AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS X

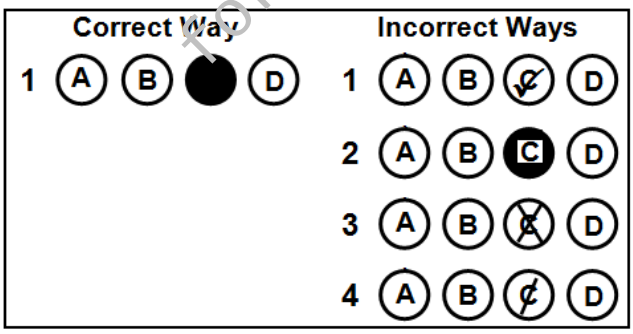
ANNUAL EXAMINATIONS (THEORY) 2025

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.

Basic Statistics

$$\overline{X} = \frac{\sum x}{n}$$

$$\overline{X} = \frac{\sum fx}{n} \text{ or } \overline{X} = \frac{\sum fx}{\sum f}$$

$$\text{variance} = \frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2$$

$$\text{Median} = l + \frac{1}{f}\left(\frac{n}{2} - c\right) \times h$$

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

$$\text{Standard deviation} = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

Algebraic Manipulation

$$HCF \times LCM = p(x) \times q(x)$$

Linear Graphs and their Applications

$$1 \text{ mile} = \frac{8}{5}\text{km}$$

1 Hectare = 2.471 Acres

$$°F = \frac{9}{5} \times °\text{C} + 32$$

Quadratic Equations

$$ax^2 + bx + c = 0,\ a \neq 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\text{Disc} = b^2 - 4ac$$

Introduction to Coordinate Geometry

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\text{M.P} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Introduction to Trigonometry

$$1° = \frac{\pi}{180}\text{ rad},\ 1\ rad = \left(\frac{180}{\pi}\right)°$$

$$A = \frac{1}{2}r^2\theta$$

$$\sin^2\theta + \cos^2\theta = 1$$

$$l = r\theta$$

$$1 + \tan^2\theta = \sec^2\theta$$

$$1 + \cot^2\theta = \text{cosec}^2\theta$$

Algebraic Formulae

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

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$a^2 - b^2 = (a+b)(a-b)$$

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

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

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

$$(a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$$

$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

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

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

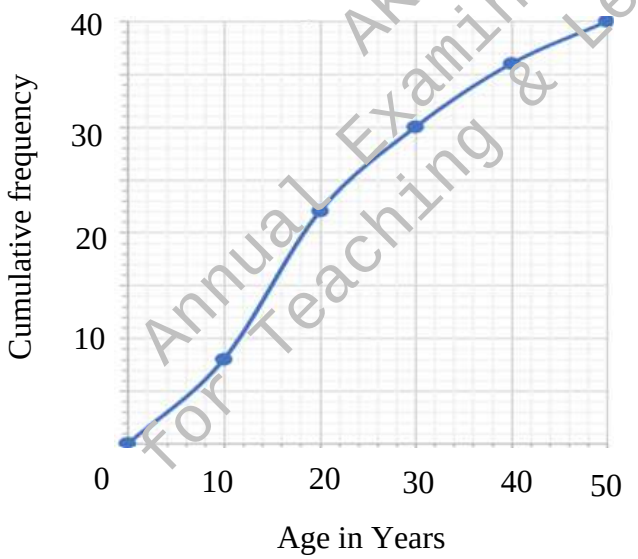
1. The length ‘L’ cm of 16 carrots were measured and recorded into a following grouped frequency table.

Length, L cm	Frequency
$0 < L \leq 10$	2
$10 < L \leq 20$	5
$20 < L \leq 30$	6
$30 < L \leq 40$	3

What are the two frequencies of the carrots with lengths less than or equal to 10 cm and more than 20 cm?

A. 2 and 9
B. 2 and 6
C. 3 and 2
D. 2 and 3

2. The given cumulative frequency curve represents the age of group of individuals.



How many group of individuals have ages greater than 20 years but less than 30 years?

