آغا خان یونیورسٹی ایگزامینیشن بورڈ
AGA KHAN UNIVERSITY EXAMINATION BOARD

Notes from E-Marking Centre SSC-I Mathematics Annual Examinations 2025

Introduction

This document has been prepared for the teachers and candidates of Secondary School Certificate (SSC) Part I (Class IX) Mathematics. It contains comments on candidates' responses to the 2025 SSC-I Examination indicating the quality of the responses and highlighting their relative strengths and weaknesses.

E-Marking Notes

This includes overall comments on candidates' performance on every question and *some* specific examples of candidates' responses which support the mentioned comments. Please note that the descriptive comments represent an overall perception of the better and weaker responses as gathered from the e-marking session. However, the candidates' responses shared in this document represent some specific example(s) of the mentioned comments.

Teachers and candidates should be aware that examiners may ask questions that address the Student Learning Outcomes (SLOs) in a manner that requires candidates to respond by integrating knowledge, understanding and application skills they have developed during the course of study. Candidates are advised to read and comprehend each question carefully before writing the response to fulfil the demand of the question.

Candidates need to be aware that the marks allocated to the questions are related to the answer space provided on the examination paper as a guide to the length of the required response. A longer response will not in itself lead to higher marks. Candidates need to be familiar with the command words in the SLOs which contain terms commonly used in examination questions. However, candidates should also be aware that not all questions will start with or contain one of the command words. Words such as 'how', 'why' or 'what' may also be used. It is imperative to refer to command word guide available on AKU-EB website for understanding the expectations of the command word.

General Observations

Candidates performed well in some concepts, such as Sets, Practical Geometry and Theorems , Factor Theorem, and Matrix Inverse Method. However, candidates who did not score well mostly failed to understand the demands of the questions, often misinterpreting the command words and the stimuli.

Mentioned below are a few concepts that teachers need to focus so that the candidates may perform even better.

- Logarithm
- Algebraic Expressions

- Factorisation
- Practical Geometry and Theorems.

Note: Candidates' responses shown in this report have not been corrected for grammar, spelling, format or information.

DETAILED COMMENTS
Constructed Response Questions (CRQs)

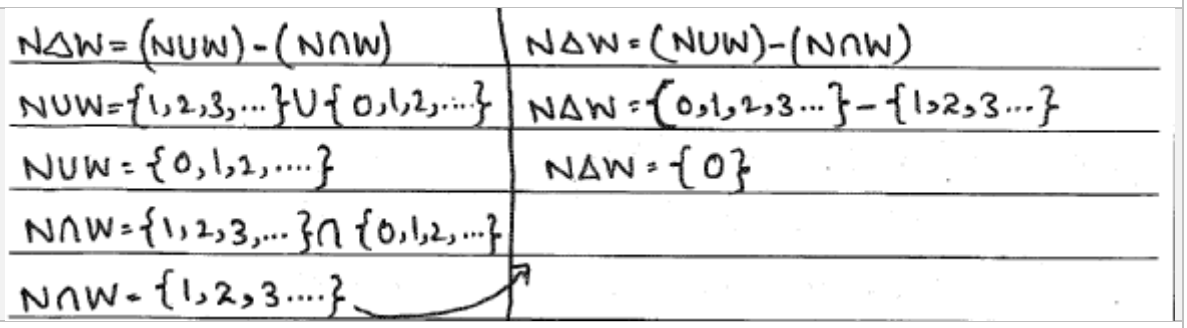
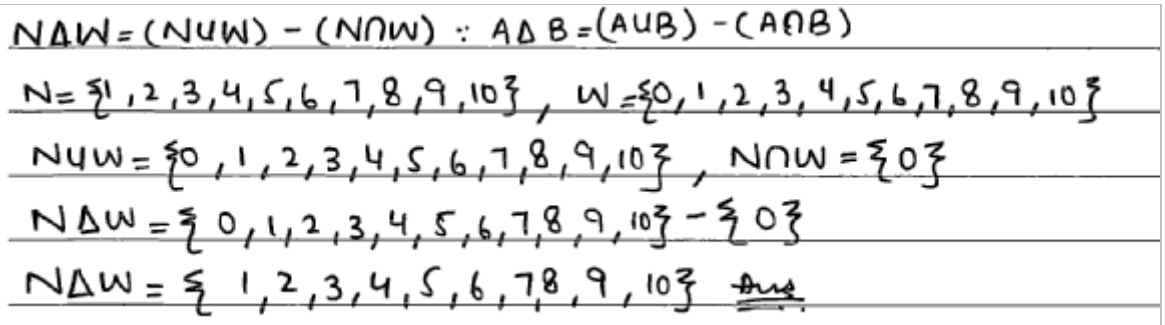
Question No. 1	
Question Text	If $N = \{1, 2, 3, \ldots\}$ and $W = \{0, 1, 2, \ldots\}$, then find $N \Delta W$.
SLO No.	1.1.3
SLO Text	Solve problems using the following operations on sets: d) symmetric difference
Max Marks	3
Cognitive Level	U
Checking Hints	1 mark for the union of given sets 1 mark for intersection 1 mark for the symmetric difference (mark would be granted if a candidate directly)
Overall Performance	The majority of the candidates were able to differentiate accurately between various set operations, although some attempted to apply them. A common point of confusion observed was between the *difference of sets* and the *symmetric difference of sets*. Furthermore, many candidates treated the given infinite sets as finite sets, which led to incorrect interpretation and ultimately incorrect answers.
Description of Better Responses	*Better responses* demonstrated a strong conceptual understanding of the symmetric difference of sets. Candidates not only applied the correct formula $N\Delta W = (N \cup W) - (N \cap W)$ but also correctly identified and used the appropriate union and intersection operations required to solve the problem. Each step was clearly written and logically structured, reflecting the candidates' command over set operations and clarity in mathematical communication.
Image of Better Response	
Description of Weaker Responses	*Weaker responses* reflected misconceptions regarding the difference and symmetric difference of sets. Several candidates struggled to correctly interpret and apply set operations, particularly confusing intersection e.g., $N \cap W = \{0\}$ with difference. Additionally, many were unable to handle the infinite nature of the given sets, treating them as finite sets, which significantly impacted their performance. These misunderstandings led to incorrect answers and loss of marks.

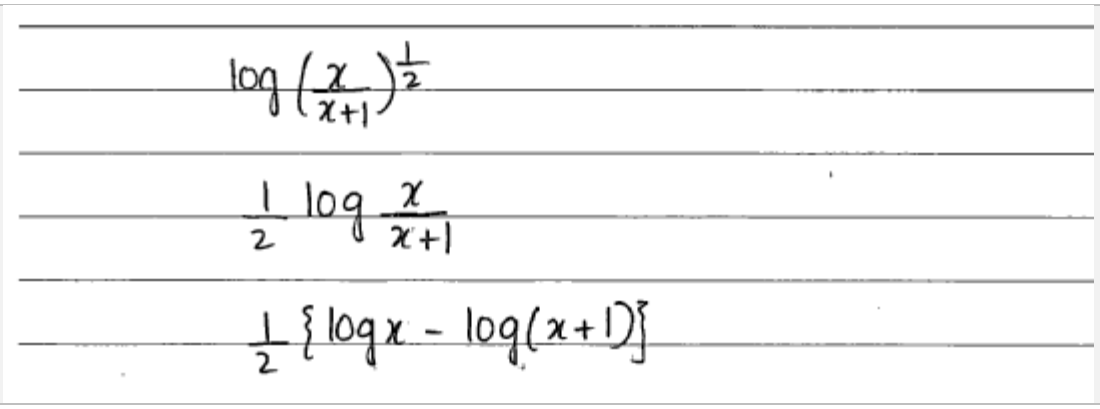
Image of Weaker Response	

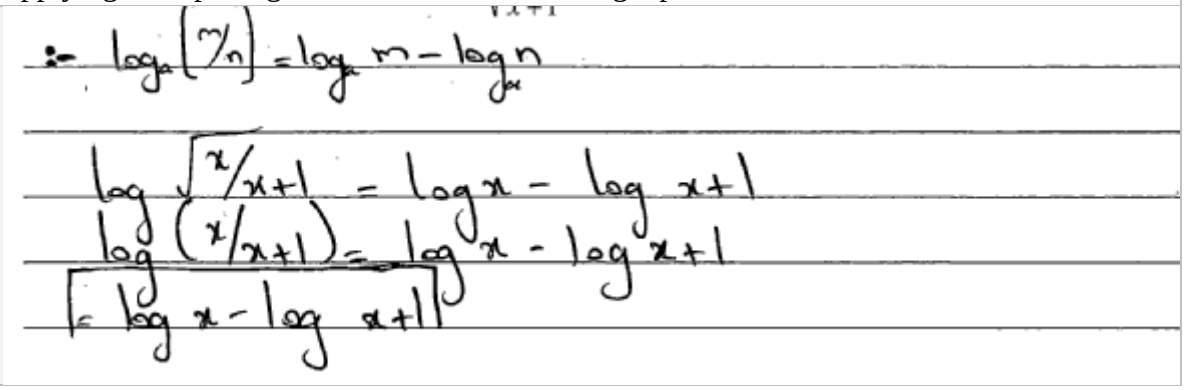
Suggestions for improvement (Highlight all that apply)

Maximising SLO Achievement	**Preferred Pedagogy** Used for this SLO**	**Assessment Strategies**
• Identify the expectation of command words (use Command Word Guide) • Ensure the content is taught at the relevant cognitive level • Identify necessary content required (skills + concepts) • Review past paper questions on the concept • Utilise the resource guide for additional materials	• Story Board • Cause and Effect • Fish and Bone • Concept Mapping • Audio Visual Resources • Think, Pair and Share • Knowledge Platform videos • Questioning Technique (Socratic approach) • Practical Demonstration ** For description of each Pedagogy, refer to Annexure A	• Past paper questions • Discussion on E-Marking Notes • AKU-EB Digital Learning Solution powered by Knowledge Platform https://akueb.knowledgeplatform.com/login

Any Additional Suggestion:
Teachers should incorporate targeted exercises that focus on distinguishing between set operations such as union, intersection, difference, and symmetric difference especially when applied to infinite sets. Moreover, explicitly highlighting the differences in notation and expected outcomes for each operation in class discussions and assessments can support students in developing a deeper conceptual understanding.

