Pearson

Examiner Report

Principal Examiner Feedback

January 2017

International GCSE Mathematics
A (4MA0) 3HR

edexcel

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 2017
Publications Code 4MA0_3HR_1701_ER

Principal Examiner's Report
International GCSE Mathematics A (4MA0)

Introduction to Paper 3HR

Students who were well prepared for this paper were able to make a good attempt at all questions.

Working was generally shown but it was not always easy to follow through. When questions require that students 'show clear algebraic working' it is essential that these instructions are adhered to. Failure to do so can result in no marks being awarded even when a correct answer is given. Take care when multiplying two term brackets by a negative value as this often results in mistakes.

Report on Individual Questions

Question 1

Students find it difficult to convert units squared and this conversion from m² into cm² was no exception. The most common incorrect answer being to multiply m² by 100 to give cm².

Question 2

This question was answered successfully by about three-quarters of students. Incorrect responses showed muddled working including finding the angle of a regular 18 sided polygon, $180 \div 18$ and incorrect formulae that was probably meant to be working with
$(2n - 4) \times 90$.

Question 3

About three-quarters of students gained the correct answer for this question. Those not getting the correct answer sometimes picked up a mark for one correct coordinate or the coordinates written in reverse. Some students were getting mixed up with formulae for the gradient and the midpoint and usually ended up giving coordinates that came from subtracting the x values and subtracting the y values.

Question 4

There was a pleasing number of correct responses for this question and many students realised that 13 hours 15 minutes is 13.25 hours. Those that used 13.15 hours gained a mark if they divided distance by this time. Some students attempted to work in minutes but often forgot to multiply a speed in kilometres per minute by 60 in order to give the speed in the units given.

Question 5

A good number of students gave the correct answer for this ratio/percentage/fraction problem. Those that didn't sometimes got the percentage and/or fraction that were taken out of the bag mixed up with the fraction or percentage that remained in the bag. A few students failed to divide the counters in the ratio 3:1 as a necessary first step, finding 15% and $\frac{1}{5}$ of the total number of counters rather than just those of the appropriate colour.

Question 6

Part (a) of this transformation question was done well, with most students recognising that it was a reflection. Most got the correct line of reflection as $y = -1$ but some put $x = -1$ and a few

thought that it was reflected in the x axis and then 'moved' down; as a single transformation was asked for, anything in addition to a reflection scored no marks.
Part (b) was done well, with just a handful of students not gaining full marks; many of these gained 1 mark for a 90° clockwise (rather than anticlockwise) rotation about (0, 0) or an anticlockwise rotation about the wrong centre and therefore with the correct orientation.

Question 7

For a large number of students, drawing the straight line graph of $y + 2x = 6$ was a well-practised skill and they were rewarded with 4 marks. A handful gained 3 marks for a partially correct line or for plotting the points correctly but not joining them; the award of 2 marks or 1 mark was equally rare. The students who gained no marks for this question often plotted a few incorrect points often involving 2, 6, −2 and 4 (numbers taken from the equation and from the range of x values asked for in the question).

Question 8

(a) It was surprising how many students did not get this seemingly straightforward scale question correct. Many saw a ratio 1:8 and thought that 224 should therefore be divided by (1 + 8). Several also multiplied rather than divided by 8.
(b) Many students were able to give the correct percentage increase and gain 3 marks. Some were able to pick up 1 mark for getting a correct increase of 112, but then were unsure what to do. Some showed the method of $\frac{523}{411} \times 100$ and then forgot to take away 100; they were awarded M1.
Some students failed to read the accuracy required and gave the answer of 27 rather than 27.2; these students gained 2 marks but lost the final accuracy mark.

Question 9

There were very few incorrect answers to part (a).
For part (b), many students showed good method but failed to read the question carefully and continued to find the mean thereby losing the final accuracy mark. A few students multiplied by the lower bound or the upper bound of the classes rather than the mid-point; these students gained a method mark. A few multiplied every frequency value by 10 (the class interval) and therefore gained no marks.

Question 10

While a good number of students gained full marks for this question it was disappointing that several did not realise they needed to first find the perpendicular height of the triangle before finding the area. Pythagoras' theorem was generally used by those who spotted the most efficient way of working out the area. However, some students chose to use the cosine rule to find an angle and then to use Area = ½absinC. Others also formed a right angled triangle and found an angle and then used this to find the height. A few students got all the way to finding the height and then got mixed up with the formula as they had used half of the triangle to find the height and then incorrectly used 0.5 × 7 × 16.58.. And failed to double it, so giving just half of the area.

Question 11

(a) This was generally done well by the students taking the higher paper. Most saw the most efficient way of adding the two given equations, but a number multiplied and subtracted to eliminate x and some used the method of substitution.
(b) This was almost always correct and any errors due to the directed numbers involved.
(c) Students found this question very challenging and while we saw a pleasing number giving a correct answer, there were several who really struggled with the power of minus one-third and

found it hard to make any progress. The mark scheme broke the award of marks down into 'dealing with simplifying the powers of y', 'dealing with the negative power', and 'dealing with the power of one-third' and many were able to gain one mark, usually for dealing with simplifying the powers of y. A good number gained 2 out of 3 marks for 2 correct values from the correct answer.

