Class X Session 2023-24
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.

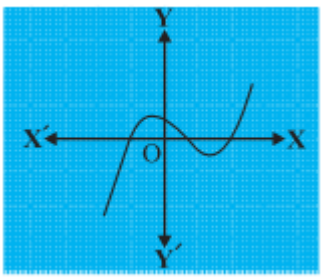
Section A

1. If two positive integers m and n can be expressed as $m = x^2y^5$ and $n = x^3y^2$, where x and y are prime numbers, then HCF(m, n) = **[1]**

   a) x^2y^2 b) x^2y^3

   c) x^3y^2 d) x^3y^3

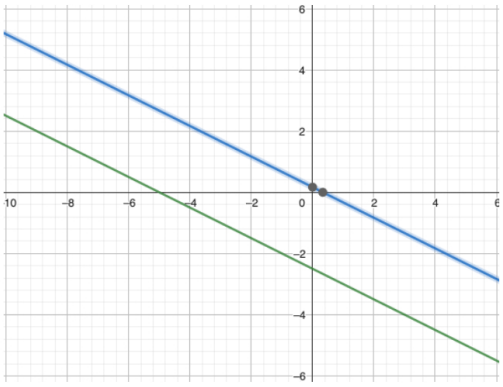
2. Find the number of zeroes of p(x) in the figure given below. **[1]**



   a) 3 b) 0

   c) 2 d) 1

3. The pair of equations x + 2y + 5 = 0 and –3x – 6y + 1 = 0 have **[1]**



a) a unique solution

b) infinitely many solutions

c) no solution

d) exactly two solutions

4. $4x^2 - 2x - 3 = 0$ have **[1]**

a) Real roots

b) Real and Distinct roots

c) No Real roots

d) Real and Equal roots

5. If 18, a, b, -3 are in A.P., then a + b = **[1]**

a) 7

b) 15

c) 19

d) 11

6. The point of intersection of the x-axis and y-axis is called **[1]**

a) ordinate

b) abscissa

c) quardant

d) origin

7. In what ratio does x-axis divide the line segment joining the points A(2, -3) and B(5, 6)? **[1]**

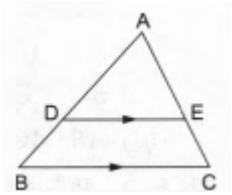
a) 1 : 2

b) 3 : 5

c) 2 : 1

d) 2 : 3

8. In a △ABC, if DE is drawn parallel to BC, cutting AB and AC at D and E respectively such that AB = 7.2 cm, AC = 6.4 cm and AD = 4.5 cm. Then, AE = ? **[1]**



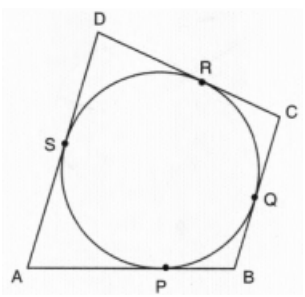
a) 4 cm

b) 5.4 cm

c) 3.2 cm

d) 3.6 cm

9. In Figure, a quadrilateral ABCD is drawn to circumscribe a circle such that its sides AB, BC, CD and AD touch the circle at P, Q, R and S respectively. If AB = x cm, BC = 7 cm, CR = 3 cm and AS = 5 cm, then x = **[1]**



a) 7

b) 10

c) 9

d) 8

10. The length of the tangent drawn from a point 8 cm away from the centre of a circle of radius 6 cm is **[1]**

a) 5 cm

b) $\sqrt{7}$ cm

c) 10 cm

d) $2\sqrt{7}$ cm

11. $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \text{cosec}\theta)$ = **[1]**

a) 0

b) 2

c) 1

d) –1

12. If $\sec\theta + \tan\theta = p$, then the value of $\sin\theta$ is **[1]**

a) $\frac{1-p^2}{p^2+1}$

b) $\frac{p^2-1}{p^2+1}$

c) None of these

d) $\frac{p^2+1}{p^2-1}$

13. Two men are on the same side of a tower. They observe the angles of elevation of the top of the tower as 30° and 45° respectively. If the height of the tower is 100m, then the distance between them is **[1]**

