Examiners' Report/
Principal Examiner Feedback

January 2016

Pearson Edexcel International GCSE
Mathematics B (4MB0)

Paper 01

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

January 2016
Publications Code UG043269

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

Introduction to Paper 01

Some questions proved to be quite challenging to many students, and centres would be well advised to focus more time on these areas when preparing for a future examination. In particular, to enhance performance, centres should focus their students' attention on the following topics:

- Incorrect assumptions about diagrams given in geometry problems
- Dividing (or multiplying) both sides of an inequality by a negative value
- Understanding the link between differentiation and gradient
- Matrix equations
- Meaning of the word *perimeter*
- Variation problems set in context
- Venn diagrams – determining subset values from given data
- Calculating an estimate of the mean from a grouped frequency table
- Correctly interpreting units on speed-time graphs
- Probability
- Giving answers to the required degree of accuracy

As well as these topics identified in this paper, students should be encouraged to read the demands of examination questions very carefully before answering the question and, wherever possible, to check arithmetical answers before progressing to the next question. They should also be encouraged to manage their time so that accessible marks towards the end of a paper are not missed.

It should be pointed out that the methods identified within this report and on the mark scheme may not be the only legitimate methods for correctly solving the questions. Alternative methods, whilst not explicitly identified, earn the equivalent marks. Some students use methods which are beyond the scope of the syllabus (such as the product rule for differentiation) and, where used correctly, the corresponding marks are always given.

Report on Individual Questions

Question 1

Just over half of all students scored full marks on this question. For the remainder, many either failed to simplify correctly a correct expanded expression or treated the question as an equation. As a consequence, either $15+10x-21x-14x^2=15-11x-14x^2=14x^2+11x-15$ was frequently seen which earned (M1)(A0), or simply $5-7x=0$ and $3+2x=0$ earning no marks at all. Despite the fact that the method mark was awarded for either a correct expansion with, at most, one sign error, there were some poor attempts at this expansion (notably $-14x$ rather than $-14x^2$) was seen on a minority of scripts.

Question 2

Three-quarters of students achieved both marks here for an answer of 93°. Of the minority of students who approached this problem incorrectly, many seemed to confuse angles of sectors in a circle with percentages and, as a consequence, the fraction of the circle was multiplied by 100 rather than 360.

Question 3

Much good working was seen with the overwhelming majority successfully differentiating $3x^2$ and over half of all students completely answering the question correctly by adding on $\frac{9}{x^4}$. The common errors seen, on a minority of scripts, included $-\frac{9}{x^4}$ and $\frac{9}{x^{-4}}$ for the final term. Given that this is a fairly standard question for the paper, it was a concern that about a sixth of students scored no marks at all.

Question 4

Much correct working was seen here with many correct answers of 20 seen. Of those students who did go wrong, many seemed to think that they needed to add 2 and 5 together then simply multiply by 8 to give an erroneous answer of 56.

Question 5

This question proved to be quite a discriminator for many students, as only a third got this completely correct. For those making errors, many seemed to think that they needed to have all **four** given equations in their answer and, whilst they may have got one pair correct, the other pair was seen to be incorrect with the inclusion of $2y = 5x + 3$.

Question 6

Only a minority of students scored full marks on this question with over half of all students scoring no marks at all. This suggests that accurate use of protractor and ruler, in the context of bearings and scale, is a skill that needs to be developed more. It was noticeable on some scripts that angles were measured in an anti-clockwise direction. The instruction to use an 'X' led to a few students misinterpreting this as a need to label their mark where the correct points B and C had been placed with an additional 'X'. Only a few candidates were penalised for failure to label B and C.

Question 7

About two-thirds of students scored full marks on this question. Of those who went wrong, many simply evaluated $\frac{15}{100} \times 0.3$.

Question 8

Two-thirds of students correctly substituted $x = 2$ into the given cubic function, and equated to zero to give the required answer of $a = -16$. Of the remaining third, most failed to equate their expression to zero and so an equation to find '*a*' was never formed. Some, but only a few, simply substituted $x = -2$ to score no marks at all. Long division attempts were rarely seen, and whenever seen they were often not performed correctly.

