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Principal Examiner Feedback

November 2013

Pearson Edexcel GCSE
In Mathematics Modular (2MB01)
Unit 3: (5MB3H_01) Higher (Calculator)

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Principal Examiner Feedback – Higher Paper Unit 3

Introduction

The demand of the paper was in line with previous papers. Candidates did appear to have been well prepared for the examination and there were few questions which the vast majority of candidates were unable to attempt. Arithmetical errors were once again a feature of this calculator paper. Particular familiar questions which were poorly answered include question 7, an inability to construct a perpendicular bisector, question 12, poor drawing of the line $x + y = 6$, and question 17, transformation of a formula. Centres do now seem to understand the demands of questions assessing Quality of Written Communication and candidates were in the main, giving clear explanations when required. However it must be noted that clear working was not always evident in support of decisions made.

Report on individual questions

Question 1

In part (a), the majority of candidates scored at least one mark, usually for identifying the transformation as a reflection. Whilst the correct line was often quoted, many were confused or contradicted themselves with incorrect alternatives. For example, "a reflection in the y -axis (y = 0)" was quite common. In part (b), the correct answer was the modal answer. However many correctly rotated the given shape through 90^o clockwise but not about the given point. Some candidates offered 'correct' rotations of either 90^o anticlockwise or 180^o.

Question 2

The most common error made here was to find one fifth of those customers who did not pay with a debit card (5473) instead of one fifth of the total number of customers. A few candidates made simple arithmetical errors, which is a concern since calculators were available.

Question 3

Although many candidates did score full marks in this question, the most common error continues to be a failure to justify the correct answer with a trial using a value between two trials giving results above and below that required. In this case the trials at x=3.5 and x=3.6 gave results of 56.875 and 61.056….respectively. It is INCORRECT to say that x=3.6 is the solution because 61.056... is closer to 60 than 56.875 It is evident from candidate's work that many are given incorrect instruction in this matter. Some candidates went further than required and offered a more accurate solution. This failed to secure full marks since a solution correct to one decimal place was requested.

Question 4
Many candidates demonstrated a correct method using a correct scaling ratio but premature approximation of their ratio prevented the award of full marks.
800 ÷ 1.6 and 90 × 5.3 were common errors. A significant number of candidates attempted to find the mass of 60 cm (150 – 90). If a correct ratio was used, this did gain some credit.

Question 5
Very few candidates attempted to solve this problem algebraically, the majority employing trial and improvement methods. Some used a ratio approach which was usually fully correct. Some candidates found the correct costs without showing a clear method but could gain full credit if they showed clearly that their total cost of the 8 purses and 9 key rings was £40
The most common error, scoring no marks, was to divide £40 in the ration 1 : 2 and then find their costs by dividing the two parts by 8 and 9 for the cost of a purse and key ring respectively. This led to answers where the price of a purse was not double the price of a key-ring.

Question 6
Very few candidates failed to score at least two of the four marks available. The most common error was in considering the purchase of tickets for one adult and two (instead of three) children. Some also failed to select the 'Off peak' tickets but credit was still given for a correct method to find the discounted cost. In working out the discounted cost, some divided by 1.1 instead of multiplying by 0.9

Question 7
This question was not answered well at all. Very few candidates understood the need or were able to construct a perpendicular bisector. Most candidates did however gain one mark for a correct arc drawn of radius 5 cm, with centre the point at Alford. The most common error was to draw an intersecting arc, centre Bancroft, of radius either 3.75 cm ($\frac{1}{2}$ of *AB*) or 5 cm and then shade the common area between the arcs.

Question 8
Candidates' solutions to this question were generally very good indeed. A variety of approaches were employed usually leading to three results which could be compared. The wrong size of tube was often selected however dependent upon the method chosen. Many candidates had not established whether they were finding ml/p or p/ml and so often made the wrong conclusion. For example, with answers of 39.10..ml/£ (70ml), 36.36..ml/£ (100ml) and 37.59..ml/£ (150ml), the 100ml tube was selected with 36.36...being the lowest value.

Question 9
Most candidates scored at least one mark for their attempts to complete the table of values in part (a).
(–1. 7) was the most common error but full marks were still available in part (b) for accurate plotting and drawing of a smooth quadratic curve. Unfortunately many failed to secure both marks in part (b), usually through drawing a line segment between the points (2, -3) and (3, -3). Some candidates were very lazy in their curve drawing and many curves did not pass through their plotted points accurately enough. In part (c), many candidates chose not to use their graph and solved the quadratic equation by an alternative method. Although the correct solutions here did gain full marks, many made mistakes in the application of their method. It should be noted that for those candidates whose graph was more of a cubic form, ALL solutions (if not fully correct) were required.

Question 10
Although this was well answered, the most common error in part (a) was in the expansion of $4(y – 7)$; $4y – 7$ being a popular wrong expression. In part (b), many candidates made an incorrect first step which prevented any credit given. $P – 3 = 4t$ was a common error. Some chose to divide by 4 initially but failed to divide all terms by 4 and so gained no credit.

