विद्या सर्वार्थ साधिका

# ANANDALAYA
## PREBOARD EXAMINATIION
## Class: X

Subject: Mathematics - Standard (041) M.M: 80
Date : 23 – 12–2025 Time: 3 hours

**General Instructions:**

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions. All Questions are compulsory.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are
4. Assertion- Reason based questions of 1 mark each.
5. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
6. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
7. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
8. In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
9. There is no overall choice. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
10. Draw neat and clean figures wherever required.
11. Take π =22/7 wherever required if not stated.
12. Use of calculator is not allowed.

**SECTION – A**

1. A line intersects the $y-axis$ and $x-axis$ at the points P and Q, respectively. If $(2,-5)$ is the mid- point of PQ, then the co-ordinates of P and Q are respectively_____. (1)
   (A) $(0,-5)\ and\ (2,\ 0)$ (B) $(0,10)\ and\ (-4,\ 0)$
   (C) $(0,4)\ and\ (-10,\ 0)$ (D) $(0,-10)\ and\ (4,0)$

2. Let $a\ and\ b$ be two positive integers such that $a = p^3q^4$ and $b = p^2q^3$, where $p\ and\ q$ are prime numbers. If HCF $(a,b) = p^mq^n$ and LCM $(a,b) = p^rq^s$ , then $(m+n)(r+s)$ = _____. (1)
   (A) 15 (B) 30 (C) 35 (D) 72

3. If the sum and product of the roots of the equation $kx^2+6x+4k=0$ are equal, then $k$ = _____ (1)
   (A) $-\frac{3}{2}$ (B) $\frac{3}{2}$ (C) $\frac{2}{3}$ (D) $-\frac{2}{3}$

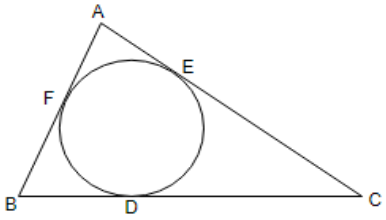
4. Determine k, so that $k+2,\ 4k-6,\ and\ 3k-2$ are three consecutive terms of an AP. (1)
   (A) $-3$ (B) 3 (C) 2 (D) 4

5. If $sin\theta = 1$ , then the value of $\frac{1}{3}\ sin\left(\frac{\theta}{3}\right)$ is _____. (1)
   (A) $\frac{1}{3}$ (B) $\frac{3}{2}$ (C) $\frac{1}{2}$ (D) $\frac{1}{6}$

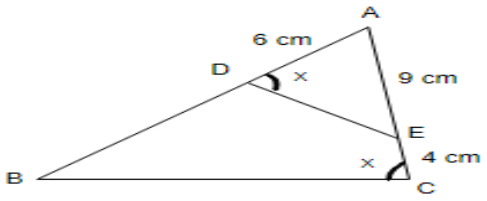
6. Find the area of a sector of a circle of radius 28 cm and central angle 45°. (1)
   (A) $208\ cm^2$ (B) $318\ cm^2$ (C) $308\ cm^2$ (D) $318\ cm^2$

7. A triangle ABC is drawn to circumscribe a circle. If AB = 13 cm, BC = 14 cm and AE = 7 cm, then AC is equal to ____ (1)

   (A) 11 cm (B) 12 cm
   (C) 15 cm (D) 16 cm

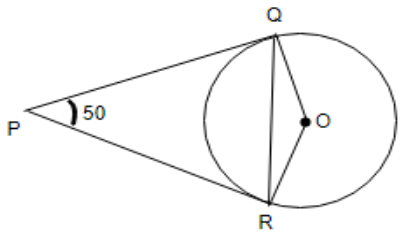


8. In the given figure, $AD = 6\ cm, AE = 9\ cm$ and $CE = 4\ cm$, then value of $2BD =$ _____. (1)




(A) 9 cm (B) 18 cm
(C) 27 cm (D) 36 cm

9. In the given figure, PQ and PR are tangents from an external point P to a circle with centre O. If $\angle QPR = 50°$, then $\angle OQR =$ _____. (1)




