Examiners' Report

Principal Examiner Feedback

January 2021

Pearson Edexcel International GCSE

In Mathematics (4MB1)

Paper 02

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 2021

Publications Code 4MB1_02_2021_ER

International GCSE Mathematics – 4MB1

Principal Examiner Feedback – 4MB1 02

Introduction

Students were generally prepared for this paper and there were some excellent responses. To enhance performance in future series, centres should focus their student's attention on the following topics:

- Expected values
- Difference between proving triangles are similar and congruent
- Solution to quadratic inequalities
- In general, students should be encouraged to identify the number of marks available for each part of a question and allocate a proportionate amount of time to each part of the question. In addition, students should also be advised to read the demands of the question very carefully before attempting to answer. 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.

Report on Individual Questions

Question 1

Part (a) was usually well done. Allowing for one sign error enabled most students to gain the first mark. The majority were able to complete the rearrangement successfully.

Students found part (b) more challenging and many were unable to form an equation in x. Many used c, f and x and did not recognise the link between them. Those that could form an equation either found the correct answer or formed an equation in y and forgot to double this at the end to find the value of x

Question 2

This question was accessible to the majority of students however, few gained full marks. Most were able to convert one of the measurements given correctly and were then able to use a relevant distance divided by a relevant time. The most common error resulted from realising that the distance required to solve the problem was the circumference of the circular orbit and not the radius.

Question 3

This question was generally very well answered. The most common errors included applying Pythagoras incorrectly, by not identifying QT as the hypotenuse. Others tried to apply Pythagoras to the quadrilateral. Many were very adept at simplifying the surd and showed clear working for some the working was minimal. When a question says "Show your working clearly" students should also include the method they used to simplify the surd.

Question 4

On the whole part (a) was well answered. Less successful students need reminding that the sum of each set of branches is 1 and that probabilities cannot exceed 1.

In part (b) many students were unfamiliar with how to find the expected number of games Alan won. Many were able to calculate the probability of Alan winning a game but failed to multiply this by 7. Of those students who understood what was required and achieved the correct answer, many rounded it to 2 or 3, while this did not lose marks if a correct answer was seen students should understand that non-integer answers are acceptable when calculating the expected value.

Question 5

On the whole very few totally correct answers were seen for this question. In part (a), the majority were able to score at least one mark for placing x and y correctly. Un-simplified answers were often seen for $x-4, x-3$ and $3+x$

In part (b) students generally understood the need to show that the sum of the elements in their Venn diagram should equal 1200 but gaps in the Venn diagram or poor algebra lost them this mark. When the Venn diagram is used to represent the numbers of items in the subset the number 0 should be entered in the relevant regions.

There was very little understanding shown of what part (c) was asking. Most focused on their equation $y = 28 - x$ from part(b) but few went on to consider other values from $24 - x$ etc and little evidence of reasoning, such as the number in each subset must be greater than or equal to zero, was seen.

Part (d) was again poorly answered with few correct answers seen. Follow through marks were awarded to a few students who identified the correct regions of the Venn diagram needed to form the probability. A number of answers included denominators not equal to 100 or giving value greater than 1 showing a lack of basic understanding that the question was to do with probability.

Question 6

Most students scored some marks for part (a) with the most common error being forgetting to change the inequality sign when multiplying by –1. Most were then able to plot their inequality correctly onto the number line.

In part (b), students were generally able to solve the quadratic successfully but failed to use a method to identify the inequalities required in their answer. The most successful students sketched a graph to decide which the required regions were.
In part (c) only the better students were able to gain any marks as the answer to part (b) needed to be in the correct form.

Question 7

This question proved very tricky for most students and those who did score well often used very clunky, inelegant solutions. A common error was using direct proportion rather than inverse. For those that did start correctly and gained the first M mark there was difficulty in seeing how the two statements could be combined through substitution. The other major difficulty was to realise the two constants could be expressed as one combined. This led to very complicated algebraic statements. Those that did manage to find a correct value for the constant were often unable to progress further as their combined statements were so complicated they were unable to substitute for *a* or *c* correctly.

Question 8

Parts (a), (b) and (c) were generally well-answered. Some students struggled to find the area and tried to use random incorrect formulas but most were successful here using a variation of area of a triangle or kite, trigonometry or by multiplying the diagonals

In part (d) students need to ensure they are labelling angles appropriately and accurately. Some attempted to show that triangle *ABC* was similar to *ADC*, so they must ensure they check the labelling carefully. A common misconception was to pair AE with AC rather than calculating the lengths/angles and pairing appropriately.

Question 9

Part (a) was an easy first mark with most students gaining the mark.

In part (b) the reflection in the line $y = -x$ was often incorrect, either because the student misunderstood the line of reflection and instead used one of the axes, or because the student did not know how to reflect methodically in a diagonal line.

Triangle *C* was well attempted and most students managed to multiply the matrices correctly (possibly using a calculator in many cases).

Plotting those points form part (c) for part (d) was then straightforward for most.

In part (e) if triangle *C* was incorrect their answer would often contain references to rotations and as this could be answered independently was awarded no marks. For those sho knew it was a reflection the most common error was mistaking the equation $x = 0$ for the *x*-axis.

Part (f) was poorly answered and few gave a reason involving geometry. The most common reason given by students was finding the matrix of reflection and squaring to give the identity matrix.

Question 10

Student who attempted this question were usually able to make progress in part (a)

In part (b) students demonstrated that they knew what they needed to do and many were able to find a relevant vector and prove one was a multiple of the other. A minority did not give the conclusion that this means *O*, *P* and *N* are collinear.

Very few made any attempt or worthy attempt at the part (c). There were numerous calculation and conceptual errors throughout the question. It is vital students are aware that if they work with *BA* rather than *AB* then the vector must be negated.

For those who did gain success they used the length of *BM* to find the length of *OP* rather than using the direct method.

Question 11

Most students were able to work out the points and from there, a high proportion were able to plot them accurately onto the graph. There were a very few students who used straight line to join their points or used excessive feathering - most were able to draw a smooth curve.

The majority of students who attempted part (c) were able to read off the values from their graph accurately.

In part (d) few students realised that $f(x)$ represented the gradient of the curve *C* so did not realise they could look at the gradient of the curve before and after the turning points. The most successful students in identifying which point was a maximum and which point was a minimum, of which there were few, found $f'(x)$

Question 12

Many students were able to gain full marks in part (a). The most common incorrect answer was to give the split of the dolls as 750 small and 250 large with some also getting these the wrong way around.

In part (b) there was a large variation in responses. Students should consider the layout of their work. Often their calculations were written as an added extra amongst other irrelevant information and as a consequence then got lost or forgotten in their later calculations. The most common error was to omit or incorrectly use the 100 euro shipping cost. A significant proportion of students showed poor knowledge of percentages and incorrectly found 40% by multiplying prices by 40/100 when attempting to reduce prices by 60%.

In part (c) many students found the profit margin, rather than the percentage profit.

Part (d) was unrelated to all previous parts. Students should realise that when a question says "State…" that no calculations are needed. Some students recalculated the percentage change in Forints to check whether it was the same, rather than just think logically about their answer. This then drew a mixture of responses.

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