Examiners' Report
Principal Examiner Feedback

January 2018

Pearson Edexcel International GCSE
In Mathematics A (4MA0) Paper 4H

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 2018
Publications Code 4MA0_4H_1801_ER

Report for 4MA0 paper 4H January 2018

Introduction to paper 4H

In general, students found this paper quite accessible, althoug some of the questions at the end of the paper very challenging, particularly question 20 on indices and powers of 2. This proved to differentiate between the very best students.

Students tended to show adequate working in most cases, especially those algebraic questions where it was requested.

Some students did not read questions carefully enough and so did not give the required answer; this was particularly true for q9(c) where they were presented with a grouped frequency table and asked to find an estimate for the total number of minutes, in many cases the mean number of minutes was given instead.

Report on Individual Questions

Question 1

This question is typical of the ones that have been set previously and for many students it was a nice start to the paper with full marks gained. Some omitted the $T =$ and lost one of the marks. Sometimes $T = c + r$ was seen, which was awarded one mark. A few students lost the final mark for incorrectly combining the terms in their expression. While most understood what was required here, some students attempted to use numerical values to try to work out an actual cost.

Question 2

While many students knew how to find the time taken when given the distance travelled and the average speed, many did not know how to convert 0.3 hours into minutes. This was regularly interpreted as 30 minutes, 3 minutes or 20 minutes (from assuming that 0.3 equals 1/3). 3hours, 198 mins was seen on a few occasions as was 3.3 hours and 198 mins as if students were confused about what was being asked as the final answer. A few used a partitioning method of 165 into $3 \times 50 + 15$ but they generally did not understand what to do with the remaining 15

Question 3

Division of two fractions in part (a) was well known by many, both by multiplying by the reciprocal and by writing the fractions with a common denominator and showing division of the numerators. Where one of these methods was applied, a mark was often lost by not showing the interim fraction. Some showed the method of multiplying by the reciprocal and cancelling first which gained full marks.

Overall students in part (b) found the subtraction of two mixed numbers more challenging than the division but a pleasing number of correctly worked responses were seen. Where full marks were not scored, one mark was often awarded for the initial step, most often that of converting both mixed numbers to an improper fraction. Using a common denominator could gain credit either for the first method mark or the second. As with part (a), a mark was sometimes lost by not showing sufficient working and interim fractions.

Question 4

Finding the position of a point on a scale drawing given the distance from one point and the bearing from another proved challenging for some students, although correct responses were seen regularly. Working out the required distance from the scale given was the best attempted part, with a mark awarded either for seeing the correct measurement written or from evidence on the scale drawing of the correct distance. Some had calculated the required distance but then ignored this knowledge when plotting D. There were fewer successful attempts at showing the direction of the required point, some from not understanding the concept of bearings and some from not working sufficiently accurately. Quite a few gained two marks by knowing distance and bearing but were unable to combine these successfully. A high number of apparently randomly placed points was also seen and blank responses were not uncommon. A proportion of students gave a point that was on the correct bearing from C, but with the 5.5cm measured from C. This gained two marks if 5.5, was stated, but only 1 mark if it is omitted.

Question 5

Given the diameter of a circle, students were asked to work out the circumference and the majority were able to do so. Common errors were to calculate π × radius or 2 × π × diameter or to find the area of the circle.

Question 6

The responses here showed a good knowledge of rotation, with many images rotated correctly for both marks. One mark was scored regularly for an image rotated about the wrong centre and sometimes for an anticlockwise rotation. Those students who did not understand rotation often drew a randomly orientated congruent image – blank responses were quite rare.

Question 7

Given that the probability of taking a red counter from a bag was 1/12, a fair number could work out that the probability of taking a blue or white counter was 11/12 – this could be expressed in this form, as a decimal or by two fractions that added to 11/12 and gained the first method mark. However, this was as far as some could progress, other than assorted attempts using trial and improvement. Some did not realise that this value needed to be divided by 4 to find the probability of taking a blue counter, given that the probability of white was three times that of blue; dividing by 3 was often seen. However, there were students able to work this through, giving either a fully correct answer written in an acceptable form for three marks or arriving at 2.75/12, which gained both the method marks.