(A) $50°$ (B) $30°$
(C) $40°$ (D) $25°$

10. Two dice are rolled once. Find the probability of getting such numbers on the two dice, whose product is 12. (1)
(A) $\frac{1}{3}$ (B) $\frac{1}{6}$ (C) $\frac{1}{36}$ (D) $\frac{1}{9}$

11. Find the number of solutions of the following pair of linear equations: (1)
$x + 2y - 8 = 0, \quad 2x + 4y = 16.$
(A) 1 (B) No solution (C) 2 (D) infinite solution

12. If $sec^2\theta\,(1 + sin\,\theta)\,(1 - sin\,\theta) = k$, then $k =$ _____. (1)
(A) 1 (B) 2 (C) $cos\theta$ (D) $tan\theta$

13. If the mean of the frequency distribution is 6 and $\sum f_i x_i = 90$, then $\sum f_i =$ _____ (1)
(A) 12 (B) 13 (C) 15 (D) 54

14. A quadratic polynomial whose zeros are $1 - \sqrt{2}$ *and* $1 + \sqrt{2}$ is _____ (1)
(A) $x^2 - 2x + 1$ (B) $x^2 - 2x - 1$ (C) $x^2 + 2x + 1$ (D) $x^2 + 2x - 1$

15. A sphere of maximum volume is cut out from a solid hemisphere of radius 7 cm. What is the ratio of the volume of the hemisphere to that of the cutout sphere? (1)
(A) 16: 1 (B) 4: 1 (C) 8: 1 (D) 4: 3

16. Cards marked with numbers 5 to 50, are placed in a box and mixed thoroughly. A card is drawn from the box at random. The probability that the number on the taken card is a number which is a perfect square is _____. (1)
(A) $\frac{7}{45}$ (B) $\frac{5}{46}$ (C) $\frac{3}{23}$ (D) $\frac{1}{9}$

17. Mode is the value of the variable which has _____ (1)
(A) Maximum frequency (B) Minimum frequency
(C) Mean of frequency (D) Middle most frequency

18. Radii of two spheres are in the ratio 2 : 3 . The ratio of their volume is _____ (1)
(A) 9 : 8 (B) 8 : 29 (C) 8 : 9 (D) 8 : 27

In the question no. 19 & 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

19. (A): End points of a diameter of a circle are $(2, 3)$ *and* $(5, 6)$ . Its centre is $\left(\frac{7}{2}, \frac{9}{2}\right)$. (1)
(R): Co-ordinates of mid- point of a line segment joining the points $(x_1,\ y_1)$ and $(x_2,\ y_2)$ are $x = \frac{x_1 + x_2}{2},\ y = \frac{y_1 + y_2}{2}$.

20. (A): A quadratic polynomial having $5\ and\ -3$ as zeroes is $x^2 - 2x - 15$. (1)
(R): The quadratic polynomial having $a\ and\ b$ as zeroes is given by $P(x) = x^2 - (a+b)x + ab$.

**SECTION – B**

21. There is a circular path around a sports field. Kamal takes 32 minutes to drive one round of the field while Indu takes 24 minutes for the same. Suppose they both start at the same point, and go in the same direction. After how many minutes they meet again at the starting point? (2)

22. Evaluate: $\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$. (2)

**OR**

If $2\sin(A+B) = \sqrt{3}$ and $\cos(A-B) = 1$ also $0 \le A, B, A+B \le 90°$, then find the measures of $A\ and\ B$.

