edexcel

Principal Examiner Feedback

November 2014

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Higher (Calculator) Unit 3

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

November 2014
Publications Code UG040317

GCSE Mathematics B (2MB01)
Principal Examiner Feedback – Higher Paper Unit 3

Introduction

Students appear to have been able to complete the paper in the time allowed.

Many students set out their working clearly and this often led to the award of partial credit where final answers were incorrect.

The paper gave the opportunity for students of all abilities to demonstrate positive achievement. However, the number of students taking this paper was relatively small and there were few students who scored very highly.
Students often relied on trial and improvement methods when other methods would have been more appropriate.

Report on Individual Questions

Question 1

The number of students writing down the correct answer to the first part of this question was disappointing. Many students clearly did not understand the term "reciprocal". The incorrect answers $1\frac{1}{4}$ and $\frac{5}{4}$ were commonly seen.

Part (b) of the question attracted more correct answers than part (a) though many students found the value of $\frac{9.6}{\sqrt{5-1.7}}$ $(=5.28...)$ instead of the expression given. This seemed to indicate a lack of familiarity with the correct use of their calculator, in particular with how to use the square root function. Students are advised to check more carefully that the expression they are evaluating is the same as the expression they should be evaluating. Very few students who gave an incorrect answer showed intermediate calculations so one mark was rarely awarded.

Question 2

A good proportion of students found this "best buy" question straightforward and scored full marks. The approach taken was usually either to calculate the number of matches bought for each penny or the cost per match. Some students then misinterpreted their answers and, for example, having worked out the number of matches for each penny, stated that the small box was best value. A significant number of students did not use common units and used 23, 72 and 4.16 as the three costs rather than 23, 72 and 416 or 0.23, 0.72 and 4.16

Question 3

A high percentage of students completed this question on similar rectangles successfully They usually used a scale factor approach.

Question 4

This question was also well done. Two approaches dominated in the responses seen. The majority of students worked out 40% of £1500 and added it to show that if Tony sold the car for £2100 he would reach his target for the car. A smaller number of students expressed £650 as a percentage of £1500 and showed that this was greater than the 40% target that Tony had. It was encouraging to see that students often concluded their answer with a clear written statement. A few students mistakenly used £2150 instead of £2100 in their percentage calculations.

Question 5

Well done by many students, answers to this question revealed a large number of accurate diagrams. A small proportion of students drew rectangles and other shapes.
The question was not attempted by some students and this left examiners wondering whether the students concerned had access to a pair of compasses.

Question 6

Just under a half of students scored full marks for their response to this question. Students who found the difference in the volume between two cuboids were generally more successful than those students who used area of cross section × length. Those students who tried to find the area of the cross section of the prism often made errors and unfortunately, because they did not show sufficient detail in their method or by annotating their diagram, examiners were unable to assign any credit for method. Much careless arithmetic was in evidence despite this being a calculator paper. A good proportion of students scored the mark assigned for the use of correct units though cm^2 was also often seen.

Question 7

A good number of fully correct answers to part (a) were seen. The most common incorrect response was for students to draw a reflection in the y axis – this was awarded one mark. A rotation of 180° about (0, 0) was also seen quite frequently but, of course this could not be given any marks. A small proportion of students reflected the shape in the x axis.

Over three quarters of students gained at least one mark in part (b). Most students scored the mark for enlargement and a good proportion of students were also awarded the mark for stating a correct scale factor. Fewer students gave the correct centre of enlargement. It was heartening to see that nearly all students described a single transformation rather than a combination of transformations.

Question 8

There were a good number of fully correct answers seen to this question. However, a more typical response included a correct calculation of the cost of buying the nails from the Nail Company but an incorrect calculation of the cost of buying the nails from the Hammer Company. Many students were unable to deal correctly with the special offer, costing the inclusion of 125 free nails rather than 100. Students' working was generally written down clearly but not always presented in a logical order. Most students gave a clear statement to conclude their working.

Question 9

This question attracted many good answers. Working seen in answers to this question on the technique of trial and improvement was generally accurate. Most students scored at least 3 marks and often all 4 marks for their answers. A high proportion of students evaluated the expression with $x = 2.65$ but failed to use their value correctly to determine an answer correct to one decimal place. They often gave an answer of 2.7 rather than 2.6. A significant number of students did not attempt to round their answer to one decimal place and wrote 2.65 on the answer line.

Question 10

A fully correct response to this question was not often seen. Many students either did not involve a formula for the circumference of the trundle wheel in their answers or they mistakenly used the formula for the area of a circle. Some students were awarded a mark for using the correct formula but did not consider the number of times the wheel rotated. Answers were not always changed to metres.

