Examiners' Report
Principal Examiner Feedback

Summer 2025

Pearson Edexcel International GCSE
In Mathematics A Modular (4WM1H) Paper 01
Unit 1H 1Highter Tier

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Principal Examiner's Report

Overall, we saw many good attempts across the majority of questions. While some of the more demanding, higher-grade questions towards the end of the paper were left blank by a number of candidates, it was encouraging to see others make an effort and gain partial credit by showing sound methods. Full marks were achieved by the proportion we would expect at this level.
Generally, working was easy to follow. However, we must continue to stress the importance of presenting solutions clearly and logically. Candidates should cross out any working that is not part of their final solution. In particular, on questions requiring a final value—such as Question 18—some candidates stopped at an intermediate subtotal of 22 rather than continuing to give the proportional answer required.

Premature rounding led to the loss of final accuracy marks in several cases. Candidates should be encouraged to use a sufficient number of decimal places throughout their working or store values in their calculator's memory to maintain accuracy—especially in multi-step questions involving multiple figures.

A number of errors stemmed from candidates misreading either the question or, more worryingly, their own handwriting. Candidates must write clearly to avoid misinterpreting their own work and should check carefully that they are using the correct values throughout.

Although most questions were attempted, the harder questions later in the paper saw fewer complete responses. In particular, some candidates did not show their working clearly, even when explicitly instructed to do so—for example, in questions requiring "clear algebraic working." This led to avoidable loss of marks where the correct method was not evident. There was noticeable reliance on calculator functionality. While this is allowed, candidates must still demonstrate full algebraic reasoning where required.

Some candidates showed evidence of having memorised a formula for completing the square. However, this approach was often poorly executed and led to errors. We recommend focusing on understanding the process of completing the square rather than relying on a memorised formula. This understanding is essential for tackling questions such as Q25, particularly part (b).

Surprisingly, many candidates were less successful on the common foundational number topics such as Question 1 (fractions) and Question 8 (set notation). Complex probability questions—such as Q19 and Q22—also proved challenging, as did multi-step trigonometry problems like Q10 and Q23.

In contrast, performance on algebraic topics was generally strong. However, improvement is still needed in number, statistics, and probability areas to support a balanced overall performance.

Comments on individual questions

Question 1

It is necessarily we test candidates working without the use of a calculator and this fraction multiplication question is very typical. Many candidates gained full marks. Nearly all candidates correctly turned the mixed numbers into improper fractions, but many then jumped straight to 66/7 without showing the multiplication or cancelling steps that "show that" demands—so they rarely scored more than two marks for the fraction work. Overall performance was disappointing: about 8 percent scored zero, fewer than half earned full marks, and although most reached the answer $9\ ^{3}/_{7}$, the absence of clear working (and, in some cases, failure to give a mixed-number result) cost them the second method mark.

Question 2

In parts (a) and (b) candidates unfamiliar with the terminology of lower and upper bounds tended to state numeric values with no connected logic to the question. Common wrong answers were 17.3 in part (a) and 150 and 145.5 in part (b). Part (a) on lower bounds was answered more successfully than part (b) on upper bounds, with approximately 80% scoring the mark in part (a) and 65% scoring the mark in part (b).

In part (c) Few did not round at all but rounded their answer at the end. If candidates only scored 1 mark, it was usually from not rounding the 815 or the 0.399 correctly. There were many fully correct responses, around 50% scoring full marks, but some candidates clearly did not understand 1sf rounding. 0.399 was often rounded to 0 and then ignored when doing the division. 815 was often rounded to 8. Some did not attempt to round any part to 1sf and simply type the calculation into their calculator to get the un-estimated value.

Question 3

Most candidates handled this question with confidence with around 78% scoring full marks. Yet a few fundamental errors persisted. At the lower end, some simply summed the given probabilities and set them equal to 500, while others correctly found $x = 0.05$ and then $7x = 0.35$ but then stopped, picking up only two of the four marks.

