



Class - X
Periodic Assessment - III
(2024-25)
Mathematics

Date : 09 December 2024
Time: 3 hrs.

Roll No. : _____
M.M : 80

General Instructions:

- This question paper contains **38** questions. **All** questions are **compulsory**.
- This question paper is divided into **five** sections – **A, B, C, D** and **E**.
- In **section A**, Questions no. 1 to 18 are multiple choice questions (**MCQs**) and questions number **19** and **20** are Assertion – Reason based questions of **1** mark each.
- In **Section B**, Questions no. **21** to **25** are very short answer (**VSA**) type questions, carrying **2** marks each.
- In **Section C**, Questions no. **26** to **31** are short answer (**SA**) type questions, carrying **3** marks each.
- In **Section D**, Questions no. **32** to **35** are long answer (**LA**) type questions, carrying **5** marks each.
- In **Section E**, Questions no. **36** to **38** are case study based questions carrying **4** marks each.
- Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.
- Use of calculator is not allowed.

Section-A

This section comprises 20 questions (MCQs) of 1 mark each.

1. The ratio of total surface area of a solid hemisphere to the square of its radius is _____ (1)

a) $2\pi: 1$	b) $4\pi: 1$
c) $3\pi: 1$	d) $1: 4\pi$

2. If the perimeter of a semicircular protactor is 36 cm, then its diameter is _____. (1)

a) 10 cm	b) 12 cm
c) 14 cm	d) 15 cm

3. At some time of the day, the length of the shadow of a tower is equal to its height. Then, the Sun's altitude at that time is _____. (1)

a) 30 degree	b) 45 degree
c) 60 degree	d) 90 degree

4. An arc subtends an angle of 90 degree at the centre of a circle, then the ratio of its length to the circumference of the circle is _____. (1)

a) 2: 3	b) 1: 4
c) 4: 1	d) 1: 3

5. If $ax + by = a^2 - b^2$ and $bx + ay = 0$ then the value of $x + y$ is _____.

$\begin{aligned} abx + b^2y &= b(a^2 - b^2) \\ abx + ay &= 0 \\ \hline (b^2 - a^2)y &= -b(b^2 - a^2) \end{aligned}$

(1)

a) $a^2 - b^2$

b) $a + b$

c) $a - b$

d) $a^2 + b^2$

6. The fourth vertex D of a parallelogram ABCD whose three vertices are A(-2, 3), B(6, 7) and C(8, 3) is _____ . (1)

a) (0, 1)

b) (0, -1)

c) (-1, 0)

d) (1, 0)

7. The class mark of the class 29.5 – 30.5 is _____ . (1)

a) 30

b) 30.5

c) 31.5

d) 31

8. What is the sum of all natural numbers from 1 to 100? (1)

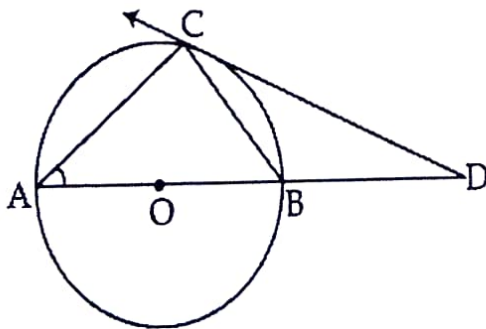
a) 5050

b) 5500

c) 4550

d) 5150

9. In the figure, AB is a diameter and AC is chord of a circle such that $\angle BAC = 30^\circ$, If DC is a tangent, then $\triangle BCD$ is .



a) Isosceles

b) Equilateral

c) Right angled

d) Acute angled

10. $(\cos^4 A - \sin^4 A)$ is equal to _____ . (1)

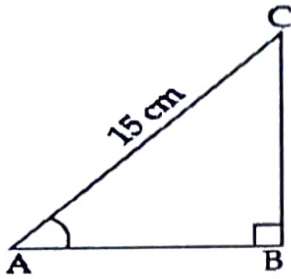
a) $2 \cos^2 A + 1$

b) $2 \cos^2 A - 1$

c) $2 \sin^2 A - 1$

d) $2 \sin^2 A + 1$

11. In figure below $\triangle ABC$ is right angled at B and $\tan A = \frac{4}{3}$. If $AC = 15 \text{ cm}$ the length of AB is. (1)