A. 12
B. 10
C. 8
D. 5

3. If the arithmetic mean of a group of numbers is 25 and each number of a group is multiplied by 2, then the new arithmetic mean is

   A. 12.5
   B. 25
   C. 50
   D. 100

4. If the range of x, 9, 10, 11 and $3x$ is 8, then the value of x will be

   A. 2
   B. 3
   C. 4
   D. 8

5. If the median of the values 6, 7, 8, a, 9 and 9 is 8.5, then the value of a will be

   A. 8
   B. 8.5
   C. 9
   D. 9.5

6. The mode of the given data 9, 10, 45, 15, 19, 9, 23, 23, 35, 27, 32, 35, 40, 35, 40, 45 is

   A. 9
   B. 35
   C. 40
   D. 45

7. The given algebraic expression $\frac{6a^3b^4}{3a^2b}$ can be expressed into simplest form as

   A. 2ab
   B. $\frac{2a}{b}$
   C. $2ab^3$
   D. $\frac{ab^3}{2}$

8. The highest common factor (H.C.F) of the expression is x^2-1 and least common multiple is $(x+1)^2$. If one polynomial of the expression is $2x^2+4x+2$, then the other polynomial will be

   A. $\frac{x^2-1}{2}$
   B. $x-1$
   C. x^2-1
   D. $2(x-1)^2$

9. If the algebraic fraction is $\frac{x-1}{x^2-4x+4}$, then the sum of partial frations will be

A. $\frac{A}{x-2}+\frac{B}{(x-2)^2}$

B. $\frac{A}{x-4}+\frac{B}{(x-4)^2}$

C. $\frac{A}{x-2}+\frac{B}{x+2}$

D. $\frac{A}{x-4}+\frac{B}{x+4}$

10. The positive square root of $49x^2-28xy+4y^2$ is

A. $(49x)^2-(4y)^2$

B. $(49x-4y)$

C. $(7x-2y)^2$

D. $(7x-2y)$

11. The highest common factor (H.C.F.) of ax^2-a and $a(x+1)$ is

A. $a(x+1)$

B. $a(x-1)$

C. ax^2-a

D. ax^2+1

12. The least common multiple (L.C.M.) of $(ax+b)^2$ and $(ax)^2-b^2$ is

A. $ax+b$

B. $(ax+b)^2$

C. $(ax-b)^2(ax+b)$

D. $(ax+b)^2(ax-b)$

13. On simplification of $\left(1-\frac{1}{x}\right)\div\frac{1}{x}$, we get

A. 1

B. $x-1$

C. $\frac{x-1}{x^2}$

D. $\frac{1-x}{x^2}$

14. Which of the following equations has no solutions?

A. $5x - 2 = 3x + 1$
B. $2x + 7 = 2x + 7$
C. $4x - 6 = 2x - 3$
D. $3x - 5 = 4x + 2$

15. The values of z which satisfy the equation $|4z - 1| = 5$ are

A. $z = -1$ or $z = \frac{1}{2}$.
B. $z = -1$ or $z = \frac{3}{2}$.
C. $z = 1$ or $z = \frac{3}{2}$.
D. $z = \frac{5}{4}$ or $z = \frac{6}{4}$.

16. Let a, b, c ∈ R.

If a > b, then b > c, then a > c, then which one of the following is TRUE?