a) None of these

b) $100(\sqrt{3}+1)m$

c) $100(\sqrt{3}-1)m$

d) $100(1-\sqrt{3})m$

14. If θ is the angle (in degrees) of a sector of a circle of radius r, then area of the sector is **[1]**

a) $\frac{\pi r^2\theta}{360}$

b) $\frac{2\pi r\theta}{360}$

c) $\frac{\pi r^2\theta}{180}$

d) $\frac{2\pi r\theta}{180}$

15. If a chord of a circle of radius 28 cm makes an angle of 90^o at the centre, then the area of the major segment is **[1]**

a) 1456 cm^2

b) 1848 cm^2

c) 392 cm^2

d) 2240 cm^2

16. If a number x is chosen from the numbers 1, 2, 3 and a number y is selected from the numbers 1, 4, 9, then P(xy < 9) **[1]**

a) $\frac{7}{9}$

b) $\frac{5}{9}$

c) $\frac{2}{3}$

d) $\frac{1}{9}$

17. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought? **[1]**

a) 240

b) 750

c) 480

d) 40

18. The marks obtained by 9 students in Mathematics are 59, 46, 31, 23, 27, 40, 52, 35 and 29. The mean of the data is **[1]**

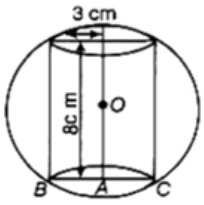
a) 30

b) 41

c) 23

d) 38

19. **Assertion (A):** In the given figure, a sphere circumscribes a right cylinder whose height is 8 cm and radius of the base is 3 cm. The ratio of the volumes of the sphere and the cylinder is 125 : 54 **[1]**



Reason (R): Ratio of their volume = $\frac{Volume\ of\ sphere}{Volume\ of\ cylinder}$

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):** Three consecutive terms 2k + 1, 3k + 3 and 5k - 1 form an AP than k is equal to 6. **[1]**

Reason (R): In an AP a, a + d, a + 2d, ... the sum to n terms of the AP be $S_n = \frac{n}{2}(2a + (n-1)d)$

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.

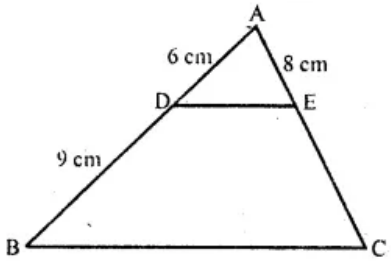
c) A is true but R is false.

d) A is false but R is true.

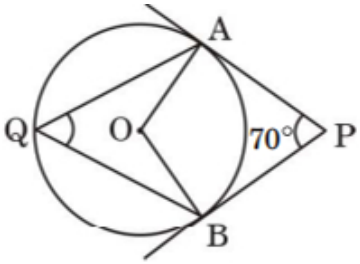
Section B

21. Find H.C.F. and L.C.M. of 56 and 112 by prime factorisation method. **[2]**

22. In the adjoining figure, find AC. **[2]**



23. In Figure, PA and PB are tangents to the circle with centre at O. If ∠APB = 70°, then find m ∠AQB. **[2]**



24. Prove the trigonometric identity: **[2]**

$\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$

OR

Prove that: (sin α + cos α) (tan α + cot α) = sec α + cosec α

25. The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm. Find the area of the sector. **[2]**

OR

Find the area of the sector of a circle of radius 5 cm, if the corresponding arc length is 3.5 cm.

Section C

26. Renu has collected 8 U.S. stamps and 12 international stamps. She wants to display them in identical groups of U.S. and international stamps, with no stamps left over. What is the greatest number of groups Renu can display them in? **[3]**

27. If one zero of the polynomial $2x^2 + 3x + \lambda$ is $\frac{1}{2}$, find the value of λ and other zero. **[3]**

28. A shopkeeper gives books on rent for reading. She takes a fixed charge for the first two days, and an additional charge for each day thereafter. Latika paid Rs.22 for a book kept for 6 days, while Anand paid Rs.16 for the book kept for four days. Find the fixed charges and charge for each extraday. **[3]**

