

Class X Session 2023-24
Subject - Mathematics (Standard)
Sample Question Paper - 2

Time Allowed: 3 hours

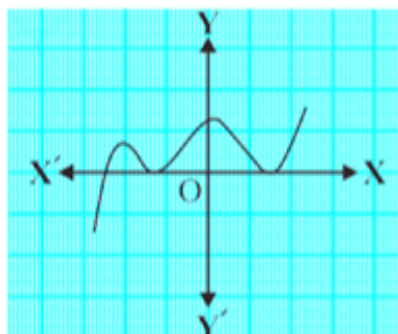
Maximum Marks: 80

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. 120 can be expressed as a product of its prime factors as: [1]
- a) 15×2^3 b) $5 \times 2^3 \times 3$
- c) $5 \times 8 \times 3$ d) $10 \times 22 \times 3$
2. The graph of $y = p(x)$ in a figure given below, for some polynomial $p(x)$. Find the number of zeroes of $p(x)$. [1]

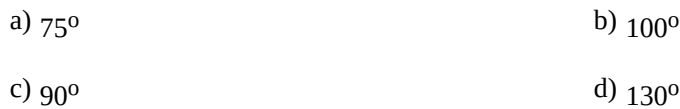


- a) 3 b) 4
- c) 2 d) 1
3. The number of solutions of two linear equations representing coincident lines is/is are [1]



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a) 5

b) 7

c) 4

d) 6

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):** Sum of first n terms in an A.P. is given by the formula: $S_n = 2n \times [2a + (n - 1)d]$ [1]

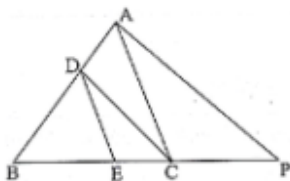
Reason (R): Sum of first 15 terms of 2, 5, 8 ... is 345.

- 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.

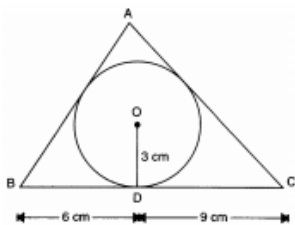
Section B

21. Can two numbers have 15 as their HCF and 175 as their LCM? Give reasons. [2]

22. In the given Fig. $DE \parallel AC$ and $DC \parallel AP$. Prove that $\frac{BE}{EC} = \frac{BC}{CP}$ [2]



23. In figure, a triangle ABC is drawn to circumscribe a circle of radius 3 cm, such that the segments BD and DC are respectively of lengths 6 cm and 9 cm. If the area of $\triangle ABC$ is 54 square centimeter, then find the lengths of sides AB and AC. [2]



24. Evaluate $2\sin^2 30^\circ \tan 60^\circ - 3\cos^2 60^\circ \sec^2 30^\circ$. [2]

OR

Prove that $\frac{\sin \theta}{1 + \cos \theta} + \frac{1 + \cos \theta}{\sin \theta} = 2\operatorname{cosec} \theta$

25. In a circle with centre O and radius 5 cm, AB is a chord of length $5\sqrt{3}$ cm. Find the area of sector AOB. [2]

OR

A horse is placed for grazing inside a rectangular field 70 m by 52 m and is tethered to one corner by a rope 21 m long. On how much area can it graze?

Section C

26. There is a circular path around a sports field. Sonia takes 18 minutes to drive one round of the field, while Ravi takes 12 minutes for the same. Suppose they both start at the same point and at the same time and go in the same direction. After how many minutes will they meet again at the starting point? [3]

27. If α and β are the zeros of the polynomial $f(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1$, find the value of k . [3]

28. Two candles of equal height but different thickness are lighted. First candle burns off in 6 hours and the second candle in 8 hours. How long, after lighting both, will the first candle be half the height of the second ? [3]

OR

Represent the following pair of linear equations graphically and hence comment on the condition of consistency of this pair.

$$x - 5y = 6, 2x - 10y = 12$$

29. If two tangents are drawn to a circle from an external point, show that they subtend equal angles at the centre. [3]

OR

ABC is a right triangle in which $\angle B = 90^\circ$. If $AB = 8$ cm and $BC = 6$ cm, find the diameter of the circle inscribed in the triangle.

