Examiners' Report
Principal Examiner Feedback

Summer 2025

Pearson Edexcel International GCSE
In Mathematics A (4WM1) Paper 1HR

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IGCSE Mathematics 4WM1 1HR Principal Examiners Report

Candidates who were well prepared for this paper were able to make a good attempt at the majority of questions.

Candidates were less successful in producing a full treatment for Pythagoras theorem (Q10 and Q20), index rules (Q12b) and completing the square (Q18).

On the whole, working was shown and mostly easy to follow. Those candidates who produced untidy, unstructured written work to the extent that their writing was almost illegible risk losing marks. There were some instances where candidates failed to read the question properly; an example being question 22. Here some candidates could not find the length of arc BD but found the area of the sector instead.

Simplifying indices and multiplying out brackets (Q15), interpreting information of a histogram (Q21), and manipulation of algebra in later questions (Q19 and Q23), proved to be challenging for many.

Generally, problem solving, and questions assessing mathematical reasoning (Q3b and Q8) were tackled well.

Comments on individual questions

Question 1

This question was well answered with 142.75 and 142.85 generally given as the correct lower and upper bounds for 142.8.

A minority of candidates clearly had no understanding of what was meant by bounds, either leaving the page blank or writing down irrelevant working such as 142.8 ± 0.5. Common incorrect answers were 142.7 and 142.9 respectively given as the lower bound and upper bound for 142.8.

Question 2

Most candidates now know what is expected of them in a 'show that' question and it was pleasing to see many answers gaining full marks, clearly understanding the need to show either $\frac{27}{7} = 3\frac{6}{7}$ as their final stage or that $3\frac{6}{7} = \frac{27}{7}$ as the first stage of working. Candidates who lost marks generally went straight from $\frac{9}{4} \times \frac{12}{7}$ to $\frac{27}{7}$ failing to show $\frac{108}{28}$ which seems to come from use of a calculator. Some candidates decided to use common denominators, for eg, $\frac{63}{28} \times \frac{48}{28}$ and then using a calculator to find $\frac{108}{28}$ thus missing the intermediate step of $\frac{3024}{784}$.

Question 3

(a) Many candidates wrote down the answer of 0.7 as required. A common incorrect response was 0.3

(b) Many candidates made a correct start on this probability problem by adding the probabilities of blue, green and purple. The majority went on to subtract this from 1 to find the probability for red and yellow, they gained the first method mark. For the next mark, this value needed to be divided by 5, as the probability of red was four times that of yellow. However, some candidates divided by 2 and were unable to progress correctly beyond this. Others did not divide at all and their working either stopped or became increasingly muddled. Those who did divide by 5 and correctly allocated the two probabilities, were generally able to work to produce the correct answer. Some candidates multiplied 0.06 by 350 giving 21 as an answer and were credited with 3 marks. A few wrote their answer incorrectly as a fraction, $\frac{84}{350}$, and lost the final accuracy mark.

Question 4

(a) and (b) For those who knew the meaning of the union symbol and the complement of B these parts of the question were quite straightforward.

(c) and (d) Some candidates clearly had no idea of what was required here and often left the answer space blank or gave incorrect responses. A significant number did not recognise the notation, particularly the empty set symbol.

Some candidates incorrectly think they should repeat numbers in sets but this was penalised, and it should be noted that a number appears just once in a set. Indeed some candidates seemed completely unfamiliar with this topic.

Question 5

Parts (a) and (b) were answered well by many candidates. A common error in part (c) was to add 2 and 10 to give an answer of 12. Many candidates did not realise that the answer to part (d) was 0

Question 6

Many candidates gave fully correct algebraic solutions. Some candidates sometimes assumed that the question would involve a perimeter or even angle total equation. To gain the first mark the candidates had to set up an equation $4x + 6 = 30 - x$ to find the value of x. Those who could do this step usually went on to find the value of x correctly.

Some candidates simply added the two expressions and equated to 180 ie setting up $4x + 6 = 30 - x = 180$ thus losing all the marks.

