

**AGA KHAN UNIVERSITY EXAMINATION BOARD**

**SECONDARY SCHOOL CERTIFICATE**

**CLASS IX**

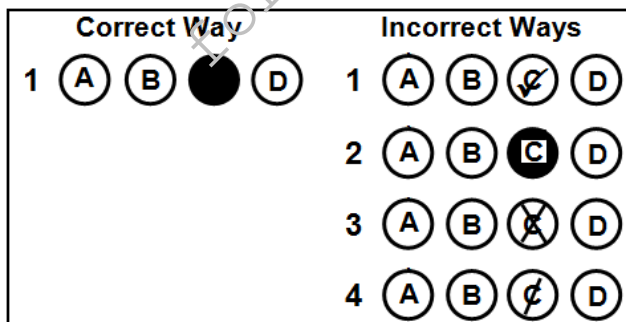
**ANNUAL EXAMINATIONS (THEORY) 2025**

**Mathematics Paper I**

**Time: 1 hour 20 minutes    Marks: 45**

**INSTRUCTIONS**

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 45 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.



**Candidate's Signature**

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. A formulae list is provided on page 2. You may refer to it during the paper, if you wish.
8. 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 &amp; 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

$$A^{-1} = \frac{1}{|A|} \text{Adj}A$$

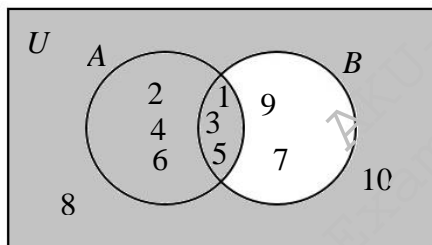
1. The set of integers, whole numbers and natural numbers are represented by  $Z$ ,  $W$  and  $N$  respectively.

Which one of the following statements is TRUE about the given sets?

- A.  $Z \cup W = W$   
 B.  $Z \cap N = N$   
 C.  $N \cap W = W$   
 D.  $N \cup W = Z$
2. If  $M$ ,  $N$  and  $P$  are three non-empty sets, then according to associative property of union the correct equation will be,

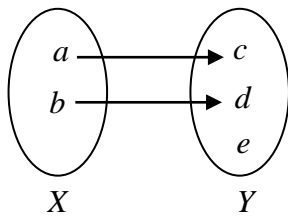
- A.  $M \cup (N \cup P) = (M \cup N) \cup P$ .  
 B.  $M \cap (N \cap P) = (M \cap N) \cap P$ .  
 C.  $M \cap (N \cup P) = (M \cup N) \cap P$ .  
 D.  $M \cap (N \cup P) = (M \cap N) \cup P$ .

3. The shaded region in the Venn diagram also represents



- A.  $(A \cup B)'$ .  
 B.  $(A - B)'$ .  
 C.  $A - B$ .  
 D.  $A \cup B$ .
4. If  $A = \{1, 2, 3, 4, 5\}$ , then the number of ordered pairs in  $A \times A$  will be
- A. 5  
 B. 10  
 C. 25  
 D. 32

5. If the element  $e$  is removed from the set  $Y$ , then the given mapping will become a/an



- A. onto function only.  
 B. one-one function only.  
 C. one-one and into function.  
 D. one-one and onto function.
6. If  $A = \{1, 2, 3\}$  and  $U = \{1, 2, 3, 4, 5\}$ , then  $A'$  will be equal to

- A.  $\{1, 2, 3, 4, 5\}$ .  
 B.  $\{1, 2, 3\}$ .  
 C.  $\{2, 3\}$ .  
 D.  $\{4, 5\}$ .

7. The simplest form of  $(7^2)^{\frac{3}{5}}$  in radical form will be

- A.  $\sqrt[5]{7}$   
 B.  $\sqrt[5]{7^2}$   
 C.  $7 \times \sqrt[5]{7}$   
 D.  $7 \times \sqrt[5]{7^2}$

8. The simplified form of  $\frac{a \times b^{-2}}{a^{-2} \times b^3}$  in radical form will be

- A.  $a^{-3} \times b^{-5}$   
 B.  $a^3 \times b^{-5}$   
 C.  $a^3 \times b$   
 D.  $a^{-3} \times b$