*K = Knowledge U = Understanding A = Application and other higher-order cognitive skills

Question No. 2	
Question Text	Using the laws of logarithm, expand $\log\sqrt{\frac{x}{x+1}}$.
SLO No.	3.4.1
SLO Text	Solve problems using the laws of logarithm (without using log and antilog tables).
Max Marks	3
Cognitive Level	A
Checking Hints	1 mark for writing radical to exponential form 1 mark for applying the power rule 1 mark for quotient rule (second rule) of logarithms
Overall Performance	This question pertained to the application of the Laws of Logarithms. Candidates appeared to struggle particularly with the application of the third law (Power Law). A key reason for this difficulty can be the perception of logarithms as a challenging topic. In this question, candidates were required to apply two logarithmic laws, and the given expression involved an irrational term with a fractional exponent.
Description of Better Responses	*Better responses* reflected that candidates had a sound understanding of the topic. They successfully applied both the quotient law [log(m/n) = log(m)-log(n)] and the power (exponent) law [$\log(m)^n$ = nlog(m)] of logarithms and followed the correct sequence of steps, ultimately arriving at the accurate answer $\frac{1}{2}\log x-\frac{1}{2}\log(x+1)$.
Image of Better Responses	

Description of Weaker Responses	*Weaker responses* revealed several misconceptions in the application of logarithmic laws and the simplification of expressions. Many candidates applied only the quotient law [$\log_a(m/n) = \log_a(m) - \log_a(n)$] and overlooked the application of the power (third) law [$\log_a(m)^n = n\log_a(m)$], which was essential to solving the question accurately. Additionally, some candidates struggled with simplifying the given irrational expression, which led to incorrect answers. This reflects a need for deeper conceptual understanding and more practice in applying multiple logarithmic laws within a single problem.
Image of Weaker Responses	

Suggestions for improvement (Highlight all that apply)

Maximising SLO Achievement	Preferred Pedagogy Used for this SLO	Assessment Strategies
• Identify the expectation of command words (use Command Word Guide)b • Ensure the content is taught at the relevant cognitive level • Identify necessary content required (skills + concepts) • Review past paper questions on the concept • Utilise the resource guide for additional materials	• Story Board • Cause and Effect • Fish and Bone • Concept Mapping • Audio Visual Resources • Think, Pair and Share • Knowledge Platform videos • Questioning Technique (Socratic approach) • Practical Demonstration	• Past paper questions • Discussion on E-Marking Notes • AKU-EB Digital Learning Solution powered by Knowledge Platform https://akueb.knowledgeplatform.com/login

Any Additional Suggestion:

- Instead of practicing each law in isolation, give questions that require **two or more laws together**.
- **Example:**

$$\log_a\left(\frac{m^3}{n}\right) = \log_a m^3 - \log_a n = 3\log_a m - \log_a n$$

This ensures students see the **power law and quotient law** working together.

Question No. 3a

Candidates were given the choice to attempt any ONE out of the two questions: 3a and 3b. Majority of the candidates attempted 3a.

Question Text	i. Prove that $(2x-3y+z)^2 = 4x^2+9y^2+z^2-12xy-6yz+4xz$ ii. If $2x-3y+z=10$ and $-6xy-3yz+2xz=15$, then find the value of $4x^2+9y^2+z^2$.
SLO No.	4.2.4
SLO Text	Find the values of $a^2+b^2c^2$, a+b+c, and ab + bc + ca, when values of any two of these are given in the above formula;
Max Marks	4
Cognitive Level	A
Checking Hints	i. 1 mark for writing $(2x-3y+z)^2=(2x)^2+(-3y)^2+(z)^2+2[(2x)(-3y)+(-3y)(z)+(2x)(z)]$ 1 mark for writing $4x^2+9y^2+z^2+-12xy-6yz+4xz$ ii.1 mark for the correct substitution of values to evaluate 1 mark for writing $4x^2+9y^2+z^2=70$
Overall Performance	This question was based on the application of the algebraic identity $(a+b+c)^2$. Despite the simplicity of the question, many candidates struggled in the application of the identity. This performance reflects several common misconceptions. Many candidates attempted to

	directly evaluate the expression rather than proving the identity. Some tried to solve it by factoring or taking out common terms, instead of expanding the square of the trinomial.
Description of Better Responses	In *Better responses* the candidates correctly applied the identity $(a+b+c)^2$, accurately handled the negative sign of the middle term $(-3y)^2 = +9y$, and successfully proved the given expression. Since the question comprised two parts, both related to the same algebraic identity, stronger candidates recognised this connection. In the second part, they efficiently factored out the 2 as a common factor and substituted the given values to find the correct result. This reflected both conceptual clarity and procedural fluency.
Image of Better Response	As by formula :- $(a+b+c)^2 = a^2+b^2+c^2+2ab+2bc+2ca$ $(2x-3y+z)^2$ $= (2x)^2 + (-3y)^2 + (z)^2 + 2(2x)(-3y) + 2(-3y)(z) + 2(z)(2x)$ $= 4x^2 + 9y^2 + z^2 - 12xy - 6yz + 4xz$ Hence Proved that $(2x-3y+z)^2 = 4x^2+9y^2+z^2-12xy-6yz+4xz.$ as $(2x-3y+z)^2 = 4x^2+9y^2+z^2-12xy-6yz+4xz$ $(10)^2 = 4x^2+9y^2+z^2+2(-6xy-3yz+2xz)$ $100 = 4x^2+9y^2+z^2+2(15)$ $100 = 4x^2+9y^2+z^2+30 \Rightarrow 4x^2+9y^2+z^2 = 100-30 = 70$ answer.
Description of Weaker Responses	*Weaker responses* revealed a lack of understanding of the question. In Part (i), candidates were required to prove the right-hand side of the given identity $(a+b+c)^2$. However, many attempted to simplify the expression instead, which often led to mistakes. Some candidates understood the nature of the question but made errors when converting terms into the required forms of 2ab, 2bc and 2ac. Others committed sign errors or incorrectly treated the square of a sum as the sum of squares. In Part (ii), a considerable number of candidates failed to factor out 2 from the expression −12xy−6yz+4xz before substituting the values. As a result, they arrived at incorrect answers.
Image of Weaker Response	$(a+b+c) = (a^2+b^2+c^2+2ab+2bc+2ca)$ $(2x-3y+z)^2 = 4x^2+9y^2+z^2-12xy-6yz+4xz$ $(2x-3y+z)^2 = (2x)^2+(3y)^2+(z)^2-12xy-6yz+(2xz)^2$ $2x-3y+z = 10 \quad -6xy-3yz+2xz = 15$ $4x^2+9y^2+z^2 = 2x-3y+z = 10 \quad -6xy-3yz+2xz = 15$ $4x^2+9y^2+z^2 = 2x+2x-3y-6y+z+z+x-3yz$ $4x^2+9y^2+z^2 = 4x^2+9y^2+z^2$ So the value of $4x^2+9y^2+z^2 = 25$

Suggestions for improvement (Highlight all that apply)

Maximising SLO Achievement	Preferred Pedagogy Used for this SLO	Assessment Strategies
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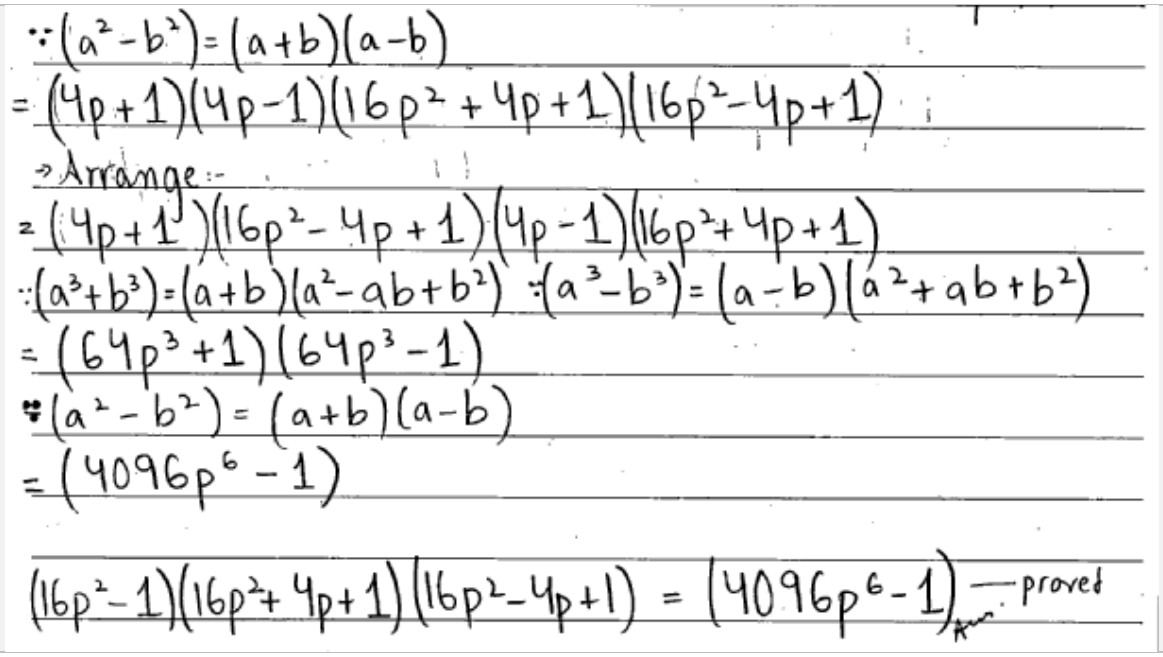
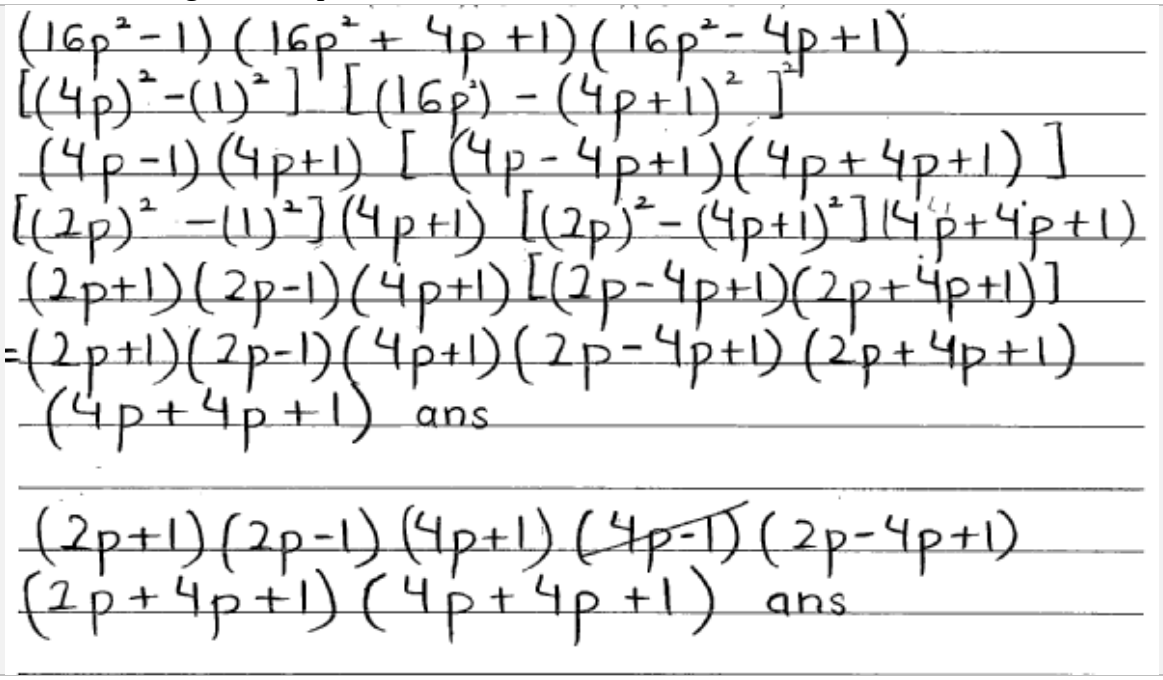
Any Additional Suggestion:		

