

Class X Session 2024-25
Subject - Mathematics (Standard)
Sample Question Paper - 5

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

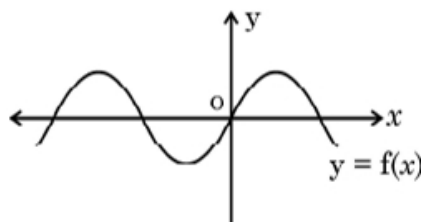
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated 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

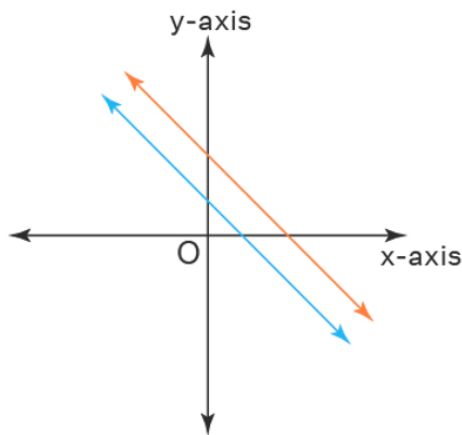
1. If $a = (2^2 \times 3^3 \times 5^4)$ and $b = (2^3 \times 3^2 \times 5)$ then HCF (a, b) = ? [1]

- | | |
|--------|--------|
| a) 360 | b) 90 |
| c) 180 | d) 540 |

2. The graph of $y = f(x)$ is shown in the figure for some polynomial $f(x)$. The number of zeroes of $f(x)$ are [1]



- | | |
|------|------|
| a) 2 | b) 3 |
| c) 4 | d) 1 |
3. A system of linear equations is said to be inconsistent if it has [1]



- a) one solution
b) at least one solution
c) two solutions
d) no solution

4. If the equation $x^2 + 5kx + 16 = 0$ has no real roots then [1]

- a) $k > \frac{8}{5}$
b) $k < \frac{-8}{5}$
c) $\frac{-8}{5} < k < \frac{8}{5}$
d) $k > \frac{-8}{5}$

5. If the sum of n terms of an A.P. be $3n^2 + n$ and its common difference is 6 then its first term is [1]

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

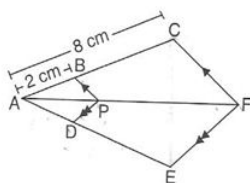
6. The distance of point $P(4, -5)$ from origin is [1]

- a) $\sqrt{40}$ units
b) 1 unit
c) 3 units
d) $\sqrt{41}$ units

7. If $(3, -6)$ is the mid-point of the line segment joining $(0, 0)$ and (x, y) , then the point (x, y) is: [1]

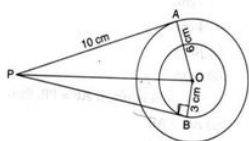
- a) $(6, -6)$
b) $(6, -12)$
c) $\left(\frac{3}{2}, -3\right)$
d) $(-3, 6)$

8. In the given figure if $BP \parallel CF$, $DP \parallel EF$, then $AD : DE$ is equal to [1]



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

9. Two concentric circles with centre O are of radii 6 cm and 3 cm. From an external point P , tangents PA and PB are drawn to these circles as shown in the figure. If $AP = 10$ cm, then BP is equal to [1]



- a) $\sqrt{91}$
b) $\sqrt{119}$ cm

c) all the three

d) median

19. **Assertion (A):** Two identical solid cubes of side 5 cm are joined end to end. The total surface area of the resulting cuboid is 300 cm^2 . [1]

Reason (R): Total surface area of a cuboid is $2(lb + bh + lh)$

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):** The sum of the series with the n th term, $t_n = (9 - 5n)$ is (465), when no. of terms $n = 15$. [1]

Reason (R): Given series is in A.P. and sum of n terms of an A.P. is $S_n = \frac{n}{2}[2a + (n - 1)d]$

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.