The first mark was usually secured by either calculating how often the spinner would land on a particular colour or by writing down a proper probability equation—recognising that the probabilities must add to one. Unfortunately, a handful of candidates merely scribbled "1" beside their table or wrote "probabilities add to 1" without actually substituting in the values ($0.14 + 0.23 + 0.18 = 0.55$) and subtracting from unity. Some found probability of blue rather than expected number of blues. For those candidates finding the expected number of reds, instead of blue, 3 marks were awarded. Despite these missteps, the majority of candidates demonstrated sound probability reasoning and comfortably 2 marks or higher.

Question 4

Most candidates gained either one mark for the correct area of the triangle, or three marks for a fully correct answer. The most common error was seen when candidates attempted to calculate the area of the semicircle, either using the diameter instead of the radius, using the wrong formula, eg or or not dividing the area by 2. Some lost the final mark due to premature rounding, leading to an area of 124 instead of the 125 expected.

A surprising amount of candidates used ½absinC for the area of a right-angled triangle. Often when this formula was used, it was used incorrectly; with some messy attempts at using trigonometric ratios to find one of the other angles in the triangle first.

Question 5

Answers to parts (a) and (b) were good. Most candidates knew they had to add the exponents in (a) and subtract the exponents in (b).

Part (c) provided evidence that candidates struggle most with the 3rd law rather than the others. When mistakes were made it was typically with the 5^3, writing 5, 15 or 625 instead of the correct 125. Or candidates would forget to raise a^4. Whereas most candidates got the r^6 correct. Thus, $5a^4r^6$ and $15a^4r^6$ were the most common incorrect responses.

Question 6

This question differentiated well. Most candidates were able to access the first mark for writing down $65 = \frac{702}{area}$ and then obtaining 10.8 or wrote down $65 = \frac{702}{6x}$. Candidates who wrote down $65 = \frac{702}{area}$ lost the first mark unless they recovered by writing down $702 \div 65$ or equivalent. It was disappointing to see that some candidates could not rearrange.

A common error was to write $65 \div 702$ at this stage of the problem. Many candidates who found 10.8 went on to gain full marks. A minority of candidates who worked out 10.8 then equated this to $6x^2$, confusing the area of the rectangle needed. These candidates lost the final two marks. Most candidates correctly went on to divide 10.8 by 6 to achieve the correct answer of 1.8. Many scoring only two marks at this stage wrote the correct method, but somehow managed to calculate the wrong answer. There were many candidates who wrote 10.8 on the answer line, forgetting to take the area of the rectangle into account for the final two marks.

Question 7

(a) Many candidates were able to gain all three marks in this part of the question, demonstrating strong algebraic understanding and manipulation skills. A common and effective strategy involved clearing the fraction and expanding the bracket in a single step. However, this approach sometimes led to errors when candidates were unclear in their intention to multiply both sides of the equation by 6, resulting in inaccurate expansions.

Errors also arose during the rearrangement process, where candidates confused addition and subtraction when attempting to isolate the x terms.

Candidates who attempted the alternative method outlined in the mark scheme—separating the right-hand side of the equation into two distinct fractions—often struggled to do so correctly. It was common to see only one term divided by 6, which resulted in no further progress and no additional credit.

A significant number of candidates failed to recognise the importance of consistently applying multiplication or division across both terms in the expressions. This led to structural errors, such as moving one term inside a bracket to the other side of the equation incorrectly, or subtracting only the constant term in the numerator without accounting for the missing factor of 6 (or 1/6).

Nevertheless, some candidates were able to recover marks through follow-through credit, awarded for correctly rearranging their resulting four-term equations to group x terms on one side and constant terms on the other.

(b) Most candidates completed part (b) successfully and were awarded all three marks. Where errors did occur, they typically involved partial factorisation—such as writing a single bracket with a constant term remaining—or, in a few cases, incorrect attempts to complete the square.

It is important to note that candidates who gave an incorrect factorisation in part (i) could still be awarded the mark in part (ii), provided they correctly solved their own factorised expression. This follow-through approach was applied consistently.

Marks were not awarded for solutions obtained using a calculator's equation solver. Similarly, use of the quadratic formula was not credited unless it was clearly used for verification purposes only and not as the primary method of solution.