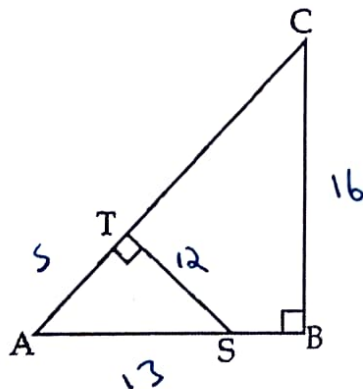
a) 4 cm

b) 3 cm

c) 12 cm

d) 9 cm

12. In the given $\angle T$ and $\angle B$ are right angles. If the lengths of AT, BC and AS (in centimeters) are 5, 16 and 13 respectively, then the length of TC (in centimeters) is _____ . (1)



a) $12\frac{1}{3}$

b) $13\frac{1}{3}$

c) 10

d) 11

17. If $\operatorname{cosec}^2\theta (1+\cos\theta) (1-\cos\theta) = \lambda$, then the value of λ is _____. (1)

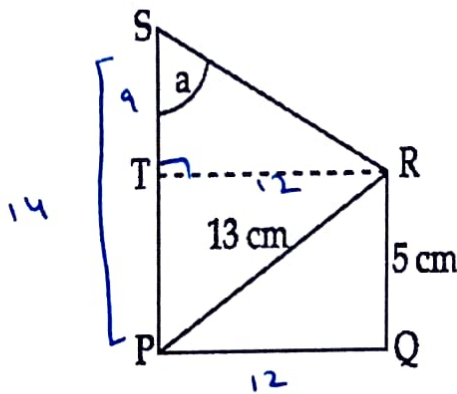
a) 0

b) $\cos^2\theta$

c) 1

d) -1

18. In fig., if $PS=14$ cm, the value of $\tan a$ is equal to _____. (1)



a) $\frac{4}{3}$

b) $\frac{14}{3}$

c) $\frac{5}{3}$

d) $\frac{13}{3}$

Questions number 19 and 20 are Assertion and Reason based questions carrying 1 mark. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (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 the Assertion (A).
- b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the 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): If the probability of occurrence of an event is 0.7, then the probability of its non-occurrence is 0.3

Reason (R): For any event A, $P(A) + P(\text{not } A) = 1$. (1)

20. Assertion (A): The area of the minor segment of a circle is always less than the area of the corresponding sector of the circle. ✓

Reason (R): The area of the major segment of a circle is always less than the area of the corresponding sector of the circle. (1)

Section-B

Section B consists of 5 questions of 2 marks each.

21. A 20 m deep well with diameter 7 m is dug and the earth from digging is spread out to form a platform 22 m by 14 m. Find the height of the platform. (2)

22. The sum of 5th and 7th terms of an A.P. is 52 and its 10th term is 46. Find A.P. (2)

23. The minute hand of a clock is $\sqrt{21}$ cm long. Find the area swept by the minute hand on the face of the clock from 7.00 am to 7.05 am. (2)

24. Solve for x : $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$. (2)

25. Determine the nature of the roots of the given quadratic equation $2x^2 + x - 1 = 0$. (2)

Section-C

Section C consists of 6 questions of 3 marks each

26. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$. (3)
27. Prove that a tangent to a circle is perpendicular to the radius through the point of contact. (3)
28. Three coins are tossed simultaneously. What is the probability of getting. (3)
- i) At least one head?
 - ii) Exactly two tails?
 - iii) At most one tail?
29. The angles of depression of the top and the bottom of 8 m tall building from the top of a multi-storied building are 30° and 45° respectively. Find the height of the multi storied building. (3)
30. Prove that if the diagonals of a quadrilateral divide each other proportionally, then it is a trapezium. (3)

31. Show that the points $(-4, 0)$, $(4, 0)$ and $(0, 3)$ are the vertices of an isosceles triangle. (3)

Section-D

Section D consists of 4 questions of 5 marks each

32. If two sides and a median bisecting the third side of a triangle are respectively proportional to the corresponding sides and the median of another triangle, then the two triangles are similar. (5)

33. A man has only 20 paise coins and 25 paise coins in his purse. If he has 50 coins in all totaling Rs 11.25, how many coins of each kind does he have? Verify your answer. (5)

