

EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE
Home of Examinations and Assessment, Zone 6, Zwelitsha, 5600
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2025 NSC CHIEF MARKER'S REPORT

SUBJECT	MATHEMATICS		
QUESTION PAPER	1		
DURATION OF QUESTION PAPER	3 HOURS		
PROVINCE	EASTERN CAPE		
NAME OF THE INTERNAL MODERATOR	NDUMISO MKANDLA		
NAME OF THE CHIEF MARKER	NCEDISWA MAGIDA		
DATES OF MARKING	29/11/2025 – 12/11/2025		
HEAD OF EXAMINATION:	MR E M MABONA		

SECTION 1: (General overview of Learner Performance in the question paper as a whole)

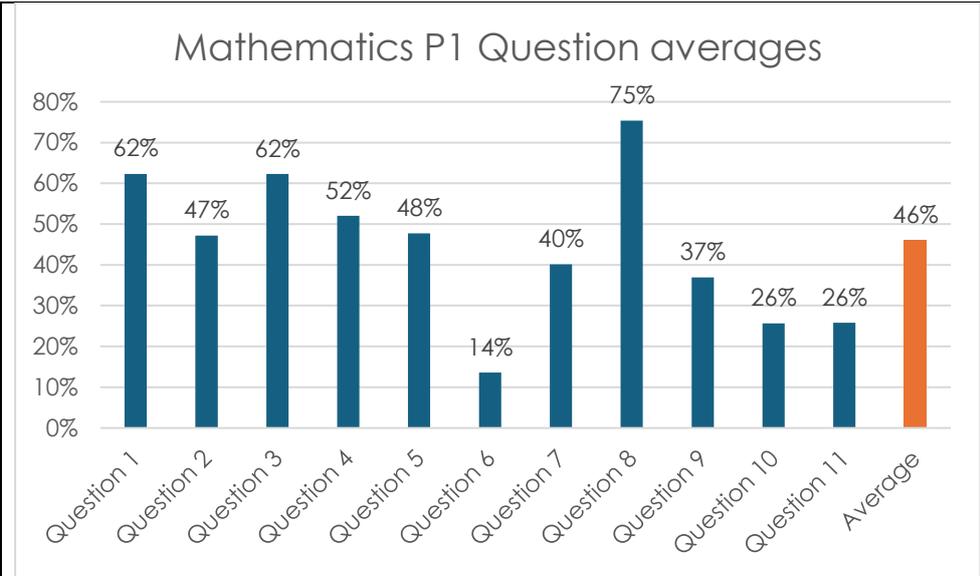
Based on the item analysis, learner performance has declined compared to 2024. From a sample of 100 scripts, the average score was 46%, which is 4% lower than the average for the same sample in 2024. A standard deviation of 39 indicates a very wide spread of marks, reflecting inconsistent performance across candidates.

The strongest-performing questions were Questions 1, 3, and 4, with average scores of 62%, 62%, and 75%, respectively. The lowest-performing question was Question 6, with an average of 14%.

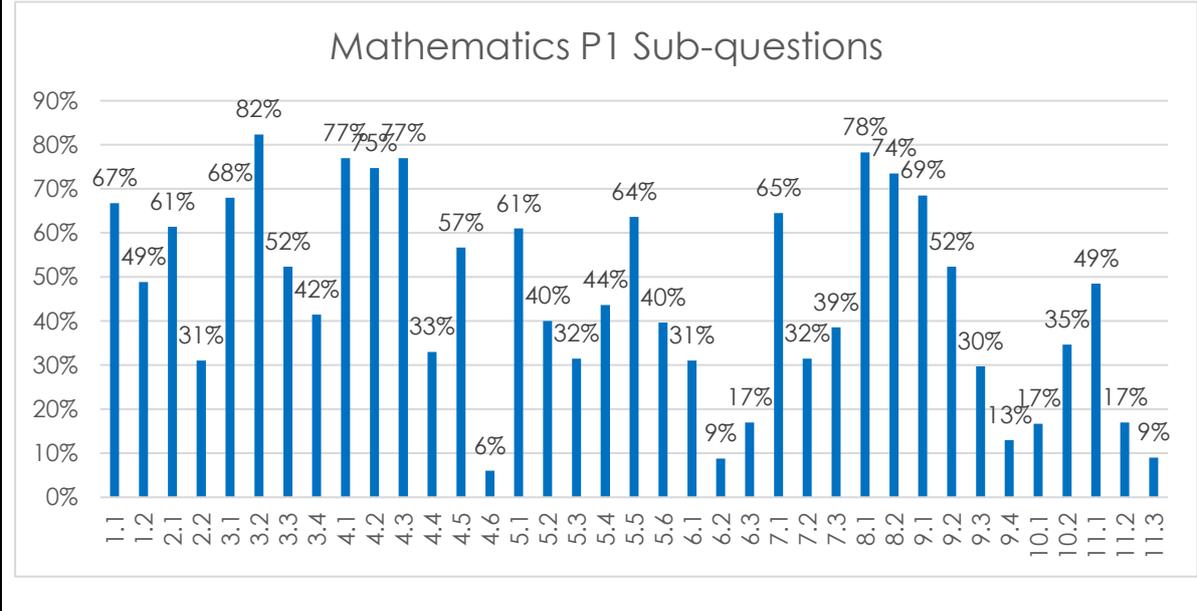
Question 8 performed well because it assessed straightforward calculus concepts that most candidates handle comfortably. In contrast, the optimisation question (Question 10) was poorly answered—not necessarily due to difficulty, but likely because it is a topic often skipped by teachers, who may assume it will be examined at a higher cognitive level.

Question 1 performed below expectations, mainly due to sub-questions 1.1.5 and 1.2. Although these were not inherently difficult, the multi-step processes required in 1.1.5 and the interpretive demand in 1.2 contributed to lower scores.

While the statistical findings are drawn from the 100-script sample, the qualitative observations for individual questions are based on the full marking process and using the 7-point scale.



Question 2.2.2 was the biggest cause for poor performance in Question 2. As for Questions 10 and 11, with an average of 26% apiece, they were not entirely difficult but it could be that candidates struggled to finish. Yes, Question 11.3.2 was difficult but it accounted for 4 marks out of the 16. Question 4.6 also proved to be quite demanding for the candidates. Transformations and inequalities are still a challenge to most of the learners.



SECTION 2: Comment on candidates' performance in individual questions

A sample of one hundred scripts was analysed to evaluate the performance of the 2025 NSC candidates in this paper. The graphs presented in this report therefore reflect the marks obtained by these 100 candidates. The patterns observed in their responses to the various sub-questions are considered representative of the likely performance of the broader cohort.

Brief comments on common errors and misconceptions are included, together with guidance for educators on how future candidates can be better prepared to achieve optimal outcomes. Additional remarks have been added to support

internal marking practices and assist in the setting of school-based assessment and internal examination papers.

Educators are strongly encouraged to read this report alongside the official marking guideline to gain a comprehensive understanding of learner performance, the expectations of the examination, and the relevant assessment standards.

QUESTION 12025

1.1 Solve for x :

1.1.1 $(x + 5)(x - 2) = 0$

1.1.2 $5x^2 + 2 = -9x$ (correct to TWO decimal places)

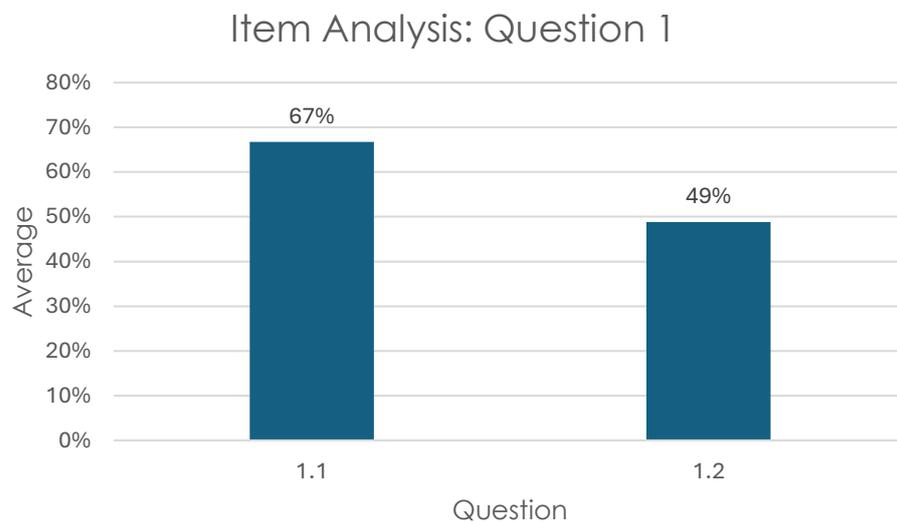
1.1.3 $8x^2 > 2x$

1.1.4 $2 \cdot 2^{2x} - 9 \cdot 2^x + 4 = 0$

1.1.5 $\sqrt{\sqrt{\frac{1}{x}} + 2} = \frac{1}{\sqrt{x}}$

1.2 Calculate the values of x and y if:

- x is the sum of 2 and y
- Five times the product of x and y , is 6 more than the square of x



(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

Questions 1.1.1

- The question was generally well answered.

