AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

ANNUAL EXAMINATIONS (THEORY) 2025

Mathematics Paper II

Time: 1 hour 40 minutes Marks: 30

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are EIGHT questions. Answer ALL questions. Choices are specified inside the paper.

3. When answering the questions:

   Read each question carefully.
   Use a black pointer to write your answers. DO NOT write your answers in pencil.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. A formulae list is provided on page 2. You may refer to it during the paper, if you wish.

6. You may use a simple calculator if you wish.

List of Formulae

Note:

- All symbols used in the formulae have their usual meaning.

Sets and Functions

$A\Delta B = (A \cup B) - (A \cap B)$ $\quad (A \cap B)^c = A^c \cup B^c$ $\quad (A \cup B)^c = A^c \cap B^c$

Real and Complex Numbers

$x^m \times x^n = x^{m+n}$ $\quad (x \times y)^n = x^n \times y^n$ $\quad (x^m)^n = x^{mn}$

$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$ $\quad \frac{x^m}{x^n} = x^{m-n}$ $\quad a^{-m} = \frac{1}{a^m}$

Exponents and Logarithms

$\log_a (m \times n) = \log_a m + \log_a n$ $\quad \log_a \left(\frac{m}{n}\right) = \log_a m - \log_a n$ $\quad \log_a b = n \Leftrightarrow a^n = b$

$\log_a (m)^n = n \log_a m$ $\quad \log_a n = \log_b n \times \log_a b$ $\quad \log_a n = \frac{\log_b n}{\log_b a}$

Algebraic Formulae & Applications and Factorisation

$(a-b)^2 = a^2 - 2ab + b^2$ $\quad (a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$ $\quad a^2 - b^2 = (a+b)(a-b)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$ $\quad (a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$

$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$ $\quad (a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $\quad (a+b)^2 - (a-b)^2 = 4ab$

Matrices and Determinants

$A^{-1} = \frac{1}{|A|} AdjA$

Q.1. (Total 3 Marks)

If $N = \{1, 2, 3, \ldots\}$ and $W = \{0, 1, 2, \ldots\}$, then find $N \Delta W$.

Q.2. (Total 3 Marks)

Using the laws of logarithm, expand $\log \sqrt{\frac{x}{x+1}}$.

(ATTEMPT EITHER PART a OR PART b OF Q.3.)

Q.3. (Total 4 Marks)

a.

i. Prove that $(2x-3y+z)^2 = 4x^2+9y^2+z^2-12xy-6yz+4xz$. (2 Marks)

ii. If $2x-3y+z=10$ and $-6xy-3yz+2xz=15$, then find the value of $4x^2+9y^2+z^2$.

(**Note**: Use the expression from part i.) (2 Marks)

(ATTEMPT EITHER PART a OR PART b OF Q.3.)

b. Find the continued product in simplified form for the given expression.

$$(16p^2-1)(16p^2+4p+1)(16p^2-4p+1)$$

(ATTEMPT EITHER PART a OR PART b OF Q.4.)

Q.4. (Total 4 Marks)

a. Using factor theorem, find the factors of the polynomial $P(x) = x^3 - x^2 - 4x + 4$.

b. Completely factorise the expression $15x^3 - 24x^2 + 9x$.

Q.5. (Total 3 Marks)

If $a : b :: c : d$, then use k-method to prove $\frac{a^4 + c^4}{a^3 b + c^3 d} = k$.

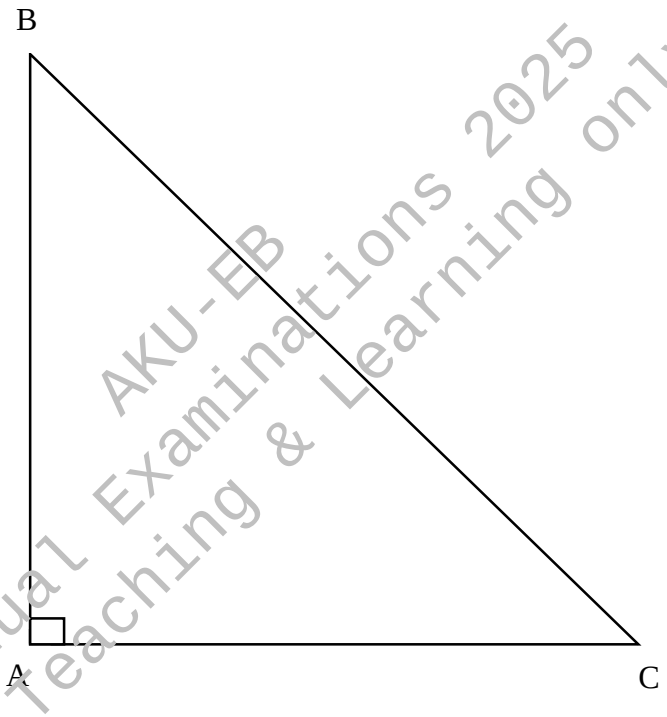
Q.6. (Total 4 Marks)

