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Principal Examiner Feedback

November 2011

GCSE Mathematics (5MB2H)
Paper 01 (Non-Calculator)

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1. PRINCIPAL EXAMINER'S REPORT – HIGHER PAPER 01

1.1. GENERAL COMMENTS

1.1.1. Almost all candidates attempted all questions.

1.1.2. Candidates should read questions carefully and answer the questions asked. Misinterpretation of words such as estimate and approximate can lead to candidates losing marks.

1.1.3. Candidates should be encouraged to check the reasonableness of their answers. In Q1(c), for example, many candidates gave an answer of £6.50. If Theo spent £6.50 on bus fares and £3.50 on food then he did not spend £1.50 more on bus fares than on food. In Q3, answers of 210° were very common even though it is clear from the diagram that angle *a* is less than 180°. Many candidates marked the interior angle of the hexagon as 60° on the diagram when it is clearly obtuse.

1.1.4. Premature rounding in working does lead to inaccurate answers and centres should encourage pupils not to round to one decimal place at the first stage of calculations unless the answer is exact to this accuracy.

1.1.5. The standard of pupils communication is sometimes poor, we see examples where we feel a student may have the correct idea but they are unable to articulate their mathematical thoughts fully. With the introduction of QWC questions centres should support students to develop the skills necessary to provide succinct and appropriate explanations or reasons.

1.1.6. Geometric reasoning was very poor on this paper and pupils should be told to use the correct terminology ie Corresponding angles not F angles are required for communication marks. Additionally allied and co-interior are terms that pupils need to know.

1.1.7. For algebra, pupils need to be more accurate in their use of brackets. They seem to ignore any necessity for them. This leads to marks being needlessly lost through inaccurate notation or incomplete working.

1.2. REPORT ON INDIVIDUAL QUESTIONS

1.2.1. Question 1

Many candidates answered this question accurately. Of those that did not, the most common error was to add numerators and add denominators as they stood. There are too many errors in simple addition (7+15=23). Inappropriate denominators were seen eg 30. A significant number of candidates could convert one fraction but not the other. Few candidates used decimals and surprisingly very few used the table method.

1.2.2. Question 2

In part (a), most candidates were able to deal with the algebra at this level. With almost 80% scoring the mark available.

In part (b), a significant number of candidates read the question as (9a+3) (8-2a) and worked out a 4 term answer. Many of these gained 1 mark for 24 and ±6a as long as no more than four terms were seen. Of those who did the correct multiplication, the vast majority had no difficulty in simplifying their answer.

Over 90% of candidates scored the mark in part (c).

Candidates found part (d) and more difficult some left it blank.

In part (e), there were a good number of correct answers, almost 70%, but sometimes the second bracket was missing, accuracy in algebraic notation is to be encouraged.

1.2.3. Question 3

There were a number of fully correct answers, although there were a variety of methods for the calculation 1.35 x 48. The most common one was a 'build up' method; finding 2 x 1.35 then x5 to get 10 lots and then x4 to get 40 lots and adding 4 lots of 2 x 1.35. Another method used was finding 50 x 1.35 by finding 100 x 1.35, then dividing by 2 and then subtracting 2 x 1.35; this was seen a few times and was generally well done. Repeated addition was rarely seen but where it was seen it was never successful. In the traditional method some candidates struggled with the place value, it was often ignored or managed incorrectly, however, the number did appear to be comparatively less than has been seen in the past. Candidates were often let down by poor arithmetic skills.

The percentage calculation was mostly done by 10% + 5% with no working out shown. There were very few 15/100 x 64.8. For those with incorrect values for £64.80, percentage answers were often rounded leading to a loss of marks. Most candidates knew what they were doing but were, again, let down by poor arithmetic in both division by 2 for the 5% and in adding their answers together. A significant number were unable to take £9.72 away from £64.80 or their equivalent figures. The continual careless arithmetic mistakes meant that candidates lost the last two accuracy marks.

Only 7% of candidates failed to score something on this question.

1.2.4. Question 4

Candidates were very imaginative in their approaches to this question. The most successful method used was finding the areas both of the large and small square, subtracting and then dividing by 4 although several candidates made arithmetical errors.

The most popular method used involved using the formula for the area of a trapezium. The height of the trapezium proved to be difficult for many candidates. Many correctly found the difference in lengths (12-8) as 4 but then instead of dividing by 2 and using this in their formula they used the 4 but did not identify this as the height of the trapezium. Other incorrect values used for the height were 8 and 12.

Some candidates worked with perimeter instead of area and where this was the clearly the case no credit could be given.

1.2.5. Question 5

In part (a), almost 90% of candidates were able to answer this part of the question.

In part (b), 75% of candidates were able to get the correct expression. Of those that did not, the most common error was to write 4n+6 or n= .A few candidates gave an answer of 6n and this scored 1 mark. Very few candidates gave “n + 6” as an answer, which represents an improvement on previous papers.

1.2.6. Question 6

This question was generally well answered with 77% of candidates gaining full marks. Those who did not gain full marks tended to lose marks due to an incorrect division of 96 by 4 getting for example 26 or 32 as their answer. However, they could still gain the mark for communication by correctly interpreting their answer and deciding whether Arthur was overweight or not.

Students who divided 96 by 2 instead of 4 could still gain a mark for correct interpretation of their answer but some failed to gain this mark as they wrongly assumed that a BMI greater than 30 was still classed as 'overweight'.

1.2.7. Question 7

Many candidates had difficulty associating the net with a volume calculation. There were many surface area calculations seen. An area of 6 was often seen, sometimes on the diagram and for this 1 mark was awarded. Some candidates got as far as 6 x 7 but could not arrive at the correct answer. Many errors in basic multiplication were seen leading to inaccurate answers. There were a significant number of candidates who could find the area of the triangular cross section but could go no further. There were also many who gave 84 in the working but were unable to take the last step to the correct answer. The correct units were often seen and managed to gain the candidates 1 mark.