- Some candidates who attempted to expand first and then solve ended up with incorrect answers, indicating difficulties in managing multi-step algebraic processes.

Question 1.1.2

- The question was largely well answered, except for errors in substituting values into the quadratic formula.
- Many candidates were only able to obtain the standard form mark, indicating partial understanding.
- Some learners applied the wrong formulas, leading to incorrect final answers.

Question 1.1.3

- Most students were able to obtain marks for the standard form and critical values only.
- The majority of candidates could not correctly identify the required region, resulting in the loss of the remaining marks.
- Some learners incorrectly used “and” instead of “or” to combine their solutions, leading to a further loss of marks.

Question 1.1.4

- The question was not done very well.
- Most candidates who earned some marks were able to obtain at least 2 marks, indicating partial understanding but incomplete solutions.

Question 1.1.5

- The question was poorly answered.
- Many learners confused “square” with “square root,” demonstrating a major conceptual misunderstanding.
- Learners often interchanged these operations incorrectly when forming equations from word problems.
- There was also a failure to correctly expand binomials, which contributed to incorrect solutions.
- This affected performance in this question, that required modelling real-life contexts algebraically.

Question 1.2

- Poor Interpretation of Word Problems

A large number of learners:

- Failed at the equation formulation stage, even before calculations began,
- Struggled to identify relationships between variables,
- Could not correctly translate verbal statements into algebraic expressions.

This confirms a serious weakness in mathematical literacy within algebraic contexts.

The analysis shows that while some learners possess sound procedural fluency, a large proportion lack the foundational conceptual understanding required to engage meaningfully with algebraic problem-solving. The inability to interpret questions, manipulate algebraic expressions accurately, and apply inverse operations correctly remains a significant barrier to success.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Many learners made errors in squaring twice, a critical procedural step. Skipping or incorrectly performing this step led to wrong solutions.
- Learners either forgot to square both sides when required, or squared only part of the expression.
- Expanding brackets incorrectly or simplifying terms wrongly, e.g., combining unlike terms.
- Learners often assume the answer is simpler than it is, neglecting intermediate steps.
- Confusion between length and area in geometric contexts (thinking a "square" always refers to area rather than side lengths).

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Educators should focus on teaching for conceptual understanding rather than solely for exam performance, ensuring learners grasp the underlying principles.
- Greater emphasis should be placed on inequalities and their interpretation, as this remains a challenging area for many learners.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Candidates often ignore the instruction that providing answers only does not necessarily earn full marks; it is important for them to show all relevant working.
- Learners should be encouraged to copy relevant formulas from the formula sheet when solving problems to reduce errors and ensure correct application.
- Allocate time in each relevant chapter to practising word and application problems so that learners become familiar with the types of questions they are likely to encounter in examinations.

QUESTION 2

2.1 Given the infinite geometric series: $(t + 10) + (t - 2) + (t + 4) + \dots$

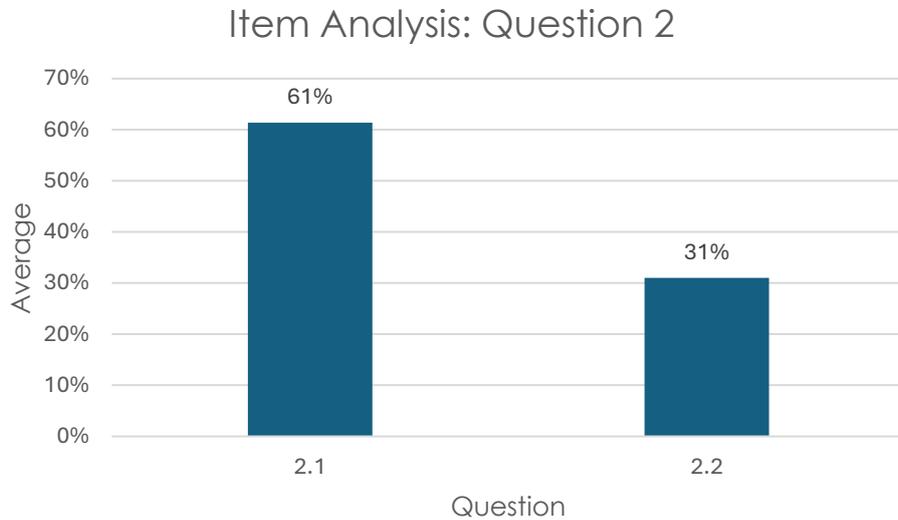
2.1.1 Show that $t = -2$

2.1.2 Calculate the value of T_{25} . Write your answer in the form $T_n = b^x$

2.1.3 Calculate the sum of the infinite series.

2.2 Given $\sum_{p=k}^{117} (4p - 1) = 26\,675$

- 2.2.1 Write down the difference between T_6 and T_{14} .
- 2.2.2 Calculate the value of k .



(a) General comment on the performance of Candidates in the specific question. Was the question well answered or poorly answered?

Question 2.1.1

- The question was generally well answered.
- Some candidates struggled with clearing the denominators.
- Most candidates who successfully reached the intermediate step were able to obtain full marks.

Question 2.1.2

- The question was quite accessible to most candidates.
- Those who did not achieve full marks generally struggled to express their answers in the required form, $\frac{a}{b} = \frac{c}{d}$.

Question 2.1.3

- The question was very accessible to most candidates, although some learners applied the wrong formula, leading to incorrect answers.

Question 2.2.1

- The question was poorly answered by most candidates, even though it involved a linear function.

Question 2.2.2

- The question was poorly answered by the majority of candidates.
- Most learners did not understand the information conveyed by the sigma notation, which affected their ability to complete the question correctly.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Learners are generally not comfortable with series, regardless of type. Many mix up formulas and use arithmetic and geometric series formulas interchangeably, leading to incorrect solutions.
- Exponents remain a significant challenge, which prevents learners from expressing terms in the required form. Many are also unaware of the conditions necessary for a series to converge.
- Sigma notation is intimidating to most students. They struggle to break it down and relate it to the corresponding formula, whether for an arithmetic or geometric series.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

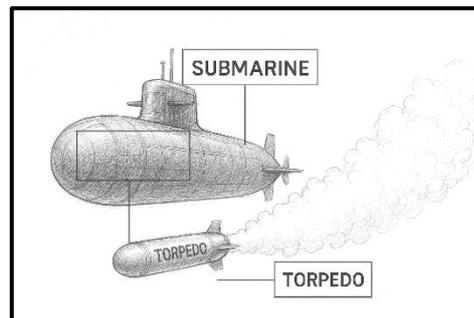
- Exponents should be emphasised to learners, especially since they were last formally taught in Grade 11. Strong understanding of exponents is essential for working with series effectively.
- Educators should teach series in their various forms. For example, the formulas for geometric and arithmetic series should be compared with and related to the sigma notation
- Learners must be comfortable expressing each series in different formats to improve conceptual understanding and application skills.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Educators should focus on teaching mathematics conceptually, rather than merely coaching learners to pass exams.
- Learners need preparation on how to approach and answer exam-type questions, as textbook exercises alone are insufficient for developing the necessary skills and reasoning.

QUESTION 3

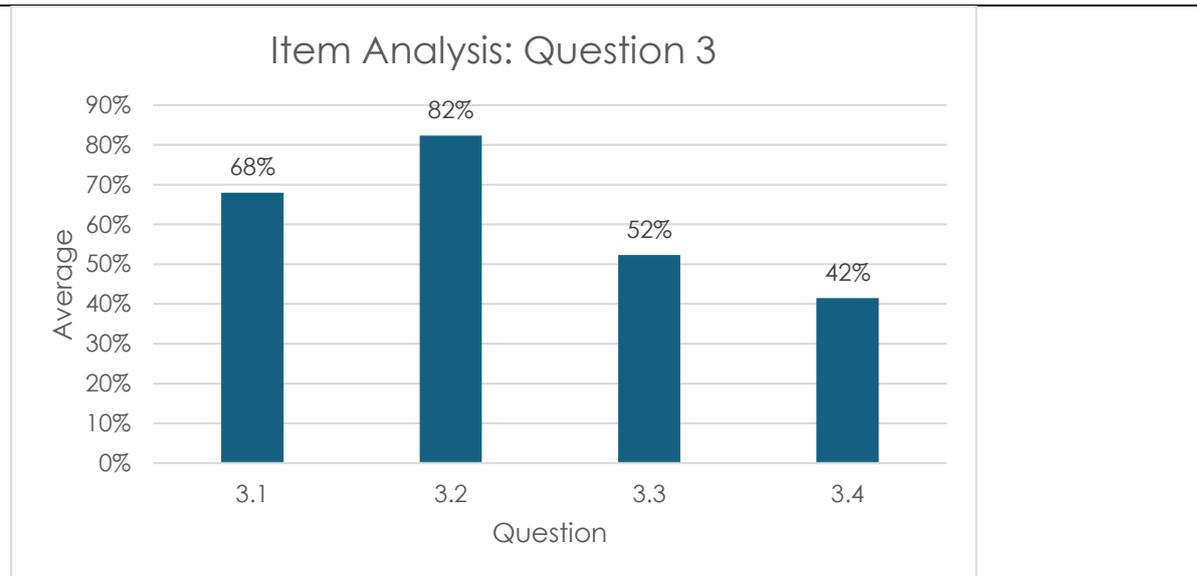
The depth of a torpedo below sea level forms a quadratic pattern, where 0 metres is at sea level. A submarine tracked a torpedo in one-second intervals.



