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**SAHODAYA PRE-BOARD EXAMINATION – 2025 - 26**

- Please check that this question paper contains **08** printed pages.
- Set number given on the right-hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **38** questions.
- Please write down the serial number of the question in the left side margin of the answer book before attempting it.
- **15** minutes time has been allotted to read this question paper. The question paper will be distributed 15 minutes prior to the commencement of the examination. The students will read the question paper only and will not write any answer on the answer script during this period. Students should not write anything in the question Paper.

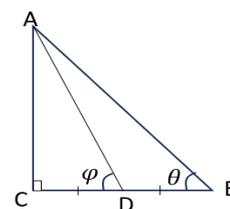
**CLASS-X****SUBJECT: MATHEMATICS (STANDARD – 041)****Time Allowed: 3 hours****Maximum Marks – 80****General Instructions:****Read the following instructions carefully and strictly follow them:**

1. This question paper contains 38 questions.
2. This Question Paper is divided into five Sections: **A, B, C, D and E.**
3. In **Section A**, Question No. **1 to 18** are Multiple Choice Questions (MCQ) and Question no. **19** and **20** are Assertion-Reason based questions of **1** mark each.
4. In **Section B**, Question no. **21 to 25** are Very Short Answer (VSA) type questions, carrying **2** marks each.
5. In **Section C**, Question no. **26 to 31** are Short Answer (SA) type questions, carrying **3** marks each.
6. In **Section D**, Question no. **32 to 35** are Long Answer (LA) type question, carrying **5** marks each.
7. In **Section E**, Question no. **36 to 38** are case-based question carrying **4** marks each with sub parts of the values of **1, 1** and **2** marks each respectively.
8. All questions are compulsory. However, an internal choice in **2** questions of section B, **2** questions of section C and **2** questions of section D has been provided. Also, an internal choice has been provided in all the **2** marks question of Section E.
9. Take  $\pi = \frac{22}{7}$  wherever required if not stated.
10. Use of calculators is **not** allowed.

## SECTION – A

(This section comprises 20 Multiple Choice Questions (MCQs) carrying 1 mark each.)

1. The HCF and LCM of two numbers are 33 and 264 respectively. When one of the numbers is divided by 4, the quotient and the remainder are 16 and 2 respectively. The other number is:  
 (A) 66            (B) 130            (C) 132            (D) 196
2. If  $\alpha$  &  $\beta$  are the zeros of the polynomial  $P(x) = x^2 - 32x + 4$ , then one of the values of  $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$  is:  
 (A)  $2\sqrt{7}$             (B) 8            (C) -8            (D) -6
3. The value of  $k$  for which the lines:  $5x + 7y = 3$  and  $15x + 21y + k = 0$  coincide each other is:  
 (A) 9            (B) 5            (C) 7            (D) -9
4. The length of the shadow of a tower on the playground is  $\sqrt{3}$  times the height of a tower. The angle of elevation of sun is:  
 (A)  $45^\circ$             (B)  $30^\circ$             (C)  $60^\circ$             (D)  $90^\circ$
5. In the given figure, ABC is a right triangle. D is the mid-point of BC. The value of  $\frac{\tan\theta}{\tan\phi}$  is:  
 (A) 2            (B)  $\frac{1}{\sqrt{3}}$             (C) 1            (D)  $\frac{1}{2}$