9. If  $x + 3i - 1 = 2 + 3i$ , then the value of  $x$  will be

- A.  $-3$   
 B.  $-2$   
 C.  $2$   
 D.  $3$

10. On simplification of  $ai + ib - b - a$ , we get
- A.  $(a+b)i-1$
  - B.  $(a+b)(i-1)$
  - C.  $a-b+(a+b)i$
  - D.  $(a-b)i+a+b$
11. If a number 0.0101 can also be expressed as  $a \times 10^b$ , then the value of  $a$  and  $b$  respectively will be
- A. 10.1 and  $-2$
  - B. 1.01 and  $-2$
  - C. 1.01 and 2
  - D. 10.1 and 2
12. If  $\log_x \left( \frac{1}{4^2} \right) = -2$ , then the value of  $x$  will be
- A.  $-4$
  - B.  $-2$
  - C. 2
  - D. 4
13. The value of  $\log_2(16)^{\frac{3}{4}}$  will be
- A. 1
  - B. 2
  - C. 3
  - D. 8
14. In single logarithm, the expression  $\log 3x - \log x^2 + \log(x - y)$  will be equal to
- A.  $\log(4x - x^2 - y)$ .
  - B.  $\log 3x^3(x - y)$ .
  - C.  $\log \frac{3x - x^2}{x - y}$ .
  - D.  $\log \frac{3x(x - y)}{x^2}$ .
15. The logarithm  $\frac{\log_3 5}{\log_3 7}$  can be expressed as
- A.  $\log_3 5 - \log_3 7$
  - B.  $\log_3 7 - \log_3 5$
  - C.  $\log_5 7$
  - D.  $\log_7 5$

16. In the given options, an example of polynomial is

A.  $x^2 + \frac{1}{x^2}$

B.  $x^2 + \frac{1}{\sqrt{x}} + \frac{1}{2}$

C.  $x^2 + \sqrt{x} + \frac{1}{2}$

D.  $x^2 + x + \frac{1}{\sqrt{2}}$

17. On simplification,  $\frac{y^0 \times x}{x^0 \times y}$  is equal to

A.  $\frac{x}{y}$

B.  $\frac{y}{x}$

C. 1

D. 0

18. If  $(x+2y)^2 = 361$  and  $xy = -60$ , then the value of  $x-2y$  will be equal to

A.  $\pm 19$

B.  $\pm \sqrt{481}$

C.  $\pm \sqrt{601}$

D.  $\pm 29$

19. If  $y - \frac{1}{y} = 3$ , then  $y^3 - \frac{1}{y^3}$  will be

A. 24

B. 27

C. 36

D. 54

20. The value of  $(2+4) - \sqrt{4} + \sqrt{2}$  is equal to

A.  $4 + \sqrt{2}$

B.  $4 + \sqrt{6}$

C.  $6 - \sqrt{2}$

D.  $6 - \sqrt{6}$

21. The product of expressions is given as  $(a-1)(a^2+a+1)$ .

The simplest form of this product will be

- A.  $(a+1)^3$
- B.  $(a-1)^3$
- C.  $a^3-1$
- D.  $a^3+1$

22. The factors of  $a^2-3a+2ab-6b$  are

- A.  $(a+3)$  and  $(a-2b)$ .
- B.  $(a+3)$  and  $(a+2b)$ .
- C.  $(a-3)$  and  $(a-2b)$ .
- D.  $(a-3)$  and  $(a+2b)$ .

23. The complete factorised form of the expression  $9-(a^2+1)^2$  will be

- A.  $(3+a^2+1)(3+a^2-1)$ .
- B.  $(3+a^2+1)(3-a^2-1)$ .
- C.  $(9+a^2+1)(9+a^2-1)$ .
- D.  $(9+a^2+1)(9-a^2-1)$ .

24. The expression  $k^2-kt-2t^2$  can be expressed in terms of product of factors as

- A.  $(k-t)(k-2t)$ .
- B.  $(k+t)(k-2t)$ .
- C.  $(k+t)(k+2t)$ .
- D.  $(k-t)(k+2t)$ .

25. The polynomial  $(3a+1)^3$  is the factorised form of the polynomial

- A.  $27a^3+27a^2+9a+1$
- B.  $27a^3+9a^2+3a+1$
- C.  $27a^3+3a^2+3a+1$
- D.  $27a^3+a^2+a+1$

26. The factorised form of  $8a^3-125$  to the lowest forms is

- A.  $(2a+5)(4a^2-10a-25)$ .
- B.  $(2a-5)(4a^2-10a+25)$ .
- C.  $(2a+5)(4a^2+10a+25)$ .
- D.  $(2a-5)(4a^2+10a+25)$ .