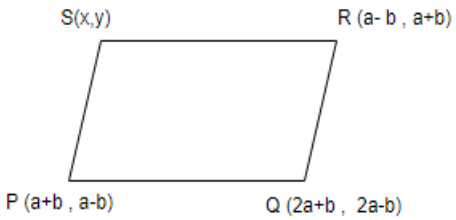
23. The king, queen and jack of diamonds are removed from a pack of 52 cards and then the pack is well shuffled. A card is drawn from the remaining cards. Find the probability of getting a card of diamond. (2)

**OR**

A box contains 19 balls bearing numbers 1, 2, 3, .....,19. A ball is drawn at random from the box. What is the probability that the number on the ball is neither divisible by 5 nor by 10.

24. $P(-2, 5)$ and $Q(3, 2)$ are two points. Find the co-ordinates of the point $R\ on\ PQ$ such that $PR = 2\ QR$. (2)

25. If $P(a+b, a-b), Q(2a+b, 2a-b), R(a-b, a+b)$ and $S(x, y)$ are the vertices of a parallelogram PQRS, then find the fourth vertex $S(x, y)$. (2)




**SECTION – C**

26. Given $\sqrt{3}$ is irrational, show that $5 - 2\sqrt{3}$ is an irrational number. (3)

27. $P(x) = 2x^2 - 6x - 3$. The two zeroes are of the form $\frac{3 \pm \sqrt{k}}{2}$; where $k$ is real number. Use the relationship between the zeroes and coefficients of a polynomial to find the value of $k$. (3)

**OR**

If the zeroes of the polynomial $x^2 - px + q$, be in the ratio 2: 3, prove that $6p^2 = 25\ q$.

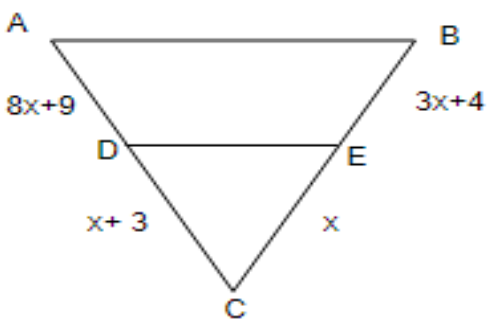
28. Sum of two numbers is 34. If 3 is subtracted from one number and 2 is added to another, the product of these two numbers becomes 260. Find the numbers using quadratic formula. (3)

29. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = q$, show that $q(p^2 - 1) = 2p$. (3)

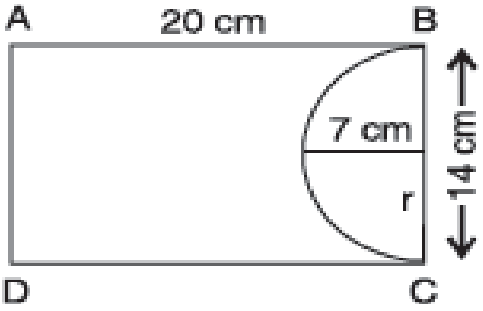
**OR**

Prove that : $(\sin^4\theta - \cos^4\theta + 1)\operatorname{cosec}^2\theta = 2$

30. What value(s) of $x$ will make DE || AB in the given figure? (3)



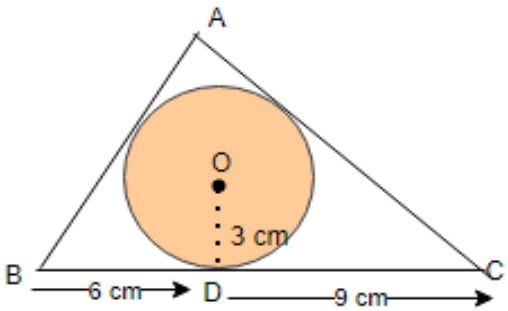
31. A paper is in the form of a rectangle ABCD in which AB = 20 cm and BC = 14 cm. A semicircular portion with BC as diameter is cut off. Find the area of the remaining part. Use $\pi = \frac{22}{7}$ (3)




