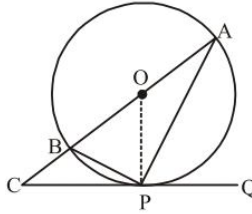


5. A tangent CQ touches a circle with centre O at P. Diameter AB is produced to meet the tangent at C. If $\angle ACP = a^\circ$ and $\angle BPC = b^\circ$, find the relation connecting a and b.



- (a) $a^\circ + b^\circ = 180^\circ$ (b) $a^\circ + 2b^\circ = 90^\circ$ (c) $a^\circ - b^\circ = 60^\circ$ (d) $2a^\circ + b^\circ = 100^\circ$
6. There is a small island in the middle of a 100 m wide river and a tall tree stands on the island. P and Q are points directly opposite to each other on the two banks, and in line with the tree. If the angles of elevation of the top of the tree from P and Q are respectively 30° and 45° , find the height of the tree.

- (a) 36.6 m (b) 1.73 m (c) 2.73 m (d) 4.46 m

7. A book containing 100 pages is opened at random. Find the probability that a doublet page is found.

- (a) $\frac{8}{25}$ (b) $\frac{9}{100}$ (c) $\frac{7}{100}$ (d) $\frac{11}{100}$

8. The marks in science of 80 students of class X are given below. Find the mode of these marks obtained by the students in science.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	5	16	12	13	20	5	4	1	1

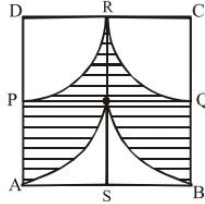
- (a) 53.18 (b) 53.25 (c) 52.25 (d) 53
9. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought?
- (a) 40 (b) 240 (c) 480 (d) 750
10. If $(1 - b)$ is a root of quadratic equation $x^2 + bx + 1 - b = 0$, then its roots are
- (a) 0, 1 (b) 0, -1 (c) -1, 1 (d) 0, 2

(Q. 11 – Q. 15) Fill in the blanks.

11. If $\cos A + \cos^2 A = 1$, then $\sin^2 A + \sin^4 A$ is _____.
12. If three points $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ lie on the same line, then $\frac{y_2 - y_3}{x_2 x_3} + \frac{y_3 - y_1}{x_3 x_1} + \frac{y_1 - y_2}{x_1 x_2}$ is _____.
13. In $\triangle ABC$, $\angle A = 30^\circ$ and $\angle B = 90^\circ$. If $AC = 8$ cm, then its area is _____.
14. If h be the height and α the semi-vertical angle of a right circular cone, then its volume is _____.
15. If the wheel of an engine of a train is $4\frac{2}{7}$ m in circumference makes seven revolution in 4 seconds, then the speed of the train is _____.

OR

In the given figure, ABCD is a square. Points P and Q are mid-points of sides AD & BC respectively. Now, points P, Q, C & D are centres of quadrants of circles of the same radius. If the area of the shaded portion is 162 cm^2 , then the radius of the quadrants is _____.



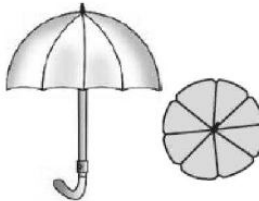
(Q. 16 – Q. 20) Answer the following questions.

16. Find the length of the tangent drawn from a point, whose distance from the centre of a circle is 5 cm and radius of the circle is 3 cm.
17. How many normals can a circle have?
18. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$; $0^\circ < A + B \leq 90^\circ$; $A > B$, find A and B.

OR

If $\sec 4A = \operatorname{cosec}(A - 20^\circ)$, where $4A$ is an acute angle, find the value of A.

19. An umbrella has 8 ribs which are equally spaced (see Fig.). Assuming umbrella to be a flat circle of radius 45 cm, find the area between the two consecutive ribs of the umbrella.



20. The surface area of a sphere is 5544 sq. cm. Find the Volume ? (use $\pi = \frac{22}{7}$)

SECTION - B

21. How many three digit natural numbers are divisible by 7 ?

OR

An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march ?

22. A certain class has 's' students. If a student is picked at random, the probability of picking a boy is $\frac{8}{13}$.
If the class has 24 boys, what is the value of 's'?

23. A bag contains 40 coins, consisting of ₹ 2, ₹ 5 and ₹ 10 denominations. If a coin is drawn at random, the probability of drawing a ₹ 2 coin is $\frac{5}{8}$. If x ₹ 2 coins are removed from the bag and then a coin is drawn at random, the probability of drawing a ₹ 2 coin is $\frac{1}{2}$. Find the value of x .
24. Solve the following system of equations :
- $$\frac{4}{x} + 5y = 7; \quad \frac{3}{x} + 4y = 5$$
25. If the p^{th} term of an A.P. is $\frac{1}{q}$ and q^{th} term is $\frac{1}{p}$. Prove that the sum of the first pq terms is $\frac{1}{2}(pq + 1)$.
26. If $(3, 0)$, $(2, a)$ and $(b, 6)$ are the vertices of a ΔABC , whose centroid is $(2, 5)$. Find the values of a and b .

OR

Using distance formula show that the points $A(8, 1)$, $B(3, -4)$ and $C(2, -5)$ are collinear.

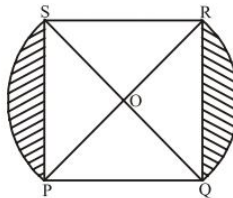
SECTION - C

27. Prove that $\sqrt{2} + \sqrt{5}$ is irrational.
28. Quadratic polynomial $2x^2 - 3x + 1$ has zeroes as α and β . Now form a quadratic polynomial whose zeroes are 3α and 3β .
29. Prove that the points (a, a) , $(-a, -a)$ and $(-\sqrt{3}a, \sqrt{3}a)$ are the vertices of an equilateral triangle.
30. In a triangle ABC , $AD \perp BC$, If $AD^2 = BD \cdot DC$, prove that ΔABC is right angle triangle.

OR

AD is the median of ΔABC . The bisector of $\angle ADB$ and $\angle ADC$ meet AB and AC at points E and F . Prove that $EF \parallel BC$.

31. In figure, PQRS is a square lawn with side $PQ = 42$ metres. Two circular flower beds are there on the sides PS and QR with centre at O , the intersection of its diagonals. Find the total area of the two flower beds (shaded parts).



32. Solve the following pair of equations : $\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2$ and $\frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1$

OR

Solve the system of equations : $\frac{2}{x} + \frac{2}{3y} = \frac{1}{6}$ and $\frac{3}{x} + \frac{2}{y} = 0$ and hence find 'p' for which $y = px - 4$.

33. If a circle touches the side BC of a triangle ABC at P and extended sides AB and AC at Q and R , respectively, prove that $AQ = \frac{1}{2}(BC + CA + AB)$

34. A toy is in the form of a cone mounted on a hemisphere of common base radius 7 cm. The total height of the toy is 31 cm. Find the total surface area of the toy. (use $\pi = \frac{22}{7}$)

OR

The rain water from a roof $22 \text{ m} \times 20 \text{ m}$ drains into a cylindrical vessel having diameter of base 2 m and height 3.5 m. If the vessel is just full, find the rainfall in cm.

SECTION - D

35. If the sum of p terms of an A.P. is q and the sum of q terms is p then, show that sum of $(p - q)$ terms is equal to $(p - q) \left(1 + \frac{2q}{p} \right)$.

OR

36. If S_1, S_2, S_3 , be the sum of $n, 2n$ and $3n$ terms respectively of an A.P., prove that $S_3 = 3(S_2 - S_1)$
37. From a window (h meters high above the ground) of a house in a street, the angles of elevation and depression of the top and the foot of another house on the opposite side of the street are θ and ϕ respectively, Show that the height of the opposite house is $h(1 + \tan \theta \cot \phi)$ meters.

OR

A pole 5 m high is fixed on the top of the tower. The angles of elevation of the top of the pole observed from a point A on the ground is 60° and the angle of depression of the point 'A' from the top of the tower is 45° . Find the height of the tower.

37. Out of a certain number of Saras birds one-fourth the number are moving in lotus plants, $\frac{1}{9}$ th coupled with $\frac{1}{4}$ th as well as 7 times the square root of the number move on a hill, 56 birds remain in Vacula tree. What is the total number of birds?
38. Find the value of $(1 + \tan \theta + \sec \theta)(1 + \cot \theta - \operatorname{cosec} \theta)$.
39. Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter and on opposite sides of its centre, each at a distance of 7 cm from its centre. Draw tangents to the circle from these two points P and Q.
40. On the sports day of a school, 300 students participated. Their ages are given in the following distribution:

Age (in years)	5 - 7	7 - 9	9 - 11	11 - 13	13 - 15	15 - 17	17 - 19
Number of students	67	33	41	95	36	13	15

Find the mode of the data.

OR

Monthly expenditures of milk in 100 families of a housing society are given in the following frequency distribution:

Monthly expenditure (in ₹)	0-175	175-350	350-525	525-700	700-875	875-1050	1050-1225
Number of families	10	14	15	21	28	7	5

Find the mode for this distribution.