Question 11
The correct answer was often seen but not always the result of the most straightforward method. Many candidates found the length *DF* by Pythagoras and then used sine or cosine. Some even attempted to use the sine rule. However, many choosing these alternative approaches made careless mistakes in their algebraic manipulation and failed to score as a result.
A significant number started well with "tan = $\frac{86}{37}$" but could go no further.

Question 12
A fully correct solution was not the norm in this question. A great many candidates were unable to draw the three lines correctly; $x = –1$ and $y = 2$ were often drawn as $y = –1$ and $x = 2$ and often $x + y = 5$ or $x = 6$ and $y = 6$ were drawn instead of $x + y = 6$. Shading, whether 'in' or 'out', was generally well done but credit was dependent upon at least two correct lines.

Question 13
Once a scale factor had been established, many candidates used it for **all** of their calculations and so *BC* = 7.5 cm (5 × 1.5) with *EC* = 8.7 cm was a common error. Some gave *BC* = 10 cm (5 × 2). Some candidates found the perimeter of triangle *ABC* instead of the trapezium; some credit was given if a correct scale factor had been used. Some candidates assuming an isosceles triangle, gave *EC* as 4.2   A significant number of candidates used cosine and sine rules to work out angles *DAE, ADE* and *AED*, usually leading to none or at most one mark.

Question 14
Errors in calculations involving the addition or subtraction of directed numbers was the usual cause of error in this question $12x - 15y = 99$ and $12x + 4y = 4$ followed by $-11y = 95$ was often seen. Many candidates were able to score two marks provided only one arithmetical error had been made in the original elimination process. Candidates should be advised to check working that leads to non-exact decimal solutions.

Question 15
In part (a), the correct answer of 3.202...... was the modal answer but this was often followed by incorrect rounding to 3 sig. figs (3.202 or 3.2 being the most common errors). Failure to get the correct answer in (i) was usually either a result of attempting to find the square root of 5.357..../1.673 or an attempt to do the complete calculation in one go using a calculator. An incorrect answer in (i) was often followed by correct rounding in (ii) although many still gave their answer correct to 3 decimal places by mistake. In part (b), the correct answer was seen more than not. Some gave a correct answer but not in standard form.

Question 16
Part (a) was poorly answered. Many candidates simply gave an answer of 12.5 (0.5 × 5 × 5). Some attempted to use the $\frac{1}{2}$absinC but did not know the size of angle C, 5^{o} or 15^{o} was often seen. Some candidates found the perpendicular height of the triangle, but premature approximating often prevented a correct solution.
In part (b), many candidates used an incorrect formula, even though the correct formula was clearly given on the sheet provided; r^2 was often used instead of r^3. Many simply found the volume of the sphere and then continued 'correctly'. Quite a few divided their volume of the container by 80 litres instead of dividing 80 litres by their volume of a container. Some candidates, who knew what they were doing, often worked with spheres rather than hemispheres.

Question 17
Only the most able candidates scored more than two of the four marks here. Many correctly made the first step of multiplying both sides by $x^2 - 7$ but could go no further. Note here, it was not sufficient to simply say $y \times x^2 - 7$, correct manipulation was required. Having established $yx^2 - x^2$, many were unable to factorise this expression fully.

Question 18
Many candidates found the required angle to be 128^{o}, some by incorrect methods and many more with insufficient reasoning. Common errors included taking *AOCB* as cyclic quadrilateral, saying that angle *ADC* was 116^{o}, and also taking angles *BAD* and *BCD* to be right-angles. Errors in the reasons given included, omitting the word 'cyclic' from the description of *ABCD* and referring to the circumference of the circle as 'edge' or “perimeter”. Many candidates gave “angles in a circle = 360” as a reason.

Question 19

A correct answer was often seen in part (a), but less so in (b). In part (b), *AX* and *BX* were often taken as $\frac{1}{4}$ and $\frac{3}{4}$ of *AB*. Many clearly understand vector addition but failed to gain credit in the absence of a correct vector equation, eg. $\overrightarrow{OX} = \overrightarrow{OA} + \overrightarrow{AX}$ or equivalent. Incorrect use of brackets led to expressions such as "$\frac{1}{5}$ - a + b". Many who attempted a vector addition did not appreciate the difference between $\overrightarrow{AB}$ and $\overrightarrow{BA}$.

Question 20

Factorisation of a quadratic function with non- unitary coefficient of x^2 was poor. Many chose to employ the formula to solve the given equation. Any mistake in the use of the formula, which was more often than not, resulted in no marks. A fully correct solution by this method gained just one of the three available marks. Many did make good attempts at factorising but then failed to complete the solution. A common incorrect attempt at factorisation was $(4x-9)(2x+3)$.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
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