30. If $\sin\theta + 2\cos\theta = 1$ prove that $2\sin\theta - \cos\theta = 2$. [3]

31. The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality. [3]

Find the median, mean and mode of the data and compare them.

Monthly consumption (in units)	Number of Consumers
65-85	4
85-105	5
105-125	13
125-145	20
145-165	14
165-185	8
185-205	4

Section D

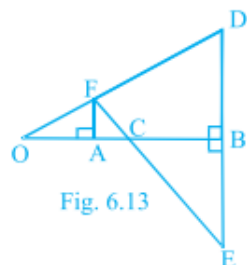
32. If the factory kept increasing its output by the same percentage every year. Find the percentage, if it is known that the output doubles in the last two years. [5]

OR

A train takes 2 hours less for a journey of 300 km if its speed is increased by 5 km/hr from its usual speed. Find the usual speed of the train.

33. In the figure, OB is the perpendicular bisector of the line segment DE, $FA \perp OB$ and F E intersect OB at point [5]

C. Prove that $\frac{1}{OA} + \frac{1}{OB} = \frac{2}{OC}$.



34. A solid toy is in the form of a hemisphere surmounted by a right circular cone of same radius. The height of the cone is 10 cm and the radius of the base is 7 cm. Determine the volume of the toy. Also find the area of the coloured sheet required to cover the toy. (Use $\pi = \frac{22}{7}$ and $\sqrt{149} = 12.2$) [5]

OR

A solid right circular cone of height 120 cm and radius 60 cm is placed in a right circular cylinder full of water of

height 180 cm such that it touches the bottom. Find the volume of water left in the cylinder, if the radius of the cylinder is equal to the radius of the cone.

35. The monthly income of 100 families are given as below:

[5]

Income in (in ₹.)	Number of families
0-5000	8
5000-10000	26
10000-15000	41
15000-20000	16
20000-25000	3
25000-30000	3
30000-35000	2
35000-40000	1

Calculate the modal income.

Section E

36. Read the text carefully and answer the questions:

[4]

India is competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6th year and 22600 in 9th year.



- Find the production during first year.
- Find the production during 8th year.

OR

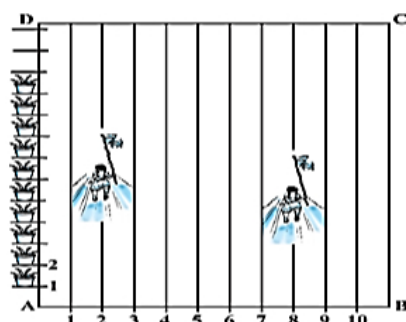
In which year, the production is ₹ 29,200.

- Find the production during first 3 years.

37. Read the text carefully and answer the questions:

[4]

To conduct Sports Day activities, in your rectangular shaped school ground ABCD, lines have been drawn with chalk powder at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along AD, as shown in Fig. Sarika runs the distance AD on the 2nd line and posts a green flag. Priya runs the distance AD on the eighth line and posts a red flag. (take the position of feet for calculation)



- (i) What co-ordinates you will use for Green Flag?
- (ii) What is the distance between the green flag and the red flag?

OR

What is the distance between green and blue flag?

- (iii) If Monika wants to post a blue flag adjacently in between these two flags. Where she will post a blue flag?

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

[4]

Two trees are standing on flat ground. The angle of elevation of the top of Both the trees from a point X on the ground is 60° . If the horizontal distance between X and the smaller tree is 8 m and the distance of the top of the two trees is 20 m.



- (i) Calculate the distance between the point X and the top of the smaller tree.
- (ii) Calculate the horizontal distance between the two trees.

OR

Find the height of small tree.

- (iii) Find the height of big tree.