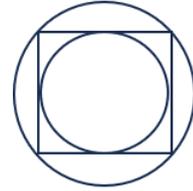


6. Which of the following is not a quadratic equation?  
 (A)  $\frac{-2(x^2-3x)}{2x} + x = 0$             (B)  $2(x-1)^2 = 1 - 2x + 4x^2$   
 (C)  $(2x+1)(1-2x) + 3 = x$             (D)  $x + \frac{1}{x} - 3 = 0$
7. The area of the triangle formed by the line  $x + y = a$  with co-ordinate axes is:  
 (A)  $a^2$  sq. units            (B)  $2a^2$  sq. units            (C)  $\frac{1}{2}a^2$  sq. units            (D)  $\frac{1}{4}a^2$  sq. units
8. The probability of guessing the correct answer to a certain test question is  $\frac{x}{4}$ . If the probability of not guessing the correct answer is  $\frac{1}{8}$ , then the value of  $x$  is:  
 (A)  $\frac{7}{2}$             (B)  $\frac{1}{2}$             (C)  $\frac{1}{6}$             (D)  $\frac{1}{4}$
9. In the given polynomial,  $p(x) = ax^2 + bx + c$ , if  $a + b + c = 0$ , then one of the zeroes of the polynomial is:  
 (A) 0            (B) 1            (C) 0.5            (D) -1

10. The volume of the largest right circular cone that can be cutout from a cube of edge 4.2cm is:

- (A)  $9.7 \text{ cm}^3$       (B)  $77.6 \text{ cm}^3$       (C)  $58.2 \text{ cm}^3$       (D)  $19.404 \text{ cm}^3$

11. In the given figure, a circle is inscribed in a square of side 5 cm and another circle is circumscribing the square. The ratio of the area of the outer circle to the area of inner circle is:



- (A) 3:2      (B) 2:1      (C) 4:3      (D) 4:1

12. If the  $n^{\text{th}}$  term of an AP is  $3n - 1$ , then the common difference is:

- (A) 1      (B)  $-1$       (C) 3      (D) 2

13. If  $k, 2k - 1$  and  $2k + 1$  are three consecutive terms of an AP, then the value of  $k$  is:

- (A)  $-2$       (B) 3      (C)  $-3$       (D) 6

14. In  $\Delta ABC$ , P and Q are points on sides AB and AC respectively such that  $PQ \parallel BC$ . If  $AP = 2.4 \text{ cm}$ ,  $AB = 9.6 \text{ cm}$  and  $AQ = 1.8 \text{ cm}$ , then CQ is equal to:

- (A)  $7.2 \text{ cm}$       (B)  $4.8 \text{ cm}$       (C)  $3.6 \text{ cm}$       (D)  $5.4 \text{ cm}$

15. The value of 'c' for which the quadratic equation  $x^2 - 3x + 9c = 0$  has real roots is:

- (A) More than 0.25      (B) Less than or equal to 0.25  
(C) Less than 0.25      (D) More than or equal to 0.25

16. The distance between the points  $A(a \cos \alpha, 0)$  &  $B(0, a \sin \alpha)$  is:

- (A)  $(\sin^2 \alpha - \cos^2 \alpha)$  unit      (B) 1 unit      (C)  $a$  unit      (D)  $\sqrt{a}$  unit

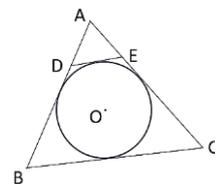
17. AB is the diameter of a circle whose Centre is  $(2, -3)$  and B is  $(1, 4)$ . The coordinates of the point A is:

- (A)  $(1.5, -1.5)$       (B)  $(3, -10)$       (C)  $(1.5, 1.5)$       (D)  $(-3, 10)$

18. In the given figure,  $AB = 8 \text{ cm}$ ,  $BC = 12 \text{ cm}$  and  $AC = 14 \text{ cm}$ .

DE is the tangent drawn to the given circle. The perimeter of  $\Delta ADE$  is:

- (A) 17 cm      (B) 10 cm      (C) 11 cm      (D) 12 cm



*Question number 19 and 20 are Assertion and Reason based question. Two statement, one labeled as Assertion (A) and other is labeled as reason (R). Select the correct answer to these question from the code (A),(B),(C) and (D) as given below.*

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true but Reason (R) is false.

(D) Assertion (A) is false but Reason (R) is true

19. **Assertion (A):** The polynomial  $p(x) = x^2 + 3x + 3$  has two real zeros.

