of parallel lines which led to ambiguous answers when the same symbol was used. The term perpendicular caused difficulties with many candidates identifying a pair of triangle sides. Unfortunately, others labelled all 4 of the rectangle sides, again leading to ambiguous answers.
In part (b) nearly 90% correctly measured the line and usually gave exactly 11cm. Those who did not gain the mark either did not answer or gave an estimate of 9 or 12 suggesting that they did not have a ruler to use. About 60% correctly measured the angle giving the exact answer of 68° or rounding to 70°. Again there was evidence that some candidates did not have equipment with blank responses or estimated answers.

Question 6

Parts (a) and (b) were very well answered with the vast majority of candidates able to identify the next and 10^{th} term in the linear sequence. The most common misconception in part (b) was to double the 5^{th} term 22 from part (a) to give 44 rather than 42.Three quarters of the candidates were able to gain at least one mark for parts (c) and (d) and usually did so with a correct explanation in part (c) Answers referring to 101 being odd and/or the terms in the sequence being even were most common with some excellent answers with statements well justified using numerical examples. A common error was to assume that the sequence was multiples of 4 as it had a term-to-term difference of 4.
In part (d) many candidates correctly identified the need for 4n in the term, but few were able to complete it successfully. Others reversed the 2 and 4 in the rule to give 2n+4 and many gave the term-to-term rule of n+4 instead.

Question 7

Three quarters of candidates gave the correct answer with many showing no working suggesting that they knew how to find 10% mentally. The most common wrong responses came from misunderstanding the demand to find “10% of” where candidates subtracted either £10 or 10% “off” £50

Question 8

Over 90% successfully worked with line symmetry in part (a) giving a variety of correct answers. A few candidates lost the mark by shading more than one extra square. In contrast, over 90% failed to gain the mark using rotational symmetry in part (b). The vast majority did shade 2 squares but gave a final shape with line symmetry instead. Students need to be encouraged to identify key words in the questions make good use of readily available tracing paper.

Question 9

The question was generally well attempted with nearly 60% of candidates gaining full marks. Many chose to use some type of number line and some drew clocks; these visual aids often helped candidates organise their work and ensure correct progression through calculations. The most common error was to treat the times as decimal numbers, in effect assuming that there are 100 minutes in an hour. A few were confused by the extra time of 0710, which should have been discounted. Again, students need to be encouraged to show clear working in order to gain method marks even if arithmetic errors occur. Many lost marks because they just jotted numbers down without showing what they were doing, or showed no working at all, just the answer.

Question 10

About 30% of candidates obtained the correct answer but many obtained the £27 cost of two sides and failed to double this for the entire perimeter. The context of a lawn and edging strip appeared to help candidates realise they needed to work with perimeter and so relatively few used an area calculation instead. In order to multiply perimeter by the £1.50 cost per metre many used repeated addition rather than more efficient methods.

Question 11

About 60% of candidates scored no marks on this question with many indicating that they had used a protractor or estimated by comparison to the 30° angle marked. Students need to understand that these strategies are inappropriate when a "Diagram not accurately drawn" label is present. Some made some progress using angles around a point but then failed to continue using the isosceles triangle. About 20% reached the correct answer but correct geometrical language to describe reasons was very rare indeed. Many students referred to "angles in a circle" rather than "angles around a point" and left out crucial aspects of the remaining reasons. Misunderstandings of symbols on the diagram led to references to parallel lines and some wrote of equal sides rather than equal angles for the isosceles triangle. Students need opportunities to practise describing their reasons using correct geometrical language in multi-step angle problems.

Question 12

Candidates appeared to be familiar with the "best buy" context with over half finding appropriate values for comparison followed by clear communication of a conclusion. The most common approach seen was to find the cost of five 200g boxes to compare with the 1000g box cost with repeated addition often seen to calculate 5 × 2.50. Occasionally, £10.50 ÷ 5 or £2.10 was used to compare 200g in both sizes. Some students began by calculating 4 small boxes would cost £10 but did not go on to compare costs for the extra 200g so lost subsequent marks. There were correct attempts to find comparable 200g, 2000g or 100g costs and, although this was a non-calculator paper, there were a few attempts to find the cost per gram or grams per pence. Students need to be encouraged to look for values that are the most straightforward to calculate and compare to avoid unnecessary arithmetic errors.

Question 13

Only about 10% of candidates gained full marks for correctly multiplying and adding fractions. Many could do one operation but not the other, often muddling up methods for both. In part (a) many candidates found the common denominator of 40 before an unsuccessful attempt at multiplying or adding numerators to give 31/40. Cross-multiplication was also seen and a significant number of otherwise correct methods were spoiled by giving 2×3=5 or failing to simplify $\frac{6}{40}$ to $\frac{3}{20}$.

In part (b) many candidates added both numerators and denominators to give $\frac{4}{12}$. Attempts to cross multiply led to denominators of 12 and 8; others could correctly find the correct common denominator but then made arithmetic errors. Use of the cell method frequently led to errors with numbers being incorrectly positioned in the cells or added rather than multiplied. Students clearly need to practise using a mixture of operations with fractions so they are more confident with which methods to use and less likely to confuse them.

Question 14

Two thirds of candidates had no success with this question and the marks that were awarded were generally given in part (a). Here, common mistakes included multiplying out just the first term in the bracket, failing to simplify, or failing to deal correctly with the 2. Some candidates attempted a grid method as if multiplying out a pair of linear expressions. Correct factorisation in part (b) was very rare indeed. When an attempt was made, candidates often worked with factors but gave a final answer involving 2 pairs of brackets. Partial factorisation using only an integer also seen but often not fully correct and when a common factor was identified, there was often an error with the terms inside the bracket.

Question 15

About 70% of candidates were able to make some progress with this question with just under a quarter gaining full marks following an efficient and accurate long multiplication method. Most candidates chose to multiply 515 by 35p and usually converted pence to pounds successfully at the end. Many candidates chose to use the grid method for long multiplication and usually showed good knowledge of place value although arithmetic errors led to the loss of some marks. Weaker candidates used a variety of methods to attempt the long multiplication. A significant number used repeated addition to multiply by 10 or 15 instead of using a method of multiplication or manipulating place value. Some candidates found difficulty in applying a complete method, mixing repeated addition with partitioning methods suggesting that whilst they were aware of various strategies they had not mastered one in particular. On occasions, poor writing of figures, particularly 3 and 5, caused errors as candidates transferred from one part of working to the next.

Question 16

Nearly two thirds of candidates were unable to produce a graph or set of points which merited part marks. There were many blank responses and some cases where candidates took the numbers from $y = 2x - 3$ and -2 to 2 given to form and plot two pairs of coordinates $(2, -3)$ and $(-2, 2)$. Where candidates set up a table of values, many had errors with negative values of x and were unable to make further progress. When an accurate table was used, candidates usually went on to plot correctly with just under 25% gaining full marks.

Question 17

Over two thirds of candidates gained no marks on this question with less than 5% giving a fully correct response. Most candidates did not display knowledge of surface area but instead set about finding the combined length of the edges or simply multiplied three or four of the given numbers together. When candidates did appreciate the need to find areas they often forgot to divide by 2 when finding the area of one of the triangular ends. The sloping face of 260cm^2 was often found and added to a single value of 60. The most successful candidates showed well organised working labelling the different parts of their area calculations with names or diagrams of the shapes involved.

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