Examiners' Report
Principal Examiner Feedback

November 2017

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Non-Calculator) Paper 1H

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GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Higher Paper 1

Introduction

This paper proved to be a challenge for the cohort of students who entered. The majority of the questions in the second half of the paper yielded almost no marks for most students; not surprising given that the majority of entries will have been from students presumably aiming for a grade 4 rather than a grade 7 or higher. It is possible that a good number of the students entered would have had more successes on the Foundation tier paper. However, there were a number of questions where students were able to gain marks.

Report on Individual Questions

Question 1

A familiar question to students, and one where a larger percentage of students were able to score full marks for a correct prime factor decomposition, either using index form or not. When full marks were not scored many gained one mark for a correct partial method.

Question 2

The most successful approach to this first problem question on the paper was to form an equation based on the ages of three friends, solve to find the ages, and then write the ages as a ratio. Most students attempted an algebraic approach, but often only managing a single mark for two correct expressions. Once expressions had been formed some students were then able to sum and equate to 77 to gain the second mark. Those who managed to form an equation, were normally able to gain the 3rd mark for isolating their terms, or more commonly for actually solving to get 14. Of those who got this far many found all three ages and formed a suitable ratio. However, there were quite a number who forgot the demand of the question and lost a mark as they did not present their final answer as a ratio.

Question 3

Students continue to struggle with geometry questions in forming complete solutions with full reasoning. There were a great number of methods evident within the responses seen, and most students were able to score some marks. For the B1 it was typically for 35 marked on the diagram at *AFB*, although any correct angle marked gained this mark. 2 marks was a common score, either B1C1 for an angle marked and a correct reason, or for a correct pair marked as per the mark scheme. However, many who scored B1M1 also scored C1 for an appropriate reason. It continues to be disappointing to see students with fully correct working drop marks due to incorrect reasons stated, or reasons incorrectly stated.

Question 4

The second problem question on the paper proved to be a huge challenge for many in this cohort. In particular students providing just a written explanation relating to 1 circle out of 3 so it is $\frac{1}{3}$. Those who started to work with πr^2 typically got at least 2 marks for a method to find the shaded area, which was very pleasing to see. Of those who got this far it was about even as to whether they could then draw a correct conclusion and compare to $\frac{1}{3}$. Noticeable was the error that occurred when students believed $\frac{33}{100}$ to be equal to $\frac{1}{3}$.

Question 5

It was surprising to see part (a) of this question, a common one on the legacy specification, answered so poorly. Many students appeared to not understand estimating the mean at all and made no attempt to find fx. When students did it was most common to see 2 marks awarded. Some dropped the second by failing to divide by 20, many making the common error and dividing by 5. Many who scored 2 marks didn't gain the third mark due to arithmetic errors, typically when finding their products rather than the division.

Part (b) of this question proved to be too much for almost all students. It seems that more time needs to be taken within centres on choosing the most suitable average. Very few students gained the mark on this question in which they had to consider the effect of outliers on the mean, typically just stating that the mode or median would be better with no suitable reason why.

Question 6

This problem put a slightly different twist on a familiar concept, but was one that most students were able to access in one way or another. The most common approach was to equate the two lengths and solve for x, before substituting into one length and using the area to find y. Of those who were unable to form a suitable equation, many gained a mark for finding the width by assuming $y=3$, eg $48 \div 3 = 16$. There were a number of students who scored zero as they went down a route of finding the product of the two lengths rather than equating them, or worked with perimeter.

Question 7

Students responded well to this question and a large number realised that the use of line segments on a quadratic graph was wrong. There were though, many students who talked about mis-plotting of points, or who wrongly thought that the graph should go through the origin.

Question 8

A question ordering recurring decimals has never been set before, but most students were able to gain some credit. One was the most common score seen. This was normally gained for having three of the decimals in the correct relative order, although many gained the mark for showing understanding of the notation, eg 0.2464646...

Question 9

This speed problem was too much for many students, and typically the best score seen was 1 mark only. This was awarded for a method to find the correct speed for James, eg 50 ÷ 2.5 or in minutes 50 ÷ 150. Unfortunately many of those who attempted this were unable to divide by 2.5, or when working in minutes completed the division the wrong way round and were unable to get further. A small number of students were able to get further, using time in hours and minutes to get to Peter’s 40 minutes for 15km. Those who did get this far generally went on to get the correct answer.

Question 10

Part (a) of this question was answered quite well, with a good number knowing that the power of $\frac{1}{2}$ is the square root. The common incorrect response was to halve 100 and get 50

In part (b) fractional indices to this degree proved harder. There were a large number of students who dealt with the power simply as a fraction and attempted to find $\frac{2}{3}$ of 125. However, getting as far as 5 allowed many to score 1 mark. A small proportion of students were able to complete the solution to 25

Question 11

Forming and solving simultaneous equations proved to be where many students stopped gaining marks. Many students attempted to solve this problem through a trial and improvement method, normally with little or no success. Of those who gained a mark for forming 2 equations, many then had no strategy for solving them. Those who did have a strategy often made arithmetic errors leading to incorrect answers.

Question 12

Most students gained at least one mark for 3 correct values on the box plot in part (a). Those who had a good understanding gained 3 marks, and this was common place. There were a number of students who plotted an incorrect value for their minimum, this normally meant zero marks were scored as all the values were then in the wrong place on the plot.

In part (b) students struggled to gain marks for comparisons of plots. Some students just stated values but made no comparisons. Some stated figures (which they didn't need to do) and stated them incorrectly within a comparison and thus lost their marks. Typically those who made comparisons gained only one mark as they were unable to contextualise their statements.

Question 13

The concepts of proportion within part (a) of this question were too complicated for most students; many started with the fraction of $\frac{15}{450}$ rather than $\frac{4}{15}$, and as a result failed to score marks. Those who started correctly normally scored full marks.

Part (b) was very poorly answered with almost no one scoring two marks. For those who scored 1 mark, it was normally for stating a correct bound (5.5 or 6.5).

Question 14

Students typically tried to start with the solution here and work backwards and as a result scored no marks at all. Very few students started with a correct statement, eg $\frac{y+w}{y-w} = k$. Those who did very often had sufficient skill in manipulation to gain full marks.

Question 15

Another familiar question from the legacy specification and one where we would expect to see more correct algebra. Most students understood the need to find multiples of x, unfortunately these were either often wrong, or the wrong multiples were found. For example finding $1000x$ but not $10x$. There were though a good number of students that were able to follow the algebra through to the correct fraction.

Question 16

Most students did not know how to structure their response to this fairly standard question, with a significant number being unable to form a suitable equation. Those who did were then troubled significantly by the fraction $\frac{7}{6}$ and struggled to be able to divide this by $\sqrt[3]{8}$. It was pleasing, however, to see students showing their working and as such, those who showed they needed to complete this division were able to score 2 of the 3 marks.

Question 17

Most students understood the need to expand the brackets, but with only 2 marks available, both had to be expanded correctly to gain the method mark. This proved a step too far for many with one or both being expanded incorrectly. Those who did expand correctly were very rarely able to simplify and factorise correctly to complete the proof.

Question 18

A very disappointing performance on this enlargement question. Most students completed either an enlargement of scale factor 2 or $\frac{1}{2}$, and as such scored zero marks. Few had a method or understanding to arrive at a triangle in the correct orientation and size. This resulted in very few marks being awarded.

Question 19

Almost no students were able to start this question at all. The few that gained any marks typically rearranged the given equation into the form y = mx + c to find its gradient, or for showing an understanding perpendicular gradients. The concepts appeared to be beyond the vast majority of the cohort.

Question 20

A slightly better performance was seen here and it was evident that some effort has been made in centres to get students to learn the values of the trigonometric ratios, or how to find them using unit triangles. This meant that a reasonable number gained one mark for a correct value of cos(x). Very few were able to use this knowledge, combined with the information in the table to form any equations in a and b. As such more than one mark was rarely awarded.

Question 21

Again, very few students understood how to rationalise a complicated denominator such as this. Those who had some understanding often used $\sqrt{2}$ – 1 rather than $\sqrt{2}$ + 1 and therefore gained no credit. Those who knew which surd expression to use were normally able to gain at least two marks for the correct expansion of the numerator, many being unable to then simplify fully.

Question 22

It was good to see a number of students having some understanding of similar shapes and awarding 2 marks for a value of x =2 correctly found wasn't uncommon. Almost no students were then able to deduce the second assumption that could be made and as such no further marks were awarded.

Question 23

This grade 9 question did allow for some marks to be awarded to a small number of students who were able to write expressions for both areas. However it was disappointing to see how many failed to gain this first mark because they failed to use the correct formula for the area of a triangle, often forgetting the half. Very few were able to form a suitable inequality from their expressions, of those who did and had strategies to solve (typically by factorisation) almost no one gained full marks as they failed to discard the the critical value of $\frac{1}{2}$.

Summary

Based on their performance on this paper, students should:

- Focus attention on basic arithmetic skills such as multiplication and division, and multiplying by powers of 10 to ensure marks are not dropped unnecessarily.

- Practise non-standard procedure (AO1) questions and be able to answer them confidently. For example, finding the mean from a grouped frequency table.

- Spend more time working with ratio and proportion.

- Practice solving problems where translating the given information into algebraic expressions and equations is an efficient method of solution.

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

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