A minority of candidates failed to realise that the two lengths on the isosceles triangle are equal.

Question 7

This question was answered well by the majority of candidates. Many candidates could recall that there are 1000 metres in 1 kilometre. Some candidates need to recall how to convert seconds to hours. Many responses showed their method clearly.

Question 8

Many candidates recognised the need to use trigonometry, a pleasant proportion followed through correctly to get the answer of 24.7. Some candidates used the correct trigonometrical ratios and also gave the correct answer. Unfortunately, some who could state the correct ratio of tangent, were unable to rearrange correctly and used the method $BD = 17 \times \tan 32$ rather than $17 \div \tan 32$. Some candidates who did work out BD (27.2) correctly proceeded to assume it was the length CD and then used Pythagoras theorem to find BD which did not gain any further marks.

A majority of candidates were rewarded with all 4 marks. Most candidates were able to gain some marks and many showed a clear method in answering the question.

Question 9

(a) Candidates were tested on the use of the power laws $(ab)^n = a^n b^n$ or alternatively the use of $(5k^3n^4)^2 = 5k^3n^4 \times 5k^3n^4$ followed by the application of a simpler rule. Common incorrect answers were to write down $5k^5n^6$ where the power of k and n had been treated incorrectly.

(b) It was encouraging to see a fair number of correct responses for factorising a two term expression with common factors. Where full marks were not awarded, one mark could be gained for a correct partial factorisation with at least two factors outside the bracket or having the correct factor outside the bracket. There were also many and varied incorrect attempts.

(c) Many correct answers were seen. A common incorrect answer was to write the signs the wrong way round in the brackets e.g. $(x - 6)(x + 7)$ or $(x + 6)(x - 7)$ or $(x + 6)(x + 3)$; one mark was awarded for this. Some candidates found this part difficult and then could not answer the second part of this question. Candidates should ensure they have the correct factors by multiplying back as a useful check for this type of question. Candidates failed to recognise that the word **hence** meant that they must use their previous answer to solve the equation.

Question 10

An encouraging number of candidates were able to see that they needed to use Pythagoras' theorem as the first stage of their working. Those who knew to subtract rather than add usually gained two marks~~,~~ for the correct use of the theorem and finding the length of CD. The third method mark was awarded for working out the area of the rectangle. Candidates who worked out the area of the rectangle then proceeded to find the correct answer for the pressure.

Not unexpectedly, there were candidates who were unable to make a correct start, combining the given lengths, sometimes incorporating 90 and 180, in a variety of ways. Others made no attempt at this question.

It was common to see a response where trigonometry had been used instead of Pythagoras' theorem to find the length of CD but, if applied correctly, this approach obviously gained the appropriate method marks. There were also many and varied incorrect attempts.

Question 11

(a) The majority of candidates were able to correctly complete the probabilities on the tree diagram. Some gave decimals rather than fractions but rarely to the required accuracy. A minority gave integer values to the branches rather than fractions. Some candidates lost marks by not labelling the second set of branches on the tree diagram correctly.

(b) This part was usually done well, sometimes taking advantage of the follow through from the tree diagram for full marks. Just a few candidates added probabilities, producing a probability value greater than one.

Question 12

(a) Most candidates were familiar with this sort of equation, usually choosing to start by using a common denominator to subtract terms on the left. Predictably, $-(2a + 5)$ frequently became $-2a - 5$, but it was still possible to score 2 marks by multiplying both sides by 12. Those who started with this multiplication sometimes failed to treat the left hand side correctly, stating $20a - 32 - 2a - 5 = 12 \times 23$. Other common errors were multiplying the numerators correctly but omitting the common denominator altogether and multiplying the numerator by its own denominator. Many scored full marks.

Most candidates now seem to understand the demand to show clear algebraic working.

(b) Many candidates found this part of the question challenging. Many gave an answer of $\frac{3}{\sqrt{y}}$ thus gaining only the first mark, not appearing to realise that they must give the answer as $3y^{-\frac{1}{2}}$.