Question 8

Part (a) required students to reduce 62 million by 14.5%, which many were able to do. A common error was simply to find 14.5% of 62 million and give this as their answer. or to add this figure onto 62 million. Too many students assumed they needed to write 62 million out in full before starting the percentage calculations and made their working unnecessarily complicated, and sometimes incorrect due to the wrong number of zeros. If they were consistent with this error, their final answer was often able to gain two of the three marks. As often is the case, students lost method marks for writing, for example, 62 × 14.5% and gaining an incorrect answer; students should be encouraged to write percentages as decimals or numbers over 100

Part (b) asked for a percentage decrease and many students began by working out the difference between the values for one mark. Where this was then used with the original value and changed into a percentage, the further marks could be gained. Alternative acceptable methods could also gain full marks but this was the method seen most often. Some students lost marks as they only worked out the percentage and not the percentage decrease, forgetting to do the subtraction from 100.

Far more correct answers were seen in part (c), for the total number of minutes calculated from grouped data given in a table. Correct use of the midpoints and the sum of the products led often to the correct total, although a noticeable number of students penalised themselves by going on to calculate the mean. Using a point within the class intervals other than the midpoint allowed some students to gain one method mark. Giving the sum of the frequencies, the sum of the midpoints and multiplying the frequencies by 10 were responses seen.

Question 9

Many students were able to give a correct list for part (a), although it is clear that some got mixed up with set notation signs.

Asked in part (b) if 20 was a member of set A, many students wrongly stated that it was, because it was an even number and set A was even numbers; the error here was failing to recognise that the universal set contained only the numbers 1 to 12. A variety of explanations that did indicate why 20 could not be in set A gained credit. Some thought 20 could not be a member because of the sum of Set A's members

Finding exactly three correct members for a set C, given various conditions, was quite successfully answered, although many responses could only gain one of the two marks available; this occurred where they gave more than three values, all of which were potentially acceptable, or they omitted the essential 7 or they gave two correct values with one incorrect.

Question 10

(a) Most students successfully factorised the expression.

(b) Again, most students could correctly expand the given factorised expression.

(c) The simplification of an expression with indices produced a good number of fully correct solutions for two marks and partly simplified expressions for one mark. The main error seen was the multiplication and division of the indices, rather than the addition and subtraction which was required.

(d) Expanding two brackets and simplifying the expression is clearly a familiar topic for most students, who scored either both marks or one mark for the expansion without correct simplification. Most often it was the positive and negative signs that was the problem but incorrect combining of the terms also occurred.

(e) A fully correct solution was seen quite regularly, and if not fully correct, a partially correct factorisation with at least two terms outside the bracket gained one mark and this was awarded to quite a few students. A number of students attempted to combine the expression instead of factorising it giving an incorrect answer of $63p^8m^3$

Question 11

If students realised they needed to find the unmarked side and this could be done by the use of Pythagoras' theorem, they generally gained full marks. Several students made incorrect use of Pythagoras' Theorem and added the squares rather than finding a difference, and so lost all marks. Sadly, some students did calculations with the three given measurements and gained no marks. A small proportion found the length 7.5 by correct Pythagoras and then added correctly the area of the triangle and rectangle, gaining full marks for this. Several also wrongly applied the formula for area of a trapezium.

Question 12

On the whole this question was very well attempted, with many students gaining full marks. The most common mistake in (a) was to forget to subtract the reading from 80 and in (b) to misread the horizontal scale. Attempts at the interquartile range rather than the median were seen.

Question 13

(a) This question was well attempted and most students scored full marks. If they got mixed up with the LCM and HCF, they were generally able to pick up a method mark for writing the numbers as a product of prime factors.

(b) This question gained a mixed response as students are generally happier with finding the HCF when they are given two actual numbers rather than two numbers written as prime factors.

Question 14

Most students gained the mark for (a) as they could calculate the missing two numbers in the table.

Part (b) was fairly well done, but errors sometimes occurred in plotting as 1 small square represented two units vertically. Also the decimal values in the table confused some students.

Part (c) was poorly done with many students leaving the answer blank. Some students had drawn a completely new graph to find their estimate, but the majority drew the line $y = 15$ and read off from there. Some students were able to give a correct answer without a line on the graph.