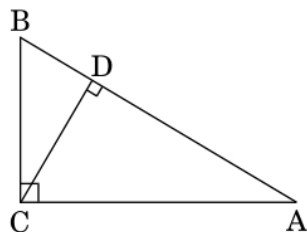
c) A is true but R is false.

d) A is false but R is true.

Section B

21. Prove that $\frac{2}{\sqrt{7}}$ is irrational. [2]

22. In Figure, $\angle ACB = 90^\circ$ and $CD \perp AB$. Prove that $\frac{BC^2}{AC^2} = \frac{BD}{AD}$. [2]



23. From a point P, the length of the tangent to a circle is 15 cm and distance of P from the centre of the circle is 17 cm. Then what is the radius of the circle? [2]

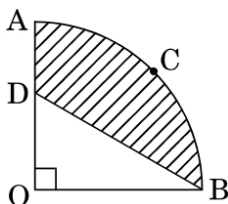
24. Prove the trigonometric identity: [2]

$$\frac{1 + \cos \theta - \sin^2 \theta}{\sin \theta (1 + \cos \theta)} = \cot \theta$$

OR

If $3 \tan \theta = 4$, evaluate $\frac{3 \sin \theta + 2 \cos \theta}{3 \sin \theta - 2 \cos \theta}$.

25. In Figure, OACB is a quadrant of a circle with centre O and radius 7 cm. If $OD = 3$ cm, then find the area of the shaded region. [2]



OR

The short and long hands of a clock are 4 cm and 6 cm long respectively. Find the sum of distances travelled by their tips in 2 days. [Take $\pi = 3.14$.]

Section C

26. In order to promote reading habits among students, a school organized a Library Week. As part of the celebration, three genres of books: Biography, Mystery, and Self-help books were bought. For optimum arrangement, the organizers have stacked the books in such a way that all the books are stored topic-wise and the [3]

height of each stack is the same. The number of Biography books is 96, the number of Mystery books is 240 and the number of Self-help books is 336. Assuming that the books are of the same thickness, determine the number of stacks of Biography, Mystery, and Self-help books.

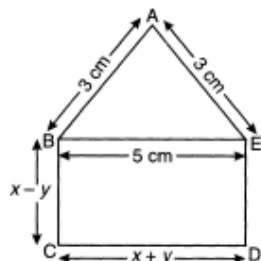
27. If α, β are the zeroes of the $x^2 + 7x + 7$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$. [3]

28. Solve the following system of equation by elimination method: [3]

$$\frac{x}{2} - \frac{y}{5} = 4 \text{ and } \frac{x}{7} + \frac{y}{15} = 3$$

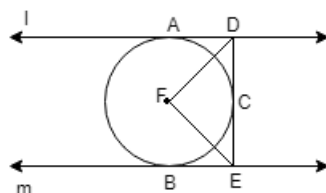
OR

In the figure below ABCDE is a pentagon with $BE \parallel CD$ and $BC \parallel DE$. BC is perpendicular to CD. If the perimeter of ABCDE is 21 cm, find the Values of x and y.



29. In Fig. 1 and m are two parallel tangents at A and B. The tangent at C makes an intercept DE between l and m. [3]

Prove that $\angle DFE = 90^\circ$.



OR

Prove that the tangents drawn at the ends of a chord of a circle make equal angles with chord.

30. Prove the following identity: $\frac{\sin \theta}{1 - \cos \theta} + \frac{\tan \theta}{1 + \cos \theta} = \sec \theta \cdot \cos \theta + \cot \theta$ [3]

31. Find the median of the following data. [3]

Class Interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	Total
Frequency	8	16	36	34	6	100

Section D

32. Find the value of m for which the quadratic equation $(m + 1)y^2 - 6(m + 1)y + 3(m + 9) = 0$, $m \neq -1$ has equal roots. Hence find the roots of the equation. [5]

OR

The sum of ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present ages.