The depth (in metres) that the torpedo reached is given in the table below.

	Depth (in metres)
At the end of the first second	36
At the end of the first 2 seconds	71
At the end of the first 3 seconds	104

- 3.1 Calculate the depth of the torpedo at the end of the first 5 seconds.
- 3.2 Show that the depth of the torpedo at the end of n seconds was $T_n = -n^2 + 38n - 1$
- 3.3 Calculate the maximum depth that the torpedo reached.
- 3.4 After how many seconds was the torpedo at 104 m below sea level for the second time?



(a) General comment on the performance of Candidates in the specific question. Was the question well answered or poorly answered?

Question 3.1

- Generally, well answered by the majority of candidates.

Question 3.2

- The question was generally well answered, as expected.
- A few candidates struggled to relate the depth of the torpedo to the given parameters, resulting in partially incorrect solutions.

Question 3.3

- The question was fairly answered overall.
- Many candidates struggled to determine whether the depth corresponded to the value of n , whether they needed to set the derivative equal to 0, or whether another approach was required.
- Quite a number of learners correctly found the derivative but did not proceed to determine the required value, resulting in incomplete solutions.

Question 3.4

- The question was not well answered.
- Candidates appeared unsure of the required approach; some simply substituted values incorrectly, while others solved the problem correctly but failed to select the final answer.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Candidates do not necessarily understand how to mathematically interpret sequences and series.
- Candidates are not sure when to use which formula, as such many take chances and go with what they think gives them the correct answer.
- The concept of 'show' in mathematics is still foreign idea to many candidates.
- There is very little meaning attached in relation to the equation of a parabola.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Strengthen learners' ability to interpret and solve word problems in sequences & series:
- Many learners struggle to translate contextual scenarios into mathematical expressions. Regular exposure to varied word problems at the end of the chapter will help them make connections between formulas and real-life contexts, enhancing both comprehension and application.
- Teach the formula in relation to the quadratic function on the Cartesian plane:
- Educators should link the relevant sequence/series formula (e.g. as a quadratic expression) to the graphical representation of a quadratic function.
- This helps learners distinguish between the variables involved, understand the structure of the formula, and interpret terms such as T_n and n more meaningfully.
- Develop the concept of 'show that' questions: Teachers should train learners to approach a "show that..." question by solving the problem without relying on the given answer, as if the target expression were unknown. This builds logical reasoning, ensures learners justify every step, and reduces the tendency to reverse-engineer answers without proper method.

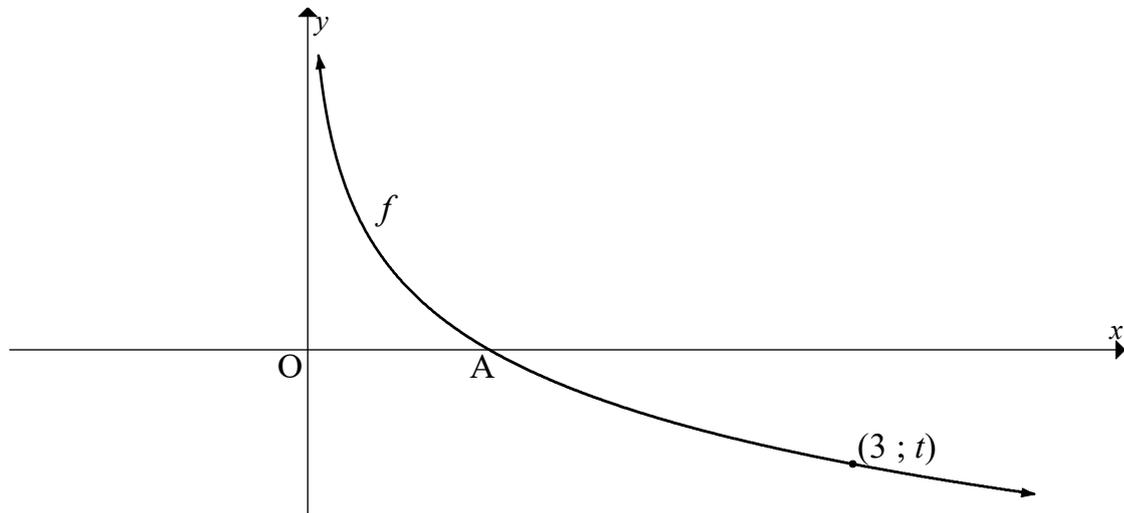
(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- There is an evident shift by examiners towards questions that assess learners' ability to apply concepts, rather than merely recall knowledge. Educators are therefore encouraged to incorporate more application-oriented questions into their teaching and assessment practices.
- Word problems should not be overlooked during exam preparation. Engaging learners in solving such problems is essential for developing critical thinking and problem-solving skills, which are crucial for success in the matric examination.

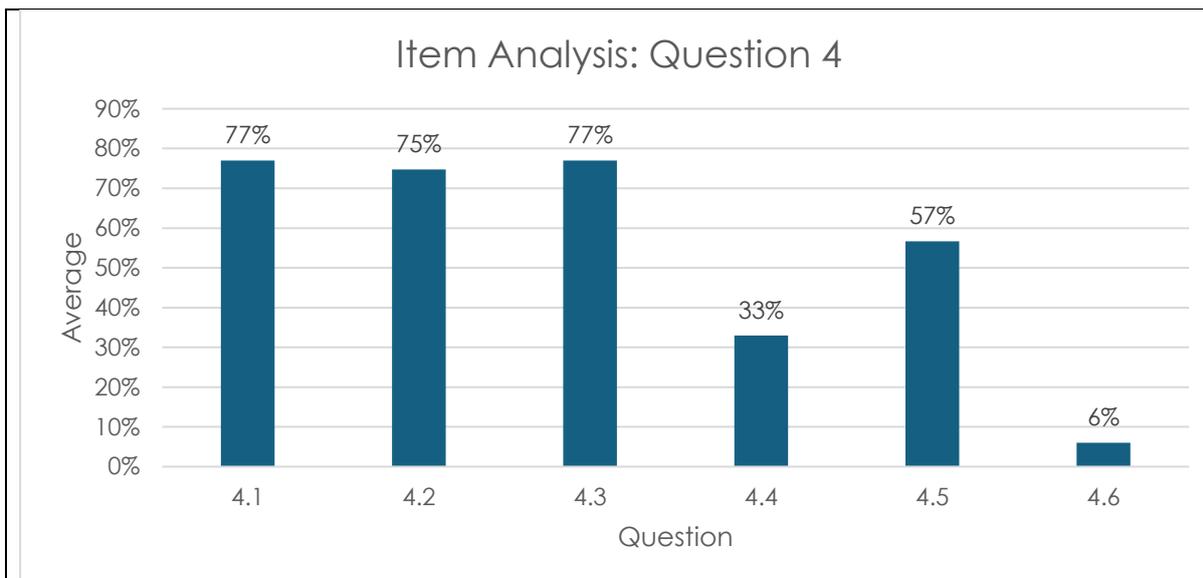
QUESTION 4

$$f(x) = \log_{\frac{1}{3}} x$$

The graph of $f(x) = \log_{\frac{1}{3}} x$ is drawn below. Point A is the x-intercept of f and $(3; t)$ lies on f .



- 4.1 Calculate the value of t
- 4.2 Write down the coordinates of A.
- 4.3 Determine the equation of f^{-1} , the inverse of f , in the form $y = \dots$
- 4.4 Write down the equation of the asymptote of f^{-1}
- 4.5 Draw the graph of f^{-1} on the set of axes provided in the ANSWER BOOK. Clearly indicate the intercepts with the axes, the coordinates of ONE other point and the asymptotes.
- 4.6 The graph of h is obtained when f^{-1} is translated 5 units to the right. Determine the y-values of h where $x > 4$.



(a) General comment on the performance of Candidates in the specific question. Was the question well answered or poorly answered?

Question 4.1

- Well answered.

Question 4.2

- Well answered.

Question 4.3

- Well answered.

Question 4.4

- Most candidates could only swap x and y , nothing more.
- Candidates could not relate the function with its inverse.

Question 4.5

- Fairly done.
- Even some candidates who were not able to obtain the equation of f^{-1} were able to draw the sketch.
- Many candidates were not able to plot a point that lies on f^{-1} .

