Pearson Edexcel

# Examiners' Report
# Principal Examiner Feedback

## January 2019

Pearson Edexcel International GCSE
Mathematics A (4MA1) Paper 1HR

## 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

## Grade Boundaries

Grade boundaries for all papers can be found on the website at:
https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

January 2019
Publications Code 4MA1_1HR_1901_ER

## 4MA1 1HR January 2019 Principal Examiners Report

Students who were well prepared for this paper were able to make a good attempt at all questions. It was encouraging to see some good attempts at topics new to this specification. Of these new questions, students were particularly successful in the question assessing the expansion of three linear expressions

On the whole, working was shown and easy to follow through. Although a calculator was available for the paper, most students made a clear attempt to show the steps of their methods which led to potentially more marks being awarded.

Questions 12b and 13c were both reasoning questions and it is clear from the responses seen that this cohort could do more to improve their understanding of these types of questions.

1 The first question on this paper was a familiar one for the students. This was evidenced in the fact that the majority of them scored 3 marks, with most choosing to convert to improper fractions and find a common denominator of 12. Of the few students who did not gain full marks, most did pick up 2 marks but failed to come to an adequate conclusion i.e. they did not finish their solution with $4\frac{5}{12}$ .

2 This ratio and fraction question was answered well with almost all students able to pick up marks. A large number of the cohort picked up the first 2 marks for a correct method to find the number of girls or boys who play a musical instrument; some went straight to the total number of children who play a musical instrument (39). Unfortunately some students stopped at this point and did not deal with what the demand in the question was asking – the fraction of the 60 children who played a musical instrument. Many students did take note of this and gave the correct answer of $\frac{13}{20}$ or $\frac{39}{60}$. There were a small number of students who mixed up girls and boys in the initial ratio; in this scenario they were able to pick up the first method mark but then usually failed to gain any more marks.

3 The first geometry question on the paper saw students being asked to use Pythagoras' Theorem twice to find the length *PQ*. It was pleasing to see the majority gain all 4 marks for a fully correct method and answer. For those that did not get full marks, the most common incorrect

answer seen was 7, coming from a failure to correctly input $\left(4\sqrt{6}\right)^2$ into the calculator; these students could still gain 3 marks if they showed their method. A small number of students lost accuracy by expressing some of the surds in the solution as decimals; again 3 marks could be gained if the full method was shown.

4 This question was answered well with a large proportion of the students picking up the full 3 marks. Almost all students gained the first mark for a correct method to find *a*, or for simply writing their value for *a* as 26 on the answer line. For those students who then didn't go on to gain further marks, the most common problem was confusing the median with mean and trying to work backwards to find *b*.

5 Students dealt well with this speed, distance, time problem with a variety of methods being seen. The most common solution seen was to go straight to a complete method e.g. $30.5 \div \frac{8}{60}$; this automatically picked up the two method marks. The most common correct answer seen was 228.75, however 229 and 228.8 were also accepted for 3 marks. Some students lost accuracy as they converted $\frac{2}{15}$ into a decimal and then rounded to 0.13; in this scenario 2 marks could still be gained given that the full method was seen.

6 Students needed to recognise the symmetrical property of an isosceles triangle to make a start on this question and most were able to do so by equating the two expressions for angle *P* and angle *Q*. Once they had reached this stage many of the students went on to reach a correct answer of 34 for *y*. It was pleasing to see all students follow the instructions of the question and show clear algebraic working throughout. There were a small number of students who only picked up 2 marks as they failed to substitute $x = 21$ correctly into a calculation to find *y* and a few students were not able to start the solution correctly, trying to add the three expressions in *x* and *y* for the angles and equate to 180.

7 This scale factors question was answered well with the majority of students gaining 3 marks. A variety of methods were seen but the most common was to use one of the scale factors given in the mark scheme, although some students chose to work entirely in centimetres or entirely in metres. It was common to see solutions go straight to the second line in mark scheme and show a complete method; these students usually went on to the correct answer. Of those that didn't gain 3 marks most picked up 1 mark for a correct scale factor; most then

went on to give an answer in metres rather than centimetres and as a result only picked up the 1 mark.