Solve the given simultaneous linear equations by matrix inverse method.

$$x + y = 5$$
$$x - 2y = 1$$

Q.7. (Total 3 Marks)

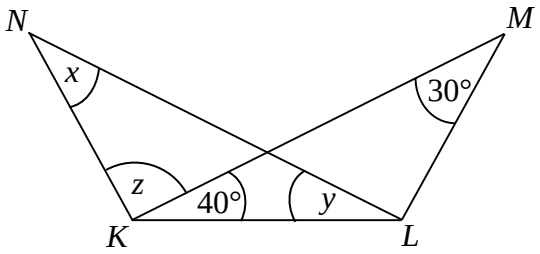
A right angled triangle *ABC* having right angle at *A* is given. Hence, draw an altitude from *A* to *BC*.



(ATTEMPT ANY TWO PARTS a, b OR c OF Q.8.)

Q.8. (Total 6 Marks)

a. In the correspondence of $\Delta LKM \leftrightarrow \Delta KLN$, $\Delta LKM \cong \Delta KLN$. (3 Marks)

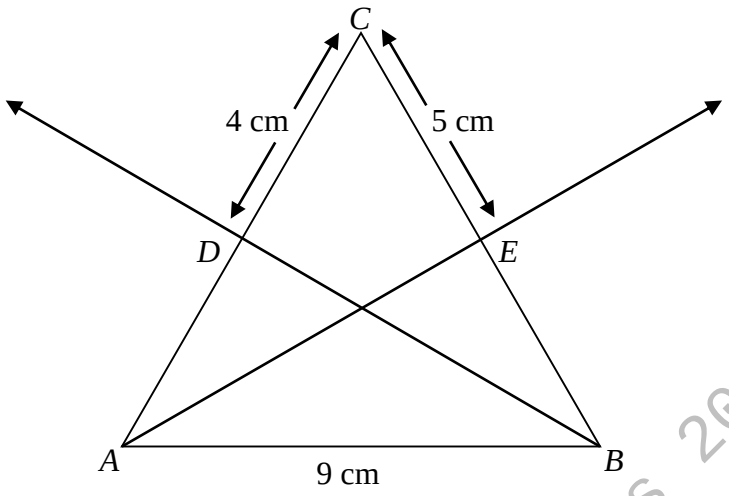


NOT TO SCALE

Using the given diagram, find the values of *x*, *y* and *z*.

(ATTEMPT ANY TWO PARTS a, b OR c OF Q.8.)

b. In the given triangle *ABC*, *BD* and *AE* are the medians of the triangle. (3 Marks)



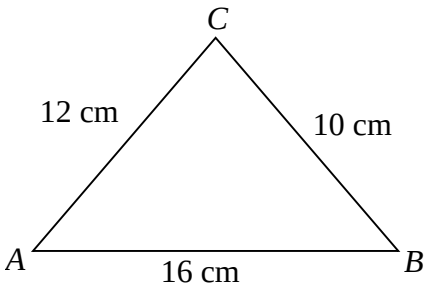
NOT TO SCALE

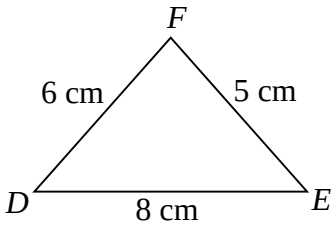
i. Find $m\overline{DE}$ and $m\overline{BC}$. (2 Marks)

ii. Is $\overline{DE}$ parallel to $\overline{AB}$? Give a reason to justify your answer. (1 Mark)

(ATTEMPT ANY TWO PARTS a, b OR c OF Q.8.)

c. Using properties of ratios of corresponding sides of two triangles, prove that $\Delta ABC \sim \Delta DEF$.





NOT TO SCALE

(3 Marks)

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