edexcel

Examiners' Report/ Principal Examiner Feedback

Summer 2016

Pearson Edexcel International GCSE Mathematics B Paper 1R (4MB0/01R)

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 4MB0_01R_1606_ER

Principal Examiner's Report

International GCSE Mathematics B

Paper 1R (4MB0/01R)

Introduction

There was no evidence to suggest that students ran out of time in answering the paper as attempts (erroneous though they were) at many of the latter questions were made. Some questions proved to be quite challenging to many students and centres would be well advised to focus some time on these areas when preparing students for a future examination.

In particular, to enhance performance, centres should focus their student's attention on the following topics, ensuring that they read examination questions **VERY** carefully.

- Significant figures for numerical values less than 1
- Removing negative signs in inequalities
- Intersecting chords theorem
- Standard construction methods
- Equating coefficients from algebraic identites
- Map scales and areas
- Representation of Standard Form
- Correctly representing a time interval as a decimal
- Calculation of a mean from a grouped frequency distribution

As well as these topics identified in this paper, students should be encouraged, 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 and, where used correctly, the corresponding marks are given.

Details of Marking Scheme and Examples of, and Report on, Students' Responses

Question 1

About half the students scored full marks on this question. The primary cause of errors was the lack of understanding of what is meant by 3 significant figures when the decimal fraction has a zero in the first place after the decimal point. As a consequence, 0.041 or 0.042 proved to be popular, but erroneous, answers to part (b).

Question 2

The overwhelming majority of students scored full marks here by correctly dividing $385 by the exchange rate. Less than one-tenth of students incorrectly multiplied by the exchange rate.

Question 3

Again, a well answered question with nearly 80% of students scoring full marks. Errors were generated where students made either simple arithmetical slips, added -28 to -54 (instead of finding the difference), or tried to use the formula $a+(n-1)d$ for an arithmetic series. Such errors meant that students achieved, at most, one mark.

Question 4

A significant minority of students simply used a calculator to achieve 8√13 and then stopped. This is the answer given by the calculator and, fortunately for such students, one mark was gained which generously gained them a mark. Those who found prime decompositions of 832 generally made a much better attempt at this question. Nearly 60% of students scored full marks here.

Question 5

Nearly 80% of students scored full marks here. Of those who didn't score any marks at all, the majority made simple sign slips or treated the vectors as fractions.

Question 6

Nearly half of the students failed to appreciate that the selling price of £450 included the profit of 20%. So, instead of calculating $\frac{450}{120}\times 100$ many simply calculated 20% of £450 (= £90) and either subtracted this value from £450. Indeed, the erroneous answer of £360 proved nearly as popular as the correct answer of £375.

Question 7

Three-quarters of students scored full marks on this question. The majority of those students who scored no marks at all was as a direct consequence of using the formula for the area of a sector rather than arc length. Curiously, some students attempted to use the radian measure formula but with limited success as it was rare to see that 12° was converted correctly to $\frac{\pi}{15}$ radians.

Question 8

The vast majority of students correctly gathered the terms in *x* on one side of the inequality and the constant terms on the other for the method mark. Where about a quarter of students then went wrong was in correctly handling the inequality sign where a negative was involved. In particular, the correct statement of $-7x<14$ was often followed by the incorrect statement of $x<-2$. Centres should be mindful of this and reinforce the correct process with future students.

Question 9

A poorly answered question with just over half of the students scoring no marks at all. Most students seemed to realise that they needed to equate two products of two lengths but often the wrong lengths were chosen. In particular, a popular, but incorrect method was writing down $3\times AB=4\times 5$. For those students who did successfully determine *AB* = 9 cm, they unfortunately earned no marks until 3 had been added.

Question 10

Nearly two-thirds of students scored full marks on this question. Of those who were unsuccessful, many simply divided 1980 by 180 giving the incorrect answer of 11. A small minority of students clearly misread the question by assuming that the number of sides of the polygon was 1980 and the polygon was regular. Subsequently an attempt was made to determine an interior angle and scored no marks at all.

