Roll No. .....

Total No. of Questions : 40] [Total No. of Printed Pages : 15

10th ARNKD(W/Z) JKLUT-2025

1003-A

MATHEMATICS

Time : 3 Hours] **[Maximum Marks : 80**

Note:- **"Attempt any 68 Marks out of 80 Marks".**

SECTION–A

(1 mark each)

1. Which of the following is a rational number?

(a) π (b) $\sqrt{2}$

(c) $\frac{3}{7}$ (d) None of these

2. Which of the following is a polynomial?

(a) $\frac{1}{x}+2x$

(b) $3x^2-2x+5$

(c) $2\sqrt{x}+7$

(d) None of these

3. If $x + 2y = 10$, what is the value of y when $x = 4$?

(a) 2

(b) –3

(c) 3

(d) None of these

4. If the n^{th} term of an A.P is given by $a_n = 4n - 2$, what is the 3^{rd} term?

(a) 10

(b) 14

(c) 2

(d) None of these

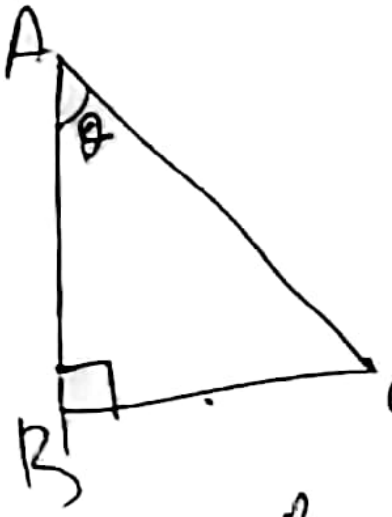
5. Which of the following is the ratio of opposite side to the hypotenuse in a right triangle for acute angle θ.

(a) Cos θ

(b) Tan θ

(c) Sin θ

(d) None of these



P/H

S C T

P B P

H H B

6. What is the midpoint of the line segment joining the points (2, 1) and (6, 3) ?

(a) (2, 4)

(b) (2, 6)

(c) (4, 2)

(d) None of these

7. L.C.M of 12 and 30 is :

(a) 120

(b) 60

(c) 30

(d) None of these

8. Probability of getting a head when a fair coin is tossed is :

(a) 0.5

(b) 1

(c) 0.25

(d) None of these

9. The volume of a cube with side 7cm is

(a) 49 cm^3

(b) 393 cm^2

(c) 343 cm^3

(d) None of these

10. The equation $ax^2 + 2x + a = 0$ has two equal roots, if

(a) $a = 0, 1$

(b) $a = \pm 1$

(c) $a = 0$

(d) None of these

11. Prime factorisation of 1771 is $7 \times 11 \times 13$. (True / False)

12. The common difference of the A.P. $\frac{1}{2b}, \frac{1-6b}{2b}, \frac{1-12b}{b}$, ... is

(a) -3

(b) 3

(c) $-2b$

(d) None of these

13. The probability of impossible event is 1. (True / False)

14. All ..... triangles are similar. (isosceles, equilateral)

15. The angle between tangent at a point on a circle and the radius through the point is Point of contact

16. Write the first three terms of the sequence $a_n = \frac{n(n-2)}{2}$.

17. The pair of equations $x^2 = a$ and $y = b$ has unique solution.

(True/False)

18. Cot A is the product of Cot and A. (True/False)

Or

If $x = 2\sin^2\theta$ and $y = 2\cos^2\theta + 1$, then $x + y =$ _____ for $0° \leq \theta \leq 90°$.

19. Calculate mean of first 5 multiples of 2.

20. Write the formula for finding mean by direct method.

Or

If mean = 20, mode = 18, then median = _____

SECTION–B

(2 marks each)

21. Half the perimeter of a rectangular garden, whose length is 4m more than its width, is 36m. Find the dimensions of the garden.

22. Find the roots of the quadratic equation $6x^2 - x - 2 = 0$ by factorisation.

23. 2 cubes each of volume $64cm^3$ are joined end to end. Find the surface area of the resulting cuboid.

Or

Find the slant height of a Cone of radius = 2.5cm and height = 6cm.

24. Given that $\tan A = \frac{4}{3}$, find the other trigonometric ratios of angle A.

25. Find the point on the x – axis which is equidistant from (2, –5) and (–2, 9).

Or

Find a relation between x and y such that the point (x, y) is equidistant from the points (3, 6) and (–3, 4).

26. Find the zeroes of the polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients.

SECTION–C

(3 marks each)

27. If A and B are (−2, −2) and (2, 4) respectively, find the coordinates of P such that $AP = \frac{3}{7}AB$ and P lies on the line segment AB.

28. A chord of a circle of radius 12 cm subtends an angle of 120° at the centre. Find the area of the corresponding segment of the circle. (use $\pi = 3.14$ and $\sqrt{3} = 1.73$).

29. Two concentric circles are of radii 5cm and 3cm. Find the length of the chord of the larger circle which touches the smaller circle.

Or

PQ is a chord of length 8cm of a circle of radius 5cm. The tangents at P and Q intersect at a point T. Find the length TP.

30. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$.

Show that $CA^2 = CB.\ CD$.

31. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. Prove it.

32. Prove that $3+2\sqrt{5}$ is irrational.

33. How many terms of the A.P:

9, 17, 25, ... must be taken to give a sum of 636 ?

Or

How many three-digit numbers are divisible by 7 ?

34. A die is thrown once. Find the probability of getting.

(i) a prime number

(ii) a number lying between 2 and 6.

SECTION–D

(4 marks each)

35. Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. Find Rohan's present age.

Or

The altitude of a right triangle is 7cm less than its base. If the hypotenuse is 13cm, find the other two sides.

36. A cubical block of side 7cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have? Find the surface area of the solid.

Or

A Gulab Jamun, contains sugar syrup upto about 30% of its volume. Find approximately how much syrup would be found in 45 Gulab Jamuns, each shaped like a cylinder with two hemispherical ends with length 5cm and diameter 2.8 cm.

37. From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20m high building are 45° and 60° respectively. Find the height of the tower.

38. Prove that $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$ using the identity $\sec^2\theta = 1 + \tan^2\theta$

Or

Write all the other trigonometric ratios of $\angle A$ in terms of sec A.

39. A girl of height 90cm is walking away from the base of a lamp-post at a speed of 1.2m/s. If the lamp is 3.6m above the ground, find the length of her shadow after 4 seconds.

Or

If AD and PM are medians of triangles ABC and PQR, respectively where $\Delta ABC \sim \Delta PQR$,

Prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.

40. The distribution below gives the weights of 30 students of a class. Find the median weight of the students.

Weight (in kg)	Number of Students
40-45	2
45-50	3
50-55	8
55-60	6
60-65	6
65-70	3
70-75	2

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$$50 + \left[\frac{\frac{30}{2} - 5}{8}\right] \times 5$$

$$50 + \left[\frac{15-5}{8}\right] \times 5$$

$$50 + \frac{10}{8} \times 5$$

$$50 + \frac{50}{8}$$