Question 4.6

- Poorly answered.
- A number of candidates were able to the upper limit of 3 but did not realise that y could not be less than 0.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Strengthen conceptual understanding of exponential and logarithmic functions: While learners generally cope well with exponential functions, many struggle with logarithmic functions because they cannot attach clear meaning to the exponential relationship itself. A deeper focus on the real-

world interpretation and growth/decay behaviour of exponential functions will provide the foundational understanding needed before introducing logarithms.

- Teach logarithmic functions explicitly as the inverse of exponential functions: Learners grasp the concept of an inverse more effectively when logarithmic functions are presented as the inverse of the exponential function, rather than approaching the relationship in the reverse sequence. This approach supports better conceptual clarity, especially regarding domain, range, and the reversal of input-output roles.
- Integrate transformations meaningfully when teaching functions: Transformations—shifts, reflections, and stretches—should be an integral part of teaching functions. Greater emphasis should be placed on using graphs to interpret and answer questions, enabling learners to visualise changes, predict behaviour, and understand function properties more intuitively.
- Improve learners' understanding of inequalities and associated regions: Learners often display limited understanding of inequalities, especially when required to identify or represent solution regions graphically. They struggle to interpret boundary lines, determine whether to include endpoints. Explicit teaching of region identification—supported by diagrams, sign-testing, and real examples—will help learners develop stronger conceptual understanding and accuracy.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

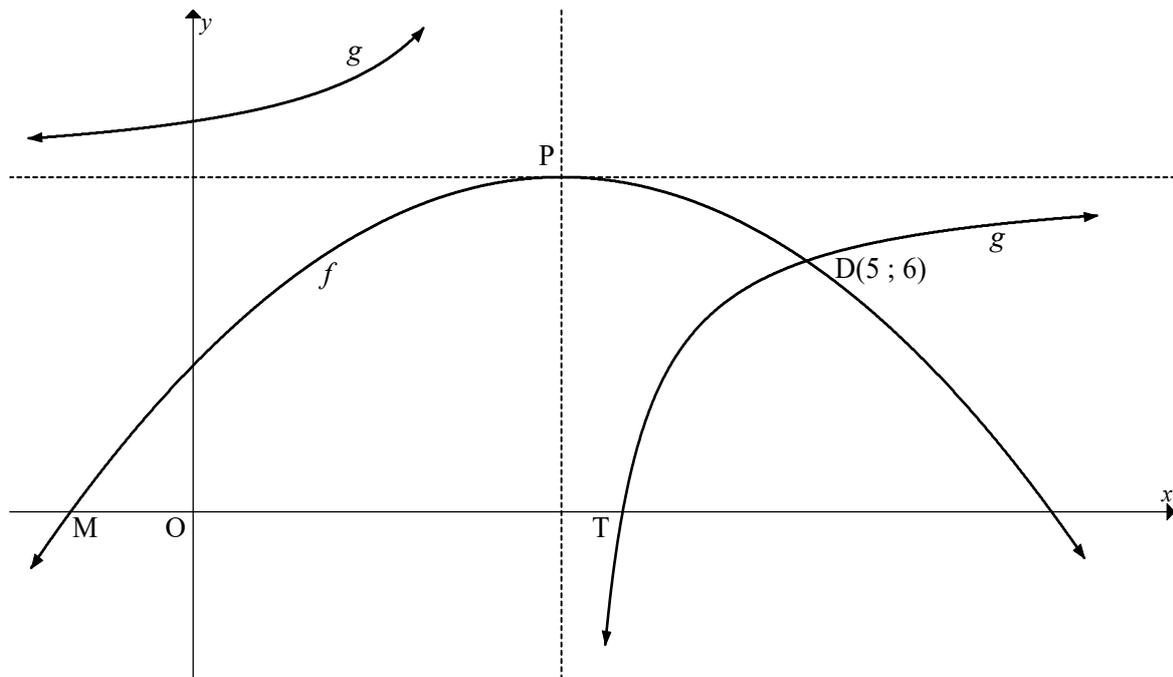
- Teach exponential and logarithmic functions explicitly as inverses of each other:
- Educators should emphasise the reciprocal relationship between exponential and logarithmic functions. Presenting them side-by-side as inverse functions strengthens conceptual understanding and helps learners navigate between the two with confidence.
- Encourage learners to identify and mark key points on graphs: Learners should be taught to locate and label significant points—such as intercepts, turning points, asymptotes, and any relevant coordinates—when sketching or analysing graphs. This practice improves accuracy, supports correct interpretation, and helps them justify their reasoning in functions questions.
- Build competence in identifying and shading inequality regions on graphs: Teaching should focus on helping learners determine which region satisfies a given inequality. Using diagrams and sketching techniques—including testing points, understanding boundary lines, and shading correctly—will support better conceptual and procedural understanding.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- The functions questions are typically accessible and straightforward for learners who have mastered the basics. However, those who lack core concepts—such as interpreting graphs, understanding transformations, identifying key features, and working confidently with inverses—find even simple items challenging. This highlights the need for consistent reinforcement of foundational function concepts throughout the year.

QUESTION 5

The graphs of $f(x) = ax^2 + bx + c$ and $g(x) = \frac{-4}{x-3} + 8$ are drawn below.
 P is the turning point of f and the point of intersection of the asymptotes of g .
 The graphs intersect at $D(5; 6)$. M and T are x-intercepts of f and g respectively.



- 5.1 Write down the domain of g .
 5.2 Write down the range of f .
 5.3 Determine the values of x for which:

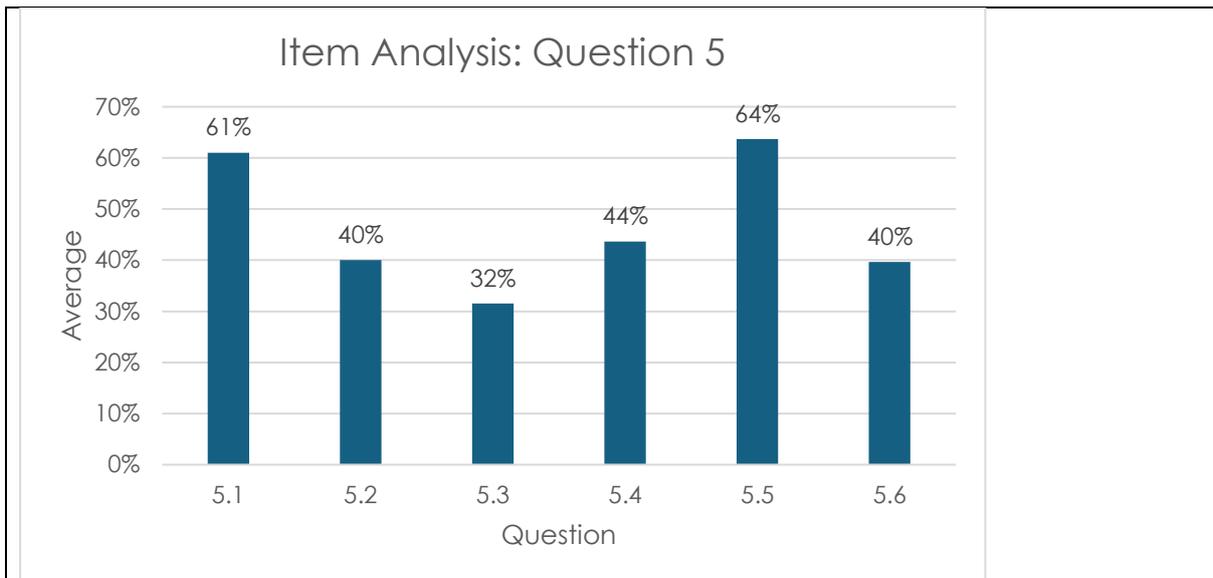
5.3.1 $g(x) \leq f(x)$

5.3.2 $f(x) < 6$

- 5.4 Show that the equation of the parabola is $f(x) = -\frac{1}{2}x^2 + 3x + \frac{7}{2}$

- 5.5 Calculate the length of MT.

- 5.6 Determine the equation of the tangent to f at D.



(a) General comment on the performance of Candidates in the specific question. Was the question well answered or poorly answered?

Question 5.1

- Fairly answered.
- Some candidates were writing the domain in terms of y .

Question 5.2

- Poorly answered.
- Most candidates who could get it right could not identify the range of f .

Question 5.3

- Probably the most difficult sub question.
- Both sub questions needed identification of inequality regions but were poorly answered.
- For those candidates who managed to identify the regions, many were not accurate in terms of the use of inequality signs.

Question 5.4

- Poorly answered.
- Many candidates used at least one of the given values to 'show', which is a wrong approach.
- The method of completing the square was not an obvious go-to method, other alternatives were correctly used.

Question 5.5

- Fairly well answered.
- Candidates used the given equation correctly, in most cases.