Question 11

Whilst part (a) was done well by the majority of students (88%), the remaining two parts were more of a challenge and only half the students correctly identified the shaded regions in parts (b) and (c).

Question 12

The attempts at this question broke down into three nearly equal groups. About a third of the students did not know where to begin. Of the remainder, about a half seemed to know how to find the cost of one kg for at least one of the days, but then simply subtracted their two fractions. As a result, $\frac{9}{50}$ was a common, but erroneous, answer. Just over 30% of students scored full marks for this question.

Question 13

Just over half the students scored zero on this question. Many simply either did not write down anything, wrote down $\frac{1}{6}\times\frac{1}{6}$ or wrote down $\frac{4}{6}\times\frac{2}{6}$. In the case of the latter fractions the student was undoubtedly thinking that the number on the spinner represented the numerator of the probability fraction. Those students who tackled the question by using a complete sample space or a subset of the sample space fared better and, as a consequence, just over a third of students scored full marks.

Question 14

The majority of students struggled to score on this question particularly on parts (a) and (b) where two thirds of students scored zero. Students would have fared much better if they had started with three intersecting sets in a Venn diagram. Indeed, the elements for *A*, $A\cap B$ and $A\cap C$ could readily be place on the diagram. Given that the sets *B* and *C* both contain four elements, the remaining two elements, *q* and *s*, could then be placed in $(B\cap C)\cup A'$. The three answers could then be read directly from the diagram.

Question 15

This matrix question was done well on the whole - most students knew what to do and it was a matter of careless arithmetic work that led to a loss of marks rather than a failure to understand the principles of matrix manipulation. Just under 60% of students scored full marks on this question.

Question 16

Nearly a quarter of the students did not seem to know how to properly construct the locus of points which are equidistant from two given points. Of those who failed to score, one pair of arcs plus a measured midpoint of *AB* seemed to be sufficient. As an incomplete construction however, the method scored no marks. Of those who did provide the correct construction, the majority went on to identify and label the point *P* correctly. The measurement of the required angle proved to be a challenge to a significant number of students. Measuring the wrong angle or giving an answer outside of tolerance $(55\pm1^{\circ})$ meant that the final mark was lost. As students were asked to measure this angle, evidence of a trigonometrical method also lost this final mark. Overall, about a third of students scored full marks here.

Question 17

The vast majority of students correctly expanded the brackets to earn the first method mark. Only about half the students who got this far then knew that they needed to compare coefficients. The most common mistake was to express *a* and *b* in terms of each other and *x*. Whilst 85% of students earned the first mark, only half of these students went on to score full marks.

Question 18

Incorrect geometrical assumptions about the diagram proved to be the downfall for a significant number of students. Of these erroneous assumptions, $\angle ADC = 110^\circ$, *CD* being parallel to *BA*, and *CA* bisecting $\angle BAD$ proved to be the most popular. It was pleasing to see that for those students who did find the correct required answer, the vast majority gave at least two correct geometrical reasons and, as a consequence, just under half the students scored full marks.

Question 19

This was a standard simultaneous equations question and, as always, students seemed well drilled in the methods of elimination or substitution. This is one of the questions where a student can (and should) check their answers. A simple check here would have enabled some students to overcome their earlier arithmetical slips. Without these checks, just under 80% of students scored full marks.

Question 20

Compared to previous years this question on variation was done surprisingly well. The vast majority of students found *k* correctly. At this point, the challenge for a significant number of students was in re-arranging the expression to find *x*. Students often got this correct by knowing how to calculate the value rather than expressing it. Students who did not score the final mark almost never scored the 2nd M mark as they were unable to write the correct cube root symbol or they ignored the negative and just wrote $\sqrt[3]{64}$. Two-thirds of students scored full marks on this question which is a significant improvement on similar questions in previous examinations.

Question 21

This question proved to be quite a challenge to a significant number of students. Indeed, nearly 40% scored zero whilst only 33% scored full marks. Many students failed to achieve the required expressions in parts (a) and (b) with a small number of students even feeling they needed to solve an equation to gain a numerical answer for these two parts. Those who did manage to gain the correct expressions in part (a) and (b) often went on to achieve full marks in (c) with the only common mistakes seen being to assume a difference of 18 taken the wrong way around or that one term was 18 times the other.

