edexcel

Principal Examiner Feedback

Summer 2015

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

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 2015
Publications Code UG042114

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

Introduction

Many candidates lost marks through poor arithmetic or from choosing a method unsuitable for a non-calculator paper. This was particularly true for questions 3, 6 and 14b. There was also a lack of technique shown when applying algebra to finding the area of a compound shape. Good points included the confident handling of surds, the derivation of the equation of a straight line and conversion between imperial and metric units.

Report on individual questions

Question 1

Part (a) was generally well done although in some cases the answer was not fully simplified. Part (b) was also well done although some candidates on obtaining an answer of 12 went on to multiply this number by 28 to get (£) 336
Part (c) was mainly done by rounding 19.89 to 20 and 201.71 to 200 eventually giving a final answer of 4000. Alternatives were to round to 202 or 201 giving answers of 4040 and 4020 respectively, both of which were accepted for both marks. Candidates who attempted to work out the accurate calculation were given no marks.

Question 2

This was a standard straight line question. The majority of candidates drew up their own table to record values. The most common error was to miscalculate with the negative value of x. A few candidates were unable to address the question in any real sense because they could not evaluate the expression $3 - 2x$ correctly. For example, when $x = 3$, y was evaluated as
$3 - 2 (\times) 3 = 1 \times 3 = 3$

Question 3

There were various strategies adopted in solving this problem. The most common was to calculate the area of the floor and the area of a floor board and then divide the former by the latter. Many candidates could not carry out an accurate calculation of 40.5 divided by 0.15, however. Some tried to do it by converting units, a few by working out 4050 divided by 15. An alternative approach was to find how many board lengths can fit along the sides - this was usually successful - possibly because those candidates had greater insight or because the calculations were much more straightforward - for example $9 \div 1.5 = 6$ and $4.5 \div 0.1 = 45$ giving a final calculation of $6 \times 45 = 270$

Question 4

Most candidates scored full marks. One error was to recognise that the sequence generated consisted odd numbers but decided to start with 1, 3, 5 ....

Question 5

Many candidates were able to score all 3 marks, usually by working out the cross sectional area first and then multiplying by the length of the solid. Good candidates remembered to include the correct units. Some candidates wrote down incorrect units (usually cm^2), whilst others simply multiplied the length by width by height. A few candidates really misunderstood the difference between the volume and the total surface area, worked out the area of all the surfaces and found the sum. They generally gained no marks.

Question 6

This question was found challenging by many candidates. Although the majority of candidates could work out the number litres of petrol/oil mixture, they then could not go on and share this amount in the ratio 1:14, oil: petrol. Although the mathematical task involved is a straightforward one (divide 150 in the ratio 1:14) many candidates could not cast the given problem in this form and so failed to make any progress.

An alternative method which some candidates tried was to divide a litre in the ratio 1:14 and use the answer to that to work out how much oil was needed to travel 3000 miles. Although this method would work it has the defect that the calculations involved are challenging without the use of a calculator and most candidates using this method failed to score many marks, getting lost in the demands of the calculations.

Question 7

Candidates were able to score highly on all parts of this question. In part (a) most candidates were able to expand the brackets correctly, but some went on to simplify incorrectly. In part (b) a few candidates were not able to apply the correct index law. Part (c) was almost always correctly answered.

Question 8

This was a standard compound interest type of task and many candidates were able to work out the correct answer. The most common error was to calculate 15% of £2000 and then 10% of £2000, before adding the answers together. These candidates scored just one mark.

Question 9

Many candidates were well primed for this question. They knew the equivalence of 5 miles = 8 kilometres and could use it to convert between miles and kilometres. The most straightforward way is to convert miles to km via the calculations 70 ÷ 5 = 14, followed by 14 × 8 = 112. This is a significantly easier calculation than the approach of converting 130 km to miles. Candidates were expected to compare the speeds using correct units (of speed).

Question 10

Many candidates were able to find the 27^{o} size angle - either by using the difference in the interior angles or in the exterior angles. Most candidates seemed to favour the interior angle approach, presumably because the required angle can be directly seen as the difference between the angles in a pentagon and in an octagon. Candidates were asked to supply a reason (or reasons) - this had to refer to the correct formula for the sum of the interior (or internal) angles or its equivalent or to the sum of the exterior angles.