27. If  $P(x) = x^3 + 1$  is divided by  $(x + 2)$ , then the remainder is
- A.  $-7$
  - B.  $-5$
  - C.  $7$
  - D.  $9$
28. Which of the given options is NOT a zero of the polynomial  $(2a + 1)(a + 3)(a - 3)(a - 1)$ ?
- A.  $-3$
  - B.  $-1$
  - C.  $1$
  - D.  $3$
29. If  $x$ ,  $a + b$  and  $a - b$  are in continued proportion, then  $x$  is equal to
- A.  $(a + b)^2$
  - B.  $(a - b)^2$
  - C.  $\frac{(a - b)^2}{a + b}$
  - D.  $\frac{(a + b)^2}{a - b}$
30. If numbers  $k$ ,  $5$ ,  $3$  and  $15$  are in fourth proportion, then the value of  $k$  is
- A.  $\frac{1}{5}$
  - B.  $1$
  - C.  $5$
  - D.  $15$
31. If  $x : 5 = 7 : y$ , then applying the componendo theorem, we get
- A.  $\frac{x + 5}{5} = \frac{7 + y}{y}$ .
  - B.  $\frac{x - 5}{5} = \frac{7 - y}{y}$ .
  - C.  $\frac{x}{x - 5} = \frac{7}{7 - y}$ .
  - D.  $\frac{x}{x - 5} = \frac{7}{7 + y}$ .

32. The volume of a gas 'V' varies inversely with pressure 'P' at a constant temperature. The volume of the gas is noted as 240 cubic centimetres at 30 kg/ cm<sup>2</sup> pressure.

The volume of this gas at 45 kg/ cm<sup>2</sup> pressure will be

- A. 5.6 cm<sup>3</sup>  
 B. 160 cm<sup>3</sup>  
 C. 360 cm<sup>3</sup>  
 D. 720 cm<sup>3</sup>
33. The matrix  $\begin{bmatrix} a & 0 \\ b & 2 \end{bmatrix}$  is a scalar matrix if
- A.  $a = 0$  and  $b = 2$   
 B.  $a = 0$  and  $b = -2$   
 C.  $a = 2$  and  $b = 0$   
 D.  $a = 2$  and  $b = 2$
34. If  $M = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ ,  $N = \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$  and  $P = [2 \quad 1]$  are given matrices, then which of the matrix product is possible?
- I.  $MN$   
 II.  $PM$   
 III.  $NP$
- A. I only  
 B. II only  
 C. I and III  
 D. II and III
35. The multiplicative inverse of the matrix  $\begin{bmatrix} 2 & 6 \\ -1 & -3 \end{bmatrix}$  is
- A.  $\begin{bmatrix} -3 & -6 \\ 1 & 2 \end{bmatrix}$ .  
 B.  $-\frac{1}{12} \begin{bmatrix} -3 & -6 \\ 1 & 2 \end{bmatrix}$ .  
 C.  $\frac{1}{12} \begin{bmatrix} -3 & -6 \\ 1 & 2 \end{bmatrix}$ .  
 D. does not exist.

36. If the matrix  $\begin{bmatrix} a & 6 \\ 1 & -3 \end{bmatrix}$  is a singular matrix, then the value of  $a$  will be

- A. -3
- B. -2
- C. 0
- D. 2

37. If  $2x+3y=2$  and  $x-2y=1$  are two simultaneous linear equations, then the matrix form of the equations will be

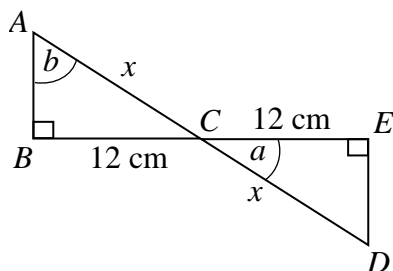
- A.  $\begin{bmatrix} 2 & 3 \\ 1 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ .
- B.  $\begin{bmatrix} 2 & 3 \\ 1 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ .
- C.  $\begin{bmatrix} 2 & 1 \\ 3 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ .
- D.  $\begin{bmatrix} 2 & 1 \\ 3 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ .

38. After solving the matrix equation  $3A + \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ -1 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ , the matrix  $A$  will be

- A.  $\begin{bmatrix} 0 \\ \frac{1}{3} \\ 3 \end{bmatrix}$ .
- B.  $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ .
- C.  $\begin{bmatrix} 0 \\ -1 \end{bmatrix}$ .
- D.  $\begin{bmatrix} 0 \\ \frac{1}{-3} \end{bmatrix}$ .

