Delhi Public School, Howrah

PERIODIC ASSESSMENT- III (2025-2026)

Class-X

Care must be taken not to write anything on the question paper. All the questions must be attempted in the correct sequence.

Subject: Mathematics (Code No. - 041)

Time: 3 Hours **F.M. 80**

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D, and E.
2. Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
3. Section B has 5 Short Answer-I (SA-I) type questions carrying 2 marks each.
4. Section C has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.
5. Section D has 4 Long Answer (LA) type questions carrying 5 marks each.
6. Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 2 marks, 2 Questions of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

Section A

(Section A consists of 20 questions of 1 mark each)

1) The mean and median of a distribution are 14 and 15 respectively. The value of the mode is:

(A) 16 (B) 13 (C) 18 (D) 17

2) Which of the following equations has two distinct real roots?

(A) $x^2 + x - 5 = 0$ (B) $x^2 + 3x + 2\sqrt{2} = 0$ (C) $5x^2 - 3x + 1 = 0$ (D) $2x^2 - 3\sqrt{2}x + \frac{9}{4} = 0$

3) Given that $\cos^2\theta - \sin^2\theta = \frac{3}{4}$, what is the value of $\cos\theta$?

(A) $\frac{7}{8}$ (B) $\frac{\sqrt{7}}{2\sqrt{2}}$ (C) 1 (D) $\frac{\sqrt{7}}{2}$

4) If a pair of linear equations given by $l_1x + m_1y + n_1 = 0$ and $l_2x + m_2y + n_2 = 0$ has infinitely many solutions, then which of the following is definitely true?

(A) $\frac{l_1}{l_2} = \frac{n_2}{n_1}$ (B) $l_1 l_2 \neq m_1 m_2$ (C) $\frac{l_1}{l_2} \neq \frac{m_1}{m_2}$ (D) $l_1 m_2 = m_1 l_2$

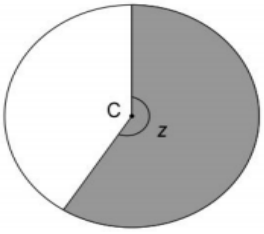
5) Consider the following frequency distribution table of the heights (in cm) of 60 students of a class.

Class	150-155	155-160	160-165	165-170	170-175	175-180
frequency	15	13	10	8	9	5

The upper limit of the median class in the given data is

(A) 165 (B) 160 (C) 155 (D) 170

6) In the figure shown below, C is the centre of the circle. The area of the shaded sector is $\frac{5}{8}$ times of the area of the circle.



What is the measure of $\angle z$?

(A) 135° (B) 200° (C) 225° (D) cannot be determined

7) What is the distance of $(7, -3)$ from the origin?

(A) $\sqrt{7}$ units (B) $\sqrt{58}$ units (C) $\sqrt{21}$ units (D) $\sqrt{40}$ units

8) For any event E, $P(E) + P(not\ E) = x$, then the value of $x^3 - x$ is:

(A) -2 (B) 2 (C) 1 (D) 0

9) A cone and a cylinder have the same radii but the height of the cone is 3 times that of the cylinder. The ratio of their volumes is :

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

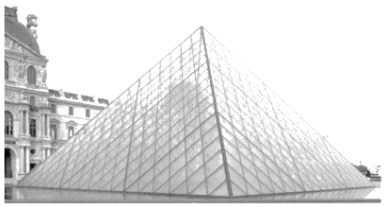
10) The relation between x and y so that the point (x, y) is equidistant from the points $(-4, -4)$ and $(-2, 4)$ is:

(A) $x - 4y + 3 = 0$ (B) $x - 4y - 3 = 0$ (C) $x + 4y - 3 = 0$ (D) $x + 4y + 3 = 0$

11) The LCM of two prime numbers p and q (p > q) is 221. The value of 3p − q is:

(A) 4 (B) 28 (C) 38 (D) 48

12) Shown below is the Louvre Museum, the world's most visited museum. It is in the shape of a square pyramid with the height of $17\sqrt{3}$ m and base of edge 34 m.



Which of these angles is equal to the angle of elevation of the top of the museum from the mid-point of its 34 m edge?

(A) 30° (B) 50° (C) 60° (D) 75°

13) Given below is an Arithmetic Progression. X and Y are unknown values.

$4\frac{1}{4}$, $6\frac{3}{4}$, X, $11\frac{3}{4}$, Y, $16\frac{3}{4}$

Which of these are X and Y?