**Reason (R):** A quadratic polynomial can have at most two real zeros.

20. **Assertion (A):** If  $\sec A + \tan A = 4$ , then  $\sec A - \tan A = \frac{1}{4}$

**Reason (R):**  $\sec^2 A - \tan^2 A = 1, 0^\circ \leq A < 90^\circ$

### SECTION - B

(This section comprises of Very Short Answer (VSA) type questions of 2 marks each)

(5 × 2 = 10)

21. How many three digit numbers are divisible by 2 and 3?

**OR**

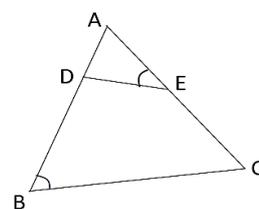
Find the 20<sup>th</sup> term from the last term of the AP: 3, 8, 13, ..., 253.

22. Prove that  $2 - 3\sqrt{2}$  is not a rational number where it is given that  $\sqrt{2}$  is not rational.

23. A drone takes two photographs of a tower and a nearby pole from the same altitude. In the photo, the height of the pole appears 3 cm, and the height of the tower appears 12 cm. If the real height of the pole is 6 m, then find the height of the tower.

**OR**

In the given figure,  $\angle ABC = \angle AED$ ,  $AB = 4.8$  cm,  $AC = 5.1$  cm and  $AE = 1.6$  cm. Find the length of AD.



24. Evaluate:  $\frac{5 \cos^2 60^\circ + 4 \sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$ .

25. Find the mode of the following data

CI	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
F	4	4	7	10	12	8

### SECTION-C

**(This section comprises of Short Answer type questions (SA) of 3 marks each)**

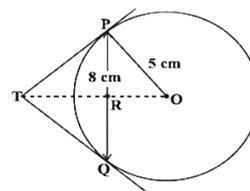
**(6 × 3 = 18)**

26. Side AB, BC and median AD of  $\triangle ABC$  are respectively proportional to sides PQ, QR and median PM of  $\triangle PQR$ . Show that  $\triangle ABC \sim \triangle PQR$ .
27. A school wants to schedule three activities: Yoga, Music and Sports. Yoga is conducted in every 12 days. Music in every 18 days and Sports in every 27 days. They all happened together on 1<sup>st</sup> February 2025. On which date will all three activities fall again?
28. Prove that  $\frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} + \frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = \frac{2}{2\sin^2\theta - 1}$ .

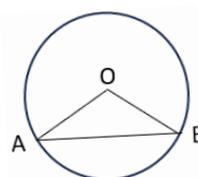
**OR**

If  $a \cos \theta - b \sin \theta = c$ , then prove that  $a \sin \theta + b \cos \theta = \pm \sqrt{a^2 + b^2 - c^2}$

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



30. In the given circle,  $AB = 14\sqrt{3}$  cm and  $OA = 14$  cm. Find the area of the minor sector.



**OR**

A chord of a circle of radius 20 cm subtends an angle  $90^\circ$  at the center. Find the area of the corresponding major segment of the circle. (use  $\pi = 3.14$ )

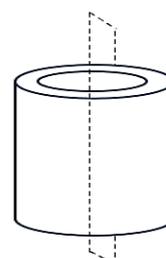
31. Two dice are rolled simultaneously. Find the probability of
- The sum of the numbers appearing on the top faces is a perfect square.
  - The product of the numbers appearing on the top faces is at most 9.

### SECTION D

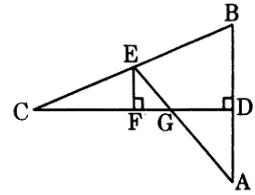
**(This section comprises of Long Answer (LA) type questions of 5 marks each)**

**(4 × 5 = 20)**

32. The given figure is a hollow cylinder whose external diameter is 12 cm and internal diameter is 10 cm. The height of the cylinder is 7 cm. The cylinder is cut vertically through the middle into two equal parts. Calculate the total surface area of one of the parts.