Question 12

This cumulative frequency question had a pleasing response with many students gaining full marks. A few plotted the graph at the lower end or mid-point; as long as this was consistently done, we awarded 1 mark and the student could gain follow through marks in parts (b) and (c). Most could give the correct median if they had drawn a correct graph. For part (c) a few gave the number of people who waited less than 1.5 hours at the airport, rather than waited for more than 1.5 hours; care must be taken to read questions carefully.

Question 13

This standard form question was well done with the majority of students giving the correct answer for part (a). Part (b) was frequently correct and those who did not gain full marks often gained 1 mark for 20.15×10^9, the correct number but not in standard form.

Question 14

A pleasing number of students gained full marks for this compound interest question but some used simple interest and gained just 1 mark for finding 1.8% of 9000. Dealing with 1.8% caused some students issues and they were seen using the multiplier 1.18 rather than 1.018

Question 15

Many students had a good amount of success with this question. Some students gained just 3 marks as they did not show they understood which value in $y = mx + c$ related to the gradient. Other students who did not know what was entailed to show whether the lines were parallel showed spurious working and did not often make progress.

Question 16

This question had a pleasing response with over half the students taking the paper gaining full marks across the two parts. When (a) was incorrect it was generally due to getting signs confused when dealing with $-5(x - 4)$ and giving $-5x - 20$ rather than $-5x + 20$.

The most common mistake made for part (b) was not gathering the terms in p together and incorrectly giving $p =$ an expression with p remaining in it. Many, however, did gain 1 mark for multiplying t by $3p + 1$, those that did not usually failed to show brackets around $(3p + 1)$.

Question 17

Usually students gained either 3 or 0 for this question. Incorrect answers usually came from adding the dimensions or using and making incorrect statements, e.g. 12 + 4 = 3 + RX or $\frac{12}{4} = \frac{RX}{3}$.

Question 18

Many students struggled with this question and we also some blank responses were noticed. We did see a fair number of correct responses, and some where good working was shown and a small slip resulted in 2 marks being awarded. 1 mark was awarded for multiplying the numerator and denominator by $\sqrt{p^3}$ or for writing all values of p as indices – many students who weren't entirely sure what to do benefitted from this mark.

Question 19

Parts (a) and (b) were generally well done. Part (c), finding the inverse function of f was often started but sometimes not fully completed or the answer was given in terms of y rather than x. Students tended to get as far as $y(2 - x) = 3$ or $x(2 - y) = 3$ but then got confused. Part (d) was often awarded 1 mark for the correct substitution of $\frac{2x+1}{3}$ into f(x) but a problem then arose as after multiplying each term by 3 students needed to simplify, and the minus sign on the denominator caused problems.

Question 20

Around half of the students taking this paper were awarded full marks for this question. Those that weren't very often gained 2 marks for part (a), showing they know how to differentiate. For part (b) common mistakes were to work as though looking for the coordinates of a turning point, i.e. putting their part (a) = 0 rather than 1. Some students substituted $x = 1$ into y. Students who correctly worked out x sometimes continued to work out y which was not required. We ignored any attempt to find the y values, but students would have incurred a time penalty for doing more than was asked in the question.

Question 21

This question had a very mixed response and was a good differentiator at the top end of the grades. Many students were seen using $\frac{1}{2}ab\sin C$ to find the area of triangle OAB and for this gained 1 mark. Students often failed to realise they needed to find the side OB to enable them to find the area of the sector and if this happened they gained no more marks. A few failed to recognise the triangle as non-right angled and incorrectly used Pythagoras' theorem or trigonometry.

Question 22

As this was a more advanced probability question, the response was pleasing. Several students were able to pick up marks for method, and in particular the mark of 3 was awarded frequently where students thought there were 6 combinations of 2 sweets the same colour rather than 18. Some students worked with just two sweets and scored zero. A few didn't realise that this was non-replacement probability and were awarded a maximum of 3 marks for their working. Some students who did realise it was non-replacement, reduced the numerator but not the denominator or vice versa and this resulted in no marks as it was inconsistent.
More students thought of combinations such as lemon, lemon, strawberry and lemon, lemon, orange rather than lemon, lemon, other flavour.

Question 23

Those students familiar with vectors scored at least one mark and usually two in part (a). Part (b), however, proved only to be accessible to those likely to achieve the top grade. Some understood the need to find an expression for a pair of vectors from $\overrightarrow{BP}, \overrightarrow{PD}, or\ \overrightarrow{BD}$ but found them quite difficult to work out correctly. Those that got them correct frequently stated that this showed BPD was a straight line when it clearly didn't.

Summary

Based on their performance in this paper, students should:

- Remember that a cumulative frequency graph should have plots at the ends of the class intervals;
- use brackets around two term expressions in algebra and when calculating with negative numbers;

- Note that a single transformation means only one should be described and any more will result in no marks being awarded;
- Not get mixed up with the formula for gradient and mid-point between 2 coordinates;
- Ensure questions are read correctly so you don't do more than is required and either lose marks or end up with a time penalty because you have spent time doing work that is not required;
- Ensure that in time calculations you remember that, for example, 13 hours 15 minutes is equal to 13.25 hours;
- In probability, note when questions are referring to replacement or non-replacement and be consistent with your working.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

http://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

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