Question 13

(a) There were many successful methods which gained full marks by working out the lengths *AX* or *XB* or *CD*. Many candidates started well by writing down $\tan 30 = \frac{(AX)}{25}$ or $\tan 42 = \frac{(XB)}{25}$, ~~however~~, on most occasions these expressions were rearranged well but some candidates lost marks with expressions such as $AX = \frac{25}{\tan 30}$ or $XB = \frac{25}{\tan 42}$. Once candidates worked out *AX* and *XB* they gained the first 2 marks. The third mark involved adding the length of *AX* with *XB* which was done well by many candidates.

(b) This part was done well by the majority of students as they could find the required angle of 55.9°. Many candidates gained one mark as they followed through their answer to part (a)

Question 14

Many candidates scored full marks here with an excellent appreciation of the steps needed to convert recurring decimals to fractions. The common method seen was working with 1000*x* and *x*. Most candidates scored both marks with this method, but a few did not give the intermediate fraction $\frac{6060}{9900}$ or omitted the conclusion of $\frac{101}{165}$ and thus losing the final mark.
Other candidates did not subtract two recurring decimals that would result in a terminating decimal or whole number. Some candidates lost marks because they did not demonstrate an appreciation of the recurring pattern - if they did not use dots or lines to demonstrate the recurring part of the numbers, we needed to see values given to at least 6 sf, which some candidates did not do.

Candidates who were not confident on this topic, generally tried to use their calculators to demonstrate that the fraction and the recurring decimal were the same. This scored no marks as the question clearly asked candidates to use an algebraic approach.

Question 15

(a) The majority of candidates did follow the instructions in the question and showed clear working. However, there were some candidates who gave correct answers with no working and therefore gained no marks. Candidates who gave working generally gained full marks but some made errors when using their calculator or failed to give both solutions. Some candidates did not take enough care when substituting numbers into the formula and scored 0 marks as a result. Candidates need to be aware that simply stating the result produced by a calculator that is able to solve quadratic equations is not sufficient working and in order to gain marks there must be a demonstration of a correct method.

(b) The vast majority of candidates were able to demonstrate a correct start to the process of expanding three brackets by first expanding a pair of brackets. Once this was done, success was varied. Whilst many fully correct answers were seen, the second expansion often either led to errors in expansion or else errors when simplifying the resulting terms. Candidates who simplified the expansion of their first pair of brackets before multiplying by the third set of brackets generally made fewer errors. Attempts to expand all three brackets in one go were poor and should be discouraged.

Question 16

(a) Many candidates wrote down the correct answer of 24 or $2\sqrt{24}$.

(b) Many candidates knew the correct process; to rationalise the denominator and sensibly showed how to do this.

Errors seen from candidates in this question included using an incorrect multiplier to rationalise the denominator, typically using $3-\sqrt{5}$ or simply entering the given fraction as a calculation into their calculator and copying the screen display - this approach scored no marks as working was required.

Candidates must show all the stages of working to gain full marks. Candidates that take short cuts in their working risk losing marks.

Question 17

It was encouraging to see many candidates accessing this question for one mark at least. Many candidates worked out one correct product in any order. The more able candidates worked out that the different combinations of finding the sum of the counters less than 5 and then went on to find the correct answer. Some candidates simply worked out the probabilities for two products then added these probabilities together and subtracted this answer from 1.

Credit was given for writing their probabilities by considering with replacement.

Question 18

(a) This was poorly attempted. The majority of candidates could not factorise before completing the square and the manipulation of algebra was very poor. Some candidates who factorised correctly lost marks due to missing brackets when attempting to complete the square, for example, $2(x - 3)^2 - 9 + 23$, $2(x + 3)^2$ ... and to a lesser extent $2(x + 6)^2$ were quite common. Generally, this part of the question was left unattempted by many.

(b) This part of the question was also poorly attempted.

Question 19

Many candidates could gain the first mark by writing down, $(2x+3)^2$, the correct expression of the area of the square or $\frac{1}{2}\times 2x\times(2x+3)$, the area of the triangle. Many candidates successfully added the area of the square with the area of the triangle and equated this to 84 thus forming the equation $(2x+3)^2+\frac{1}{2}\times 2x\times(2x+3)=84$. Some candidates lacked algebraic skills to multiply out the LHS correctly thus losing a mark if two out of three terms were not correct.