Question 5.6

- Not well answered.
- The first derivative was badly calculated.
- The idea of substituting (5 ; 6) into the first derivative was well understood.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Difficulty with inequalities: Several sub-questions required learners to solve or represent inequalities. Generally, learners struggle with inequalities, particularly in identifying solution regions and correctly interpreting boundary conditions on graphs.
- Errors in determining coefficients of a parabola: In questions requiring the identification of a , b and c in a parabolic function, many learners substituted at least one of the given values incorrectly, leading to partially or fully incorrect solutions.
- Challenges with the relationship between a parabola and a tangent: Many learners could not fully grasp the relationship between the equation of a parabola and a tangent line. Consequently, sub-questions involving tangency were very difficult, resulting in low success rates.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Emphasise the use of graphs to identify regions in inequalities: Educators should focus on helping learners interpret and use function graphs to determine solution regions for inequalities. This includes shading correctly, understanding boundary lines, and linking algebraic solutions to graphical representations.
- Develop the skill of “show that” questions: Learners should be trained to solve “show that” questions independently, without relying on the provided answer. This encourages logical reasoning, step-by-step justification, and deeper understanding of the underlying concepts.
- Highlight the relationship between functions and tangents: Teaching should emphasise how a tangent interacts with a function at any given point, including how to determine the slope, coordinates, and equation of the tangent line. Understanding this relationship is crucial for solving higher-order questions involving parabolas and other curves.

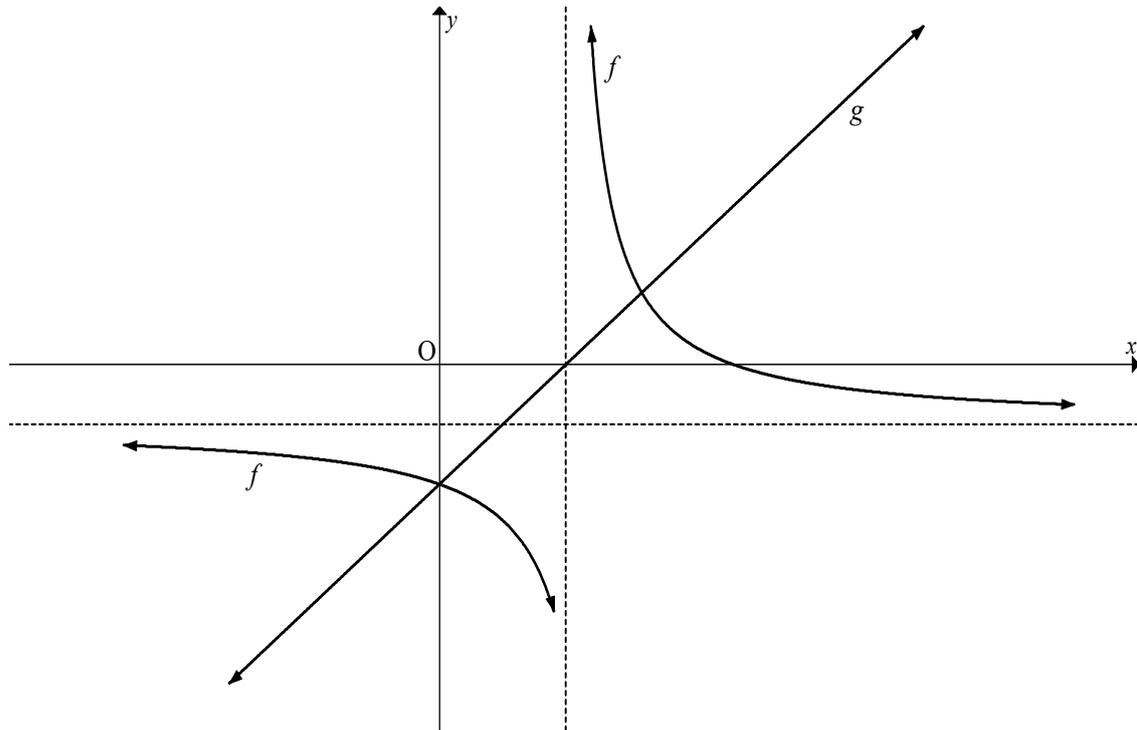
(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Teach functions in relation to one another: Educators should present linear, quadratic, cubic, exponential, logarithmic, and hyperbolic functions in a connected manner. This approach helps learners understand each function individually while also developing the ability to work with two or more functions on the same set of axes. It fosters comparative understanding, strengthens graph interpretation skills, and enhances problem-solving involving multiple function types.

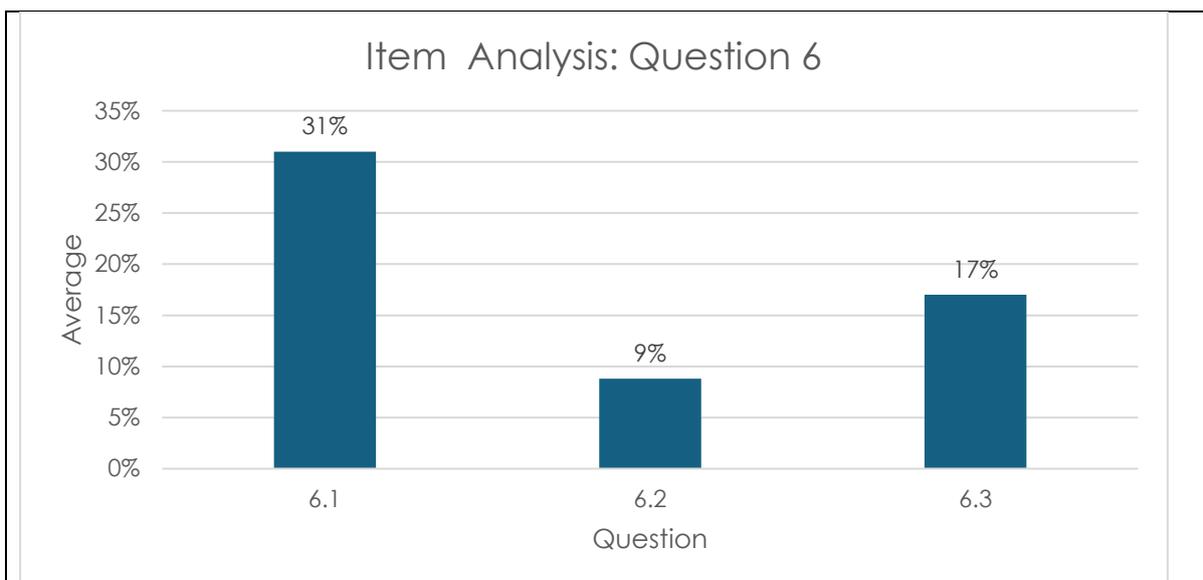
QUESTION 6

$$f(x) = \frac{a}{x+p} + q$$

The graphs of $g(x) = x + c$ and $f(x) = \frac{a}{x+p} + q$ are drawn below. Graph g and the vertical asymptote of f intersect at the x -axis.



- 6.1 Write down the coordinates of the x -intercept of g in terms of p .
- 6.2 Graph g intersects the horizontal asymptote of graph f at $x = 1$ and the graph at $x = 3$. Graphs f and g also intersect on the y -axis. Determine the equation of f .
- 6.3 Describe the transformation that g must undergo to become an axis of symmetry of f that cuts f at two points.



(a) General comment on the performance of Candidates in the specific question. Was the question well answered or poorly answered?

Overall, this was the most poorly answered question in the whole paper.

Question 6.1

- Poorly answered.
- There is a general lack of understanding for the meaning of $(x + p)$ or $(x - p)$ in the context of functions.

Question 6.2

- The most poorly answered sub question in the whole question paper.
- Candidates could not make head or tail of exactly what was needed to find the four unknowns.
- The information given to the candidates was rather confusing for them to be able to come out with coherent equations.

Question 6.3

- This was going to be an accessible sub question, only if they got the right equation of f .
- Transformations in any form or kind are a challenge to our learners.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- High complexity requiring abstract understanding: The question was very complex and demanded an abstract understanding of functions. Many learners struggled because the problem required reasoning beyond routine procedures.
- The answer was not correct for most learners mainly because learners are taught the equation.
- They generally take this to be a formula rather than an equation.
- Misconceptions regarding equations and formulas: The majority of learners did not provide the correct answer, largely because they were taught the

equation as a formula rather than understanding it as an equation to be solved. Consequently, many simply wrote down the formula without performing the necessary steps, resulting in incorrect solutions.

- The diagram was drawn to scale, which led some candidates to make assumptions about values rather than deducing answers logically. This approach caused learners to lose marks, particularly in Question 6.2, where working should have been purely algebraic or deductive rather than based on measurement. The question was very complex and it required an abstract understanding of functions.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Explain the equation of functions both contextually and generally: Educators should ensure learners understand that function equations, such as that of a hyperbola, can be written in standard forms: $f(x) = \frac{a}{x-p} + q$ or without error.
- This helps learners appreciate the flexibility of representation and strengthens conceptual understanding.
- Develop skills in deriving equations from diagrams and vice versa: Learners should be guided to derive function equations using variables based on diagrammatic representations, as well as to interpret diagrams from given equations. This promotes strong analytical skills and deeper comprehension of function behaviour.
- Emphasise teaching functions for meaning: Functions should be taught so that learners can deduce general equations by observing key features in diagrams. This encourages learners to move beyond rote memorisation and develop the ability to reason and generalise from visual representations.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Composite functions must be included in assessments and practice tasks, enabling learners to develop an understanding of how two or more functions interact. This helps them interpret relationships and transformations from graphs and diagrams and draw conclusions based on visual information.
- Learners generally struggle with interpreting functions both algebraically and graphically. More focused teaching and practice are required to help them read, analyse, and understand functions conceptually, moving beyond rote computation to reasoning about function behaviour, transformations, and interactions.