Question 8

(a) This part of the question proved challenging for many candidates, with approximately half achieving full marks. Those who scored only one mark often failed to consider the complement of the required set or did not list all four of the expected elements. Misunderstanding the notation or overlooking part of the set definition contributed to these incomplete responses.

(b) This part was generally well answered. Many candidates correctly identified that the number 30 belonged to the given set, thereby concluding that the set could not be empty.

(c) This was a polarised question, with candidates typically scoring either full marks (2) or none. Awarding of one mark was rare. The most common errors stemmed from a lack of attention to the role of the universal set. Many candidates included numbers outside the universal set or failed to apply the given constraints correctly. Even among those who correctly identified 18 and 26 as required elements, mistakes included adding another member from set A, including more than one even number not in set A, or selecting odd numbers not listed in the universal set.

Question 9

(a) This part was answered well. Many candidates giving an answer of 0. Some candidates wrote their final answer as 7^0 which was condoned.

(b) Many candidates achieved full marks in this part of the question. The most successful responses came from those who first clearly wrote down the full expression involving powers of 8 for example those who first wrote $\frac{8^7}{8^{12}}$. Not many students used the method of writing the linear equation − 4 + 11 − 12 = n to obtain their answer, instead sight of the expression − 4 + 11 − 12 was more commonly seen.

A frequent incorrect method involved calculating − 4 + 11 followed by 12 − 7 to give the incorrect answer of 5 was seen. This suggests a misunderstanding of the order and rules of index operations.

Marks were typically either full marks (2) or no marks. Method marks alone were rarely awarded, as many candidates worked only with the indices numerically, without referencing the powers of 8 explicitly. This highlights the importance of showing correct use of index laws, rather than just manipulating the exponents in isolation.

Question 10

This was a well-chosen question for assessing differentiation skills and proved appropriately challenging at this stage of the paper. The question posed difficulties for many candidates, resulting in a wide distribution of marks. Most candidates were able to gain the first one or two marks, often for initial steps involving trigonometry. Common errors included incorrect calculation of segment **AB**, such as subtracting 6 instead of 12, making unjustified assumptions about angles, or applying an incorrect trigonometric ratio. Attempts to use the sine or cosine rules to find the area of triangles were frequently seen but typically earned only one mark due to incomplete or incorrect application. Drawing auxiliary lines on the diagram often helped candidates visualise the problem better, and those who did so were more likely to make progress. A recurring mistake involved incorrect use of Pythagoras' Theorem—particularly omitting brackets around the surd $6\sqrt{3}$. It was clear that many candidates needed to annotate their diagrams more carefully and think critically about which lengths they were finding at each stage. Several managed to find some correct intermediate values but failed to use them appropriately in the final stages of their solution.

Question 11

(a) It was pleasing to see that many candidates gained full marks for a correct and fully expanded expression. Among those who did not achieve all three marks, a significant number still earned two, as their method was broadly sound but contained a single arithmetic or sign error in one of the expansion stages.

However, a notable proportion of candidates scored no marks. The most common incorrect method involved multiplying both brackets by 5x5x5x, rather than expanding systematically. Some candidates expanded only two of the three factors and then incorrectly added the third factor, overlooking that all three expressions needed to be multiplied together.

Another recurring issue was the attempt to simplify the final expression by dividing through by a common factor such as 5 or xxx. Candidates should be reminded that this is not appropriate in this context, and such actions often invalidated an otherwise correct answer.

(b) Most candidates demonstrated an understanding that a common denominator was required and generally attempted to find one, often arriving at the correct denominator of $20y$. Many were able to make full progress through the question and achieve the correct final answer.

However, several common errors were observed. Some candidates made mistakes in the final stage by incorrectly changing a negative sign to positive, such as converting "−28" to "+28". Others began by adding the fractions correctly but later switched to subtraction partway through their working.

A frequently seen mistake was the failure to multiply both terms within the bracket $(y-7)$ by 4, leading to incorrect numerators. There was also clear evidence of errors in cancelling terms, often due to misidentifying common factors.

