edexcel

Principal Examiner Feedback

Summer 2016

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

Summer 2016
Publications Code 5MB3H_01_1606_ER

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

Introduction

This exam paper gave a good range of marks for the award of a pass.

Though most students showed their working there were still far too many cases when it was often disorganised there was often a lack of clarity and without a logical progression. Sometimes this will have caused students to lose marks when it was not possible to follow their train of thought.

Students need to practice the skills of algebraic manipulation, formulating and solving equations and solving inequalities.

Almost all students had the necessary equipment which was gratifying to see. Few students had to resort to non-calculator methods to work out their answers.

Report on individual questions

Question 1

A well understood question where students had a high success rate with almost all students gaining full marks for a correct method and decision.

Question 2

Almost all students were able to rotate the shape 180° about (0, 0) in part (a) but the success rate dropped significantly in part (b) as about a quarter of students forgot to give the centre of enlargement.

Question 3

One mark was gained for a small proportion of students for either adding 5 to both sides of the equation or dividing both sides of the equation by 2 as a first step in solving the equation however only about two thirds of students were able to successfully make w the subject of the formula.

Question 4

This was a well understood question with almost all students being able to make a start on the problem and find that the base angles of the isosceles triangles was 58°. Most students were then able to make progress and find a correct value of x.
A number of students gained success by forming an equation by using all three angles of a triangle adding to 180°.

Question 5

This non-standard locus question caught many students unawares. About half of the students shaded the intersection of the two circles rather than more that 10km from *M* and less than 6 km for *N*. About a half of the students gave a fully correct solution.

Question 6

This was a well understood question with most students understanding what they had to do to solve the problem. Those that made mistakes either worked out the circumference of the pond rather than its area or used $2\pi r^2$ for the area of a circle.

Question 7

Students scored high marks on this question about repayments on a car loan. Most students scored all five marks and those that didn't made errors in working out the percentage discount but were able to gain marks if they subtracted £1500 and divided by 24 in the correct order.

Question 8

Solving a cubic equation using trial and improvement method is a regular visitor to these papers and most students scored 3 or 4 marks. The students that scored 3 marks usually failed to gain the extra marks because they gave the answer to more than one decimal place (usually 3.72) or they did not do a trial for $3.7 < x \leq 3.75$

Question 9

This was a well understood question as almost all students realised they had to find the area of the cross section and multiply it by the length however many students had difficulty with the sloping section of the prism. Some tried to use the area of a trapezium formula on the pentagonal cross section whilst others forgot to divide by two when they split the shape into two rectangles and a triangle and gave the triangle area as 5×5 and not $\frac{1}{2} \times 5 \times 5$.

Some also did not realise that if they used two 8×3 rectangles the two rectangles would overlap. There were a few attempts made to work by subtracting the $5 \times 5 \times 8$ triangular prism from the square prism with 8×8 cross section but these were usually unsuccessful too.

Question 10

This question on Pythagoras' theorem and Trigonometry in a right angled triangle was a question of two parts. The Pythagoras question was well answered and most students gained all three marks with few gaining one or two marks for partial solutions.

It was a similar case for the Trigonometry question where only a few students scored one or two marks with most students scoring full marks and about a third scoring no marks at all. Interestingly many students chose to use the sine rule for finding the missing side.

The students that scored no marks often realised it was a question about trigonometry but chose the wrong trig ratio.

Question 11

This question on using a calculator efficiently and dealing with a calculation written in standard form was well answered with most students scoring all the marks. The common mistakes were to find the square root of the whole fraction in (a) and write the answer incorrectly in standard form as 0.4×10^{-2} rather than 4×10^{-3}

Question 12

Students tend to struggle with inequalities and this proved to be the case in this question with only about half the students being able to score any marks. Answers were often given as equalities or with the inequality sign pointing in the wrong direction. Only about a third of the students were able to give fully correct solutions.

Question 13

This question on completing a table of values, plotting a quadratic graph and then using the graph to solve a quadratic equation discriminated very well. Almost all students were able to score at least one or two marks, usually for partially completing the table and plotting their values. In part (b) many students drew straight lines to give a flat topped curve which lead to the loss of a mark. Only the most able students were able to give the correct two solutions to the quadratic equation with many giving the solution to $6 - x - x^2 = 0$ rather than $6 - x - x^2 = 2$

Question 14

This question on reverse percentages was only really understood by about a third of the students and it was often a case where either 3 marks or no marks were earned as those students that understood the question usually gave fully correct solutions whilst those that carried out a procedure to add on 5% and/or 7.5% scored no marks.

Question 15

About half of the students gave fully correct answers to the solution to a pair of simultaneous equations. It was gratifying to see that few students attempted a trial and improvement method of solution with the elimination method being the most popular with the elimination of y by adding being the most successful.

Question 16

Many students were confused by this circle theorem question and showed poor understanding of opposite angles of cyclic quadrilaterals and which angle at the centre was twice the angle subtended at the circumference with only about a half of the students gaining both marks.

Question 17

Solving a quadratic equation using the quadratic formula is a regular question on the3H paper so it was quite surprising that only about half the students were able to substitute the values of a, b and c correctly into the formula. Once this step had been carried out about two thirds of them were able to calculate the correct answer.

Question 18

About half of the students understood how to start this problem and were able to score some marks in this question. Almost all the attempts used the approach that linked the sine rule and sine formula for finding the area of a triangle rather than dropping the exterior perpendicular from A or the interior perpendicular from C. Those students that managed to start the question then went on to solve the problem and score all four marks.

Question 19

More than half of the students were able to start this problem on bounds and many were able to give the upper and lower bounds for *s* and *t* and then go on and combine them correctly to give the upper and lower bounds for *p*. It was after this that most of the students were confused. They found the average of the upper and lower bound of *p* instead of finding the number that both the upper and lower bounds round to. Some students worked out all four combinations of the upper and lower bounds of *s*and *t* but did not identify which they were using in making their final decision

Question 20

This question was not very well understood with many students mistakenly writing *y* is proportional to x^2 or $\sqrt{x}$ or inversely proportional to x^2 rather than inversely proportional to $\sqrt{x}$ and therefore did not score any marks. Those students that correctly wrote the correct initial statement usually went on to get full marks for the question.

Question 21

Vector geometry questions appear frequently on these papers and students usually struggle with them. This was certainly true on this occasion with few students making any progress with the question. Those that did score marks were able write vector *AP* or vector *OY* in terms of another vector and then work with dividing vector *AP* in the ratio 2: 1. Quite a few of the students also gave an answer for vectors which were in the opposite direction, i.e. gave the vector for PA when they said they were giving AP. Once the students had established the correct answer for vector *OY* only the most able were able to recognise that vector *OY* is $\frac{2}{3}(7\mathbf{a} + 3\mathbf{b})$ and establish that the lines were therefore parallel.

Summary

Based on their performance in this paper, students should:

- be able to interpret a problem and write a suitable algebraic formula or equation that can be used to solve it
- always lay out their working in a logical progression so that their method can be followed easily
- never find the suitable degree of accuracy between the upper and lower bound by finding the average of the two numbers; always round each of them so they match on the most appropriate value
- practice substituting the values of *a* , *b* and *c* into the quadratic equation formula
- remember that curved line graphs are curved between every plotted point and points should not be joined by straight lines

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