(A) X = $8\frac{3}{4}$, Y = $13\frac{3}{4}$ (B) X= $8\frac{3}{4}$, Y= $14\frac{1}{4}$ (C) X= $9\frac{1}{4}$, Y= $14\frac{1}{4}$ (D) X= $9\frac{1}{4}$, Y= $13\frac{3}{4}$

14) Two tangents inclined at an angle of 60° are drawn to a circle of radius 3 cm, then the length of each tangent is

(A) $\frac{3\sqrt{3}}{2}$ cm (B) 6 cm (C) 3 cm (D) $3\sqrt{3}$ cm

15) If the sum of zeroes of the quadratic polynomial $kx^2 + 2x + 3k$ is equal to the product of its zeroes, then the value of k is:

(A) $\frac{-2}{3}$ (B) $\frac{3}{2}$ (C) $\frac{2}{3}$ (D) $\frac{-3}{2}$

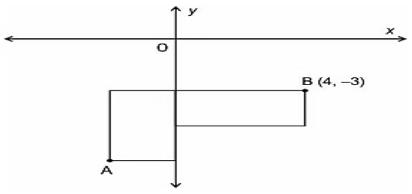
16) The roots of the quadratic equation $mx^2 - 3x - m(m + 3) = 0$, where m is a constant, are:

(A) $m, m + 3$ (B) $-m, m + 3$ (C) $m, -(m + 3)$ (D) $-m, -(m + 3)$

17) If radius of a sphere is increased by 100 %, the volume of the corresponding sphere is increased by:

(A) 700% (B) 200% (C) 500% (D) 800%

18) Shown below are 2 identical rectangles such that their breadth is half their length.



What are the coordinates of point A?

(A) (4, -5) (B) (-4, -6) (C) (-2, -7) (D) (-2, -9)

Direction for questions 19 & 20: In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

(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 but 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): All angles formed by a chord on the same side of the circumference of a circle are equal to each other.

Reason (R): The sum of any two angles formed by a chord on the opposite sides of the circumference of a circle is 180°.

20) Assertion(A): If the probability of winning a game is 0.7, then the probability of losing it is 0.93.

Reason (R): P(E) + P (not E) = 1

Section B

(Section B consists of 5 questions of 2 marks each)

21) Show that $5 + 2\sqrt{7}$ is an irrational number where $\sqrt{7}$ is given as an irrational number.

22) A) Find the ratio in which the line x - 3y = 0 divides the line segment joining the points (-2, -5) and (6, 3).

OR

22) B) Points A (-1, y) and B (5, 7) lie on a circle with centre O (2, -3y) such that AB is a diameter of the circle. Find the value of y. Also find the radius of the circle.

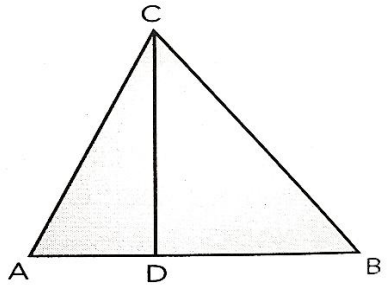
23) Two different dice are thrown together. Find the probability that the numbers obtained:
   a) have a product less than 16
   b) is a doublet of odd numbers.

24) (A) If $\cot\theta = \frac{7}{8}$, evaluate $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$.

OR

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

25) In the figure given below, if ∠ACB = ∠CDA, AC = 8 cm and AD = 3 cm, then find BD.



Section C

(Section C consists of 6 questions of 3 marks each)

26) The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one of the numbers is 280 find the other number.

27) A) If a and b are zeroes of the quadratic polynomial $2x^2 + 5x + k$, then find the value of 'k' such that $(a + b)^2 - ab = 24$.

OR

27) B) If $\alpha\ and\ \beta$ are the zeroes of the quadratic polynomial f(x) = $x^2 - px + q$, then prove that $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{p^2}{q} - 2$

28) If the equation $(1 + m^2)x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots, then show that $c^2 = a^2(1 + m^2)$.

29) Prove that: $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$

30) (A) Marbles of diameter 1.4 cm are dropped into a cylindrical beaker of diameter 7 cm containing some water. Find the number of marbles that should be dropped into the beaker so that the water level rises by 5.6 cm.

OR

30) (B) An empty cone of radius 3cm and height 12cm is filled with ice-cream such that the lower part of the cone which is $\frac{1}{6}$th of the volume of the cone is unfilled (empty) but a hemisphere is formed on the top. Find the volume of the ice-cream.

31) In a ΔPQR, $PR^2 - PQ^2 = QR^2$ and M is a point on side PR such that QM ⊥ PR. Prove that $QM^2 = PM \times MR$.

Section D

Section D consists of 4 questions of 5 marks each.