In a few cases, carelessness in notation led to the omission of the variable y in the final denominator, resulting in an incomplete or incorrect final answer despite otherwise correct working.

Question 12

(a) This part was generally well answered, with many candidates correctly completing the missing branches and earning both available marks. However, a common error occurred when candidates failed to read the question carefully and incorrectly assigned probabilities of 0.7 and 0.4 to the first two branches.

(b) Among those who gained full marks in part (a), many continued successfully to part (b), correctly calculating the required probability and earning another two marks. A frequent mistake in this part involved incorrectly adding probabilities—most notably, adding 0.3 and 0.6 instead of applying the appropriate multiplication of probabilities along the branches.

Question 13

This whole question was very well answered by the vast majority of candidates.

(a) Most candidates correctly calculated the missing values in the table. The most common source of error arose from incorrect substitution of negative x-values, often leading to sign or arithmetic mistakes.

(b) The majority of candidates successfully plotted the points they had calculated. Errors were most often associated with negative values, either in plotting or in interpreting them. Some candidates lost marks by not joining the plotted points to form a smooth curve, instead connecting them with a series of straight-line segments. Additionally, a few candidates incorrectly plotted the coordinate (0, 3) as
(3, 0), which distorted the shape of the graph.

Question 14

In part (a) candidates who correctly recalled and applied the formula for the area of a sector generally gained full marks. However, several common errors were observed. Some candidates mistakenly used 6 cm instead of 12 cm for the radius, while others applied the formula for the circumference of a circle rather than the area.

There were also inappropriate attempts to solve the problem using the sine rule, Pythagoras' theorem, or the cosine rule, none of which were applicable in this context. In some cases, candidates attempted to use the correct formula for the area of a sector but introduced errors within the expression, such as incorrect additions or substitutions.

Overall, performance on this question tended to be polarised—candidates either achieved full marks or gained no credit at all.

In part (b) the majority of candidates answered this part correctly. However, some opted to use the cosine rule or sine rule to find missing lengths or angles before calculating the area of the triangle. This approach was unnecessarily lengthy for a question worth only two marks, and often introduced errors in the working, which ultimately resulted in no marks being awarded.

Question 15

When solving quadratic equations using the quadratic formula, candidates are advised to show all their working, as explicitly required by the question. While many candidates correctly demonstrated the initial substitution into the formula, they often proceeded directly to the final answers. In such cases, marks were sometimes lost due to rounding errors or giving answers to an incorrect degree of accuracy.

A number of candidates attempted to solve the equation by completing the square; however, this approach frequently resulted in incorrect solutions. Only a few candidates lost marks by providing two correct solutions without any supporting working.

Generally, substitution into the formula was handled well. However, common errors included failing to draw the square root symbol over the entire discriminant and incorrectly extending the division line, such that it did not cover the entire expression involving "$-9 \pm \sqrt{\dots}$". In some cases, candidates omitted the "±" sign altogether and only provided one solution, which could not be awarded any marks.

Question 16

A good number of candidates were able to work confidently with indices and reached the correct final answer of -1.2. The accuracy mark was dependent on M2, so full working was required to be awarded all three marks.

Many candidates successfully rewrote one or both terms on the left-hand side as powers of 2, thereby gaining the first method mark. The second mark was awarded for forming a correct equation using all three terms expressed with the same base.

It was relatively uncommon for a candidate to gain the first method mark without going on to earn full marks, and even rarer for someone to reach the second method mark without also securing the final accuracy mark.

However, there were also many responses where candidates showed little understanding of the topic, resulting in no marks being awarded.

Question 17

Marks on this question were well distributed, though less able candidates often struggled to make a clear start. Many students correctly identified the need to multiply both the numerator and denominator by the same correct expression.

However, while a number of candidates correctly stated this multiplication step, many were unable to expand either the numerator or the denominator accurately. A common issue was misuse of the calculator to obtain the final answer without showing any working. As the question explicitly required clear steps, these candidates were not awarded further marks.