8 Solving linear simultaneous equations is clearly a strength for this cohort with almost all students gaining the full 3 marks. It was pleasing to see all students follow the instructions in the question and show their clear algebraic working; this especially aided those who did not gain the correct answer as they generally picked up 2 marks for a fully correct method with one arithmetic error in the initial multiplication for the elimination method. There were a variety of methods seen including elimination of $x$, elimination of $y$ and substituting one equation into the other.

9 Part (a) of this question was answered well with almost all students gaining 1 mark. Those that didn't generally gave their answer as an ordinary number instead of in standard form. In part (b) the full range of marks were seen as students who chose to go down the factor tree route struggled to arrive at the correct answer due to the number of steps required in the method. The most successful method was to break 480 and $10^{11}$ down to their prime factors and combine the two for the final answer. Part (c) was a 1 mark question and around half of these students picked up the mark for an answer of 29 296 875. The alternative answer of $3 \times 5^{10}$ was occasionally seen.

10 This area of a semicircle problem solving question provided the full range of marks available for students' responses. There were a good number who managed to interpret the information correctly and arrive at the correct answer of $10\pi$. Some of the students worked with the area of a circle formula but failed to divide by two at any point; this method could still pick up 1 mark. Some students correctly used 6cm as the radius of the larger semicircle but used 5cm for the smaller one, also picking up 1 mark only. There were a small number of students who mistakenly used the formula for circumference instead of area.

11 It was pleasing to see the majority of students gain the full 3 marks on this question. The information was interpreted correctly and many manage to arrive at the correct answer of 4.2. Of those that did not gain 3 marks, a complete method was rarely seen therefore these students generally gained 0 or 1 mark. Some were able to recognise that to calculate the total coins for the boys 12 × 5.5 needed to be done and gained 1 mark; others were not able to make a correct start and tried to work with 5.5 and 18÷8.

12 Part (a) was answered well with a good number of students able to pick up 2 marks. There were a small number of students who misinterpreted the common difference and gave answers of $n + 1$ and $n + 2$ for the

numerator and denominator respectively. There was less success in part (b) where an answer that achieved the full 3 marks was rarely seen. A large number of students recognised that an expression for an odd number needed to be squared; some used $2n + 1$, others used $2n - 1$. The second M mark proved a difficult one to gain, with many students choosing to divide by 4 but evaluating this incorrectly, with $n^2 \pm n + 1$ being seen regularly which could only gain 1 mark. A concluding statement was required to gain the full 3 marks; sadly this was rarely seen even if the student had shown a complete correct method to gain the two M marks.

13 Find the derivative of a polynomial is clearly a strength for this cohort with almost all students gaining 2 marks in part (a). Part (b) again produced lots of fully correct solutions. Some students picked up the first M mark for equating their answer from (a) to zero, but then failed to show their working from then so despite reaching the two correct values did not gain any further marks. Part (c) rarely saw both marks being gained; many students did not show their method for substituting their $x$ values into the original function for the curve **C** and therefore gained 0 marks. Substituting the $x$ values into the derivative was also commonly seen. For those students who did show $x = 2$ correctly substituted and evaluated in the polynomial for the curve, many did not give an appropriate concluding statement e.g. one that explained why (2,0) being a turning point meant the $x$-axis was a tangent to the curve.

14 Part (a) of this question was answered very well with almost all students giving an answer in range for 1 mark. In part (b) it was pleasing to see many fully correct curves; those that didn't pick up 2 marks usually gained 1 mark for at least 4 points plotted correctly. The points that appeared to cause students problems were those at (40, 15) and (80, 85). Part (c) again saw a large amount of success with many students able to gain 2 marks for an answer in range or a correct answer following through from their curve. Common incorrect answers were to only read off one of the medians and give that as their answer (this gained 1 mark) or to try to estimate the mean from the table.

15 Part (a) of this algebra question saw students give a variety of responses. Around half gave the correct answer, of those that didn't a good number did manage to pick up 1 mark for evaluating two terms correctly, usually the algebraic ones. Some students failed to grasp the concept of raising the bracket to a power and gained 0 marks. Part (b) was the most successful part of the question for these students with many picking up 2 marks. It was common to see the correct answer gained and further factorisation taking place – if this was incorrect students lost the A mark. Part (c) saw little success with many students not spotting that this quadratic expression was a difference of two

squares. Part (d) was a 3 mark simplification question and saw a good number of candidates gain full marks. Of those that didn't many picked up 2 marks for factorising both numerator and denominator but were unable to simplify further.