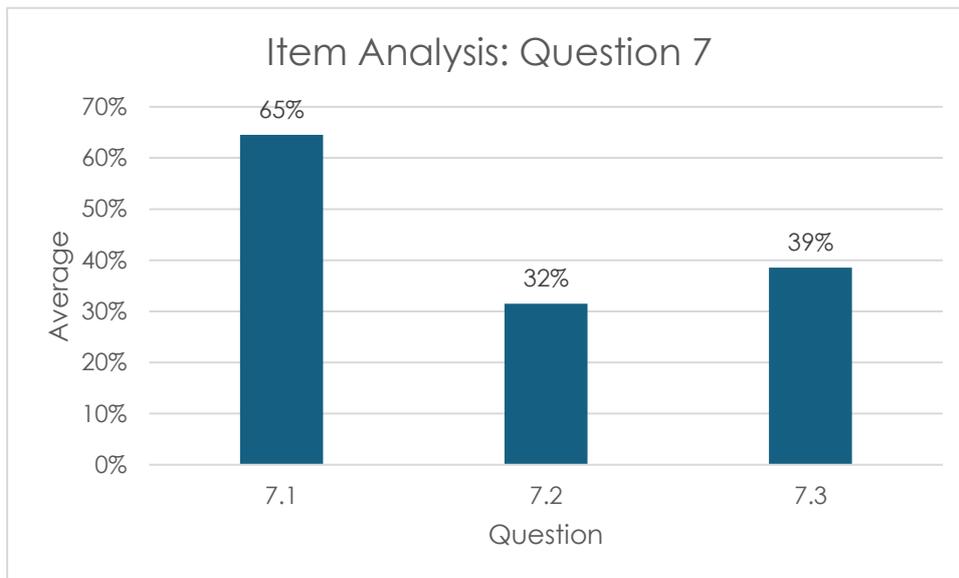
QUESTION 7

- 7.1 A travel company informs Robert that a holiday to a certain destination costs R40 now. The company predicts that the cost of this holiday will increase by 7,8% per annum. What will this holiday cost in 5 years' time?
- 7.2 Sarah opened a savings account that paid interest at a rate of 5,8% p.a., compounded quarterly. She deposited R2 300 into the account on 1 January 20 and continued to make deposits of R2 300 at the beginning of each quarter thereafter. She made her last deposit on 1 October 2025. Calculate the accumulated amount in the account on 1 January 2026.

7.3 The bank granted Rajesh a loan of R900 000 on 28 February 2024 at an interest rate of 6,8% p.a., compounded monthly.

7.3.1 Rajesh was unable to make the first three payments. He made his first repayment of R10 000 on 30 June 2024. He continued to make monthly repayments of R10 000 at the end of each month thereafter. How long, in completed months, will it take Rajesh to repay the loan from the time the loan was granted?

7.3.2 Calculate the value of the final payment.



(a) General comment on the performance of Candidates in the specific question. Was the question well answered or poorly answered?

Question 7.1

- Fairly well answered.
- Candidates who got it wrong mostly used the wrong formula or if they used the correct formula, they compounded the interest monthly.

Question 7.2

- Poorly answered.
- Many candidates could not identify the correct number of quarters or if they did, they did not multiply by $(1+i)$.
- Some candidates could not identify the correct formula.

Question 7.3.1

- Poorly performed too.
- Most candidates who did not get full marks did not raise the interest for the first 3 months, or if they did, they raised it for the first 4 months.
- Equally they forgot to add the 3 months to the n value that they obtained through calculation.

Question 7.3.2

- The question was generally not well answered by learners.
- Many candidates who did not achieve full marks applied the wrong formula, leading to incorrect solutions.
- Those who used the present value formula often used an incorrect value for n , affecting the accuracy of their answers.
- The majority of learners failed to account for one month of interest in calculating the final balance, resulting in answers that were lower in amount, than expected.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Learners display a lack of knowledge regarding which formula to use in different financial mathematics contexts. This often leads to incorrect application of compound and simple interest formulas.
- Many candidates were unaware that inflation is calculated annually on a compound interest basis, which resulted in errors when solving related questions.
- Compounding interest on a quarterly basis posed a significant challenge. Numerous learners struggled to correctly determine the number of compounding periods (n), leading to inaccurate calculations.
- There is a general misunderstanding of the difference between the future value and present value formulas. Many learners do not know when to apply each formula, causing confusion in solving problems.
- Early rounding off during calculations continues to be an issue. Learners who round intermediate values too soon often produce final answers that deviate significantly from the expected results.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Teach learners the differences between various financial formulae to ensure they understand when and how each should be applied.
- Expose learners to different compounding periods instead of focusing only on monthly compounding. Most candidates are more familiar with monthly compounding, but understanding quarterly, semi-annual, and annual compounding is essential for full comprehension.
- Clearly explain which formula to use in each context, and relate the future value and present value formulas to the sum of a geometric series to strengthen conceptual understanding.
- Encourage learners to avoid early rounding off and emphasise that rounding should only be done in the final answer to maintain accuracy.
- Provide extensive practice with “final balance” and “final payment” problems to build familiarity and confidence in applying financial mathematics concepts.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Use real-life examples when teaching financial mathematics to help learners understand and relate to the formulas. Demonstrating how concepts such as interest, inflation, and final balances apply to everyday situations makes learning more meaningful and enhances conceptual understanding.

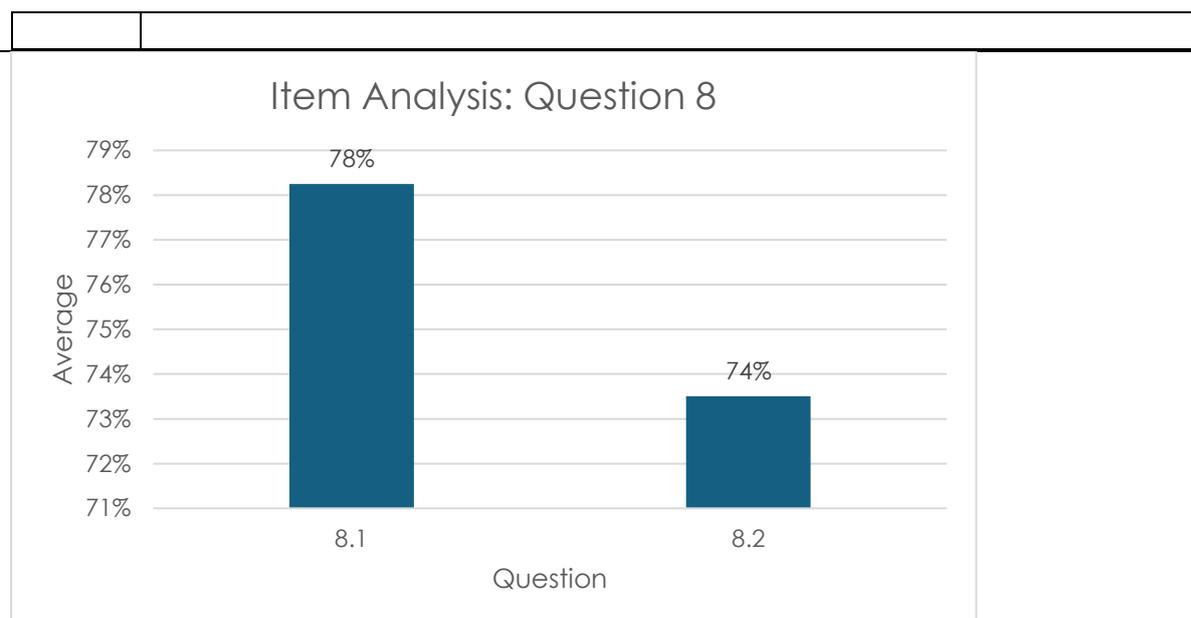
QUESTION 8

8.1 Determine $f'(x)$ from first principles if it is given that $f(x) = -2x + 3$.

8.2 Determine:

8.2.1 $g'(x)$ if $g(x) = -3x^4 + 2x$

8.2.2 $\frac{dy}{dx}$ if $y = \frac{2x^4 + 1}{x^2}$



(a) General comment on the performance of Candidates in the specific question. Was the question well answered or poorly answered?

The loveliest question for most of the candidates in 2025.

Question 8.1

- As expected, this was one of the most well-done sub questions.
- The few who could not get full marks were mostly unsettled by a linear function, whereas they are used to functions that have a 'square'.

Question 8.2.1

- It was well answered; most candidates did not struggle with this question.