32) The marks obtained by 80 students of Class- X in a mock test of Mathematics are given below in the table:

Marks	0 and above	10 and above	20 and above	30 and above	40 and above	50 and above	60 and above	70 and above	80 and above	90 and above	100 and above
No. of students	80	77	72	65	55	43	28	16	10	8	0

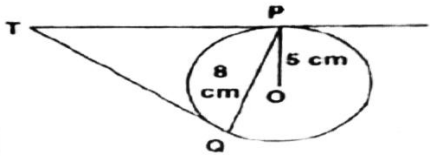
Find the median and the mode of the data.

33) (A)The angle of elevation of an aeroplane from a point P on the ground is 60°. After a flight of 15 seconds, the angle of elevation changes to 30°. If the aeroplane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the aeroplane.

OR

33) (B) Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30°, respectively. Find the height of the poles and the distances of the point from the poles.

34)



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

35)(A) A boat covers 14 kms in upstream and 20 kms downstream in 7 hours. Also, it covers 22 kms upstream and 34 kms downstream in 10 hours. Find the speed of the boat in still water and of that the stream.

OR

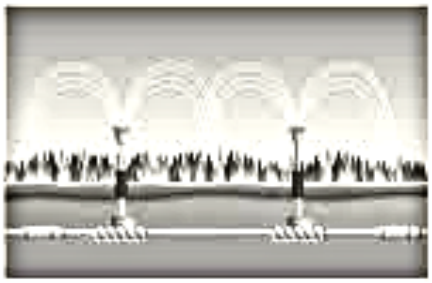
35)(B) Priya travels 300 km to her home partly by train and partly by bus. She takes 4 hours if she travels 60 km by train and the remaining by bus. If she travels 100 km by train and the remaining by bus, she takes 10 minutes longer. Find the speed of the train and the bus separately.

Section E

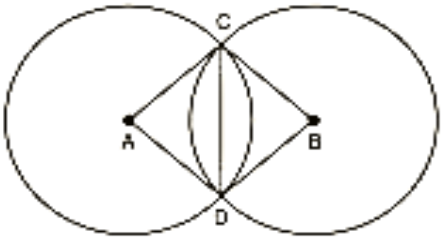
(Case study-based questions are compulsory)

36) **Case Study – 1**

Sprinklers are crop irrigation equipment which rotate around a centre and spray water on the crops in the circular region. Two such high power sprinklers, occupying negligible area are installed in a straight line in a field such that they spray water on a common area. Shown below are the side and top views where points A and B are the sprinklers.



Side view of the sprinkler



Top view of the region sprayed

Both the sprinklers spray over an equal area. It is given that, CD = 400 m and ∠CAD = ∠CBD = 90°.

(a) Find the radius of the circular region sprayed by the sprinkler. (1)

(b) Find the perimeter of the overlapping region. (1)

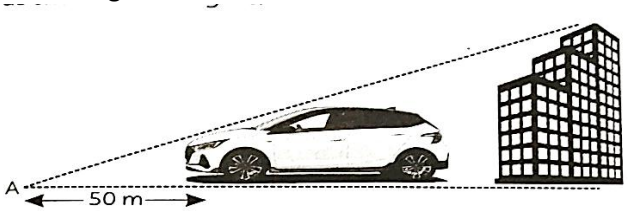
(c) Find the area of the overlapping region. (2)

OR

(d) Find the total area of the region spread by both sprinklers. (2)

37) **Case Study – 2**

Rimi visited to her Nani's house. From a point A where Rimi was standing, a moving car and a building can be seen in a straight line as shown in the figure.



(a) Which similarity criterion can be seen in this case, if car and building are considered in a straight line? (1)

(b) If the distance between Rimi and the car is twice the height of the car, then find the height of the car? (1)

(c) If the distance of Rimi from the building is twelve times the height of the car, then what is the ratio of the height of car to the height of the building? (2)

OR

(d) What is the ratio of the distance between Rimi and top of car to the distance between the top of the car and the top of the building? (2)

38) **Case Study – 3**

Meena's mother wanted the independence to manager her own affairs, make her own choice, etc. without requiring assistance from others. So, she opened her own shoe shop. She displayed the shoes by placing three pairs in the first row, five pairs in second row and seven pairs in third row and so on.



On the basis of above information, answer the following questions.

(a) If she puts a total of 120 pairs of shoes, then find the number of rows required. (1)

(b) What is the difference between the pairs of shoes in 17^{th} row and 10^{th} row. (1)

(c) Find the pair of shoes in 30^{th} row. (2)

OR

(d) If there are 360 shoes, then how many pairs of shoes are displayed on 12^{th} row from the top. (2)

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