Question 15

This type of question regularly appears on this examination papers for this specification and many students were very familiar with what needed to be done, gaining full marks. A few left the proportionality sign in and gained two marks if everything else was correct. As the constant term was $\frac{2}{5}$ or 0.4, we saw many different forms of the answer and allowed all that were correct.

Question 16

(a) The majority of students were able to use the formula for the area of a triangle and gain full marks for this question.

(b) Several students realised that the cosine rule was needed to find the length of *KL* and worked through this to give a correct answer. Some students did not get the order of operations correct in the cosine rule and a few forgot to find the square root. A number of students gave an answer that was outside the allowed range, eg 23.3. This was presumably down to intermediate rounding of cos109. With full working this could gain two of the three available marks.

Question 17

(a) It was common to see a completely correct answer for this differentiation.

(b) A lot of students struggled with the second part of the question and appeared not to realise it was linked with the first part. Some simply substituted $-\frac{27}{2}$ into the equation for **C**. Most of those who formed the correct quadratic then went on to gain full marks in the question.

Question 18

(a) We saw several correct answers but many were confused as to what they needed to do. Some found the vector $\overrightarrow{AD}$ and some just added the numbers in the given vectors. It was pleasing that most remembered to give vector brackets as part of their answer.

(b) This part of the question was puzzling to many and few completely correct answers were seen. A few students tried to draw out the vectors but a lack of squared paper usually meant their efforts did not result in the correct answer. A number of students were able to gain one mark for one of the correct coordinates.

Question 19

(a) The majority of students were able to complete the tree diagram correctly; those that could not often gained a method mark for completing 'Naveed wins' on the lower left branch.

(b) Many correct answers were seen to this part, and many only gained one mark as they considered only one of the ways that Mary wins exactly one game.

(c) This part of the question caused students more problems than the first two parts. Many used replacement probability and others added probabilities or did calculations with numbers and not fractions. Some mixed replacement with non-replacement with calculations such as $\frac{3}{10}\times\frac{2}{10}$ or $\frac{3}{10}\times\frac{3}{9}$.

Question 20

(a) This question caused many students difficulties and several blank or only partially attempted responses were seen. Those students who had some knowledge of negative and fractional powers were often able to pick up at least one mark for dealing with either achieving the correct numbers or powers of the letters. An expression with a stage missing, usually simplifying the final answer gained two marks and a fully correct expression gained the third mark. The range of marks was fairly well distributed.

(b) A number of poor attempts at this question were seen with many failing to realise that writing all the values as powers of 2 meant an equation could be obtained. A method mark was available for writing either 8^x or 4^n as powers of two or combining the powers on the LHS to a single power of 2. Some who were able to do this then failed at the next step they divided subtracting the the powers 2 on the right hand side of the equation instead of subtracting them or multiplied those on the left hand side of the equation.

Question 21

The most common mark for this question was one and this was for giving an upper or lower bound for one of the values. Many students failed to get to the next step of using the correct lower bounds and the correct formulae for the total surface area of the cone. Students had to find the value of k where $k\ \pi$ was the total surface area. It was common to see the value of k being given where it included the value of π. One of the main errors here was to halve the diameter, then take the lower bound of 3.4 when rounded to one decimal place. Use of 3.35 as the lower bound of the radius instead of 3.375 was not uncommon.

Question 22

A simultaneous equation with a quadratic involved is quite a common question on examination papers for this specification, and so for students who have been practicing such equations this proved to be no problem. There were several attempts, however, that showed a lack of knowledge or understanding of what was required. Students in some cases squared an equation by simply squaring each term e.g. $y = 3 – 2x$, so $y^2 = 9 – 4x^2$. Some fairly successful students found the x values but seemed to forget about the y values, and some did not pair their values which meant that the last mark was withheld.

Summary

Based on their performance on this paper, students should:

- read questions carefully, ensuring they give the answer required
- know the meaning of the recurring dot on a calculator
- practice expanding expressions such as $(3 – 2x)^2$
- practice work on fractions, and in particular, showing each stage of their working
- avoid prematurely rounding answers in multi-step calculations