33. In the given figure, CD is the perpendicular bisector of the line segment AB. EF is perpendicular to CD and AE intersect CD at G.



Prove that  $\frac{CF}{CD} = \frac{FG}{DG}$ .

34. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/h more than its original speed. If it takes 3 hours to complete the total journey, what is its original average speed?

**OR**

Two water taps together can fill a tank in  $9\frac{3}{8}$  hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

35. Find the median of the following data is 50. Find the values of  $p$  and  $q$ , if the sum of all the frequencies is 90.

Class	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	p	15	25	20	q	8	10

**OR**

Find the mean of the following distribution

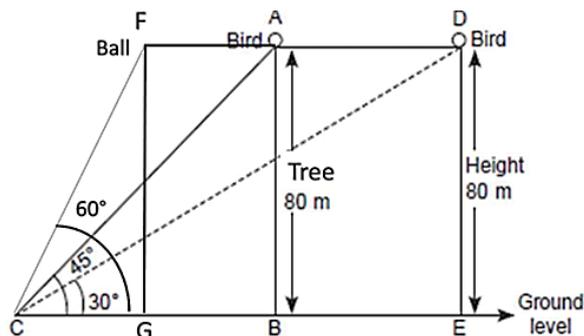
Daily wages (Rs)	100-120	120-140	140-160	160-180	180-200	200-220	220-240
No of Workers	10	15	20	22	18	12	13

### SECTION E

**(This section comprises 3 case-based questions of 4 marks each)**

**(3 × 4 = 12)**

36. One evening, Kaushik was in a park. Children were playing cricket. Birds were singing on a nearby tree of height 80m. He observed a bird on the tree at an angle of elevation of  $45^\circ$ . When a sixer was hit, a ball flew through the tree frightening the bird to fly away. In 2 seconds, he observed the bird flying at the same height at an angle of elevation of  $30^\circ$  and the ball flying towards him at the same height at an angle of elevation of  $60^\circ$ .



On the basis of above information answer the following questions:

- (i) At what distance from the foot of the tree was he observing the bird sitting on the tree?
- (ii) What is the speed of the bird in  $m/s$  if it had flown  $20(\sqrt{3} + 1)m$ ?
- (iii) (a) How far did the bird fly in the mentioned time?

**OR**

- (b) If hitting the tree, how far did the ball travel in the sky when Kaushik saw the ball?

37. A school plans to build a small rectangular **herbal garden** on the campus. The garden will be laid out on a coordinate grid so that the maintenance team can easily mark the locations of different medicinal plants.

The vertices of the rectangular garden are placed at points: A(2, 3), B(10, 3), C(10, 9) and D(2, 9).



Inside the garden, a water sprinkler is to be installed at point P, which lies exactly at the midpoint of diagonal AC.

Using this information, answer the following questions:

- (i) Find the coordinates of point P.
- (ii) If another sprinkler is to be placed at point R, the centroid of triangle ADC, find the coordinates of R.

(iii) (a) A point Q lies on the line segment AD such that its ordinate is 7. At what ratio the point Q divides the line segment AD?

**OR**

(iii) (b) Justify that the triangle ABC is a right angled triangle.

38. A school canteen sells sandwiches and fruit juice during the lunch break. On a particular day, the canteen staff observed that a total of 50 items were sold. The total amount collected from these items was ₹1150. Let the number of sandwiches sold be  $x$  and the number of juice packets be  $y$ .

Using this information, answer the following questions

(i) Write the linear equation for the total number of items sold.

(ii) Write the linear equation for the total money collected. (let price of a sandwich is ₹ $m$  and a juice packet is ₹ $n$ )

(iii) (a) If a sandwich costs ₹25 and a juice packet costs ₹15, find how many sandwiches and juice packets were sold.

**OR**

(iii) (b) If a sandwich costs ₹50 and a juice packet costs ₹5, find how many sandwiches and juice packets were sold.

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