More able students successfully expanded the denominator and simplified it to **7**. However, some errors were still seen in the expansion of the numerator—often due to candidates forgetting to multiply both terms by 21. Additionally, a number of candidates failed to cancel the common factor of 7 in the final step, thereby losing the final accuracy mark.

Question 18

The majority of candidates were able to gain at least one mark on this histogram question. Those who recognised the need to work with the area of each bar were generally successful in securing the first mark, and a range of valid methods were seen, involving a variety of areas and scales being considered.

However, many candidates scored only the first mark because they gave 22 as their final answer—stating the number of people rather than the required proportion. Some candidates correctly calculated the frequencies for each bar but did not sum these to obtain a total, which was necessary for determining the correct proportion.

Errors in accuracy often arose from the unequal class widths, with some candidates misreading the scale or failing to account for the varying intervals appropriately.

Question 19

This was a challenging question that required strong fluency and precision in working with algebraic fractions to reach a fully simplified solution.

It was encouraging to see that most candidates attempted the question, though with varying degrees of success. The most effective approach was demonstrated by candidates who identified that the numerator of the second fraction contained a factor of *xy*, which could be cancelled with the denominator—greatly simplifying the expression from the outset. When this was combined with accurate factorisation elsewhere, it typically earned candidates 1 or 2 marks.

The second method mark was awarded for correctly inverting the second fraction and performing appropriate cancellations, either through full factorisation or equivalent simplification.

Some candidates earned 1 mark by expanding both numerators and denominators after flipping and multiplying the fractions; however, this approach often introduced errors and rarely led to a correct final answer.

Stronger candidates correctly factorised all expressions and applied the reciprocal multiplication step. Nevertheless, the most frequent incorrect answer was **6**, with many candidates wrongly cancelling the expressions $(x+y)$ and $(x-y)$. Only a small number of candidates arrived at the correct final answer of – 6.

Question 20

A good range of marks was achieved on this question making it a good discriminator.

Most candidates attempted this item. Those who did often gained 1 mark for substituting to the stage of only having *n* terms in their expression. Others gained this 1 mark for being able to deal correctly with the denominator. Only the best candidates worked accurately to give a fully correct expression in the form required. A common error was to re-write $\frac{3}{4n}$ as $\frac{3}{4}n$.

Those that attempted but gained no marks often forgot to simplify the denominator, or forgot to substitute the expression $\frac{3}{4n}$ into the numerator and the denominator.

A significant number of candidates did not correctly apply brackets in the numerator and ended up with +*n* in the numerator instead of 7*n*.

The candidates scoring 2 marks were quite often awarded for having d = 3 and two other correct terms in the answer. Many candidates struggled with the fractions within fractions, however those that found the most success realised they could multiply the numerator and denominator by $4n$.

Question 21

Candidates who began with the cosine rule generally earned two marks before proceeding to the sine rule. Although most substitutions into the sine rule were correct, some candidates faltered when rearranging their expressions. In marking, any BD value was accepted for awarding sine-rule method marks—even if it came from an incorrect cosine-rule calculation—so those who wrongly treated triangle ABD as isosceles could still score.

As a two-step question, it was well answered overall: very few candidates scored zero. A common error was applying Pythagoras to find BD, yet many of those candidates then correctly used the sine rule. Occasionally, candidates showed flawless cosine-rule working but made a data-entry slip on their calculator, yielding the wrong BD; fortunately, they typically picked up follow-through marks on the sine-rule step. It also helped that the third and fourth marks were independent of the first two, and that both 10.3 and 10.4 were accepted for BD, accommodating premature rounding.

Question 22

Although this question tested more advanced probability and proved challenging—many candidates overlooked that the counters weren't replaced or only formed combinations of two instead of three—the overall performance was strong. Most earned the first mark by calculating a single valid product correctly. Those who then enumerated every possible counter combination secured full marks; a few, despite using a valid method, slipped on the final summation and received two marks. Candidates who applied a correct approach but assumed replacement were awarded one special-case mark. Many only reached M1 by identifying sequences like RRY without multiplying by three (yielding 17/76) because they didn't count all permutations; a partially or fully drawn tree diagram often helped. A handful became entangled in their workings or made calculator-entry errors, though others demonstrated clear, systematic solutions.