16 The first part of this probability question was answered well with most students who attempted it picking up 2 marks. A small number of students added the two probabilities instead of multiplying. Part (b) threw up more challenges but again it was pleasing to see a large number of students from this cohort gaining full marks. Of those that didn't, it was a failure to recognise that there were two possible combinations for each pair of colours that cost them 2 marks. A small number of students treated the problem 'with replacement'; if done correctly they could gain 2 marks as a Special Case. This was the first question of the paper which saw a number of blank responses.

17 This volume and surface area question proved to be a difficult one for the students. In part (a) some were able to arrive at the correct answer but many failed to include one or both of the circles as part of the surface area for the cylinder. Some also included $\pi$ as part of their expression for $k$. If students didn't gain the correct answer in (a) they could still pick up 2 marks in (b) given their expression for $k$ was in terms of $r$. Of those students who did pick up all 3 marks, some worked in fractions instead of ratios which was acceptable to show the relationship between the volumes and surface areas.

18 This familiar question saw most students pick up at least 1 mark for a correct start to the method, either multiplying by a correct fraction or simplifying the surds in both the numerator and denominator. From there most students went on to gain 1 or 3 marks; those that showed a complete method were able to pick up full marks, those that didn't only 1 mark as to gain the A mark both M marks had to be gained. Students need to ensure they show all steps of their method in these questions in particular when simplifying surds.

19 To work out the size of angle *DCE* in this question students needed to make use of the alternate segment theorem; this became the undoing of a large number of the cohort. Those that did manage to find the size of angle *BCE* or *BDE* often went on to pick up 3 marks for correctly working out the size of angle *DCE*. It was disappointing to see very few students to go on to gain the full 5 marks; it is clear that giving angle reasons is something this cohort need to work on. Some were able to pick up the 4$^{th}$ mark for one correct relevant circle theorem but seeing a full set of reasons relevant to their method was rare.

20 The fact that the cube in this question was not given a numerical length caused issues for a large number of students on this paper. Some were able to pick up the first B mark for identifying the correct angle required; this was usually seen on the diagram. From then on it was all or nothing; some candidates had clearly interpreted the information correctly and went on to achieve the correct answer. Others did not know where to start and their method was incorrect from then on.

21 Considering this 5 mark question is at the end of the paper it was pleasing to see a good number of students pick up full marks. For those that didn't, some picked up at least 1 mark for recognising the cosine rule was required and for substituting the expressions in $x$ and $y$. Mistakes were made in simplifying and rearranging and this was usually where methods went wrong. Approximately half of the students gained 0 marks on this question with either a blank response or an incorrect method. On occasion an alternative method was seen where a perpendicular was dropped from *Y* onto *XZ* and right-angled trigonometry and Pythagoras was worked with, to good effect.

22 This question proved to be a challenging one for the majority of this cohort. Some were able to pick up 1 mark for a correct statement for $\overrightarrow{EX}$ but further marks beyond this was rarely seen. Working out a vector for $\overrightarrow{DC}$, $\overrightarrow{CX}$ or $\overrightarrow{FA}$ was the sticking point for most; those that did manage this step usually went on to gain all 4 marks.

23 For part (a) on this question students very rarely picked up any marks. Many were able to make a start but the most common problem was to evaluate $(xy)^2$ as $xy^2$, which led to 0 marks. Those that did make it beyond this step occasionally went on to gain the full 3 marks; an answer of $\pm\sqrt{2}$ was seen on a few occasions which gained 2 marks. For part (b) it was common to see students pick up the first M mark for interpreting the composite function correctly, but success beyond this point was rarely seen. Again the algebraic rearrangement proved too challenging for the majority.

**Summary**

Based on their performance in this paper, students should:

- Practise proof and 'show that' questions, in particular ensuring students give a satisfactory concluding statement at the end of their method.
- Ensure angle rules are learnt including circle theorems and reasons are given for each of stage of working when asked for in geometry questions.
- Practise vector questions in particular ones which require several steps in the method
- To work on algebraic simplification and rearrangement, including fractions, square roots and indices.

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