A. Multiplicative Property
B. Law of Trichotomy
C. Transitive Property
D. Additive Property

17. Which one of the following inequality is shown by the given number line?

A. $2 - x \leq 3$
B. $2 - x \leq 1$
C. $1 - x \leq 3$
D. $3 - x \leq 2$

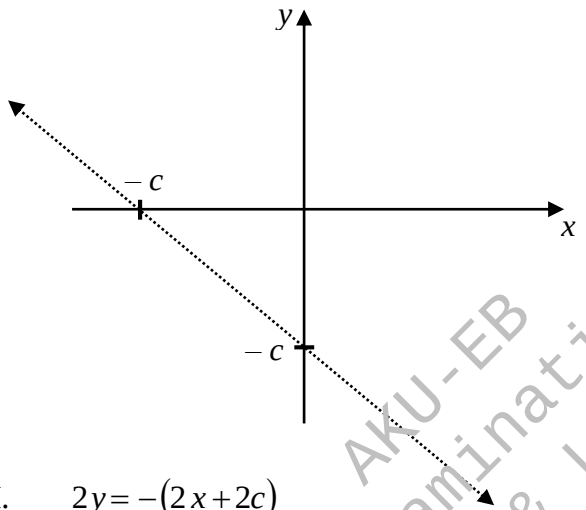
18. For the equation $\sqrt{y-1} = -1$, where $y \in R$, the solution set will be

A. $\{\ \}$.
B. $\{-1\}$.
C. $\{0\}$.
D. $\{2\}$.

19. Which of the following inequalities satisfies the solution set $x < 1$ or $x > -1$?

A. $|8x| < 8$
B. $|8x| > 8$
C. $|x| + 1 > 1$
D. $|x| + 1 < 1$

20. The given graph represents straight line(s)

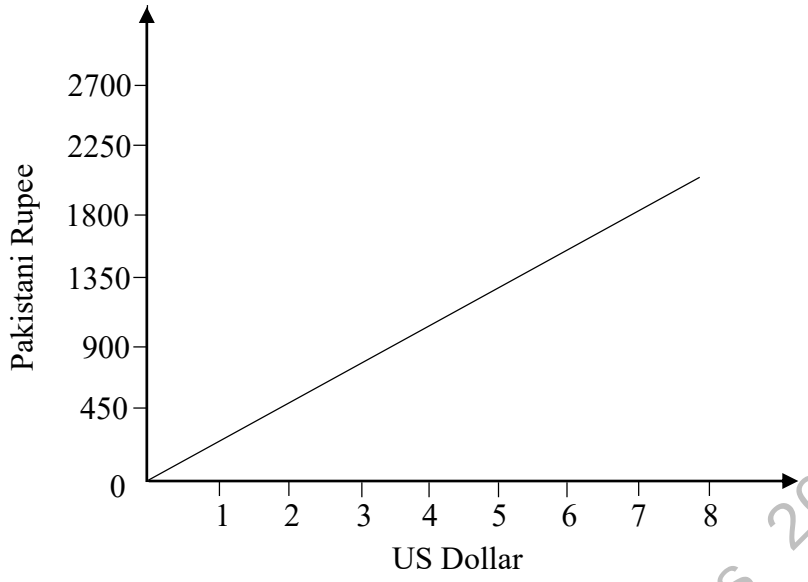


NOT TO SCALE

I. $2y = -(2x + 2c)$
II. $y = -x - c$
III. $2y = x - c$

A. I and III.
B. I and II.
C. III only.
D. II only.

21. The given graph represents the relationship between US Dollars and Pakistani Rupees.



Referring to the graph, 7 US Dollars are approximately equal to

A. 1600 Pakistani Rupees.
B. 1800 Pakistani Rupees.
C. 2000 Pakistani Rupees.
D. 2200 Pakistani Rupees.

22. The value of *a* is 2 and the value of b is 1. If one of the equations is $a + b = 3$, then the other equation will be

A. $a + b = 6$
B. $a + b = 1$
C. $a - b = 1$
D. $a - b = 3$

23. The area of a rectangle is given by the equation $A = x^2 - 6x - 4$, where *x* is the length of one side.

If the area is 12 m^2, then the value of *x* will be

A. $x = 8$ m.
B. $x = 4$ m.
C. $x = 2$ m.
D. $x = -8$ m.

24. Which of the following equations has the discriminant equals to 1?

A. $5x^2 - 2x + 6 = 0$
B. $2x^2 - 5x + 3 = 0$
C. $x^2 - 2x - 6 = 0$
D. $x^2 - 5x + 3 = 0$

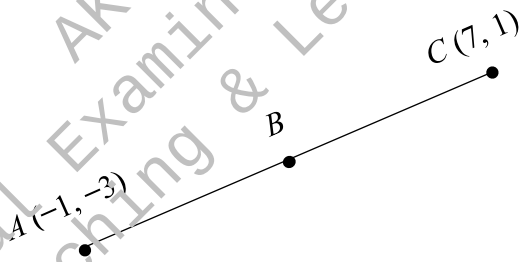
25. The standard form of the quadratic equation $\frac{x}{2} = -x^2 + 3$ is

