

**Class X Session 2024-25**  
**Subject - Mathematics (Standard)**  
**Sample Question Paper - 3**

**Time Allowed: 3 hours**

**Maximum Marks: 80**

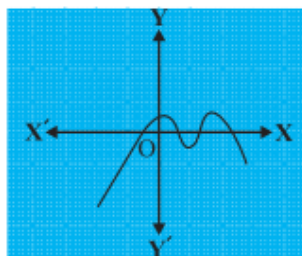
**General Instructions:**

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 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 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take  $\pi = \frac{22}{7}$  wherever required if not stated.

**Section A**

1. The sum of the exponents of the prime factors in the prime factorisation of 196, is [1]
  - a) 5
  - b) 3
  - c) 4
  - d) 2

2. Find the number of zeroes of  $p(x)$  in the figure given below. [1]



- a) 2
  - b) 4
  - c) 1
  - d) 3
3. The lines represented by the linear equations  $y = x$  and  $x = 4$  intersect at P. The coordinates of the point P are: [1]



- a) 3                                  b) -3  
c) 6                                  d)  $-7/2$

- a) -1                      b)  $-\frac{1}{p}$   
c) 1                        d)  $\frac{1}{p}$

- 
- A coordinate plane with x and y axes. The x-axis is labeled "Road - I" and the y-axis is labeled "Road - II". Two points are plotted: (2, 2) and (6, 5).

- a)  $(-4, 2)$   
c)  $(4, 2)$
- b)  $(4, -2)$   
d)  $(-4, -2)$

- 
- A trapezoid  $ABCD$  is shown with vertices  $A$  (top-left),  $B$  (top-right),  $C$  (bottom-right), and  $D$  (bottom-left). The top base  $AB$  is labeled with a length of 4. The bottom base  $DC$  is labeled with a length of 6. The diagonals  $AC$  and  $BD$  intersect at point  $P$ . The segment  $AP$  is labeled 7.5 cm, and the segment  $BP$  is labeled 7.5 cm.

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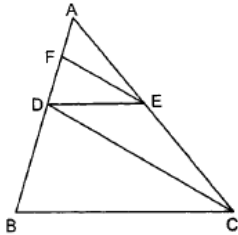


19. **Assrtion (A):** A toy is in the form of a cone mounted on a hemisphere with the same radius. The radius of the conical portion is 4 cm and its height is 3 cm. the surface area of the toy is  $163.28 \text{ cm}^2$ . [Take  $\pi = 3.14$ ] [1]  
**Reason (R):** Volume of hemisphere is  $\frac{2}{3}\pi r^2$
- 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.

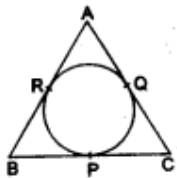
20. **Assertion (A):**  $\sqrt{3}, 2\sqrt{3}, 3\sqrt{3}, 4\sqrt{3}$  this series forms an A.P. [1]  
**Reason (R):** Since common difference is same and equal to  $\sqrt{3}$  therefore given series is an AP.
- a) Both A and R are true and R is the correct explanation of A.      b) Both A and R are true 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.

### Section B

21. Find the LCM and HCF of the pairs of integers 336 and 54 and verify that  $\text{LCM} \times \text{HCF} = \text{product of the two numbers}$ . [2]  
22. In Fig.  $DE \parallel BC$  and  $CD \parallel EF$ . Prove that  $AD^2 = AB \times AF$ . [2]



23. A circle is inscribed in a  $\triangle ABC$ , touching BC, CA and AB at P, Q and R respectively, as shown in the given figure. If  $AB = 10 \text{ cm}$ ,  $AQ = 7 \text{ cm}$  and  $CQ = 5 \text{ cm}$  then find the length of BC. [2]



24. If  $A = B = 60^\circ$ , verify that  $\sin(A - B) = \sin A \cos B - \cos A \sin B$  [2]  
OR

Prove the trigonometric identity:

$$\tan^2 A \sec^2 B - \sec^2 A \tan^2 B = \tan^2 A - \tan^2 B$$

25. Find the difference of the areas of a sector of angle  $120^\circ$  and its corresponding major sector of a circle of radius 21 cm. [2]

OR

A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the corresponding:

- minor segment
- major sector.

### Section C

26. For a morning walk, three persons steps off together. The measure of their steps is 80,85 and 90 cm respectively. What is the minimum distance each should walk so that all can cover the same distance in complete steps? [3]

Which value is preferred in this situation?

27. Find the zeroes of the quadratic polynomial  $6x^2 - 3 - 7x$  and verify the relationship between the zeroes and the coefficients of the polynomial. [3]
28. Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers. [3]

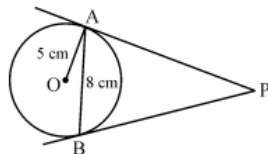
OR

Solve algebraically the following pair of linear equations for x and y

$$31x + 29y = 33$$

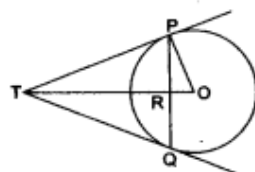
$$29x + 31y = 27$$

29. In a given figure, AB is a chord of length 8 cm of a circle of radius 5 cm. The tangents to the circle at A and B intersect at P. Find the length of AP. [3]



OR

PQ is a chord of length 4.8 cm of a circle of radius 3 cm. The tangents at P and Q intersect at a point T as shown in the figure. Find the length of TP.