Question 8.2.2

- The question was fairly well answered overall.
- Most candidates who did not achieve full marks struggled with the simplification of the algebraic fraction. They were unable to express the given expression in its simplified form, such as rewriting $\frac{1}{x^2}$ as x^{-2} or into $x^{\frac{3}{2}}$ which is essential before applying the rules of differentiation.
- Candidates also experienced difficulty determining the derivative of expressions involving negative exponents. Many were unsure how to apply

the power rule correctly when the exponent is negative or fractional, leading to incorrect derivatives.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Learners continue to struggle with the simplification of algebraic fractions, particularly when factoring, identifying common denominators, and reducing expressions correctly.
- Derivation from first principles should be taught across expressions involving the first three exponents (e.g. ax , $ax^2 + bx$, $\frac{a}{x^3}$, etc) so that learners understand the pattern, the role of the constant h and the underlying concept rather than memorising steps.
- Learners should be exposed to expressions involving fractional exponents to strengthen their algebraic manipulation skills and improve their ability to apply rules of exponents in more complex differentiation problems.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

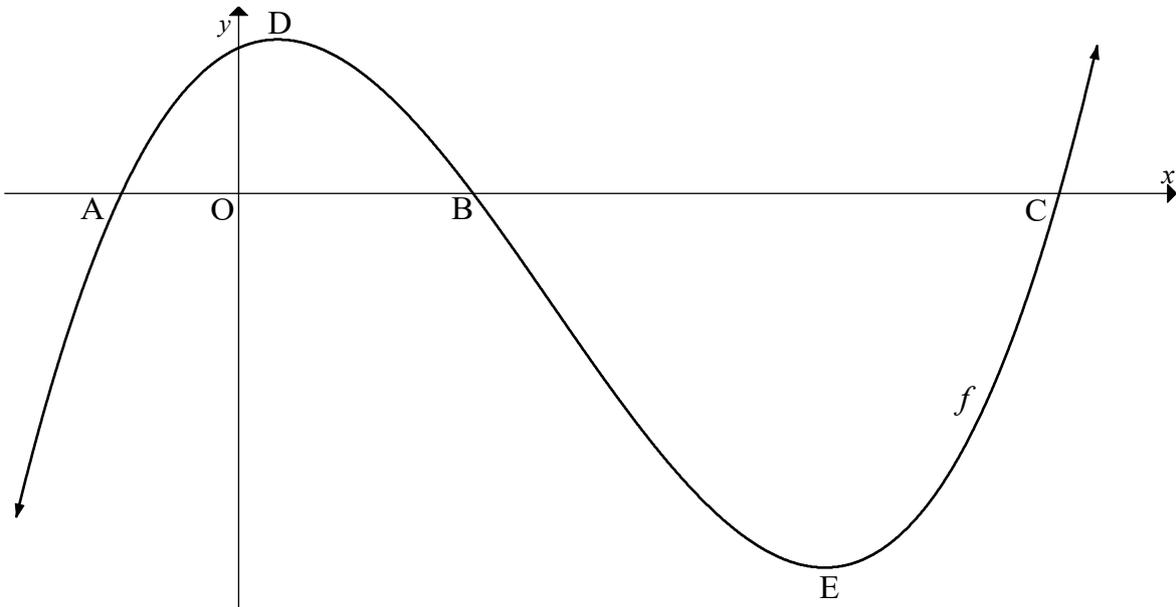
- Educators should teach differentiation across a wide range of expressions rather than restricting learners to the types they assume will be examined. A broader exposure helps learners develop confidence and adaptability when faced with unfamiliar functions.
- The simplification of algebraic fractions should be taught separately from the process of deriving a function from first principles. This allows learners to master the algebraic skills required before attempting the more complex differentiation procedure.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Derivatives should be taught in direct relation to the tangent of a curve so that learners understand the meaning of the derivative as the gradient of the tangent at a point. This conceptual link strengthens their ability to interpret and apply differentiation in graphical and contextual problems.

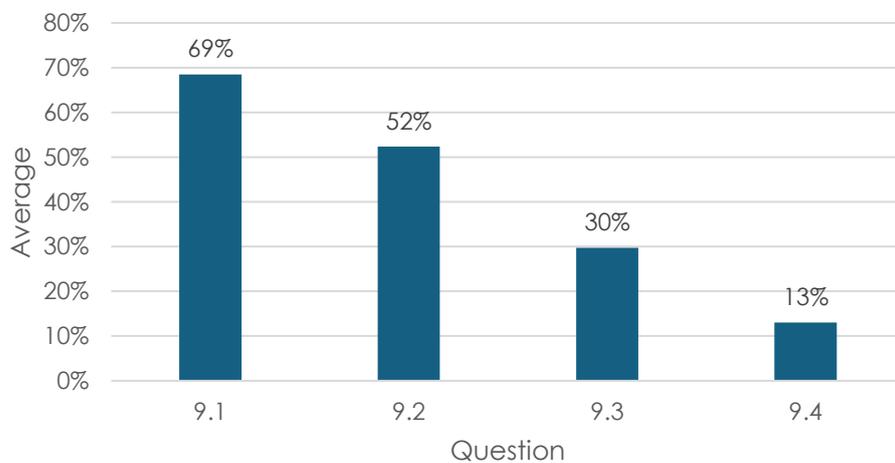
QUESTION 9

Sketched below is the graph of $f(x) = x^3 - 8x^2 + 5x + 14$. A, B and C are the x-intercepts of f . D and E are the turning points of f .



- 9.1 Calculate the coordinates of E.
- 9.2 For which values of x is f concave down?
- 9.3 The coordinates of B are $(2; 0)$. Use the graph to determine the values of x for which $f(x) \cdot f''(x) < 0$
- 9.4 For which values of t will $y = -11x + t$ intersect f at 3 distinct points?

Item Analysis: Question 9



(a) General comment on the performance of Candidates in the specific question. Was the question well answered or poorly answered?

Question 9.1

- Fairly well answered.
- A number of candidates could not come up with the correct derivative.
- Some could not factorise the derivative.

Question 9.2

- Fairly done.
- Many candidates found the correct derivative but left it at $x = \frac{8}{3}$.
- Others used the wrong inequality sign even though everything else is correct.

Question 9.3

- The question was poorly answered by most candidates.
- Many learners did not recognise that they first needed to determine the x -intercepts before they could identify the required regions on the graph. Skipping this step led to incorrect or incomplete solutions.
- Even after successfully finding the x -intercepts, many candidates struggled to write the corresponding inequalities correctly. This reflects a broader weakness in interpreting solution regions and expressing inequalities in proper mathematical form.

Question 9.4

- The question was poorly answered by most candidates.
- Learners who scored some marks typically received only 1 mark for correctly equating the functions or their derivatives. Beyond this step, they were unable to proceed because they did not know how to handle the variable t , indicating a lack of understanding of subsequent steps in solving the problem.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Learners displayed a lack of understanding of the turning or stationary points of cubic functions, which affected their ability to analyse and interpret the graph correctly.
- Many candidates failed to use inequalities to describe the required regions, resulting in incomplete or incorrect solutions.
- Most learners did not know how to identify the three distinct points of intersection between a cubic function and a linear function, indicating weaknesses in both algebraic manipulation and graphical interpretation.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Educators should emphasise obtaining the correct derivative, as it is critical for learners to earn full marks in related questions.
- The concept of concavity should be taught in relation to points of inflection, helping learners understand how the second derivative indicates the curvature of a function.

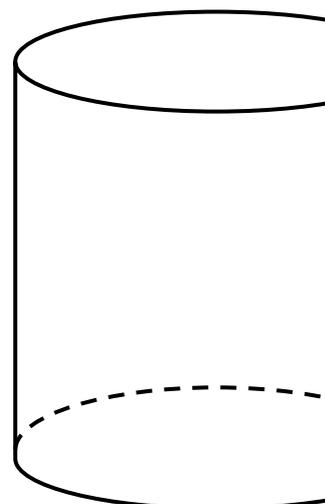
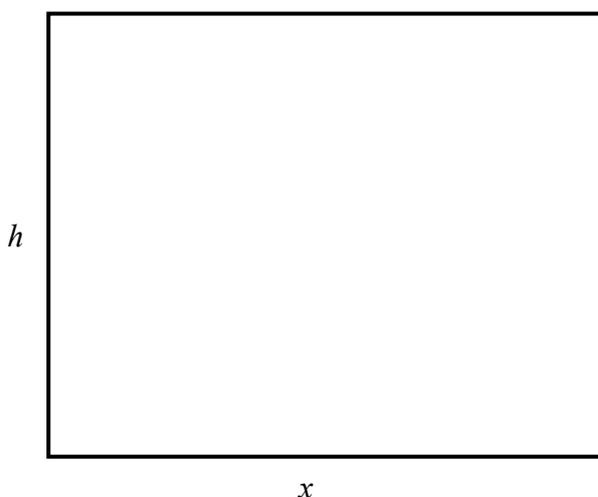
- Learners need a deeper understanding of how to use inequalities to identify required regions on a graph, linking algebraic solutions to graphical interpretation.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Cubic functions should not be taught in isolation. They must be presented in relation to other functions, with particular emphasis on understanding their first and second derivatives to analyse gradients, turning points, and concavity.
- Inequalities should be applied regularly to identify required regions, as these types of questions consistently appear in examinations. Regular practice will strengthen learners' ability to link algebraic solutions with graphical interpretations.