A. $2x^2 + 2x + 6 = 0$
B. $2x^2 + 2x - 6 = 0$
C. $2x^2 + x - 6 = 0$
D. $2x^2 + x + 6 = 0$

26. What should be added to $x^2 + 3x$ to make it a perfect square?

A. $\frac{1}{9}$
B. $\frac{1}{3}$
C. $\frac{3}{2}$
D. $\frac{9}{4}$

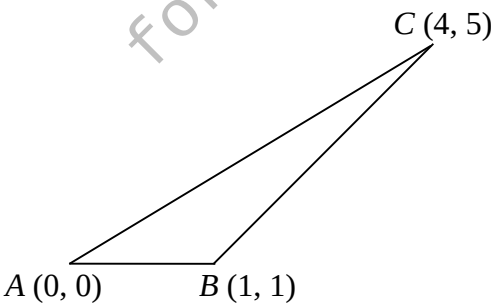
27. If AB = BC, then the coordinates of the point B will be



NOT TO SCALE

A. (−1, 3)
B. (3, −1)
C. (4, −2)
D. (−2, 4)

28. In the given triangle *ABC*, side *BC* is equal to



NOT TO SCALE

A. 5 units.
B. 7 units.
C. $\sqrt{41}$ units.
D. $\sqrt{61}$ units.

29. If the angle is 28.965°, then its D°M'S" representation will be

A. 28°90'57"
B. 28°57'90"
C. 28°57'54"
D. 28°54'57"

30. For a circle with a radius of 10 metres, if the central angle of the sector is $\frac{3\pi}{4}$ radians, then the area of the sector will be

A. $\frac{15\pi}{4} m^2$
B. $\frac{75\pi}{4} m^2$
C. $\frac{75\pi}{2} m^2$
D. $75\pi\, m^2$

31. The value of $\sin 30^o$ is

A. $\frac{1}{2}$
B. $\frac{\sqrt{3}}{3}$
C. $\frac{\sqrt{3}}{2}$
D. $\frac{3}{2}$

32. The angle of measurement $\frac{7\pi}{18}$ radians, in degrees, is equal to

A. 56^o
B. 63^o
C. 70^o
D. 140^o

33. A ladder is leaning against a wall. The top of the ladder touches the wall at a height of 8 metres, and the foot of the ladder is 5 metres away from the base of the wall.

Approximately, the angle of depression will be

A. $\text{Tan}^{-1}\left(\frac{8}{5}\right)$.

B. $\text{Tan}^{-1}\left(\frac{5}{8}\right)$.

C. $\text{Sin}^{-1}\left(\frac{8}{5}\right)$.

D. $\text{Sin}^{-1}\left(\frac{5}{8}\right)$.

34. In the fourth quadrant, which one of the following trigonometric ratios is positive?

A. $\sin\theta$
B. $\cos\theta$
C. $\tan\theta$
D. $\cot\theta$

35. On simplification of $\frac{\sin^2\theta + \cos^2\theta}{1+\tan^2\theta}$, we get

A. 1
B. $\cos^2\theta$
C. $\sec^2\theta$
D. $\sin^2\theta$

36. The central angle subtended by an arc of length '*x*' m, at the centre of a circle and its diameter is 2 m, will be

A. 4*x* radians.
B. 2*x* radians.
C. *x* radians.
D. $\frac{x}{2}$ radians.

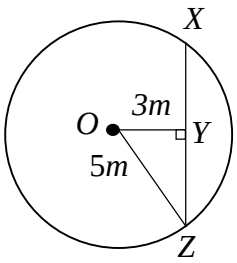
37. Which of the following are the sides of the right angled triangle?

