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General Certificate Secondary of Education
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Methods in Mathematics (Pilot) 93652H

(Specification 9365)

Unit M2: Methods in Mathematics (Geometry and Algebra) - Higher

Report on the Examination

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Unit 2: Higher Tier

General

The overall standard was high. There were many excellent scripts and a large proportion of marks over 80%. Students had been well prepared for the examination and there were few questions that were not well answered. Standards of presentation were high and working was almost always shown. Poor arithmetic and poor algebraic manipulation were often the cause of lost marks.

Topics that students found difficult included:

- recognising an alternate angle
- identifying the interior and exterior angles of polygons
- finding a common denominator for two ratios
- problem solving
- algebraic fractions.
- intersecting chord theorem.

The rest of the paper was generally well done.

Question 1

Algebraic processes were well known and applied accurately. In part (c), poor arithmetic was the cause of the majority of lost marks.

Question 2

Almost all students who attempted this question picked up at least one and many got full marks. Most understood the process described and the majority of lost marks were caused by using an odd non-prime number as one of their pair. There were quite a few blank answers.

Question 3

In part (a) almost all students gave 68° as the value but fewer than a quarter gave the correct reason. Opposite, parallel and corresponding were common wrong answers. The colloquial term ‘Z-angles’ was often seen. Schools must make students aware that ‘Z angles’ is not a valid mathematical term.

In part (b) most students had some idea of the process but the main error was to confuse the interior or exterior angles of the pentagon.

Question 4

Both parts were well done. In part (a) there was some confusion between perimeter and area and some poor arithmetic such as $10 \times 10 = 20$. Most students showed that they understood the problem in part (b) and so picked up marks. There were errors converting cm to m but as this was a strand (iii) QWC mark the Q mark could still be gained if the overall strategy was correct. Many who got as far as 15 by 10 large squares then added instead of multiplying to get the total number.

Question 5

Part (a) was well done. The most common error was to add 5 more boxes to one box, giving the answer of 100 cm. This was given a special case mark of 2.

Part (b) was very badly done. Finding the nth term of a linear sequence cannot be asked explicitly on this paper but part (a) was designed as a lead in for students to access the $8n$ part of the required expression. Common errors were $8n + 60$ and $n + 8$.

Question 6

Part (a) was usually correct and part (b) was quite well done. The majority realised that the height of one layer was 25 cm. This was frequently multiplied by 27, although there was an independent mark for converting the calculated height in cm to m. A few students divided by 10 when doing this.

Question 7

Both parts were well done. If part (a) was correct then part (b) was usually correct as well. The main errors were miscounting or, in part (a), drawing the shape connected at some point to the coordinate (5, –4).

Question 8

A majority scored at least one mark on this question. There was an easy mark for finding the difference but the important step for the method was to divide by 32518. The answer then had to be interpreted to give the percentage increase to the nearest percent. This mark was often lost. A common error was to divide by 36420.

Question 9

This was not well done. Students who had some idea of the method usually picked up a mark but many students did not seem to be able to manipulate algebraic fractions. There are two distinct parts to solving this type of equation. The first is to combine the numerators and denominators of the LHS. If correctly expanded this leads to $5x + 11$. The next step is to put this expression equal to 12 and solve the resulting equation. Errors were made in expanding brackets or putting the expression equal to 2. Follow through was allowed on a correct method and one arithmetic or expansion error. There were a lot of attempts at Trial and Improvement, many of which were successful.

Question 10

Part (a) was very well done. The main error was to add the squares rather than subtract.

Part (b) was not very well done. There was a lot of confusion over which trigonometric ratio to use and, if cosine was chosen, various arrangements of cos, 17 and 11 were seen. Some students found the third side of the triangle by using Pythagoras' theorem and then attempted the cosine or sine rule. This could gain both method marks if a full method was seen but the additional complexity usually meant an error was made.

Question 11

This question was well done. The majority of students used some method of repeated proportion. The straightforward 200×0.6^9 was common but many students who calculated the height of each bounce made errors or stopped at the 8th bounce assuming that 200 cm was the first bounce. As long as only one error was made 2 marks could still be scored so overall this was a high scoring question.

Question 12

This was not well done. It is a fairly easy equation to factorise and students who took this approach usually managed to get the correct brackets. There were some incorrect brackets such as $(x + 2)$ and/or $(x + 5)$ but these could be followed through. However, many who managed to get a factorisation often failed to go any further. A very common approach was to use the formula. This had to be done exactly to gain any method marks and there were many errors, particularly the wrong sign for $-b$. A few tried completing the square but were defeated by the fractions. There were many trial and improvement attempts and either 2 or 5 were usually found. For trial and improvement to score in a question of this kind, both answers must be found to score marks.

Question 13

This is an AO3 question and was not well done. Making both ratios into the same multiple of 18 was not often seen but usually led to a fully or partly correct answer. Using the fractions $-\frac{1}{6}, \frac{5}{6}, \frac{7}{18}$ and $\frac{11}{18}$ was sometimes seen and again often led to a fully correct answer. There were many blank answers.

Question 14

There were some attempts using Pythagoras' theorem, right-angled triangle trigonometry or sine rule but those students who realised that this was a cosine rule question usually scored 1 mark for method and many went on to gain full marks. The main errors were using an incorrect formula or evaluating a^2 as 1 × cos54.

Question 15

Neither part was well done. In part (a) there were many correct sized enlargements but with *C* as one of the vertices. Students who knew to draw the rays from *P*, *Q* and *R* usually drew the enlargement correctly.

Part (b) is an AO3 question. There is a clue with the image of *P* given but few students showed sufficient problem solving skills to find the x-coordinate of *Q*. The y-coordinate was often given as 14 which earned a mark.

Question 16

This was not well done. Although many found the length of the rectangle as 17 there was a common assumption that the length was twice the width. This is an AO3 question. Mathematically it is no harder than subtraction and addition but students do not appear to have good problem solving skills.

Question 17

This was the least well done question on the paper. Correct answers for both x and y were rare. It is clear that students do not understand the intersecting chords theorem. The potential distractor of having 3 intersecting chords was not to blame as the vast majority added the different parts of chords instead of multiplying. x was found to be 7 on a few occasions but this was not then always used to find y. A common error was to use $8 \times 3 = 6 \times y$. Other errors were to multiply all parts of the chords so $3 \times 8 = 2 \times x \times 5$ was often seen.

Question 18

The algebraic technique of completing the square is not well known. There were many blank answers. Use of the quadratic formula was common and could score up to 3 marks if done correctly and √48 was then shown to be 4√3.

Question 19

This was quite well done with many students scoring full marks. Many adopted a numerical approach. This scored 3 out of 4 but not the QWC mark. The main errors were incorrect formula or poor arithmetic, particularly when dealing with the fraction.

Mark Range and Award of Grades

Grade boundaries are available on the [Results statistics]() page of the AQA Website.

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