Question No. 3b	
Question Text	Find the continued product in simplified form for the given expression. $(16p^2-1)(16p^2+4p+1)(16p^2-4p+1)$
SLO No.	4.2.9
SLO Text	Find the continued product by using the above formulae
Max Marks	4
Cognitive Level	A
Checking Hints	1 mark to write correct pairing to make feasible for formula application 1 mark for applying the formula $a^3+b^3=(a+b)(a^2-ab+b^2)$ 1 mark for applying the formula $a^3-b^3=(a-b)(a^2+ab+b^2)$ 1 mark for applying the formula and writing the product as $(4096p^6-1)$
Overall Performance	In this question, candidates were required to apply three algebraic identities, which may have contributed to the low number of attempts for Part (b). The primary issue identified was the incorrect application of the cubic identities, which suggests a gap in both conceptual understanding and procedural accuracy.
Description of Better Responses	*Better responses* reflected a strong understanding of the application of both the difference of squares and cubic identities [$a^3+b^3=(a+b)(a^2-ab+b^2)$ and $a^3-b^3=(a-b)(a^2+ab+b^2)$]. Candidates not only correctly factorised the expression ($16p^2-1$), but also demonstrated the ability to rearrange the given terms appropriately to apply the cubic identity and find the product. This indicated both conceptual clarity and procedural fluency in handling algebraic expressions.

Image of Better Response	

Description of Weaker Responses	*Weaker responses* showed that while some candidates were able to apply the difference of squares formula correctly, they were unable to identify the appropriate pairs required for the application of the cubic identity $a^3 - b^3 = (a-b)(a^2+ab+b^2)$. Due to this misconception, many incorrectly applied the identity $(a+b)^2$ to the remaining factors, which led them towards an incorrect solution. This reflected a lack of deeper understanding of the structure of algebraic expressions.
Image of Weaker Response	

Suggestions for improvement (Highlight all that apply)

Maximising SLO Achievement	Pedagogy Used for that SLO	Assessment Strategies

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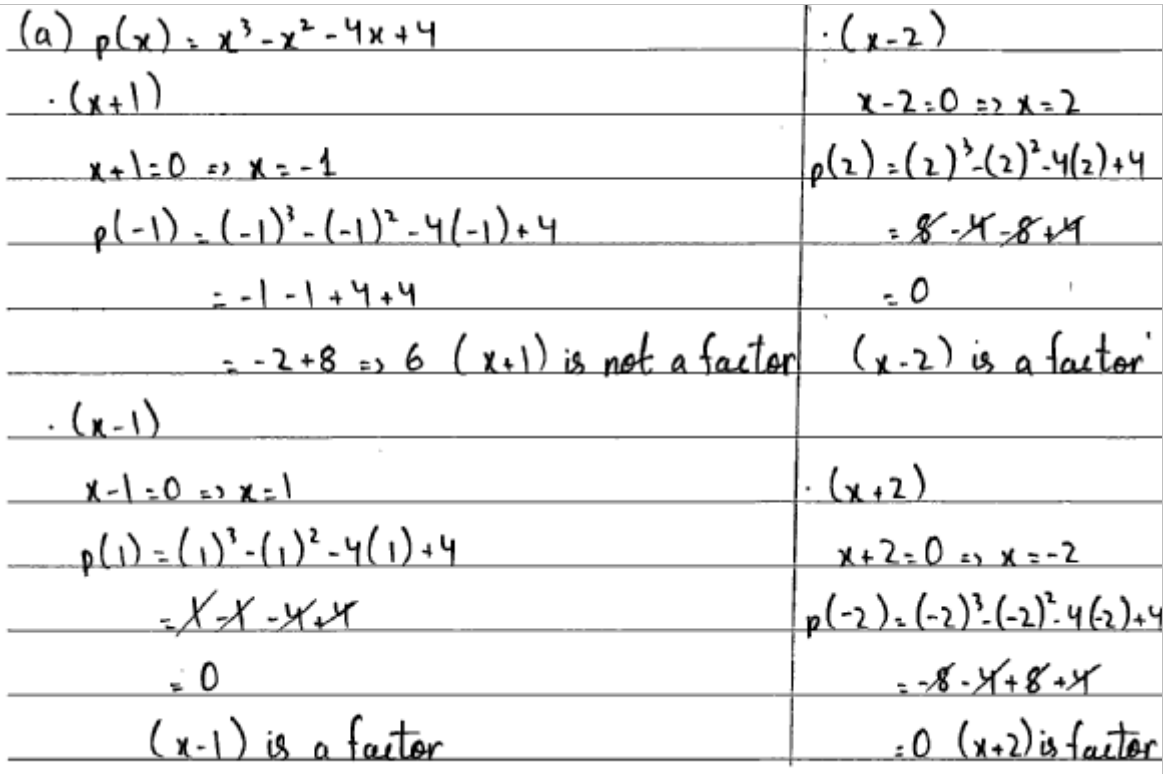
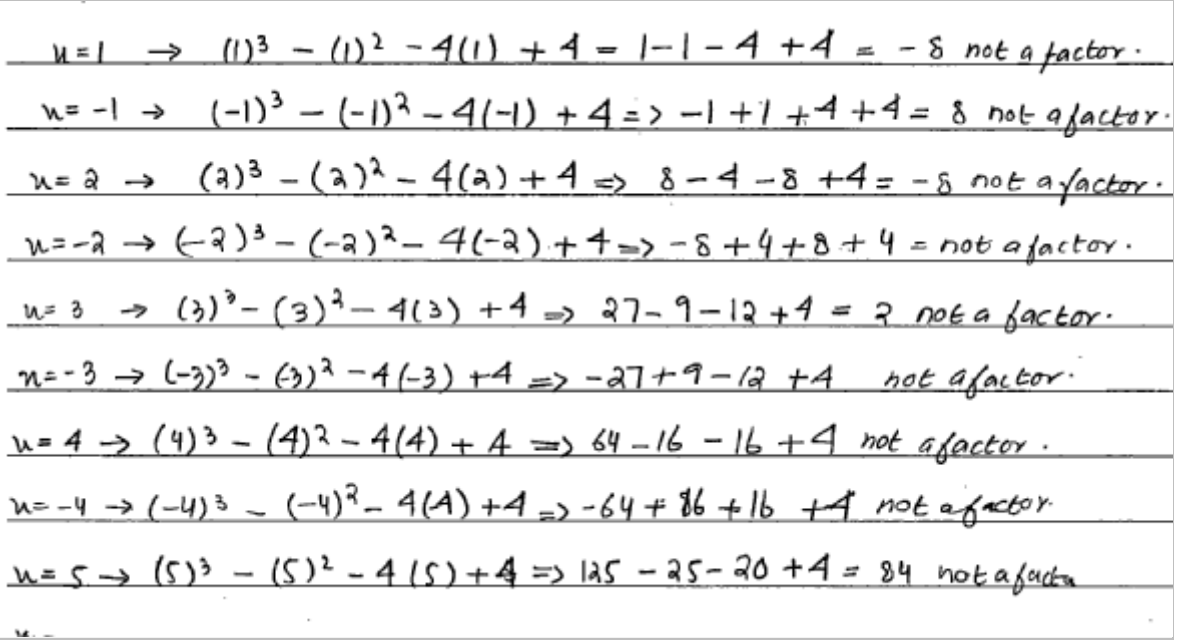
Any Additional Suggestion:
To address these misconceptions, it is recommended that students are given more structured practice in recognising patterns within algebraic expressions and distinguishing between different identities. Teachers should emphasise the conditions under which specific identities such as the cubic and square identities are applicable. Using guided examples that compare and contrast similar-looking expressions can help prevent the misapplication of formulas and strengthen conceptual clarity.

Question No. 4a

Candidates were given the choice to attempt any ONE out of the two questions: 4a and 4b. Majority of the candidates attempted 4a.

Question Text	Using factor theorem, factorise the polynomial $P(x) = x^3 - x^2 - 4x + 4$.
SLO No.	5.4.1
SLO Text	Apply factor theorem to factorise a cubic polynomial
Max Marks	4
Cognitive Level	A
Checking Hints	1 mark for applying the factor theorem 1 mark for finding the first factor 1 mark for second factor (may be based on first factor if applies division method) 1 mark for the third factor
Overall Performance	Candidates generally performed well in this question.. It was encouraging to see that many candidates employed a variety of approaches to find the remaining factors after identifying the initial ones. This demonstrated both familiarity with the topic and flexibility in problem-solving.
Description of Better Responses	*Better responses* demonstrated a range of effective approaches to solving this particular question. After identifying the first factor e.g., (x-1), some candidates used synthetic division, while others opted for long division to determine the remaining two factors e.g., (x-2) and (x+2). However, the majority successfully applied the factor theorem to find all three factors. They showed great understanding of operations (+, -) and brackets especially when negative sign was there. This reflected not only a strong grasp of algebraic techniques but also the ability to select appropriate methods based on individual preference and understanding.