30. Prove that:  $\frac{1}{\operatorname{cosec} A - \cot A} - \frac{1}{\sin A} = \frac{1}{\sin A} - \frac{1}{\operatorname{cosec} A + \cot A}$ . [3]
31. Compute the median for the following cumulative frequency distribution: [3]

Less than	Less than	Less than	Less than	Less than	Less than	Less than	Less than	Less than
20	30	40	50	60	70	80	90	100
0	4	16	30	46	66	82	92	100

#### Section D

32. Solve for x [5]

$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x} \text{ where } a+b+x \neq 0 \text{ and } a, b, x \neq 0$$

OR

If  $x = -4$  is a root of the equation  $x^2 + 2x + 4p = 0$ , find the values of k for which the equation  $x^2 + px(1 + 3k) + 7(3 + 2k) = 0$  has equal roots.

33. In a trapezium ABCD,  $AB \parallel DC$  and  $DC = 2AB$ .  $EF \parallel AB$ , where E and F lie on BC and AD respectively such that  $\frac{BE}{EC} = \frac{4}{3}$ . Diagonal DB intersects EF at G. Prove that,  $7EF = 11AB$ . [5]
34. A tent is in the form of a right circular cylinder surmounted by a cone. The diameter of the base of the cylinder or the cone is 24 m. The height of the cylinder is 11 m. If the vertex of the cone is 16 m above the ground, find the area of the canvas required for making the tent. (Use  $\pi = \frac{22}{7}$ ) [5]

OR

From a cubical piece of wood of side 21 cm, a hemisphere is carved out in such a way that the diameter of the hemisphere is equal to the side of the cubical piece. Find the surface area and volume of the remaining piece.

35. Find the mean and the median of the following data:

[5]

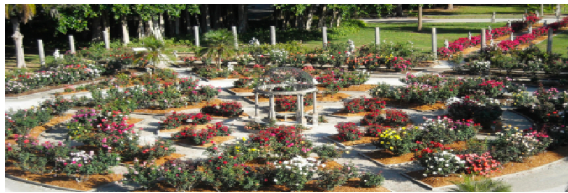
Marks	Number of Students
0 - 10	3
10 - 20	5
20 - 30	16
30 - 40	12
40 - 50	13
50 - 60	20
60 - 70	6
70 - 80	5

### Section E

36. Read the text carefully and answer the questions:

[4]

Kamla and her husband were working in a factory in Seelampur, New Delhi. During the pandemic, they were asked to leave the job. As they have very limited resources to survive in a metro city, they decided to go back to their hometown in Himachal Pradesh. After a few months of struggle, they thought to grow roses in their fields and sell them to local vendors as roses have been always in demand. Their business started growing up and they hired many workers to manage their garden and do packaging of the flowers.



In their garden bed, there are 23 rose plants in the first row, 21 are in the 2<sup>nd</sup>, 19 in 3<sup>rd</sup> row and so on. There are 5 plants in the last row.

- How many rows are there of rose plants?
- Also, find the total number of rose plants in the garden.

OR

If total number of plants are 80 in the garden, then find number of rows?

- How many plants are there in 6th row.

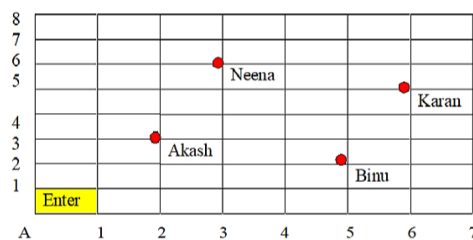
37. Read the text carefully and answer the questions:

[4]

Karan went to the Lab near to his home for COVID 19 test along with his family members.

The seats in the waiting area were as per the norms of distancing during this pandemic (as shown in the figure).

His family member took their seats surrounded by red circular area.



- What is the distance between Neena and Karan?
- What are the coordinates of seat of Akash?

OR

Find distance between Binu and Karan.

- (c) What will be the coordinates of a point exactly between Akash and Binu where a person can be?

38. **Read the text carefully and answer the questions:**

[4]

An observer on the top of a 40m tall light house (including height of the observer) observes a ship at an angle of depression  $30^\circ$  coming towards the base of the light house along straight line joining the ship and the base of the light house. The angle of depression of ship changes to  $45^\circ$  after 6 seconds.



- (a) Find the distance of ship from the base of the light house after 6 seconds from the initial position when angle of depression is  $45^\circ$ .
- (b) Find the distance between two positions of ship after 6 seconds?

OR

Find the distance of ship from the base of the light house when angle of depression is  $30^\circ$ .

- (c) Find the speed of the ship?