Question 23

This question proved exceptionally demanding: many candidates left it blank or submitted incorrectly labelled diagrams with no meaningful progress. The principal hurdle was identifying the angle of elevation of P from A—mislabelling ∠CAD as 24° often led to wrong length calculations—and some mistakenly treated P as the midpoint of CF, using CP = 5 cm instead of the given 3 cm.

Those who scored the first mark either calculated GP correctly or pinpointed the adjacent side in triangle CAX (with X on DE beneath P), usually as part of their working to find the cuboid's height. Earning the second method mark depended on determining a next length accurately; those who did generally went on to find the correct angle of elevation. Common later mistakes included misapplying the cosine rule or an inappropriate sine-rule approach, substituting AF for AP, and using tan 24° = PX/12 before identifying the adjacent side. Although most recognised the need for Pythagoras—picking up one or two marks for finding the cuboid's height—very few carried the solution through to completion. Premature rounding, decimal answers instead of surds, and unsupported diagram annotations were widespread, yet the structured mark scheme ensured that partial progress was still rewarded.

Question 24

Candidates were asked to find the equation of the line through a square's diagonal by using the coordinates of two opposite corners—a question that clearly separated stronger candidates. Although many left it blank, the first two marks—awarded for correctly computing the gradient of PR and for showing (even via a diagram) how the midpoint was obtained—were relatively straightforward. Subsequent marks required taking the negative reciprocal of PR's gradient and combining it with the midpoint to form the perpendicular line's equation. Common pitfalls included sign errors in the gradient (due to reversing the order of subtraction), unnecessary attempts to calculate the distance between the points, using the original corner instead of the midpoint, and failing to present the final equation in the required format (for example, leaving it as $y = \frac{1}{3}x - 1$, which earned only four marks). A number of candidates also found midpoints by subtracting coordinates before halving rather than by averaging. Drawing a clear diagram, averaging coordinates by addition then dividing by two, applying the perpendicular-gradient formula correctly, and expressing the result with integer coefficients would have guided more candidates to full marks.

Question 25

This problem was designed to stretch the strongest candidates by asking them to complete the square when the squared term carries a negative coefficient. In part (a), many earned the first mark by factoring out ±4, but a common slip was leaving the negative sign inside the completed-square bracket. A number of candidates then stumbled over subsequent steps—sometimes because they tried to apply a memorised formula incorrectly, or because they misused brackets—so few progressed beyond the first method mark. Rarely did anyone use coefficient comparison, even though that approach can yield marks more generously. Many others couldn't even begin the simple factorisation by −4.

In part (b), candidates were expected to use their completed-square form to solve the equation. Those who left (a) blank had no foothold here, and even some who completed (a) correctly failed to demonstrate the required "hence" method. Instead they turned to the quadratic formula—which earned no credit, since this question was specifically assessing the use of the completed-square result—and so only a handful scored full marks. Greater emphasis on the process of completing the square and on the meaning of “hence” would help more candidates reach the intended learning outcomes.

Summary

Based on candidates' performance in this paper, the following areas should be prioritised for improvement:

- Learn the suggested list of formulae provided, and practise applying those provided on the formula sheet correctly in context.
- Read each question carefully and ensure they are responding precisely to what is being asked, particularly when a specific format (e.g. proportion or probability) is required.
- Write clearly and legibly to avoid errors caused by misreading their own handwriting.
- Avoid premature rounding in multi-step problems; instead, use a sufficient number of decimal places or store values in the calculator's memory until the final step.
- Show all working in a clear, logical, and sequential manner, especially for “show that” questions or those requiring algebraic steps.
- Practise breaking down complex, multi-step problems—even partial attempts may gain method marks.
- Strengthen understanding and application of more advanced probability concepts and problem-solving techniques.
- Manage exam time effectively—avoid spending too long on a single question at the expense of others.
- Develop a strong understanding of standard algebraic techniques, such as completing the square, and apply this method confidently to solve quadratic equations.
- Always check that the final answer satisfies the requirements of the question, including correct format and units.

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