A. 4, 6, 8
B. 13, 27, 30
C. 2, 17, 9
D. 24, 10, 26

38. In a right angled triangle, if the lengths of the shortest and the longest sides are 6 cm and 10 cm respectively, then the length of the third side will be

A. 7 cm.
B. 7.5 cm.
C. 8 cm.
D. 8.5 cm.

39. In the given diagram, *O* is the centre of the circle.



NOT TO SCALE

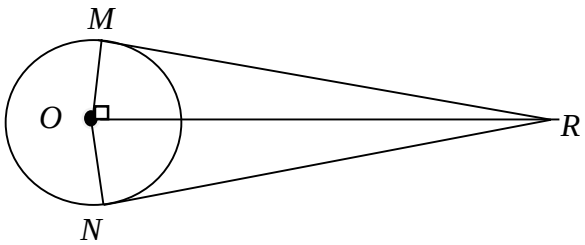
The value of $\overline{XZ}$ will be

A. 3 *m*.
B. 4 *m*.
C. 6 *m*.
D. 8 *m*.

40. If $\overline{AB}$ and $\overline{CD}$ are two congruent chords of a circle, then they are

A. equal to the diametre of the circle.
B. equidistant from the centre of the circle.
C. equidistant from the tangent to the circle.
D. intersecting at their midpoints.

41. In the given image, *O* is the centre of the circle. From point *R*, *RM* and *RN* are tangent segments touching the circle at *M* and *N* respectively.



NOT TO SCALE

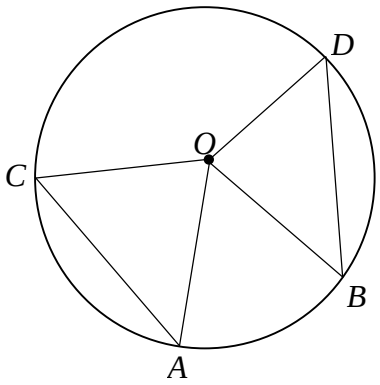
RN is equal to

A. *RO*
B. *RM*
C. 2*MO*
D. *MN*

42. If two circles touch each other internally and their radii are 8 cm and 12 cm, then the distance between their centres is

A. 2 cm.
B. 4 cm.
C. 10 cm.
D. 20 cm.

43. In the given diagram, a circle with centre *O*. We draw two equal chords AC and BD.

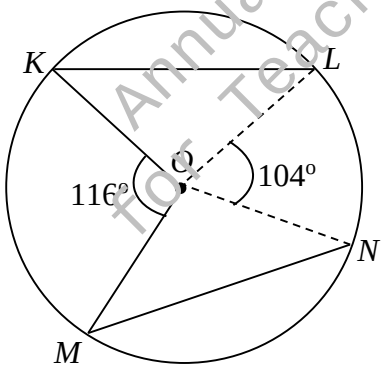


NOT TO SCALE

If $\angle BOD = 60°$, then the measurement of $\angle AOC$ will be

A. 30°
B. 60°
C. 90°
D. 120°

44. In the given circle, two arcs *KL* and *MN* are congruent.

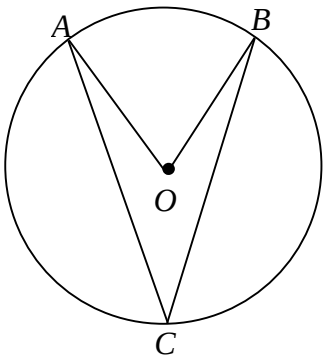


NOT TO SCALE

The CORRECT relationship between the lengths of chords *KL* and *MN* will be

A. $2MN = KL$
B. $KL = \frac{1}{2}MN$
C. $KL - MN = 0$
D. $KL + MN = 0$

45. In the given diagram, if the central angle of a minor arc $\angle AOB$ is $30°$, then the measure of the angle subtended by the corresponding major arc will be



NOT TO SCALE

A. $\angle ACB = 15°$
B. $\angle ACB = 30°$
C. $\angle ACB = 60°$
D. $\angle ACB = 90°$

END OF PAPER

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Please use this page for rough work