Question 9

A poorly attempted question as three-quarters of students scored no marks at all. Whilst 90° proved a popular incorrect answer for θ, a few correct answers of 180° were seen whilst $a = 1$ proved to be a rare answer indeed. There seemed to be much guesswork and only very rarely was a diagram seen to help find the answers.

Question 10

Over half of all students either did not realise that this was a problem involving the tangent – secant theorem or simply misquoted the formula and, as a consequence, scored no marks at all for this question. Some students did find $DB = 16$ but then went on to give the radius as 8. Such responses scored the first mark (M1) only. Many students introduced an x into their working to help in solving the problem This was fine, but it would help to gain marks if they state clearly which length 'x' is meant to represent. For example, $8^2 = 4x$ seen scored no marks until it was absolutely clear that $x = BD$.

Question 11

The majority of students knew what to do with this question and correctly used the exchange rate given. The penalty for failure to round to the nearest pound was applied widely, with nearly one fifth of students stating £220.13 as the final answer and, as a consequence, the final mark was lost. A significant minority (about one-third) of students made the mistake of a wrong currency conversion with 200×1.54 or $350 \div 1.54$ seen. These students earned no marks for this question.

Question 12

This question proved to be quite a discriminator as many students were unable to make the step from $-2n < 9$ (which earned M1) to $n > -\frac{9}{2}$. As a consequence, less than half of all students went on to score more than one mark on this question. Of those that did give a correct inequality with n as the subject, about half of these either left their answer as -4.5 or gave the answer of -5.

Question 13

A significant majority of students showed the correct working step $\frac{10}{3} \times \frac{2}{3} = \frac{20}{9}$ for two marks but then did not then follow this with "$= 2\frac{2}{9}$" which would have been sufficient for full marks. Students were expected to start from the original Left Hand Side and develop it step-by-step to become equal to the Right Hand Side. There was much evidence of circular working here and several candidates who concluded the argument with $\frac{20}{9} = \frac{20}{9}$, for example, did not gain the final accuracy mark.

Question 14

Surprisingly, there were fewer correct answers than expected on this question. Many students seemed to be confused by (or simply ignored) the inequality signs. In parts (a) and (b), '0' missing proved to be the downfall of many candidates. In part (c), many incorrect answers seen included a '3' and/or a '10' in the answer. As a consequence of these errors, about half of all students scored no marks on each part of this question.

Question 15

Whilst a majority of students answered this question correctly, there was a significant minority who assumed wrongly that $DC = AB$ since the diagram seemed as though it might be a parallelogram. As a consequence, DC was often erroneously calculated as 4.33 cm. Giving an answer correct to 3 significant figures proved a step too far for about one in eight students and centres would be well advised to focus their students' attention on giving their answers to the required degree of accuracy.

Question 16

In part (a), as there was no working to be seen, the answer was either correct or not. About half of all students scored the mark for this part of the question. In part (b), $(n-2)\times180=900$ was the main method used with much success, although a few students seemed to think (incorrectly) that $(n-2)\times180=900n$ and, as a consequence, earned no marks for this part of the question. It was quite rare to see the alternative approach: $\frac{900}{n} = 180 - \frac{360}{n}$.

Question 17

A majority of students did not seem to realise that the focus of this question was calculus and many simply substituted $x=-2$ into the given equation. Indeed, of those students who did correctly differentiate, a minority substituted $x=-2$ into $10x-6$ rather than equating to $10x-6$. Correct solutions were seen on less than four-tenths of all responses.

Question 18

The vast majority of students seemed to be well drilled in matrix manipulation and only a very small minority scored no marks at all on this question. Simple arithmetical slips meant that only about half of all students scored full marks. An answer of $\begin{pmatrix} -2 & 6 \\ -2 & 5 \end{pmatrix}$ for part (b) proved to be a popular, but erroneous, answer.

Question 19

Nearly two-thirds of all students scored no more than 2 marks on this question as many had difficulty in handling the brackets. Indeed, it was common to see an erroneous answer of $(64x)^2$ for part (a) followed by an answer of $\frac{1}{64x}$ for part (b).