34. If the median of the following data is 525. Find the value of x and y if the sum of the frequencies is 100. (5)

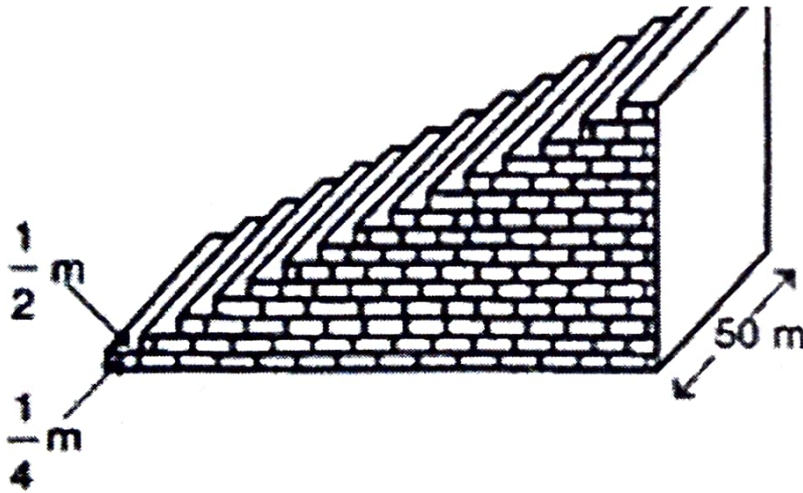
C.I.	0-100	100 - 200	200- 300	300- 400	400- 500	500- 600	600- 700	700- 800	800- 900	900- 1000
Frequency	2	5	x	12	17	20	y	9	7	4

35. The houses of a row are numbered consecutively from 1 to 49. Show that there is a value of x such that the sum of the numbers of the houses preceding the house numbered x is equal to the sum of the numbers of the houses following it. Find the value of x . (5)

SECTION-E

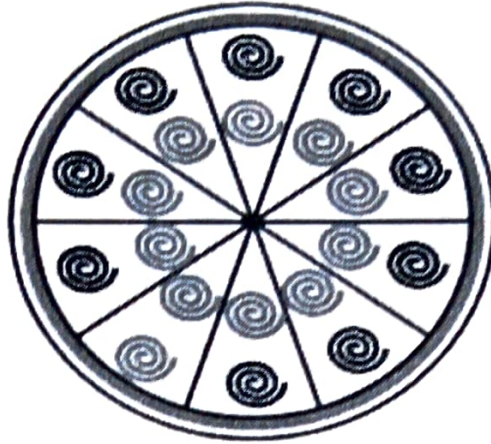
Section D consists of 3 CASE STUDY BASED questions of 4 marks each

36. A small terrace at a football ground comprises of 15 steps each of which is 50 m long and built of solid concrete. Each step rises of $\frac{1}{4}$ m and a tread $\frac{1}{2}$ m as shown in the figure below. Let $V_1, V_2, V_3, \dots, V_{15}$ denote respectively the volumes of concrete required to build the first, second, third,fifteenth step.



Based on the above information answer the following questions.

- Find the value of V_2 . (1)
 - Find the volume of concrete used in the middle step. (1)
 - Find the sum of the surface areas of 15 treads. (2)
37. The students of class X decided to decorate the class-room with a beautiful brooch to be made with silver wire in the form of a circle with diameter 35mm. The wire is also used in making 5 diameters which divide the circle into 10 equal sectors as shown in the figure below.

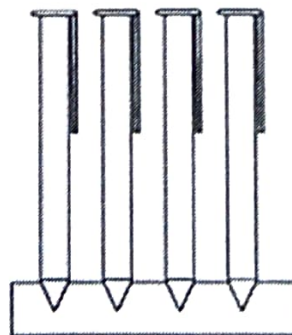
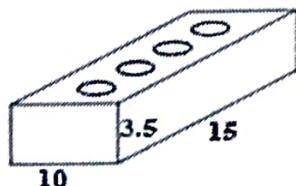


Based on the above information answer the following questions.

- i) Find the circumference of the brooch. (1)
- ii) Find the total length of silver wire used in making the brooch. (1)
- iii) Find the area of each sector of the brooch. (2)

38. An activity was conducted to make a pen stand made of wood in the shape of a cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5 cm. The diameter of each of the depression is 1 cm and the depth is 1.4 cm.

Dimensions in cm.



Radius of each depression is 0.5 cm & depth 1.4 cm

Based on the above information answer the following questions.

- i) Find the volume of the cuboid. (1)
- ii) Find the volume of the conical depression. (1)
- iii) Find the volume of the wood in stand. (2)