QUESTION 10

A rectangular metal sheet has dimensions x and h units, with $x > h$, and a perimeter of 50 units. The metal sheet is rolled into a cylinder with two open ends (top and bottom) and height h units.



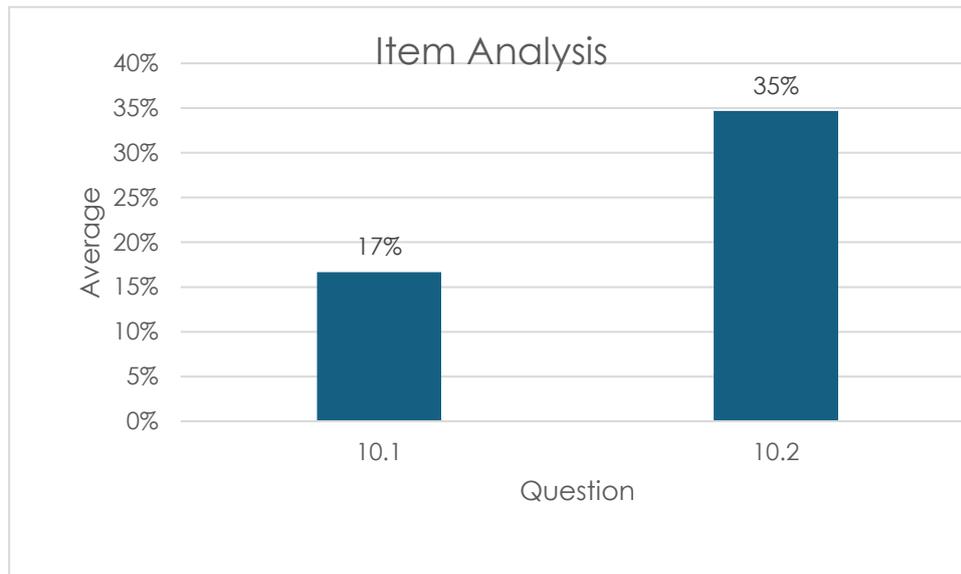
10.1

Show that the volume of the cylinder is given by

$$V = \frac{25x^2}{4\pi} - \frac{x^3}{4\pi}$$

10.2

Calculate the value of x that will maximise the volume of the cylinder.



(a) General comment on the performance of Candidates in the specific question. Was the question well answered or poorly answered?

Question 10.1

- The question was poorly answered, despite not being particularly challenging.
- Very few candidates were able to correctly calculate and show the volume of the cylinder as required.
- Only a small number of learners successfully related the two diagrams, indicating difficulties in visualising and connecting geometric information.

Question 10.2

- This question was slightly better answered than Question 10.1.
- Candidates struggled to obtain the correct derivative; some even attempted to differentiate with respect to the wrong variable, (π) leading to incorrect solutions.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Learners display a negative attitude towards optimisation questions, often approaching them with hesitation or avoidance.

- Many candidates lacked the basic skills needed to calculate areas and volumes of geometric shapes, which affected their ability to solve related problems.
- There is evident fear and difficulty in differentiating and simplifying expressions that involved fractions.
- Some of the work required in the questions had not been adequately covered at the learners' schools, contributing to poor performance.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Calculus should be taught comprehensively, without skipping any sections. No topic should be considered "not relevant," as all areas may be assessed.
- Basic revision of mensuration and related geometric concepts should be integrated to ensure learners have the foundational skills required for calculus problems involving areas, volumes, and other applications.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- This is evidently a topic that is neglected in schools, as many candidates did not attempt the questions at all.

QUESTION 11

11.1 A survey was conducted among female and male learners at a school about what type of cold drink they preferred. The data from the survey is presented in the table below.

	JUICE	ENERGY DRINKS	TOTAL
Female	a	b	c
Male	36	54	f
Total	e	d	210

11.1.1 The events male and preferring juice are independent. Show that $e = 84$.

11.1.2 Calculate the probability that a female learner, chosen at random from the group, will like energy drinks.

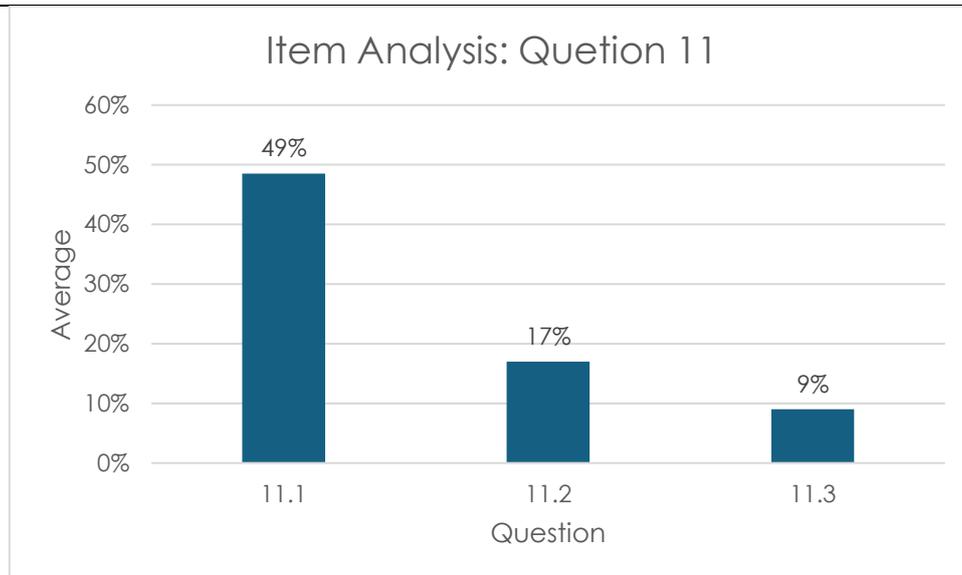
11.2 At a kiosk, 120 people buy either a cup of coffee or a bottle of water. The chance of rain on any given day is 75%. The chance of a person buying a cup of coffee on a rainy day is three times the chance of the person buying coffee on a non-rainy day.

The probability of a person buying coffee on any given day is $\frac{7}{12}$.
Calculate the number of cups of coffee that will be sold on a non-rainy day.

11.3 Eight runners compete in a race where there are no tied finishes. Bongi and Andre are two of the competitors.

11.3.1 Calculate the total number of possible ways in which the 8 runners can finish the race if Bongi finishes in a position immediately after Andrew.

11.3.2 Calculate the probability that TWO OR MORE runners finish the race after Andrew and before Bongi.



(a) General comment on the performance of Candidates in the specific question. Was the question well answered or poorly answered?

Question 11.1.1

- The question was fairly answered overall.
- Some candidates incorrectly used the given value of e to “show” the result, which indicates a misunderstanding of the purpose of “show that” questions.

Question 11.1.2

- The question was fairly answered overall.
- While most candidates were able to correctly determine the values 126 and 72, they were unable to calculate the final probability, indicating difficulty in linking intermediate results to the final probability calculation.

Question 11.2

- The question was poorly answered by most candidates.
- Many learners were confused by the concept of conditional probability and how to apply it correctly.
- A significant number of candidates could not attach meaning to the given probabilities, reflecting a lack of understanding of how probability values relate to real-world events or the problem context.

Question 11.3.1

- The question was poorly answered by most candidates.

- Some learners provided random answers, indicating guessing or a complete lack of understanding of the problem.

Question 11.3.2

- The question was poorly answered by most candidates.
- Many learners did not show their thought process, which made it difficult to award partial credit and indicated a lack of structured problem-solving.
- Several candidates attempted to use the complementary rule but were unable to execute it correctly, leading to incorrect final answers.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Learners displayed a lack of understanding of the independence rule in probability.
- Many candidates misinterpreted the information presented in contingency tables, leading to incorrect solutions.
- Conditional probability remains a challenging concept for most learners, with many unable to apply it correctly.
- There was a shaky understanding of the counting principle, which affected learners' ability to determine total outcomes accurately.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Teach learners different ways of presenting information to aid in the calculation of probabilities, including tables, lists, and systematic arrangements.
- Use tree diagrams to solve probability questions, such as those in Question 11.2, as they provide a clear visual representation of all possible outcomes and simplify conditional probability calculations.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Encourage learners to always show intermediate steps - exam answers that simply state a result without reasoning are difficult to award full credit for.
- Design classroom tasks that explicitly ask learners to interpret contingency tables (e.g., state what each cell and margin means in words) before calculating.
- When teaching conditional probability, use frequent, simple contexts (weather, sales, sports) and then scale to more abstract problems.
- Provide exemplars that demonstrate correct use of complements and stepwise permutation counting for constrained order problems.