Question 20

Surprisingly, half of all students scored no marks at all on this matrix question. Indeed, the most popular but erroneous working seen was $\begin{pmatrix} 3x^2 & -3 \\ 7x^2 & -7 \end{pmatrix} = (4x)$. Of those who did provide the correct quadratic, the equation was invariably rearranged appropriately. There was much good factorisation seen, although it is also the case that a calculator program to solve quadratics is in common use.

Question 21

Nearly three-fifths of students either did not attempt this question, used the base area as 920 m^2 or misquoted the formula for the volume of the pyramid. As a consequence, these students scored no marks at all. Indeed a method of ½ × 920 × 129 or similar was not uncommon. A further challenge to those students who did find the required volume was then in converting their answer to standard form. As a result, only one-seventh of students achieved full marks.

Question 22

Only about one-third of students scored full marks on this question. An incorrect use of the mid-point formula in part (a) led many students to either $(5, -5)$ or $(-5, 5)$ thus scoring no marks for this part. Whilst the use of Pythagoras was recognised in part (b), the method mark was often lost with the introduction of a negative sign between the two squared terms.

Question 23

A fully accurate diagram was seen in only about one-fifth of responses. Attempts at (a) included, drawing *BE* or joining all three diagonals or drawing six small arcs centred at each of the six vertices. In (b), several students drew only part of the correct arc here, but were not penalised as long as their arc went through a point equidistant from *B* and *E*. In (c), several students showed difficulty with the instruction concerning millimetres in the question. Although a correct answer of “2.4cm” was accepted, it was the case that several students made errors in converting between a centimetre unit and a millimetre unit.

Question 24

The language of this question seemed to cause problems for many students and nearly three-fifths scored no marks at all. Those who did the correct working in (a) and who had $27x^3$ in their working were given full marks, even if the equation seen was $C = 27x^3$. On a small number of occasions, when the correct working for (a) was seen in (b) but not (a), then no marks were awarded retrospectively for (a). About one-fifth of students scored full marks.

Question 25

A very poorly answered question with many blank responses for this question seen. Of those who did attempt the question, a significant number assumed that either triangle *ABC* was isosceles or that *AC* was parallel to *ED* resulting in an extra, but incorrect, 30° appearing either in the student’s working or on the diagram. Whilst a correct angle of 60° for *AEC* was seen on a minority of scripts, the accompanying reason was not always given. Circle problems, requiring reasons to support answers are never easy for students and centres would be well advised to focus on this type of question, reinforcing to their students that **no** geometrical assumptions should be made about diagrams except from the information given. About one-tenth of students scored full marks on this question.

Question 26

Only one-quarter of students scored more than one mark on this question. Invariably with incorrect answers seen, no working was shown. Indeed, with this type of question, interpreting the data given in order to place data values on the diagram was essential to a full solution. Many students seemed to ignore the complement sign and answers of 22 and 6 proved to be popular, but erroneous answers to parts (a) and (b). About one-sixth of students scored full marks.

Question 27

About half of all students scored no marks at all on this question. Of those who did score some marks, most were for correctly drawn bars of the histogram. In part (b) many students used the width of the interval rather than the midpoint in their estimate of the mean. This is a fundamental error and scored no marks. Failing to correct to the nearest year caused a problem for some students, who lost the final accuracy mark as a consequence. About one-fifth of students scored full marks.

Question 28

Part (a) was the best answered part in this question, despite a number of students being unable to read the scale on the *x*-axis correctly. Part (b) was not well answered although most who attempted this question did attempt to find the area under the graph. Not altering the units was a very common error. Part (c) and (d) were similarly not well done, although more students scored a mark in part (d) than in part (c). Overall, three-tenths of students scored half marks or more.

Question 29

A poorly answered question with three quarters of all students either not attempting the question or scoring no marks at all, mostly following incorrect assumptions in part (a). The most common errors seemed to be assuming that $x = \frac{1}{4}$ (as there are 4 possible scores) or $7x = 20$ (the sum of the scores). In the latter case, resultant probability values greater than 1 seemed to be ignored showing a poor understanding of the basics of probability.

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