39. In the given diagram, the value of  $b$  in terms of  $a$  will be equal to

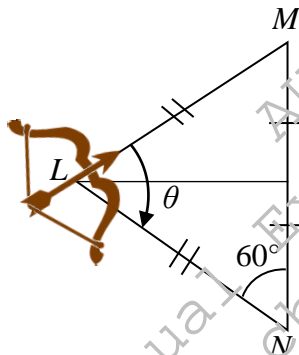
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- A.  $a^\circ$
- B.  $2a^\circ$
- C.  $(90 - a)^\circ$
- D.  $2(90 - a)^\circ$

40. An archer has two targets placed at  $M$  and  $N$ , such that both are equal distances from the archer standing at  $L$  as shown in the given diagram. After hitting the target at  $M$ , he turns to target at  $N$ , rotating an angle  $\theta$ .

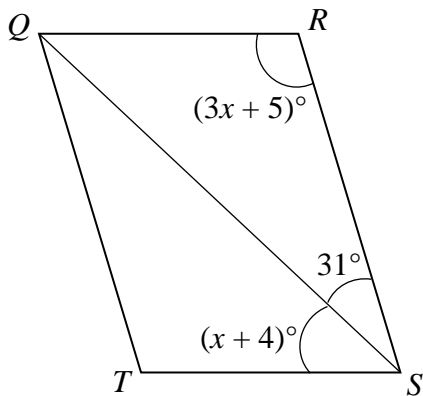
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The value of  $\theta$  will be

- A.  $50^\circ$
- B.  $60^\circ$
- C.  $100^\circ$
- D.  $120^\circ$

41. In the given parallelogram  $QRST$ , the value of  $x$  will be



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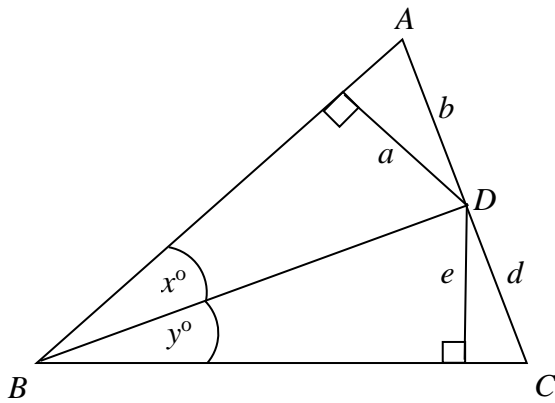
- A. 31
- B. 35
- C. 70
- D. 94

42. Which of the following diagrams represent a right bisector of the side  $XY$  of the triangle  $XYZ$ ?

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<p>A</p>	<p>B</p>
<p><b>NOT TO SCALE</b></p>	<p><b>NOT TO SCALE</b></p>
<p>C</p>	<p>D</p>

43. Consider the given diagram.

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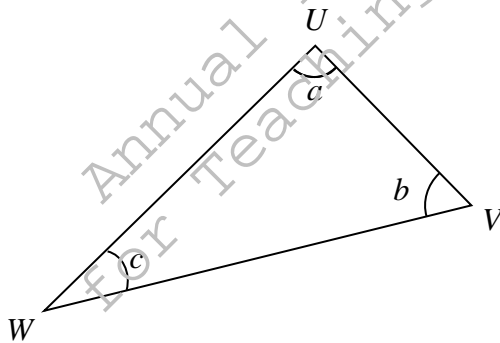


If  $a = e$ , then the correct relation(s) is/ are

- I.  $x^\circ = y^\circ$
  - II.  $a = b$
  - III.  $b = d$
- A. I only.
  - B. II only.
  - C. I and III.
  - D. II and III.

44. In the given triangle,  $VW$  is the longest side and  $UV$  is the smallest side.

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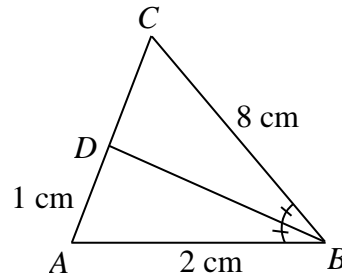


The CORRECT relationship between the angles is

- A.  $c > a$ .
- B.  $b > a$ .
- C.  $a > c$ .
- D.  $c > b$ .

45. In the following figure,  $BD$  is the angle bisector of  $\angle ABC$ . If  $AB = 2$  cm,  $BC = 8$  cm, and  $AD = 1$  cm, then the length of  $CD$  is

- A. 1 cm.
- B. 2 cm.
- C. 3 cm.
- D. 4 cm.



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