The question produced a spread of marks but pleasingly the modal mark was 4.

1.2.8. Question 8

Part (a) was well answered with the vast majority of candidates gaining full marks. and only 4% failing to gain a mark.

Part (b) was answered well with the majority of candidates scoring 2 marks for drawing the correct line. Those who had errors in (a) generally scored 1 mark for plotting their points correctly.

Part (c), many candidates did not attempt to draw a perpendicular line. Of those who did, the most common incorrect response was to draw a reflection in the y axis of their line. Candidates had varying success in finding the equation of the perpendicular line. Some were able to use the fact that the gradients of the two lines had to multiply together to give -1 in order to work out the gradient of the perpendicular and so were able to use this to find the correct equation even if their perpendicular line was non-existent or incorrect. Others found the gradient of their 'perpendicular' line from their diagram and then used this together with the y-intercept to give the equation for their line thus gaining the follow through marks.

1.2.9. Question 9

This proved to be a challenging question. However, candidates were resourceful in their methods. These included every means of comparison possible, many of which were correctly executed. The most common was Lisa – 9mph from the graph and Martin – 10mph converted from the 16kmph. The majority who gained marks for conversion did so using Martin's information and only a few candidates obtained it for Lisa – 14.4 kmph. There seems to be a wider knowledge of 5 miles = 8 km and 1 mile=1.6 km than in previous years although some candidates did not know what to do with it. Where calculations were faulty candidates often got a mark for using the same units of time or distance. Some missed the obvious conversions and opted for calculations that were far more taxing arithmetically. Division caused a problem with many writing speed and time calculations upside down, misusing the triangle they had memorised.

A few candidates used the diagram to draw a line for Martin, usually correctly; however, most did not mention the line being steeper in their final statement hence a full method was not seen. Too many candidates only wrote m for units which could have meant miles or minutes or even metres. Some candidates did not write a concluding statement; just a name or a squiggle and this cannot be classified as good communication.

The majority of candidates did score at least part marks on this question.

1.2.10. Question 10

Most candidates were able to gain 2 marks here for finding the ages as 30 and 36. The better candidates went on to simplify 30:36 to give 5:6 thus giving easier calculations and most of these went on to score full marks. Those who attempted to divide 770 by 66 often gave their answer to this as 11 remainder 44 or 11.6 or sometimes just 11. Whilst many were then able to score the next method mark for multiplying their answer to the division by 30 or 36 they lost the accuracy mark for the final answers due to premature rounding.

1.2.11. Question 11

In part (a), surprisingly only just over half the candidates gave the correct answer. Common incorrect answers were to ignore the 0 between the 6 and 8 or to leave it as 60.8×10^6

Part (b) was better answered. But some candidates ignored the negative sign or more common was the candidate who failed to put a decimal point anywhere in their final answer.

1.2.12. Question 12

Part (a) was not well answered. Often candidates used 2 and 50 to get to 100 and ignored the other terms this would generate.

Part (b) was slightly better answered. However many candidates could not cope with the coefficient of x squared being 2. A number of responses showed the correct numbers 3 and 5 but in the wrong bracket e.g. $(2x + 5)(x - 3)$, although some did score M1 for the correct brackets with incorrect signs. Another popular incorrect answer was to factorise the x^2 and x terms only and afterwards just replace the constant on the end of their answer.

Part (c) - some good answers here. When incorrect candidates either gave the power as 3 or ignored the brackets and raised the individual terms of the expression.

1.2.13. Question 13

Many candidates were aware that they needed to multiply by $\frac{\sqrt{7}}{\sqrt{7}}$ and so gained a method mark however many could not accurately complete this operation. A common wrong answer was to write 21 as the numerator. Others found the correct answer and then went on to try to evaluate it further, thus giving a final incorrect answer losing the accuracy mark.
There were more correct answers than in previous papers as more candidates managed not to carry on from the correct answer to simplify incorrectly.

1.2.14. Question 14

A large number of candidates scored 1 mark here for stating that angle ORS was 90° or more often for marking this on the diagram. Some candidates do not seem to know how to name an angle and stated single letters for angles eg R or double letters eg OR. Correct terminology is required at this level.

Only a few went on to score both C marks as most candidates were not able to give full clear statements with the correct naming of the type of angles used.

Many candidates stated that a tangent meets a circle at 90°. This is insufficient for the communication mark as we require a full and accurate description.

Many stated that the lines were parallel but did not mention corresponding angles.

Some simply stated that AST was 90° and offered no explanations.

1.2.15. Question 15

In part (a), there were a pleasing number of fully correct answers. Many candidates knew what was required in this question. Of these, many had an appropriate method but could not cope with the algebraic requirements of the question. For those not gaining full marks, some candidates were able to gain some marks by splitting the shape into rectangles and showing an area calculation. Very few wrote this with brackets, when required, so that unless their multiplication was correct, they lost marks. The expansion of brackets also proved to be problematic for many candidates. Also noteworthy were the errors in collecting like terms which often looked more like multiplication. eg $2x^2 + x^2 = 2x^4$. A good number attempted to add their quadratic expressions but again working was limited and answers often included an x^4 term.

In part (b), very few factorisations were seen in this part and some candidates seemed to get the correct answer from nowhere. Quite a lot arrived at $x + 1$ by trial and error. The majority of those who did the first part successfully also did part (b) correctly. Quite a few factorised correctly and put $(3x + 2)(x + 1)$ on the answer line thus not answering the question asked and so gaining no credit.

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