Image of Better Response	
Description of Weaker Responses	*Weaker responses* indicated that while candidates had a basic understanding of the factor theorem, they struggled with accurate simplification during its application. These simplification errors often led to incorrect operations applied e.g., 1-1-4+4 will become 0 but they wrote it equals to 8. In some cases, candidates were able to identify only one correct factor but were unable to proceed further due to errors in division or incorrect substitution. This suggests that although the conceptual foundation was present, there was a lack of procedural accuracy and fluency in applying the method across all steps of the question. It also highlighted the need for more consistent practice in multi-step algebraic problems involving the use of the factor theorem.
-Image of Weaker Response	

Suggestions for improvement (Highlight all that apply)

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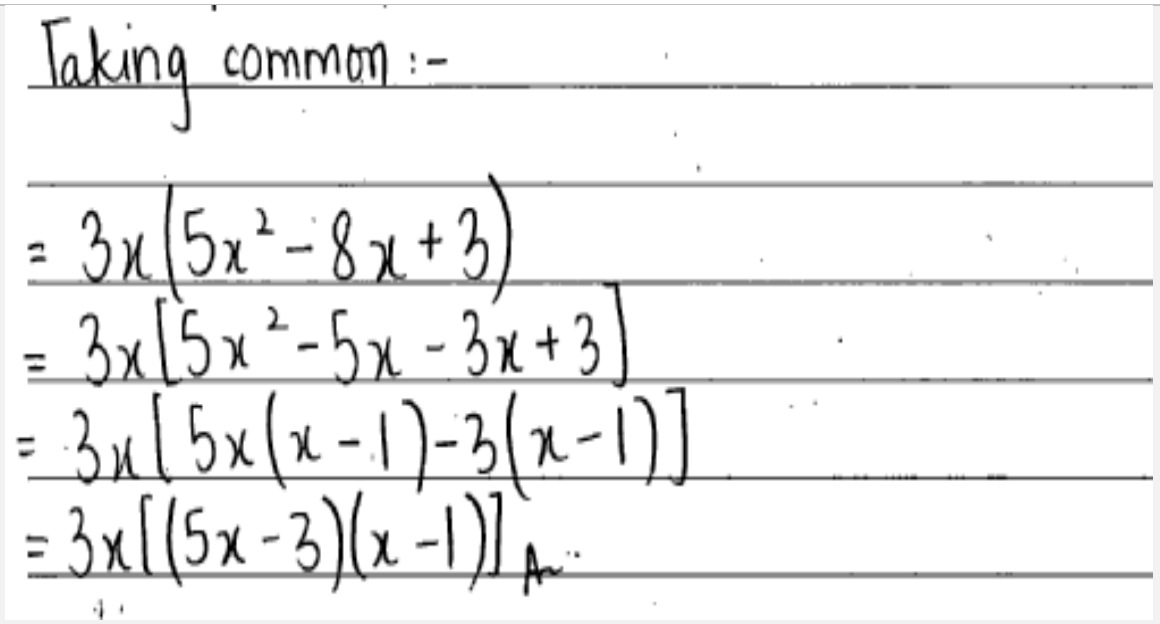
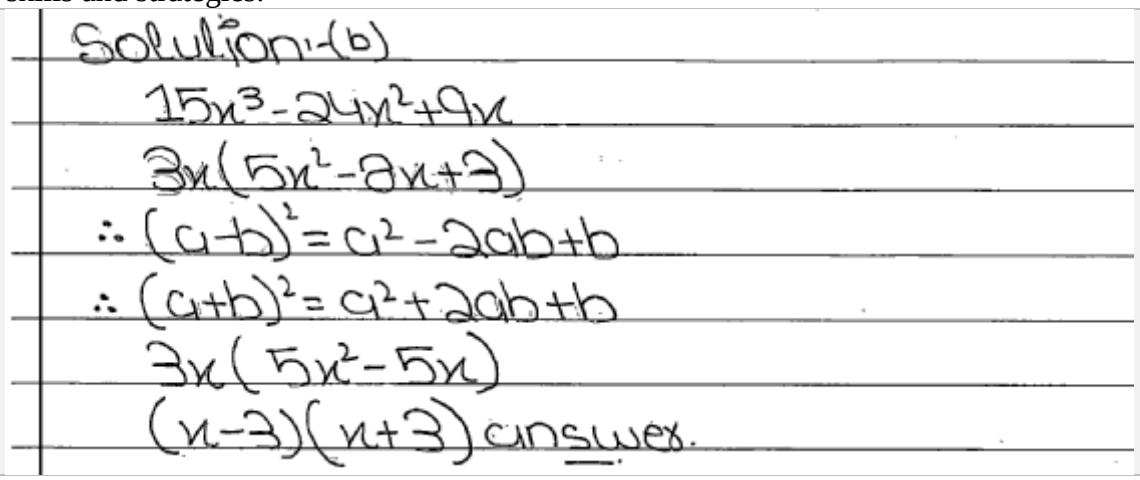
Any Additional Suggestion:		

Question No. 4b	
Question Text	Factorise the expression $15x^3 - 24x^2 + 9x$.
SLO No.	5.1.1a & 5.2.1b
SLO Text	factorise the expression of the following type
Max Marks	4
Cognitive Level	A
Checking Hints	1 mark for taking common to get $3x(5x^2 - 8x + 3)$ 1 mark for taking breaking of middle term to get $3x(5x^2 - 5x - 3x + 3)$ 1 mark for taking common, i.e, $3x\{5x(x-1) - 3(x-1)\}$ 1 mark for the complete factorisation
Overall Performance	Overall performance of candidates on this particular question was satisfactory, with less than 50% attempting it. While some struggled due to sign errors in one of the terms. As the question was related to factorisation, a concept introduced in many schools from Grade 7 onwards, most candidates demonstrated a sound understanding of taking out a common factor and applying the middle-term break method.
Description of Better Responses	*Better responses* indicated that candidates had a strong command of factorisation techniques. They not only correctly took out the common factor ($3x$) but also successfully split the middle term ($5x^2 - 5x - 3x + 3$) into appropriate factors $3x\{(x-1)(5x-3)\}$, demonstrating both procedural accuracy and conceptual understanding.

Image of Better Response	
Description of Weaker Responses	*Weaker responses* indicated that while candidates had a basic understanding of taking out a common factor ($3x$), they were unable to determine the remaining factors correctly. This was either due to errors in simplifying the algebraic expressions or difficulty in selecting and applying the appropriate method of factorization as candidates used identities of $(a+b)^2$ and $(a-b)^2$. These issues suggest a need for further reinforcement of foundational algebraic skills and strategies.
Image of Weaker Response	

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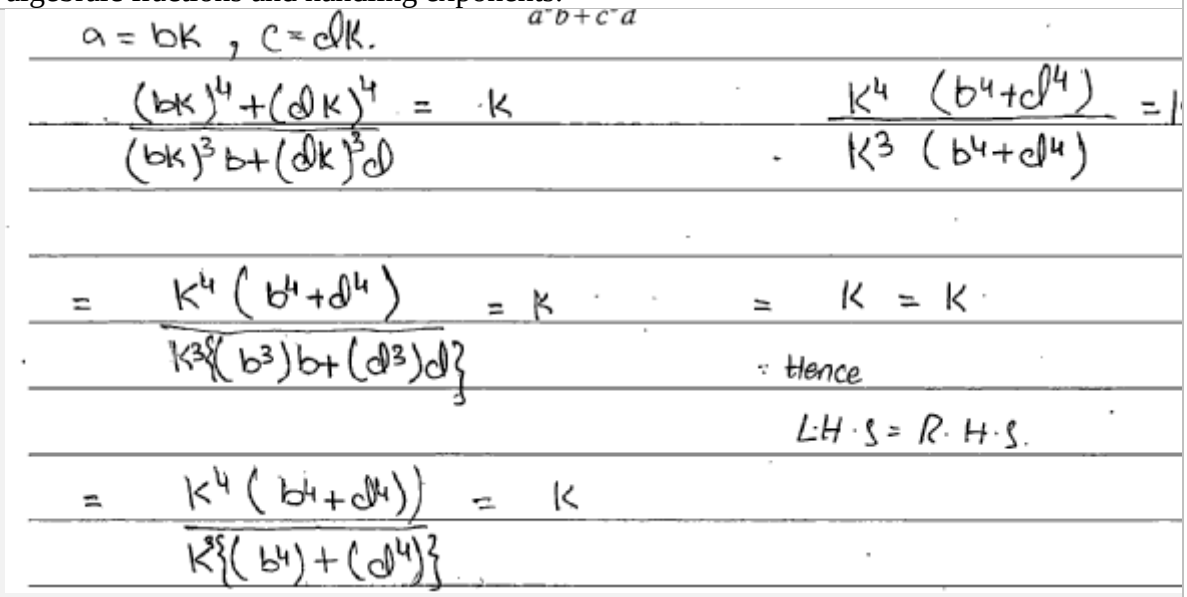
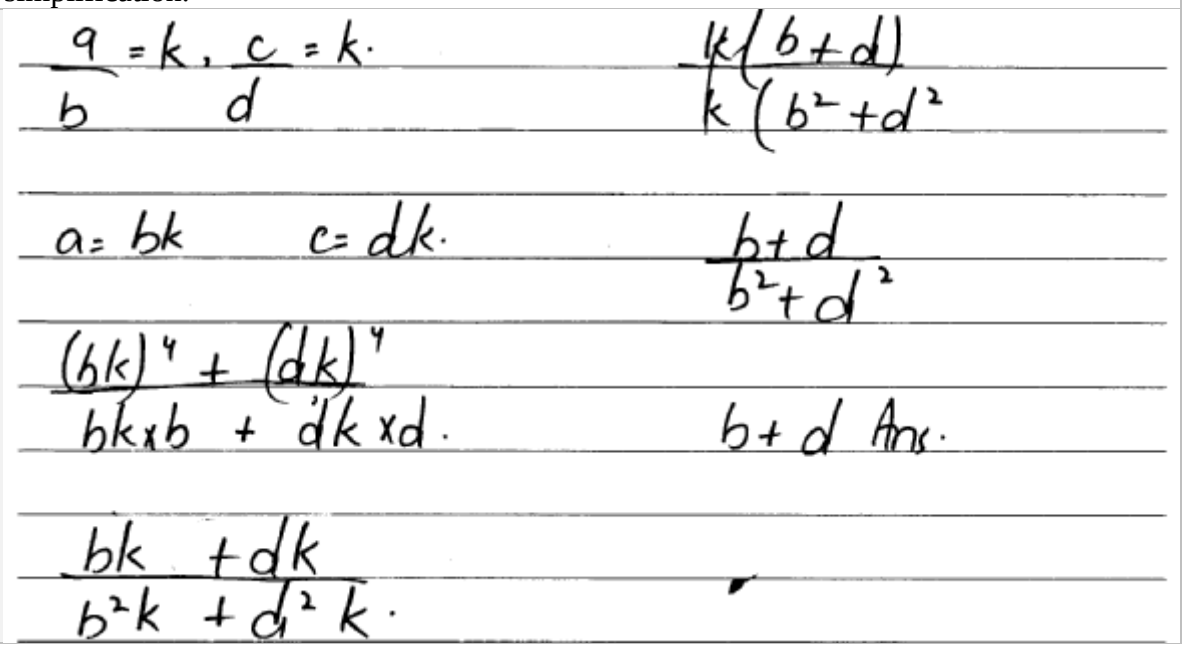
• Review past paper questions on the concept • Utilise the resource guide for additional materials	• Practical Demonstration	