**SECTION – D**

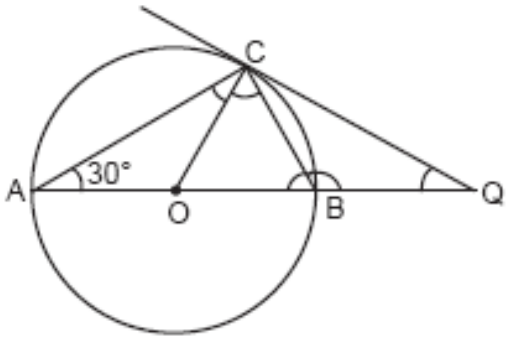
32. Draw the graphs of the equations: $4x - 3y - 6 = 0$; $x + 3y - 9 = 0$. Determine the co-ordinates of the vertices of the triangle formed by the lines and the y-axis. (5)

33. In figure, a triangle ABC is drawn to circumscribe a circle of radius 3 cm, such that the segments BD and DC are respectively of lengths 6 cm and 9 cm. If the area of Δ ABC is 54 cm$^2$, then find the lengths of sides AB and AC. (5)




**OR**

In the figure, AB is diameter of a circle with centre O and QC is a tangent to the circle at C. If ∠CAB = 30°, find ∠CQA and ∠ CBA.




34. The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60°. At a point Y, 40 m vertically above X, the angle of elevation is 45°. Find the height of the tower PQ. [use $\sqrt{3} = 1.73$] (5)

35. Calculate the median for the following data: (5)

| Class | 20 – 40 | 40 – 60 | 60 – 80 | 80 – 100 | 100 – 120 | 120 –140 | 140 – 160 |
|---|---|---|---|---|---|---|---|
| Frequency | 12 | 18 | 23 | 15 | 12 | 12 | 8 |

**OR**

Find the mode of the following distribution:

| Class | 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 | 60 – 70 | 70 – 80 |
|---|---|---|---|---|---|---|---|---|
| Frequency | 5 | 8 | 7 | 12 | 28 | 20 | 10 | 10 |

## SECTION – E

36. The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one.

(i) If the first circular row has 30 seats, how many seats will be there in the 10th row? (1)

(ii) For 1500 seats in the auditorium, how many rows need to be there? (1)

(iii) If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row? (2)

**OR**

(iii) If there were 17 rows in the auditorium, how many seats will be there in the middle row?

37. A circus tent is cylindrical up to a height of 8 m and conical above it. The diameter of the base is 28 m and total height of the tent is 18.5 m.

Based on the above , answer the following questions:

(i) Find the slant height of the conical part. (1)

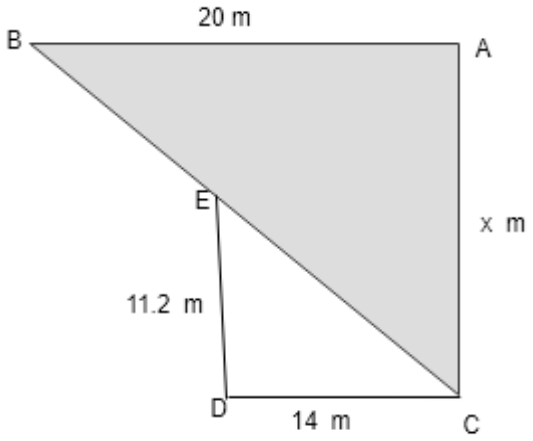
(ii) Determine the floor area of the tent (1)

(iii) Find the area of the cloth used for making tent. (2)

**OR**

(iii) Find the total volume of air inside the empty tent.

38. In the figure below, one triangular agricultural land adjacent to a triangular pond. Given $AB \parallel CD$ and $DE \parallel CA$. Triangles are said to be similar if they are of same shape. Also, the corresponding sides of similar triangles are proportions. Based on the above information and given figure, answer the following questions.




(i) Which similarity criterion has been used in the given figure? (1)

(ii) In the given similar triangles, ∠ABC = (1)

(iii) The value of x is_____ (2)

**OR**

(iii) If perimeter of ΔABC is 50 cm, then CE = _____