OR

Find the four angles of a cyclic quadrilateral ABCD in which $\angle A = (2x - 1)^\circ$, $\angle B = (y + 5)^\circ \angle C = (2y + 15)^\circ$ and $\angle D = (4x - 7)^\circ$

29. From an external point P,two tangents,PA and PB are drawn to a circle with centre O.At one point E on the circle tangent is drawn which intersects PA and PB at C and D respectively. If PA=10 cm,find the perimeter of the triangle PCD. **[3]**

OR

ABCD is a quadrilateral such that ∠D = 90°. A circle C (O, r) touches the sides AB, BC, CD and DA at P, Q, R and S respectively. If BC = 38 cm, CD = 25 cm and BP = 27 cm, Find r.

30. If sec $\alpha = \frac{5}{4}$ evaluate$\frac{1-\tan\alpha}{1+\tan\alpha}$, **[3]**

31. If the mean of the following frequency distribution is 18, find the missing frequency. **[3]**

Class interval	11-13	13-15	15-17	17-19	19-21	21-23	23-25
Frequency	3	6	9	13	f	5	4

Section D

32. The product of Tanay's age (in years) five years ago and his age ten years later is 16. Determine Tanay's present age. **[5]**

OR

Solve for x:

$\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} = \frac{2}{3}$; $x \neq 1, 2, 3$

33. D and E are points on the sides AB and AC respectively of ΔABC such that $DE \| BC$ and divides ΔABC into two parts, equal in area, Find $\frac{BD}{AB}$. **[5]**

34. A solid wooden toy is in the shape of a right circular cone mounted on a hemisphere. If the radius of the hemisphere is 4.2 cm and the total height of the toy is 10.2 cm, find the volume of the wooden toy. **[5]**

OR

A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 104 cm and the radius of each of the hemispherical ends is 7 cm, find the cost of polishing its surface at the rate of ₹10 per dm^2.

35. Calculate the median from the following frequency distribution: **[5]**

Class	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45
Frequency	5	6	15	10	5	4	2	2

Section E

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

Students of a school thought of planting trees in and around the school to reduce air pollution. It was decided that the number of trees, that each section of each class will plant, will be the same as the class, in which they are studying, e.g., a section of class I will plant 1 tree, a section of class II will plant 2 trees and so on till class XII.

There are three sections of each class.

(i) Find total number of trees planted by primary 1 to 5 class students?

(ii) Find the total number of trees planted by the students of the school.

OR

Find the total no of trees planted by class 12^{th} students.

(iii) Find the total number of trees planted by class 10th student.

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

In an examination hall, students are seated at a distance of 2 m from each other, to maintain the social distance due to CORONA virus pandemic. Let three students sit at points A, B and C whose coordinates are (4, -3), (7, 3) and (8, 5) respectively.

(i) What is the distance between A and C?

(ii) If an invigilator at point 7, lying on the straight line joining B and C such that it divides the distance between them in the ratio of 1 : 2. Then what are the coordinates of I(invigilator)?

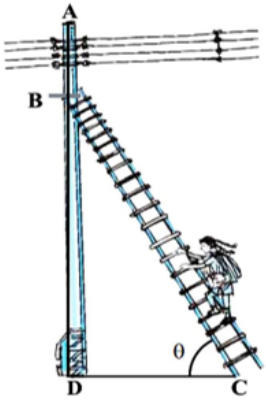
OR

What is the ratio in which B divides the line segment joining A and C?

(iii) What is the mid-point of the line segment joining A and C?

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

In a village, group of people complained about an electric fault in their area. On their complaint, an electrician reached village to repair an electric fault on a pole of height 10 m. She needs to reach a point 1.5 m below the top of the pole to undertake the repair work (see the adjoining figure). She used ladder, inclined at an angle of θ to the horizontal such that $\cos\theta = \frac{\sqrt{3}}{2}$, to reach the required position.



(i) Find the length BD?

(ii) Find the length of ladder.

OR

If the height of pole and distance BD is doubled, then what will be the length of the ladder?

(iii) How far from the foot of the pole should she place the foot of the ladder?