Question 11

The most common successful approach to solve this problem is to convert all the two standard form numbers to ordinary numbers. This was very often done successfully.

Answers were accepted written in either ordinary or standard form. The most common error came with the incorrect conversions including: 2.5 × 10-2 which was then written as −250 or 0.25 or 0.0025 or 250 and with 2.5 × 102 written as 2500 or 0.025

Question 12

Both parts of this standard question depended on straightforward knowledge of 3 dimensional coordinates. Many candidates were able to demonstrate this and collect both marks. Many others were able to pick up one of the two marks.

Question 13

There were many pleasing fully correct answers supported by clear accurate answers. However, there were very many cases where weakness of algebra was apparent. This included poor notation but also incorrect algebraic manipulation. The standard way of working out the area of an L-shape is to split into two rectangles, work out any missing lengths, calculate the area of each of the rectangles and then add. The main error which came up was of the form x + 8 − x + 5 instead of (x + 8) − (x + 5). Although x + 8 − x + 5 = 3 was allowed, often this was evaluated as 13 or as x + 3. Other errors were to multiply opposite sides together or just arbitrary sides. Some candidates wrote, for example, x + 2 × x + 5. They scored no marks for this.

Question 14

Part (a) allowed most candidates to demonstrate their knowledge of power zero. Part (b) proved much more of a challenge. Firstly candidates had to interpret what the power $-\frac{2}{3}$ meant in terms of the operations required and secondly, once interpreted correctly, candidates were faced with the problem of the actual evaluation. This became very apparent for those candidates who wrote (correctly) $\frac{1}{\sqrt[3]{64^2}}$ but then could not cope with the arithmetic of the large numbers.

Question 15

Part (a) was a standard trinomial factorisation and many candidates were able to show their skill. Many other candidates gained one mark by a nearly correct factorisation (the signs incorrect). They could have checked that their answer was correct by expanding and simplifying, as this skill is generally done more accurately.

Part (b) was an example of expanding brackets including surds and most candidates were able to supply four terms. Often the first term was wrong, being written as $6\sqrt{5}$ instead of, for example, $6\sqrt{25}$.

Surprisingly, some candidates gave their final answer as $30+\sqrt{5}-1$
Most candidates were well-primed to gain at least one mark in part (c) by multiplying numerator and denominator by $\sqrt{12}$, although only a few could go on to simplify their expression to get $\sqrt{3}$, with the answer being left as $\frac{\sqrt{12}}{2}$ or as $\sqrt{6}$

Question 16

It was pleasing to see so many candidates who had a clear idea of how to tackle this question. Many knew how to find the gradient of the perpendicular bisector and most knew that the general equation of a straight line was y = mx + c. There was some confusion in finding the coordinates of M, the midpoint of the line segment - often by finding the difference of the coordinates of A and B, rather than their means.

Question 17

This was a proof, set at very high demand and required a clear explanation together with supporting reasons. Just quoting that the tangent was at right angles to the radius did not score a mark unless it was use in support of a step in the proof. The most straightforward way to prove the statement was to use the fact that angles AOB and BOC are supplementary because they are on the same straight line and that angles BOC and CPB are supplementary as a consequence of the tangent/radius property and the angle sum of a quadrilateral.

Some candidates wrote down all the circle theorems they knew. Often these were expressed inaccurately as, for example, 'tangent meets a circle at 90^{o} '. They tended to have difficulty picking up any marks, especially as one of the theorems (angle at the centre is twice the angle at the circumference) was universally misapplied by these candidates. Candidates who made assumptions about the size of the angles (often 60^{o} and 120^{o}) were unlikely to gain marks in this high demand question.

Summary

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

- practise their arithmetic skills per se to gain greater flexibility of approach - for example in the evaluation of more complex powers.

- practise their arithmetic skills in various contexts - that is in problems where more than one approach is possible.

- work on making the algebra they use to be more accurate - for example to include brackets around expressions when subtracting.

- express circle theorems using precise language.

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 Edinburgh Gate, Harlow, Essex CM20 2JE