33. In the given figure, DEFG is a square and $\angle BAC = 90^\circ$. [5]

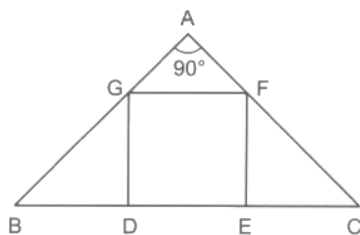
Prove that

i. $\triangle AGF \sim \triangle DBG$

ii. $\triangle AGF \sim \triangle EFC$

iii. $\triangle DBG \sim \triangle EFC$

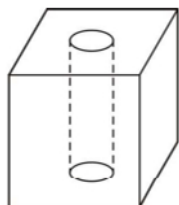
iv. $DE^2 = BD \times EC$



34. A well, whose diameter is 7m, has been dug 22.5 m deep and the earth dugout is used to form an embankment around it. If the height of the embankment is 1.5 m, find the width of the embankment. [5]

OR

In Figure, from a solid cube of side 7 cm, a cylinder of radius 2.1 cm and height 7 cm is scooped out. Find the total surface area of the remaining solid.



35. The median of the following data is 16. Find the missing frequencies a and b if the total of frequencies is 70. [5]

Class	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40
Frequency	12	a	12	15	b	6	6	4

Section E

36. **Read the text carefully and answer the questions:** [4]

The students of a school decided to beautify the school on an annual day by fixing colourful flags on the straight passage of the school. They have 27 flags to be fixed at intervals of every 2 metre. The flags are stored at the position of the middlemost flag. Ruchi was given the responsibility of placing the flags. Ruchi kept her books where the flags were stored. She could carry only one flag at a time.



- How much distance did she cover in pacing 6 flags on either side of center point?
- Represent above information in Arithmetic progression

OR

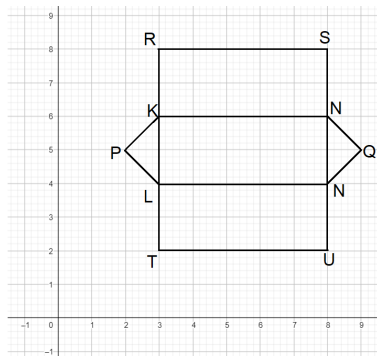
How much distance did she cover in completing this job and returning to collect her books?

- What is the maximum distance she travelled carrying a flag?

37. **Read the text carefully and answer the questions:** [4]

The camping alpine tent is usually made using high-quality canvas and it is waterproof. These alpine tents are mostly used in hilly areas, as the snow will not settle on the tent and make it damp. It is easy to layout and one need not use a manual to set it up. One alpine tent is shown in the figure given below, which has two triangular

faces and three rectangular faces. Also, the image of canvas on graph paper is shown in the adjacent figure.



- What is the distance of point Q from y-axis?
- What are the coordinates of U?

OR

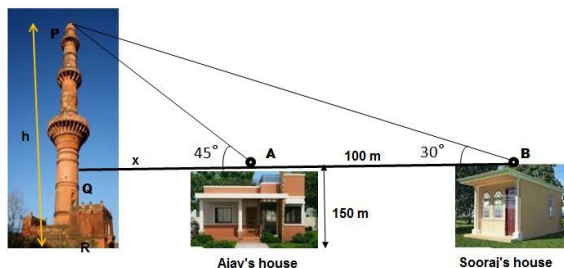
What is the distance between the points P and Q?

- What is the Perimeter of image of a rectangular face?

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

[4]

The houses of Ajay and Sooraj are at 100 m distance and the height of their houses is the same as approx 150 m. One big tower was situated near their house. Once both friends decided to measure the height of the tower. They measure the angle of elevation of the top of the tower from the roof of their houses. The angle of elevation of ajay's house to the tower and sooraj's house to the tower are 45° and 30° respectively as shown in the figure.



- Find the height of the tower.
- What is the distance between the tower and the house of Sooraj?

OR

Find the distance between top of tower and top of Ajay's house?

- Find the distance between top of the tower and top of Sooraj's house?