Some candidates did not write down the expression for the area of the triangle correctly by missing the $\frac{1}{2}$ thus writing $2x\times(2x+3)$. Many candidates went on successfully to find the correct area of 64

Most candidates now seem to understand the demand to show clear algebraic working.

Question 20

Three dimensional Pythagoras is always a challenging subject for candidates, and so it proved again. However, it was good to see many make a good start and gain some credit. A decent number of candidates were able to complete a process to find *AC* using Pythagoras. It is worth noting, that at this grade a complete method was required for a single mark, whereas at a lower level we may see 2 marks for Pythagoras.

The common error was to apply Pythagoras' Theorem incorrectly, adding rather than subtracting the squares of the lengths.

Question 21

Many correct answers were seen from those candidates who appreciated that the area of each bar is proportional to frequencies in histograms. Most candidates made some attempt at answering the question and sometimes produced a mass of figures, but it was not always clear as to what the figures represented; it is incumbent on the candidates to ensure that they make their method of solution clear. Usually, the most efficient method was to correctly calculate the frequency density values and put these on the vertical axis, or on top of the appropriate bars. Candidates who did this inevitably reached the correct answer.

Several candidates used the vertical scale as a frequency scale thereby ignoring the column width, this often led to incorrect answers being seen, and hence candidates were unable to earn any credit.

Two marks were frequently awarded for two correct products. Some candidates counted the number of "small squares" or "big squares". The mark scheme enabled candidates to gain method marks for this different approach if they involved some sort of area.

Question 22

This was a challenging question for many candidates as it involved different parts of the specification. Many candidates applied the formula for the area of the triangle and the area of the sector correctly by using one variable such as *x* or *r* for the radius of the sector of the circle to find $\frac{40}{360}\pi r^2 - \frac{1}{2}r^2 \sin 40 = 28$. Candidates with poor algebraic skills rearranged the equation incorrectly for r. Some candidates worked out the correct value of the radius and then used the cosine rule to work out the length of *BC*. Candidates who had not read the question carefully worked out the area of the sector *BCD* rather than the arc length of *BD* thus losing the final mark.

Question 23

This was a challenging question for many candidates as the majority of responses were blank. The students who tried to answer the question had a variety of methods at their disposal. Some candidates gained only 1 or 2 marks for working out that $p = 1$ or to find the correct coordinates (1, 4). From there only the most able candidates were able to proceed and gain further marks, usually by forming a correct equation of the perpendicular gradient in terms of *q*. For the fourth mark candidates had to work out the length of the radius which was done poorly.

Question 24

The combination of skills needed to complete this question made it difficult so fully correct answers were sparse. Many candidates could not factorise $2x^2 - 5x - 12$ and/or $6x^2 + 11x + 3$. As they could not factorise, the rest of the question was out of reach for the majority. Some candidates who did get to the stage $2x - 1 + \frac{x}{3x+1}$ could not find the common denominator and then lost the next two marks. Many candidates did not recognise the need to factorise, a fundamental approach to working with algebraic fractions; instead they chose to multiply out the various expressions, often being left with unwieldy numerators and denominators that prevented further progress.

Candidates who did factorise correctly did not always cancel fully and again encountered problems with further manipulation as a result. There were a significant number of candidates who were penalised for not recognising that they had to multiply the second and third fractions before adding the first.

Summary

Based on their performance in this paper, candidates should:

- be able use formula given on formula sheet correctly
- be able to apply the quadratic formula correctly
- be able to read graph scales accurately
- apply trigonometry to problems
- read the question carefully and review their answer(s) to ensure that the question set is the one that has been answered and their answer(s) represent a reasonable size
- make sure that their working is to a sufficient degree of accuracy that does not affect the required accuracy of the final answer.
- make their writing legible and their reasoning easy to follow
- when asked, show their working or risk gaining no marks despite correct answers

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