Any Additional Suggestion:

Question No. 5	
Question Text	If $a : b :: c : d$, then use k-method to prove $\frac{a^4+c^4}{a^3b+c^3d} = k$.
SLO No.	6.4.1
SLO Text	Prove conditional equalities involving proportions using K-method
Max Marks	3
Cognitive Level	A
Checking Hints	1 mark for letting $\frac{a}{b} = \frac{c}{d} = k$, $a = bk$ and $c = dk$ 1 mark for substituting the value of a and c in $\frac{a^4+c^4}{a^3b+c^3d}$ and $\frac{ab^2+cd^2}{b^3+d^3}$. 1 mark for simplifying $\frac{b^4k^4+d^4k^4}{b^4k^3+d^4k^3}$ and proving it equal to k
Overall Performance	Question was based on the K-method from the topic of variation. Most candidates began the solution correctly, however, some became confused during the simplification of terms. The overall performance was average, as several candidates made errors particularly in the simplification of exponents, which affected the accuracy of their final answers.
Description of Better Responses	*Better responses* demonstrated accurate substitution, with candidates correctly replacing a with bk and c with dk. They successfully took out k^4 as a common factor from the numerator and b^3 from the denominator, and carefully simplified the expression to isolate k. These responses reflected a clear understanding of the K-method and strong skills in simplifying algebraic fractions and handling exponents.
Image of Better Response	

Description of Weaker Responses	*Weaker responses* showed that while candidates understood how to express "a" and "c" in terms of k, they faced difficulties in simplifying the resulting algebraic fractions. For example, some wrote $(bk)^4$ but failed to correctly apply the exponent to both b and k, leading the solution in the wrong direction and ultimately resulting in an incorrect answer. This highlighted a gap in their understanding of the laws of exponents and algebraic simplification.
Image of Weaker Response	

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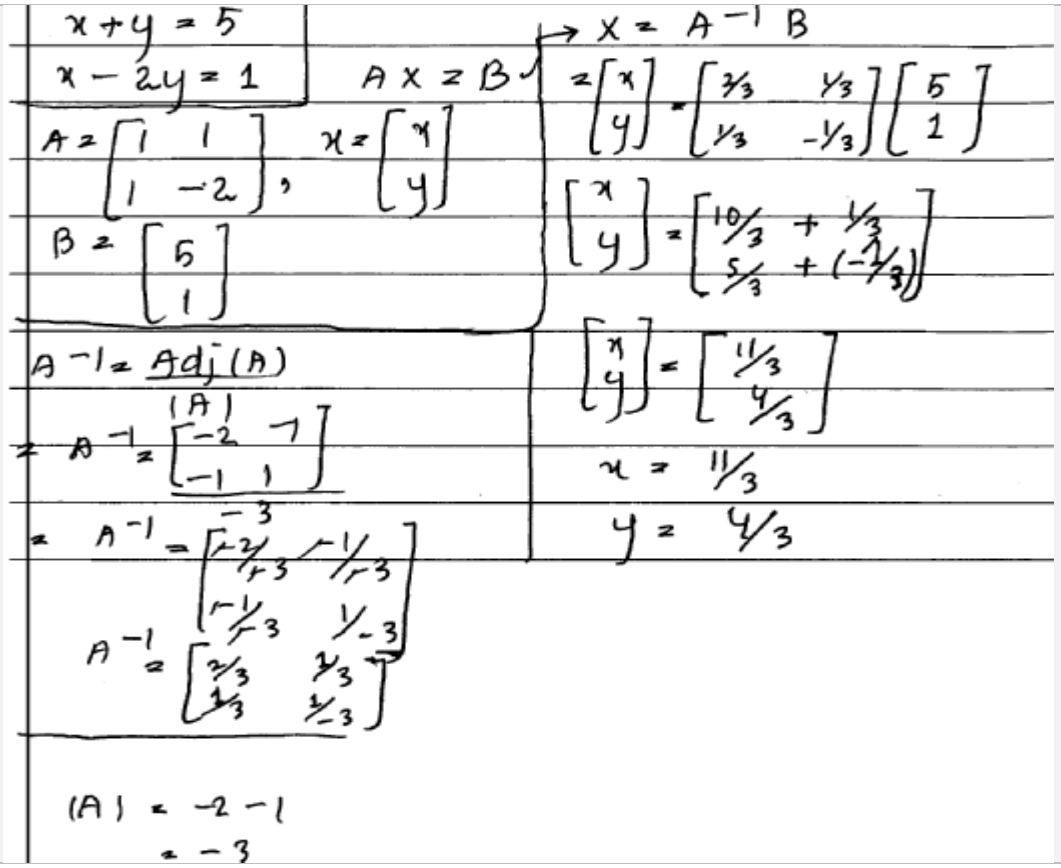
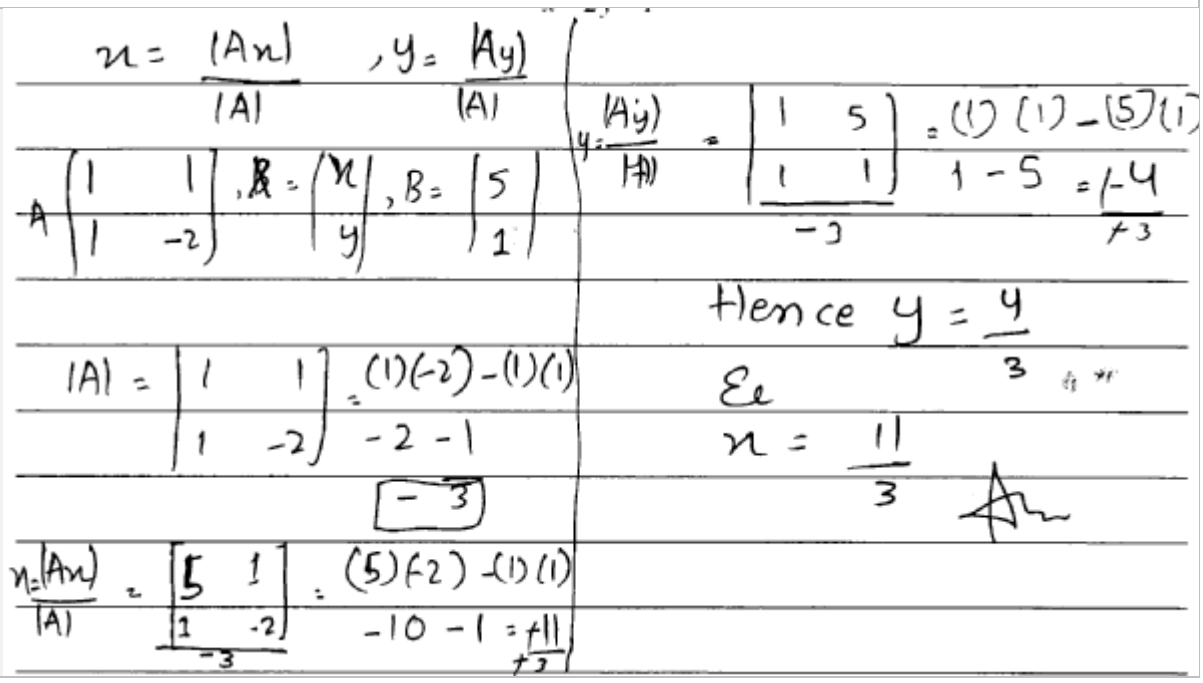
Any Additional Suggestion:
To address these issues, it is recommended that students receive more focused practice on the laws of exponents and algebraic simplification, particularly in expressions involving products raised to a power. Teachers should emphasise the correct application of powers to both coefficients and variables, using step-by-step guided examples. Regular diagnostic exercises that isolate common errors, such as misapplying exponents or simplifying fractions incorrectly, can also help strengthen procedural accuracy and boost confidence in solving variation problems using the K-method.

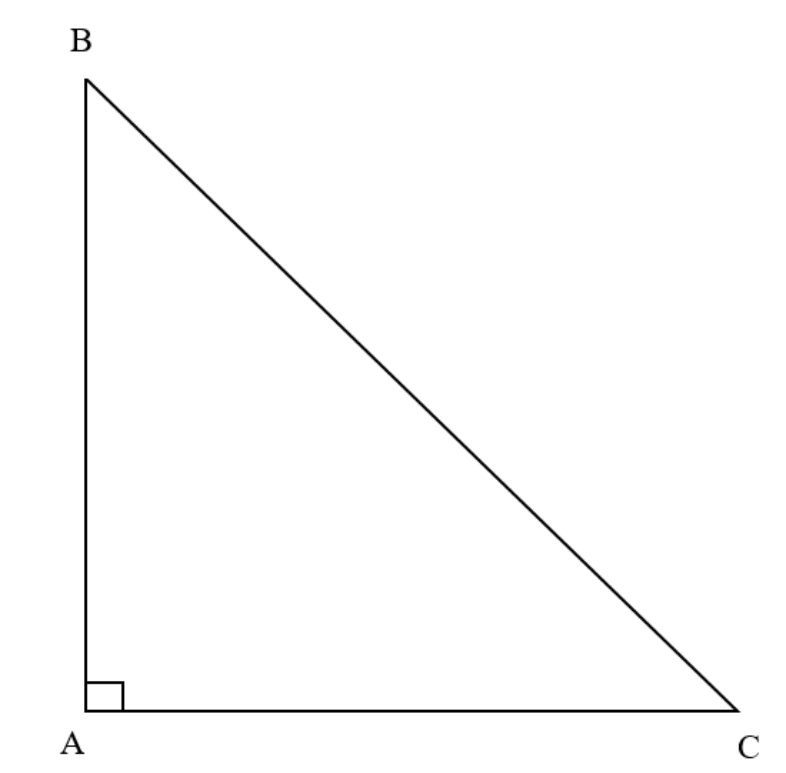
Question No. 6	
Question Text	Solve the given simultaneous linear equations by matrix inverse method. $x + y = 5$ $x - 2y = 1$
SLO No.	7.6.2a
SLO Text	Solve a system of two simultaneous linear equations in two unknowns using a. matrix inverse method
Max Marks	4
Cognitive Level	A
Checking Hints	1 mark for writing given equations as matrix form 1 mark for finding adjoint correctly 1 mark for finding the inverse using the adjoint found above 1 mark for multiplying the inverse with the solution matrix
Overall Performance	This question belonged to the topic of Matrices and required candidates to solve a system of simultaneous equations. While both the Inverse Matrix method and Cramer's Rule are valid techniques in general, candidates were specifically expected to apply the Inverse Matrix method for this question. Most candidates were able to identify the correct method; however, many made errors at various steps in the process. A few candidates incorrectly used Cramer's Rule, which was not appropriate in this context.
Description of Better Responses	*Better responses* showed that candidates were not only able to apply the Inverse Matrix method correctly but also solved the question without any errors. They demonstrated all the required steps clearly, including the calculation of the determinant $\det A = \begin{vmatrix} 1 & 1 \\ 1 & -2 \end{vmatrix} = -3$, the adjoint of the matrix $AdjA = \begin{bmatrix} -2 & -1 \\ -1 & 1 \end{bmatrix}$, and the multiplication of matrices. Additionally, they accurately represented the given system of equations in matrix form, reflecting a strong conceptual understanding and procedural fluency.

