Class X Session 2023-24
Subject - Mathematics (Standard)
Sample Question Paper - 1

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.

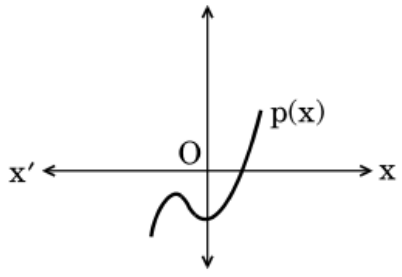
Section A

1. The HCF and the LCM of 12, 21, 15 respectively are: **[1]**

   a) 3, 140 b) 420, 3

   c) 12, 420 d) 3, 420

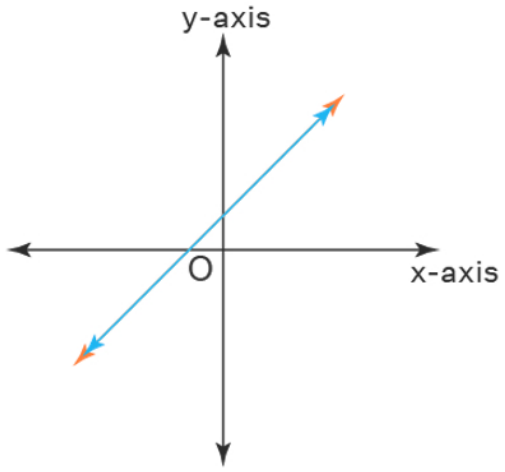
2. Number of zeroes of the polynomial p(x) shown in the Figure, are: **[1]**



   a) 2 b) 1

   c) 0 d) 3

3. A system of linear equations is said to be consistent, if it has **[1]**



a) two solutions

b) one or many solutions

c) no solution

d) exactly one solution

4. If $x^2 + 5kx + 16 = 0$, has equal roots, then the value of k is **[1]**

a) $\pm\frac{64}{25}$

b) $\pm\frac{8}{5}$

c) $\pm\frac{5}{8}$

d) $\pm\frac{25}{64}$

5. The next term of the A.P. $\sqrt{18}$, $\sqrt{32}$ and $\sqrt{50}$ is **[1]**

a) $\sqrt{72}$

b) $\sqrt{84}$

c) $\sqrt{64}$

d) $\sqrt{80}$

6. The points P(0, 6), Q(-5, 3) and R(3,1) are the vertices of a triangle, which is **[1]**

a) scalene

b) equilateral

c) isosceles

d) right angled

7. The point which divides the line segment joining the points (7, -6) and (3, 4) in ratio 1 : 2 internally lies in the **[1]**

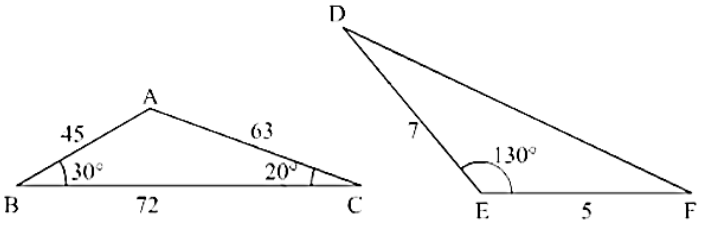
a) III quadrant

b) II quadrant

c) I quadrant

d) IV quadrant

8. In the given figures the measures of ∠D and ∠F are respectively **[1]**



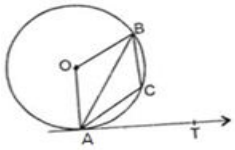
a) 20^o, 30^o.

b) 30^o, 20^o.

c) 50^o, 40^o.

d) 40^o, 50^o.

9. In figure, AB is a chord of a circle and AT is a tangent at A such that $\angle BAT = 60^o$, measure of $\angle ACB$ is : **[1]**



a) 120°

b) 150°

c) 90° d) 110°

10. In a right triangle ABC, right angled at B, BC = 12 cm and AB = 5 cm. The radius of the circle inscribed in the triangle (in cm) is **[1]**

a) 4 b) 1

c) 2 d) 3

11. $9 \sec^2 A - 9 \tan^2 A =$ **[1]**

a) 1 b) 9

c) 0 d) 8

12. The value of $(1 + \tan^2\theta)(1 - \sin\theta)(1 + \sin\theta)$ is **[1]**

a) $\sqrt{2}$ b) 1

c) 2 d) 0

13. The upper part of a tree broken by the windfalls to the ground without being detached. The top of the broken part touches the ground at an angle of 30^o at a point 8m from the foot of the tree. The original height of the tree is **[1]**

a) $8\sqrt{3}$ m b) $24\sqrt{3}$ m

c) 8 m d) 24 m

14. A chord of a circle of radius 10 cm subtends a right angle at the centre. The area of the minor segments (given, π = 3.14) is **[1]**

a) 32.5 cm^2 b) 34.5 cm^2

c) 30.5 cm^2 d) 28.5 cm^2

15. If AB is a chord of a circle of length $5\sqrt{3}$ cm with centre O and radius 5 cm, then area of sector OAB is **[1]**

a) $\frac{25\pi}{3}cm^2$ b) $25\pi cm^2$

c) $\frac{8\pi}{3}cm^2$ d) $\frac{3\pi}{8}cm^2$

16. Cards marked with numbers 1, 2, 3, ..., 25 are placed in a box and mixed thoroughly and one card is drawn at random from the box. The probability that the number on the card is a multiple of 3 and 5 is **[1]**

a) $\frac{12}{25}$ b) $\frac{4}{25}$

c) $\frac{1}{25}$ d) $\frac{8}{25}$

17. Two dice are rolled together. The probability that the sum of the numbers that appeared is 9, is: **[1]**

a) $\frac{5}{9}$ b) $\frac{1}{9}$

c) $\frac{4}{9}$ d) $\frac{2}{9}$

18. The mean of the first 10 prime numbers is **[1]**

a) 129 b) 1.29

c) 12.9 d) 11.9

19. **Assertion (A):** If we join two hemispheres of same radius along their bases, then we get a sphere. **[1]**

Reason (R): A tank is made of the shape of a cylinder with a hemispherical depression at one end. The height of the cylinder is 1.45 m and radius is 30 cm. The total surface area of the tank is 3.3 m^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):** The sum of the first n terms of an AP is given by $S_n = 3n^2 - 4n$. Then its nth term $a_n = 6n - 7$ **[1]**

Reason (R): nth term of an AP, whose sum to n terms is S_n, is given by $a_n = S_n - S_{n-1}$

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.

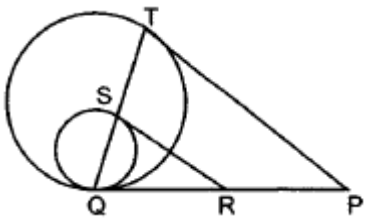
d) A is false but R is true.

Section B

21. Define HCF of two positive integers and find the HCF of the pair of numbers: 105 and 120. **[2]**

22. If ABC and DEF are similar triangles such that $\angle A = 57°$ and $\angle E = 73°$, what is the measure of $\angle C$? **[2]**

23. In the following figure, PQ is the common tangent to both the circles. SR and PT are tangent to both the circles. If SR = 4 cm, PT = 7 cm, then find RP. **[2]**



24. Evaluate: $\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$ **[2]**

OR

Prove that: $(\sqrt{3}+1)\ (3 - \cot 30°) = \tan^3 60° - 2\tan 60°$

25. What is the angle subtended at the centre of a circle of radius 6 cm by an arc of length 3π cm? **[2]**

OR

Write the formula for the area of a segment in a circle of radius r given that the sector angle is θ (in degrees).

Section C

26. Amita, Suneha and Raghav start preparing cards for greeting each person of an old age home on new year. In order to complete one card, they take 10, 16 and 20 minutes respectively. If all of them started together, after what time will they start preparing a new card together ? Why do you think there is a need to show elders that the young generation cares for them and remembers the contribution made by them in the prime of their life? **[3]**

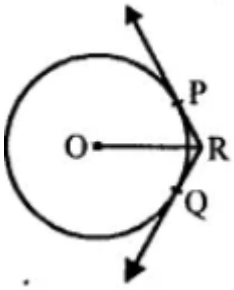
27. If one root of the quadratic polynomial $2x^2 - 3x + p$ is 3, find the other root. Also, find the value of p. **[3]**

28. Draw the Graphs of the equations x = 3, x = 5 and 2x - y - 4 = 0. Also find the area of the quadrilateral formed by the lines and the x-axis. **[3]**

OR

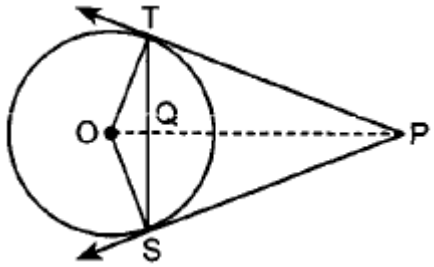
Check graphically whether the pair of equations x + 3y = 6 and 2x – 3y = 12 is consistent. If so, solve them graphically.

29. In the given figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If $\angle PRQ = 120°$, then prove that OR = PR + RQ. **[3]**



OR

In figure, from an external point P, two tangents PT and PS are drawn to a circle with centre O and radius r. If OP = 2r, show that ∠OTS= ∠OST = 30^o.



30. Find the acute angle θ, when $\frac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta} = \frac{1-\sqrt{3}}{1+\sqrt{3}}$. **[3]**

31. Find the median of the following frequency distribution: **[3]**

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Number of students	6	16	30	9	4

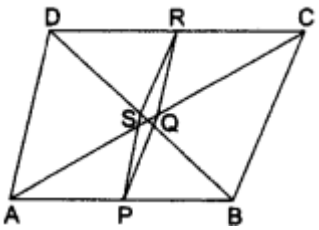
Section D

32. At t minutes past 2 p.m, the time needed by the minute hand of a clock to show 3 p.m. was found to be 3 minutes less than $\frac{t^2}{4}$ minutes. Find t. **[5]**

OR

A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If, the total cost of production on that day was ₹ 90, find the number of articles produced and the cost of each article.

33. ABCD is a quadrilateral in which AD = BC. If P, Q, R, S be the midpoints of AB, AC, CD and BD respectively, show that PQRS is a rhombus. **[5]**



34. A tent is of the shape of a right circular cylinder upto a height of 3 metres and then becomes a right circular cone with a maximum height of 13.5 metres above the ground. Calculate the cost of painting the inner side of the tent at the rate of Rs.2 per square metre, if the radius of the base is 14 metres. **[5]**

OR

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 $\pi = \frac{22}{7}$)

35. Find the mean from the following frequency distribution of marks at a test in statistics: **[5]**

Marks (x):	5	10	15	20	25	30	35	40	45	50
No. of students (f):	15	50	80	76	72	45	39	9	8	6

Section E

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

Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of ₹ 1,18,000 by paying every month starting with the first instalment of ₹ 1000. If he increases the instalment by ₹ 100 every month , answer the following:

(i) Find the amount paid by him in 30^{th} installment.

(ii) Find the amount paid by him in 30 installments.

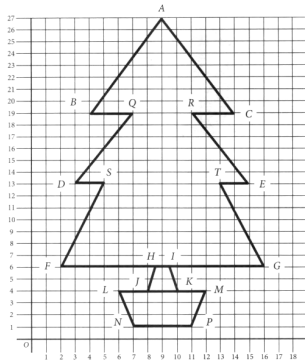
OR

Find the 10^{th} installment, if the 1^{st} installment is of ₹ 2000.

(iii) If total installments are 40 then amount paid in the last installment?

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

The design of Christmas tree is shown in the following graph:



(i) What is the distance of point A from x-axis?

(ii) What is the Length of BC?

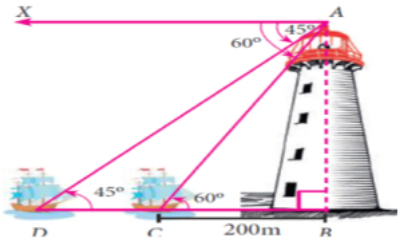
OR

What is the perimeter of its trunk LMPN?

(iii) What is the Length of FG?

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

A man is watching a boat speeding away from the top of a tower. The boat makes an angle of depression of 60^o with the man's eye when at a distance of 200 m from the tower. After 10 seconds, the angle of depression becomes 45^o.



(i) What is the approximate speed of the boat (in km/hr), assuming that it is sailing in still water?

(ii) How far is the boat when the angle is 45^{o}?

OR

As the boat moves away from the tower, angle of depression will decrease/increase?

(iii) What is the height of tower?