Question 22

This question provoked a variety of responses with twice as many students scoring zero as scored full marks. In part (a) many students failed to factor in the difference in units. As a consequence, a very common incorrect answer seen was 1:5.2. In part (b) many students failed to realise that in order to convert units for area the **square** of the standard conversion factors are needed. It was often seen that the best answers to (b) involved using $\frac{676}{5.2^2}$ directly rather than their answer from part (a). Just over one-fifth of students scored full marks on this question.

Question 23

80% of students score at least two marks on this question. Of the 20% who scored less than two marks, either an elementary sign slip was made in arriving at a trinomial quadratic equation or there was a poor attempt to substitute into the quadratic equation formula. 60% of students would have scored full marks but for the fact that many negative solutions to the quadratic were given as -0.55 rather than -0.552. It seems that the problem of significant figures where zeros are involved is a recurring theme (see Question 1) and it is a topic which centres would be well advised to focus on for future examinations. Just under 40% of students scored full marks.

Question 24

This question proved to be quite a discriminator. Part (a) was generally well done with many correct answers seen. In part (b) a common exponent needed to be considered rather than just simply subtracting 1.2 from 8. A typical, but erroneous, response to this part was 6.8×10^{n} which earned no marks and was seen on a majority of scripts. Students fared slightly better with the method for part (c) however, one significant issue was where students who failed to realise that the mantissa of a number in standard form must be between 1 and 10. As a consequence, 0.15×10^{-1} earned (M1)(A0). With only 10% of students scoring full marks and with a mean mark of under 3, this proved to be quite a challenging question.

Question 25

Although one-sixth of students simply did not know what to do, the majority of students correctly differentiated in part (a). In part (b), a significant number of students set their $v = 0$ although a minority differentiated again, effectively setting $a = 0$. Of those who did set $v = 0$ the vast majority calculated t correctly and substituted back in the original equation for s to find the distance travelled. Despite working out a correct value of t, a small minority of students did stop at that point and, as a consequence, lost the final two marks. Just over 40% of students achieved full marks on this question.

Question 26

Part (a) was better answered than part (b) where, on a minority of scripts, the car's journey was incorrectly drawn from Tower Bridge to Folkestone. Part (c) however proved to be a challenge to many students. Whereas the correct distance of 90 km was used, one and a quarter hours was written and used as 1.15. As a consequence 78.2 km/h proved to be a popular, but erroneous, answer. An incorrect conversion of hours and minutes to a decimal has been a problem in past papers and is something that centres need to address with future students. Students fared better in part (d) with the vast majority reading off the correct distance from their graphs. Just over a quarter of students scored full marks on this question.

Question 27

Parts (a) and (b) were not answered at all well. In part (a), a single value was often given rather than an interval or an incorrect interval appeared with no apparent working. The fundamental errors in part (b) included simply adding the number of trees and dividing by 4 or using either the end value of the class or the class width instead of the mid-point to multiply by the frequency. More students scored zero on these two parts than got full marks. Indeed, the majority of students scored one or zero here.

In part (c), many scripts were left blank and 40% of students scored no marks at all for this part. For those students who appreciated that the area of each bar was proportional to the frequency the three marks were straightforward. Just under half the students scored all the marks for this part of the question.

Question 28

Despite some students writing down the incorrect equation, $\tan 20 = \frac{BC}{3}$, the majority of students did get part (a) correct. To find *AD* however in part (b) proved to be quite a challenge for many students. The expected methods centred around finding the length of *AB* first and then using tan 50, or finding the length of *AE*, the angle *AED* and then using the sine rule. Whichever method was used, it was essential to find a useful angle. A significant number of students simply focussed on lengths and did not determine any extra angles. Such students did not progress far in this part of the question. As a consequence, just over half the students score two or fewer marks in total. About 30% of students scored full marks.

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