Images of Better Responses	
Description of Weaker Responses	*Weaker responses* indicated that although some candidates attempted to apply the Inverse Matrix method, many made mistakes at critical steps. Several candidates miscalculated the determinant $\det A = \begin{vmatrix} 1 & 1 \\ 1 & -2 \end{vmatrix} = -1$ (when 1 and 1 multiplied they took + sign while according to formula – sign needed to be there). Candidates showed confusion in finding the adjoint of the matrix. In addition, a lack of clear understanding of matrix multiplication was evident in many responses. It was also observed that some candidates used Cramer's Rule instead of the required Inverse Method, which resulted in no credit being awarded for their solution.
Image of Weaker Response	

Suggestions for improvement (Highlight all that apply)

Maximising SLO Achievement	Preferred Pedagogy Used for this SLO	Assessment Strategies
• Identify the expectation of command words (use Command Word Guide) • Ensure the content is taught at the relevant cognitive level • Identify necessary content required (skills + concepts) • Review past paper questions on the concept • Utilise the resource guide for additional materials	• Story Board • Cause and Effect • Fish and Bone • Concept Mapping • Audio Visual Resources • Think, Pair and Share • Knowledge Platform videos • Questioning Technique (Socratic approach) • Practical Demonstration	• Past paper questions • Discussion on E-Marking Notes • AKU-EB Digital Learning Solution powered by Knowledge Platform https://akueb.knowledgeplatform.com/login

Any Additional Suggestion:
To improve performance, it is recommended that teachers place greater emphasis on step-by-step practice of the Inverse Matrix method, particularly focusing on the calculation of determinants, adjoints, and matrix multiplication. Regular formative assessments with targeted feedback on common mistakes can also help reinforce correct procedures and deepen conceptual understanding.

Question No. 7	
Question Text	A right angled triangle *ABC* having right angle at *A* is given. Hence, draw an altitude from *A* to *BC*. 
SLO No.	8.1.2d
SLO Text	Draw for a given triangle d) altitude
Max Marks	3

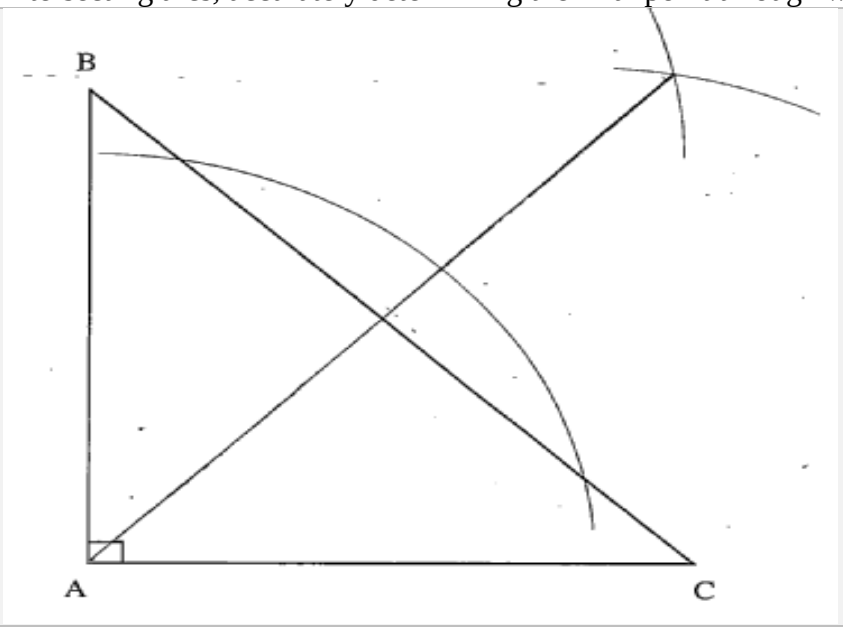
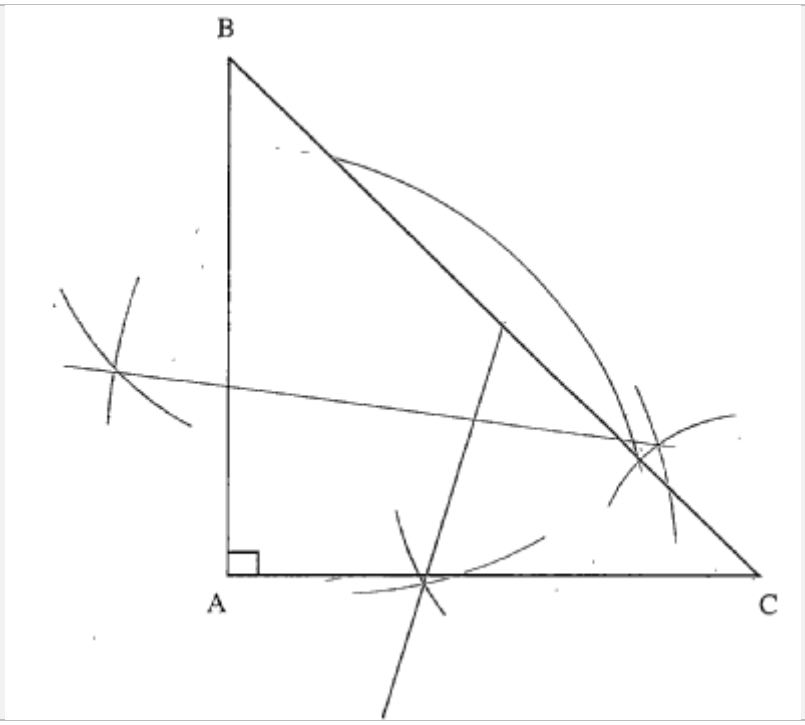
Cognitive Level	U
Checking Hints	1 mark for drawing the altitudes (3 required)
Overall Performance	The overall performance in this question was above average, as more than half of the candidates were able to fulfill the requirements of the question. Since the question belonged to the topic of Practical Geometry, candidates were expected to construct the figure using appropriate instruments such as a compass and a scale. However, it was observed that some candidates did not follow proper construction techniques. Encouraging candidates to use appropriately dark pencils and neat, labelled diagrams can also enhance the visibility of their constructions, especially in scanned scripts
Description of Better Responses	*Better responses* included clear and accurate diagrams of the required altitude. Candidates not only constructed the figure using a compass, but also marked the necessary arcs precisely and without any overlapping. They correctly made arcs that intersected the opposite side at two distinct points, and then used those points as centres to draw intersecting arcs, accurately determining the final point through which the altitude passes.
Image of Better Response	
Description of Weaker Responses	*Weaker responses* indicated that candidates were unable to demonstrate a clear understanding of how to construct an altitude. Some candidates appeared confused between the concepts of altitude, angle bisector, and median, leading to incorrect constructions. In several cases, the figures were incomplete or poorly drawn, suggesting a lack of practice and familiarity with geometric constructions.

Image of Weaker Response	

Suggestions for improvement (Highlight all that apply)

Maximising SLO Achievement	Preferred Pedagogy Used for this SLO	Assessment Strategies
• Identify the expectation of command words (use Command Word Guide) • Ensure the content is taught at the relevant cognitive level • Identify necessary content required (skills + concepts) • Review past paper questions on the concept • Utilise the resource guide for additional materials	• Story Board • Cause and Effect • Fish and Bone • Concept Mapping • Audio Visual Resources • Think, Pair and Share • Knowledge Platform videos • Questioning Technique (Socratic approach) • Practical Demonstration	• Past paper questions • Discussion on E-Marking Notes • AKU-EB Digital Learning Solution powered by Knowledge Platform https://akueb.knowledgeplatform.com/login

Any Additional Suggestion:

To improve performance, it is suggested that students receive more structured practice in distinguishing between key geometric constructions such as altitudes, medians, and angle bisectors. Teachers should incorporate step-by-step demonstrations using compass and ruler, along with regular formative assessments to check procedural accuracy. Supplementing classroom instruction with hands-on geometry sessions and construction worksheets can further strengthen both skill and confidence.

Question No. 8a

Candidates were given the choice to attempt any TWO out of the three questions: 8a, 8b, and 8c.