Question 11

This question was not always attempted. When it was attempted, a common error was for students to calculate $10^2 + 5^2$ rather than $10^2 - 5^2$ in their application of Pythagoras' Theorem. Premature rounding led some students to lose accuracy in their answers and consequently score 3 out of the 4 marks available.

Question 12

Many students taking this paper found part (a) of this question to be straightforward. Common errors included a confusion between the signs $\leq$ and $<$. Some students scored 1 mark because they omitted one of the values required or they included one extra value.

In part (b) of the question a large proportion of students were able to identify $x = 3$ as the critical value but far fewer were able to give the correct inequality, $x > 3$, as their final answer. It was interesting to see that many students gave their (correct) final answer in the form $3 < x$ rather than $x > 3$.

Question 13

There were some good attempts made at this question, usually accompanied by accurate working. The most common approach taken by students who were successful was to assign an initial sum of money and work out when it would be doubled. Fewer students restricted their consideration solely to powers of 1.15. Weaker students often multiplied the 1.15 by 2, then 3 and so on.

Question 14

The majority of students found $x = 7$ but few students recognised that $x^2 = 49$ implies $x = \pm 7$. The responses seen included the algebraic approach of solving the equation, but a trial and improvement approach was also seen on many occasions.

Part (b) of the question was poorly answered with very few students showing any understanding of how to deal with the algebraic fractions in the equation. Examiners were unable to give partial credit to most responses and very few students obtained the correct answer.

Question 15

Many students could change between standard form and ordinary numbers to score the marks available in parts (a) and (b). The most frequently seen incorrect responses to part (a) included 45×10^4 and 45^4.

Part (c) of the question was not always attempted. When it was attempted, the answer was often correct. Where students were not successful, they had often evaluated the square root or the cube root of 6.4 and included this as part of their answer instead of using their calculator correctly to work out the cube root of 6.4×10^{10}.

Question 16

Students usually either scored full marks for a fully correct answer or no marks because they were not able to identify and carry out a correct first operation. It is disappointing to report that the latter was more common.

Question 17

Many students made a good attempt to draw the graph and most of the work seen was accurate. The most common error was to calculate and use the value of the function at $x = 3$ to be 0.3. An answer using 0.3 was not appropriate as the grid allowed more accuracy than one decimal place in the plotting of values. Graphs including the point (3, 0.3) could therefore not be awarded full marks.

Question 18

This question was well attempted by the more able students who quickly identified that it required the use of the formula. These students usually worked carefully and accurately to score full marks. Of the many students who were not successful, most either attempted to factorise the quadratic expression or they attempted other fruitless algebraic manipulation. Attempts using trial and improvement were also often seen but these were invariably unsuccessful.

Question 19

Most students did not realise that they needed to set up a pair of simultaneous equations. The students who did successfully set up two equations sometimes got no further than this. It was surprising to see just how many students mistakenly based their method on working out £28.20 ÷ 5 and £44.75 ÷ 8. Attempts using a trial and improvement approach were again frequently seen. They were almost always unsuccessful.

Question 20

Students needed to identify an upper bound for the volume of the sphere in order to make any progress in this question. Most students did not identify the question as one focussing on bounds despite the reference to "the upper bound" in the question. A small minority of students scored the mark for stating the upper boundary for the volume as 70.5. Often they got no further. Where students did identify an upper boundary, even where it was incorrect, examiners were able to award some credit for a correct method to find the radius and then the surface area of the sphere.

Question 21

A significant number of students did not attempt this question. Where it was attempted, responses could only rarely be given any credit. Students showed little understanding of how to approach questions such as this. Vector equations were often not clearly expressed either in terms of directed line segments or in terms of **a** and/or **b.** A small number of students could write down a correct vector expression for $\overrightarrow{MN}$ and so gained one mark but they could not usually write this expression accurately in terms of **a** and/or **b**.

Question 22

This, the last question on the paper, was answered poorly by all but a handful of students. In part (a) the incorrect response $(0, -2)$ was often seen along with a variety of other incorrect answers.
In part (b) of the question, the lines drawn on the graph to represent $y = \mathrm{f}(x - 1)$ were often not parallel to $y = \mathrm{f}(x)$. Some students who did draw a parallel line drew it to pass through the point $(-\frac{1}{2}, 0)$.

A significant proportion of students did not attempt the question.

Summary

Based on their performance on this paper, students are offered the following advice:

- make sure you can use all the basic functions on your calculator correctly, particularly to find the value of expressions which involve square roots and cube roots
- bring all the necessary equipment to the examination – you are likely to need a pair of compasses for some examination papers
- if you have to work out lengths not already shown on diagrams, show this in your method or by marking them on diagrams in the appropriate places
- practise changing the subject of a formula
- learn the formulae for the circumference and area of a circle and make sure you do not confuse one with the other
- make sure you use consistent and appropriate units in your working and give the correct units in your answers

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL