Principal Examiner Feedback

Summer 2013

GCSE Mathematics Linked Pair Pilot
Methods in Mathematics (2MM01)

Higher (Non Calculator) Paper 1H

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GCSE Mathematics 5MM1H
Principal Examiner Feedback – Higher Paper Unit 1

Introduction

Candidates persevered with questions throughout this paper with blank responses rarely seen. It would appear that correct decisions had been made regarding tier of entry with little evidence of candidates who would have been better advised to take the Foundation paper.

Confident candidates who are working quickly through the paper need to take their time to check their work on the easiest material.

Quality of Written Communication (QWC) marks caused problems for some candidates especially for questions involving geometrical reasoning. Students should be encouraged to pause and reread the question once they have completed their answer in order to check that they have answered the actual question set. They also need to understand the importance of correct terminology for geometrical reasoning.

Students should also be encouraged to employ correct algebraic working when required as less formal methods such as trial and improvement may be penalised if final solutions are incorrect.

Report on individual questions

Question 1

Over 80% of students were successful in part (a) and substituted with accuracy. Errors usually involved incorrect processing of the -2 with many who reached 10 – 6 giving a final answer of -16

In part (b) there was slightly less success mainly due to answers of 100 given from evaluating $(2h)^2$ rather that the correct $2h^2$

Question 2

In part (a) over 80% of candidates stated yes and gave an acceptable comment about A and B being more frequent than the others. There were a few erroneous comments like "the numbers decreased from A to E". Some tried to make implications about the sizes of the sections of the spinner. Answers of no/don't know/not necessarily were rarely seen as were references to a lack of trials.

Candidates had similar success with part (b) although incorrect simplification was often seen after correct answers. Whilst this was ignored on this occasion, students need to be aware that they do not need to simplify probabilities unless they are specifically asked to do so.

Question 3

Candidates were almost equally split between those achieving 0, 1 and 2 marks. Usually, one mark was scored for the description 'translation' but a significant number had no idea about writing the vector correctly - usually the movement was described in words. There was some confusion between P and Q with -3 and -4 in a vector given to map Q to P instead.

Question 4
40% of candidates gained all 8 marks on this question with incorrect responses to parts (a) and (b) very rarely seen.

Rules for indices were muddled in part (c) with powers multiplied rather than added to find $a^5 \times a^4$ and divided rather than subtracted if $a^9 \div a^3$ was reached. Most candidates did show sufficient working to pick up one mark though.

Difficulties processing the -4 term caused problems in part (d) although again a single mark was usually gained from clearly set out working showing at least 3 out of the 4 terms. Students should aim to set out their algebra clearly to ensure maximum marks even if arithmetic slips are made.

Where candidates understood how to factorise, they almost all gained full marks in part (e) with partially factorised expressions rarely seen. Blank responses were unusual with many attempting to factorise into 2 sets of brackets.

Question 5
Candidates were clearly familiar with Venn diagrams and at least 4 marks were scored by over 90%. The most common mistake was to omit some or all of the four figures outside sets A and B.

Of those that did, many were able to gain the follow through marks for parts (b) and (c). Unfortunately marks were lost through simple counting errors with, for example, fractions $\frac{2}{10}$ and $\frac{7}{10}$ following a completely correct Venn diagram showing all 11 numbers.

Question 6
Less than 60% of candidates correctly found the expected frequency with the score 4 confusing some candidates with $\frac{150}{4}$ rather than $\frac{150}{6}$ seen.

Where candidates had a correct method to reach 25, they often presented the final answer as a fraction over 150. Some struggled with division on this non-calculator paper.

Question 7
There was an over 80% success rate for both parts (a) and (b) but for part (b), many candidates did not use the calculation given but instead presented working to calculate 124 × 34 from scratch. This in turn led to some arithmetic slips and incorrect final answers.

Question 8
This was generally well tackled with various different systematic breakdowns of the problem. For the most part those who were able to calculate the area also picked up the mark for units; conversely, those who were unable to calculate the area generally missed the standalone mark for the units. A significant minority dropped careless marks, for example where they clearly knew how to calculate the area of one triangle but did not apply this correctly to a second triangle or made arithmetic errors.

Question 9
The line in part (a) was drawn accurately by the vast majority with most candidates opting for a table of values. There were relatively few mistakes with the negative values.

In part (b) many candidates made a correct substitution or continued with the sequence from their table. Although this was a starred question testing Quality of Written Communication (QWC), the final explanations tended to be very scant, often only just gaining the C1 mark. Students need to make sure that they respond with a clearly stated response to the actual question referring to evidence given and evaluated.

Question 10
Over a quarter of candidates gained no marks at all for long multiplication methods with many adding just 42×5 and 0.7×0.6

Where a conventional method was used there were often errors with the final placement of the decimal point. Partitioning methods in a grid were done reasonably well but many basic arithmetic errors were made especially where two decimals were being multiplied. The best candidates showed evidence of checking their work using a second method.

Question 11
Those who added all 3 angles to equate to 180 generally worked it through to a correct conclusion and answered the question well. Other candidates who equated just two angles, usually the base angles, often evaluated the pair that was equal but failed to check that all 3 had a sum of 180. Students need to take care to use correct geometrical language in fully written reasoning about angles.

Question 12
Part (a) was generally well tackled with a few dropping the accuracy mark by leaving prime factors in a list or on a factor tree rather than writing them as a product.

In part (b) candidates who listed out multiples tended to be slightly more successful than those using a Venn diagram (not overly common) or prime factor trees (more popular). A sizeable minority worked on LCM instead of HCF.

Question 13
Two-thirds of candidates gave a correct expression for the nth term in part (a) but some who worked with term to term differences gave $3n + 8$ instead. There were a few responses of $n + 8$ seen.

Part (b) was done with a similar level of success but many found it hard to hard to substitute and ended up with negative final answers.

Question 14
80% of candidates scored the mark using a power of zero in part (a) but there was slightly less success with negative and fractional indices in parts (a) and (b).

Incorrect answers for 4^{-2} came from incorrect processes involving the numbers 4 and -2 and included -8, 2 and -16 whereas in part (c) candidates either knew to cube root or not. Unfortunately a significant number left their final answer as $\sqrt[3]{64}$ without evaluation.

Question 15
Although only 40% gained full marks, where candidates did make an attempt they were generally successful with part marks rarely awarded. Many didn't even have to deal with brackets as they went straight to 5x-1=3x+5 as the equation. The most common incorrect solutions have involved candidates trying to find expressions for the area or perimeter. Most substituted accurately to give the correct length.

Question 16
Just over 50% gained full marks and showed clear working showing correct use of scale factors and were unfazed by the demand for the full length of *AE* in part (b).

Relatively few picked up part marks by correct working with scale factors or finding just *AC* in part (b). Attempts to find the difference in length for similar sides were usually seen when no marks were scored.

Question 17
Many candidates made the good choice to factorise but there were errors with signs both in factorised form and subsequently in final answers. A few, having factorised, left the factorised form as their final answer. Use of the quadratic formula was rare and inevitably led to some sign errors when it was.

Question 18
Conversion to and from standard form in parts (a) and (b) was done well with about two-thirds scoring the mark in both cases. Some gave 12×10^6 for part (a).

Candidates had less success with the calculation in part (c) with many working as if the process for addition was the same as for multiplication with $(1.56 + 4.9) \times 10^{4+3}$ often seen. Those who converted both to ordinary numbers usually had some success but often failed to convert their 20500 answer back to standard form.

Question 19
Over 80% scored full marks in part (a) with only a few candidates making errors with prpbabilities for the second, blue dice.

There was much less success with part (b) where a significant number of candidates did not know how to follow through the information from the tree diagram, were not clear when to multiply or add probabilities, or were simply unable to identify what the question required. It seemed to be misunderstandings of probability, rather than confidence with fraction arithmetic, that caused many to drop marks. Of those who were able to make any kind of start on this part of the question, most earned the full three marks with just a few only earning one mark. Predictable errors included adding $\frac{1}{6}$ and $\frac{5}{6}$ or $\frac{1}{6}$ and $\frac{1}{6}$ at the start; $\frac{5}{36}$ + $\frac{5}{36}$ resulting in $\frac{10}{72}$ at the final stage.
As before, students need to be aware that there is no need to simplify a probabiltiy answer unless specifically asked to do so.

Question 20
A minority of students had a very methodical approach to the question, covering all the salient points and commenting on their reasons for doing a calculation clearly – hence just over 5% achieving full marks.

Others had a much more piecemeal approach and missed out on communication marks for not writing fully what their reasons for a calculation were. Use of and reasoning about the alternate segment theorem was rarely seen.

Students should be encouraged to write a full description of the angle rules they use step by step as an integral part of their working rather than an addition at the end. Some otherwise correct solutions lost marks for slightly incomplete reasoning or statements of angle rules.

Question 21
Only 40% of candidates gave the correct probability complement in part (a) with 0.4, the probability of B, as a common incorrect final answer.

There was more success in part (b) but the final answer 1.1 was very common. Students need to recognise that a number greater than 1 cannot possibly be a correct probabilty. Some errors multiplying 0.4 and 0.7 had incorrect placment of the decimal point with, for example, 0.028 and 2.8

Question 22
Fully correct enlargements were very rare with less than 20% making no errors. Incorrect answers involved a variety of errors: enlargements the wrong size, incorrect orientation and the triangle drawn in the wrong quadrant.

Question 23
This was the one question which was left blank by a significant number of candidates. A large number missed or ignored the explicit requirement for an algebraic proof, attempting instead to demonstrate using substitution of various numbers. Of those who did attempt to use algebra, many failed to expand (n-1)2 successfully and of those that arrived at an expression divisible by 2 many failed to factorise that expression but instead tried to make a statement, sometimes subsituting numbers to illustrate.

Question 24
85% of candiates had some success with this question scoring up to 2 marks out of the possible 5

They generally gave the correct answer in part (a) and then could make some progress with an initial vector equation worthy of and additional mark. Fully correct vector geometry solutions were relatively rare.

Question 25
This question was attempted by the majority of candidates of whom just over 30% scored one or two marks. The majority scored at least B1 for a correct probability without replacement.

A number of candidates recorded 8 as the denominator of the ‘next’ fraction, as if the two counters had already been taken. Subsequent errors involved the use of incorrect operations either multiplying all probabilities or adding rather than multiplying pairs. $\frac{51}{100}$ from the replacment method was seen occasionally.

Grade Boundaries

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