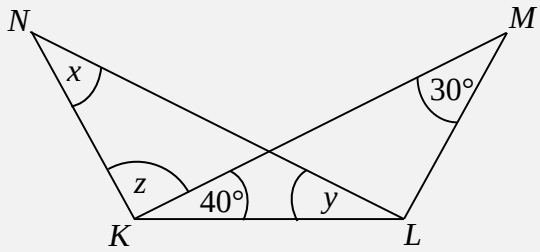
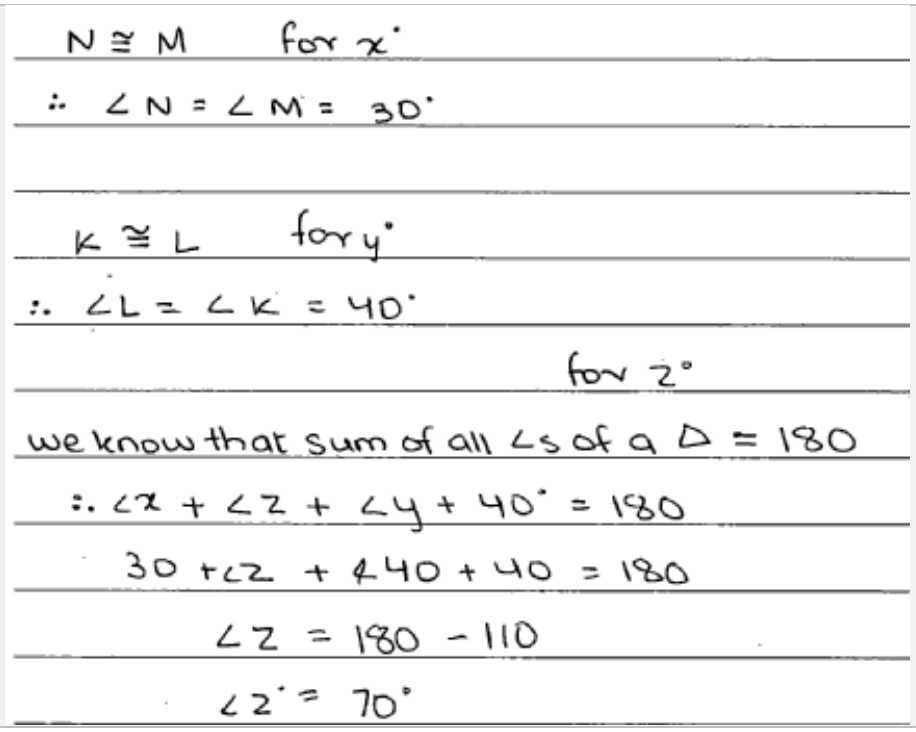
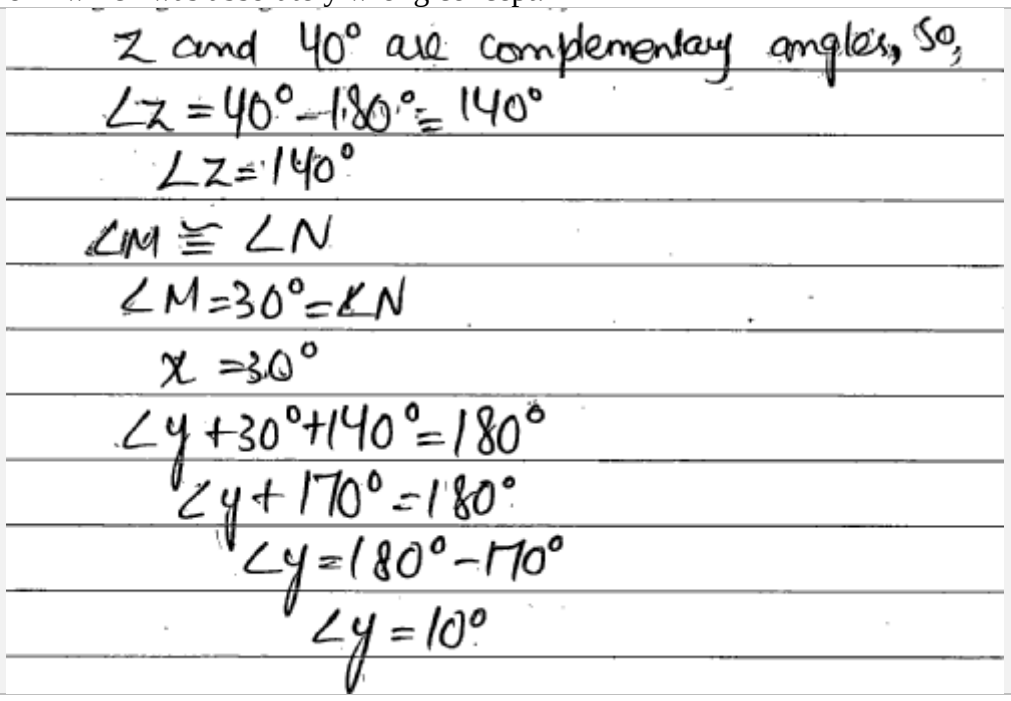
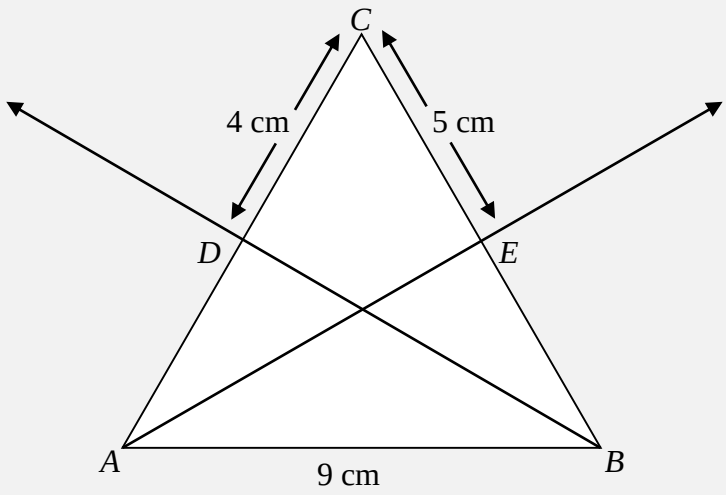
Question Text	In the correspondence of $\Delta LKM \leftrightarrow \Delta KLN$, $\Delta LKM \cong \Delta KLN$.  NOT TO SCALE Using the given diagram, find the values of *x*, *y* and *z*.
SLO No.	9.1.1 c
SLO Text	Apply the following theorems to solve related problems: In any correspondence of two triangles, if one side and any two angles of one triangle are congruent to the corresponding side and angles of the other, then the two triangles are congruent .
Max Marks	3
Cognitive Level	A
Checking Hints	1 mark for value of *x* 1 mark for value of *y* 1 mark for value of *z*
Overall Performance	This question was related to the concept of congruent triangles. Those who had a clear understanding of congruence were able to attempt the question effectively. However most of the candidates appeared confused when determining all three angles and made several errors in calculating angles y and z. This suggested a lack of understanding in applying the properties of congruent triangles to deduce unknown angles accurately.
Description of Better Responses	*Better responses* reflected strong conceptual understanding of congruent triangles, particularly in identifying corresponding pairs of congruent angles $x = 30°$ (corresponding angles of congruent triangles). Candidates demonstrated accuracy in recognising angle relationships and applied this understanding effectively. They also carefully calculated the value of angle z, correctly interpreting that two angles at vertex L were given, and therefore subtracted 40∘ from the total to determine the measure of z.

Image of Better Response	
Description of Weaker Responses	*Weak responses* showed many misconceptions related to congruent triangles as well as other geometric concepts. Some consider the triangle as isosceles, some were confused in complementary or supplementary angles and some candidates subtracted 40° for the value of z which was absolutely wrong concept.
Image of Weaker Response	

Suggestions for improvement (Highlight all that apply)

Maximising SLO Achievement	Preferred Pedagogy Used for this SLO	Assessment Strategies
• Identify the expectation of command words (use Command Word Guide) • Ensure the content is taught at the relevant cognitive level	• Story Board • Cause and Effect • Fish and Bone • Concept Mapping	• Past paper questions • Discussion on E-Marking Notes • AKU-EB Digital Learning Solution powered by Knowledge Platform https://akueb.knowledgeplatform.com/login

• Identify necessary content required (skills + concepts) • Review past paper questions on the concept • Utilise the resource guide for additional materials	• Audio Visual Resources • Think, Pair and Share • Knowledge Platform videos • Questioning Technique (Socratic approach) • Practical Demonstration	
Any Additional Suggestion:		

Question No. 8b	
Question Text	In the given triangle *ABC*, *BD* and *AE* are the medians of the triangle. i. Find $m\overline{DE}$ and $m\overline{BC}$. ii. Is $\overline{DE}$ parallel to $\overline{AB}$? Give a reason to justify your answer. 
SLO No.	10.1.1c
SLO Text	Apply the following theorems to solve related problems the line segment, joining the midpoints of two sides of a triangle, is parallel to the third side and is equal to one half of its length.
Max Marks	3
Cognitive Level	A
Checking Hints	1 mark for finding $m\overline{DE} = 4.5\text{cm}$ 1 mark for finding $m\overline{BC} = 10\text{cm}$ 1 mark for correct answer with justification
Overall Performance	Candidates with a strong understanding of the relevant theorems performed well overall. However, the majority gave incomplete or incorrect reasoning. While many were able to apply the theorems (the line segment, joining the midpoints of two sides of a triangle, is parallel to the third side and is equal to one half of its length)x procedurally, they failed to explicitly state the reasons or justify each step, which is essential for showing full concepts.

Description of Better Responses	*Better responses* reflected a strong conceptual understanding of the relevant theorem. Candidates were not only able to correctly calculate the values of *DE* ($m\overline{DE} = 4.5\text{cm}$) and *BC* ($m\overline{BC} = 10\text{cm}$), but also provided valid justifications (Yes $\overline{DE}$ parallel to $\overline{AB}$ because the line segment joining the midpoints of two sides of a triangle is parallel to the third side) for their answers. Their responses showed a clear grasp of the properties of a median and the ability to apply this concept accurately within the context of the question.
Image of Better Response	i. Find $m\overline{DE}$ and $m\overline{BC}$. (2 Marks For $m\overline{DE}$: $DE = \frac{1}{2} \times 9$ $m\overline{DE} = 4.5\text{cm}$ For $m\overline{BC}$: $BC = EC + EB$ $BC = 5 + 5$ $BC = 10\text{cm}$ ii. Is $\overline{DE}$ parallel to $\overline{AB}$? Give a reason to justify your answer. (1 Mark Yes, $\overline{DE}$ is parallel to $\overline{AB}$ because the line segment passing the mid points of a triangle is parallel to third side
Description of Weaker Responses	*Weaker responses* revealed several misconceptions related to the given theorem. Many candidates were not providing an appropriate reason in Part (ii) e.g., they provided the reason (*DE* is parallel to *AB* as they do not intersect with each other), despite attempting the calculation. Some made errors in applying the relevant property of the median, indicating gaps in conceptual understanding. In several cases, candidates failed to find the measurement of either *BC* or *DE*, which affected the completeness and accuracy of their solutions.
Image of Weaker Response	i. Find $m\overline{DE}$ and $m\overline{BC}$. (2 Mark AB = 9cm $DE = \frac{9}{3}$ DE = 3cm // (ii) 5 = CE = BE BE = 5 BE + CE = BC 5 + 5 = 10cm BC = 10cm // ii. Is $\overline{DE}$ parallel to $\overline{AB}$? Give a reason to justify your answer. (1 Mar yes, $\overline{DE}$ is parallel to $\overline{AB}$ because they do not intersect to eachother and they are infront of eachoth moreover, they will never meet at any point.

Suggestions for improvement (Highlight all that apply)

Maximising SLO Achievement	Preferred Pedagogy Used for this SLO	Assessment Strategies
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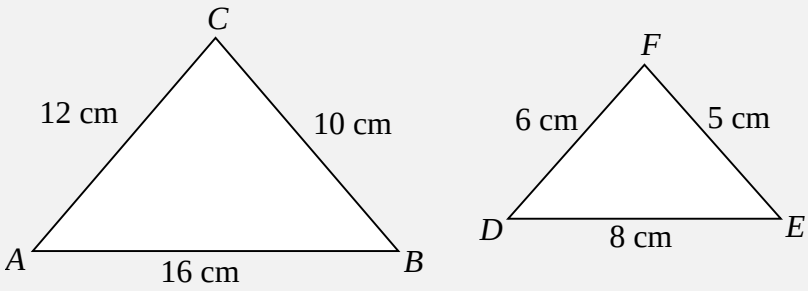
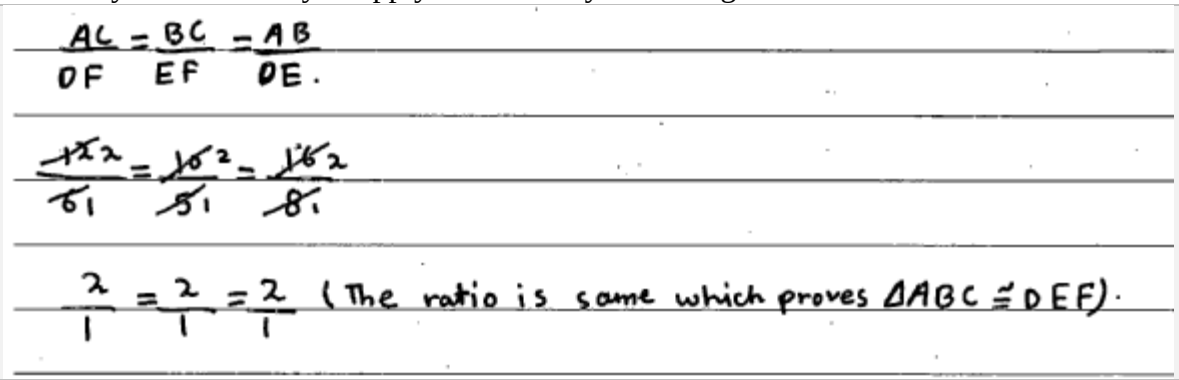
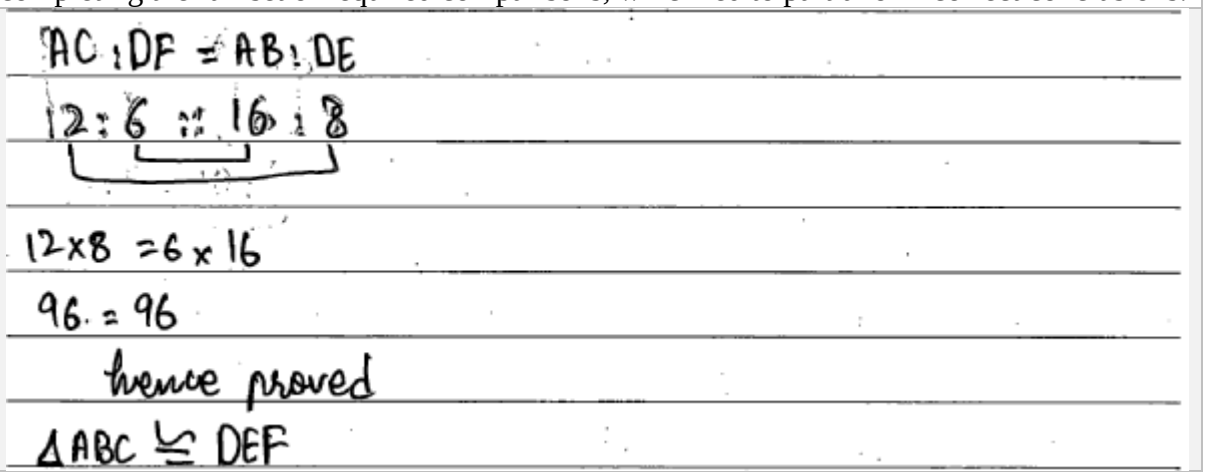
Any Additional Suggestion:
To improve student performance, it is recommended that teachers place greater emphasis on the conceptual understanding and proper articulation of geometric theorems, particularly those involving medians and related properties e.g., Draw → Name → step by step reasoning → Explain with intuition → Restate simply.. Classroom instruction should include guided practice in writing complete mathematical justifications, not just final answers. Furthermore, regular formative assessments that focus on both reasoning and computation will support students in developing a more thorough and accurate approach to geometry-based questions.

Question No. 8c

Question Text	Using properties of ratios of corresponding sides of two triangles, prove that $\Delta ABC \sim \Delta DEF$. 
SLO No.	13.1.1d
SLO Text	Apply the following theorems to solve related problems: d. if two triangles are similar, the measures of their corresponding sides are proportional.
Max Marks	3
Cognitive Level	A
Checking Hints	1 mark for writing / or using the property $\frac{AB}{DE}=\frac{BC}{EF}=\frac{AC}{DF}$ correctly 1 mark for taking the ratio of corresponding sides correctly 1 mark for drawing the correct/ required conclusion $\Delta ABC \approx \Delta DEF$

Overall Performance	Overall performance in this question was great. Some of the candidates continued to make errors in calculating the ratio between corresponding sides. This indicates a lack of reinforcement and consistent practice in applying the properties of similar triangles, particularly in identifying and matching corresponding sides accurately.
Description of Better Responses	*Better responses* indicated that candidates clearly understood the requirements of the question. They accurately identified the corresponding sides of the two triangles and correctly calculated all three ratios equal to 2 by using property $\frac{AB}{DE}=\frac{BC}{EF}=\frac{AC}{DF}$ to prove that the triangles were similar. These responses demonstrated a sound grasp of the concept of similarity and the ability to apply it effectively within a geometric context.
Image of Better Response	
Description of Weaker Responses	*Weaker responses* indicated that candidates were unable to fully understand the requirements of the question. Many not only failed to meet the expectations but also left their solutions incomplete. Some made conceptual errors and did not prove that the ratios between corresponding sides were equal, and did not use the correct property $\frac{AB}{DE}=\frac{BC}{EF}=\frac{AC}{DF}$. A few candidates only calculated the ratios of two pairs of sides and simplified them without completing the full set of required comparisons, which led to partial or incorrect conclusions.
Image of Weaker Response	

Suggestions for improvement (Highlight all that apply)

Maximising SLO Achievement	Preferred Pedagogy Used for this SLO	Assessment Strategies
• Identify the expectation of command words (use Command Word Guide) • Ensure the content is taught at the relevant cognitive level • Identify necessary content required (skills + concepts)	• Story Board • Cause and Effect • Fish and Bone • Concept Mapping • Audio Visual Resources	• Past paper questions • Discussion on E-Marking Notes • AKU-EB Digital Learning Solution powered by Knowledge Platform https://akueb.knowledgeplatform.com/login

• Review past paper questions on the concept • Utilise the resource guide for additional materials	• Think, Pair and Share • Knowledge Platform videos • Questioning Technique (Socratic approach) • Practical Demonstration	

Any Additional Suggestion:

To enhance students' understanding, it is recommended the importance of identifying and matching corresponding sides accurately when working with similar triangles. Incorporating visual aids, such as colour-coded diagrams, can help clarify side relationships. Furthermore, students should be guided through complete solutions, highlighting the need to prove all three pairs of sides are in proportion. Regular practice with structured questions and targeted feedback will help reinforce the procedural steps and improve conceptual clarity.

Annexure A: Pedagogies Used for Teaching the SLOs

Pedagogy: Storyboard
Description: A visual pedagogy that uses a series of illustrated panels to present a narrative, encouraging creativity and critical thinking. It helps learners organise ideas, sequence events, and comprehend complex concepts through storytelling.
Example: In a Literature class, students are tasked with creating storyboards to visually retell a novel. They draw key scenes, write captions, and present their stories to the class, enhancing their reading comprehension and fostering their imagination.

Pedagogy: Cause and Effect
Description: This pedagogy explores the relationships between actions and consequences. By analysing cause-and-effect relationships, learners develop a deeper understanding of how events are interconnected and how one action can lead to various outcomes.
Example: In a History class, students study the causes and effects of the Industrial Revolution. They research and discuss how technological advancements in manufacturing led to significant societal changes, such as urbanisation and labour reform movements.

Pedagogy: Fish and Bone
Description: A method that breaks down complex topics into main ideas (the fish) and supporting details (the bones). This visual approach enhances comprehension by highlighting essential concepts and their relevant explanations.
Example: During a Biology class on human anatomy, the teacher uses the fish and bone technique to teach about the human skeletal system. Teacher presents the main components of the human skeleton (fish) and elaborates on each bone's structure and function (bones).

Pedagogy: Concept Mapping
Description: An effective way to visually represent relationships between ideas. Learners create diagrams connecting key concepts, aiding in understanding the overall structure of a subject and fostering retention.
Example: In a Psychology assignment, students use concept mapping to explore the various theories of personality. They interlink different theories, such as Freud's psychoanalysis, Jung's analytical psychology, and Bandura's social-cognitive theory, to see how they relate to each other.

Pedagogy: Audio Visual Resources
Description: Incorporating multimedia elements like videos, images, and audio into lessons. This approach caters to different learning styles, making educational content more engaging and memorable.

Example: In a General Science class, the teacher uses a documentary-style video to teach about the solar system. The video includes stunning visual animations of the planets, interviews with astronomers, and background music, enhancing students' interest and understanding of space.

Pedagogy: Think, Pair, and Share

Description: A collaborative learning technique where students ponder a question or problem individually, then discuss their thoughts in pairs or small groups before sharing with the entire class. It fosters active participation, communication skills, and diverse perspectives.

Example: In a Literature in English class, the teacher poses a thought-provoking question about a novel's moral dilemma. Students first reflect individually, then pair up to exchange their opinions, and finally participate in a lively class discussion to explore different viewpoints.

Pedagogy: Questioning Technique (Socratic Approach)

Description: Based on Socratic dialogue, this method stimulates critical thinking by posing thought-provoking questions. It encourages learners to explore ideas, justify their reasoning, and discover knowledge through a process of inquiry.

Example: In an Ethics class, the instructor uses the Socratic approach to lead a discussion on the meaning of justice. By asking a series of probing questions, the students engage in a deeper exploration of ethical principles and societal values.

Pedagogy: Practical Demonstration

Description: A hands-on approach where learners observe real-life applications of theories or skills. Practical demonstrations enhance comprehension, skill acquisition, and problem-solving abilities by bridging theoretical concepts with real-world scenarios.

Example: In a Food and Nutrition class, the instructor demonstrates the proper technique for filleting a fish. Students observe and then practice the skill themselves, learning the practical application of knife skills and culinary precision.

(**Note:** The examples provided in this annexure serve as illustrations of various pedagogies. It is important to understand that these pedagogies are versatile and can be applied across subjects in numerous ways. Feel free to adapt and explore these techniques creatively to enhance learning outcomes in your specific context.)

Acknowledgements

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Additionally, we express our gratitude to the esteemed team of reviewers for their constructive feedback on overall performance, better and weaker responses, and validating teaching pedagogies along with suggestions for improvement.

These contributors include:

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