

## Section - A

1. If  $\cos \theta = \tan 40^\circ \tan 50^\circ$ , find  $\theta$ .
2. If the product of zeroes of the polynomial  $ax^2 - 6x - 6$  is 4. Find the value of  $a$ .
3. A coin is tossed 20 times. What is the probability of getting at least 1 head?
4. If  $a = 2^3 \cdot 3^5$  and  $b = 3^2 \cdot 2^5$ , then what is the HCF of  $a$  and  $b$ ?
5. If the mean and median of a distribution is 26.8 and 27.9 respectively, find its mode.
6. A conical tent has  $60^\circ$  angle at the vertex. Find the ratio of its radius and slant height.

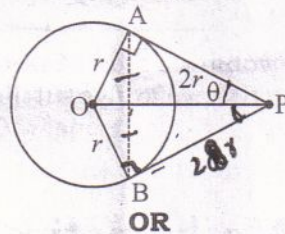
## Section - B

7. The largest possible cube is made from a wooden sphere of radius  $6\sqrt{3}$  cm. Find the surface area of the cube.
8. Find the number of terms of the AP:  $-12, -9, -6 \dots, 21$ . If 1 is added to each term of this AP, then find the sum of all terms of the AP thus obtained.
9. If one root of the equation  $x^2 - 2x - k = 0$  is the square of the other, find value(s) of ' $k$ '.
10. Draw a line segment of length 7.6 cm and divide it in the ratio 3 : 2.
11. Find the zeroes of given polynomial and verify the relationship between the zeroes and the coefficients:  

$$abx^2 + (b^2 - ac)x - bc$$
12. A, B, C are three collinear points and B and C lie on the same side of A, where  $A = (3, 4)$  and  $B = (7, 7)$ . If distance between A and C is 10 units, find the coordinates of C.

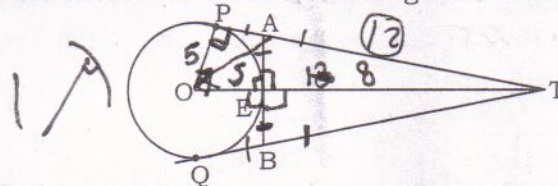
## Section - C

13. In the figure below, length of OP is equal to diameter of the circle, where O is the centre of the circle. Prove that  $\triangle ABP$  is an equilateral triangle.



OR

In the figure below, O is the centre of a circle of radius 5cm, T is a point such that  $OT = 13$ cm and  $OT$  intersects the circle at E. If  $AB$  is the tangent to the circle at E, find the length of  $AB$ .



14. If  $\cos \theta + \sec \theta = 2$ , find the value of  $(\cos^5 \theta + \sec^5 \theta)$ .

OR

If  $\sec \theta - \tan \theta = \sqrt{2} \tan \theta$ , then show that  $\sec \theta + \tan \theta = \sqrt{2} \sec \theta$ .

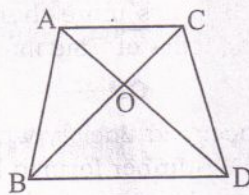
15. Points P, Q, R and S in that order are dividing a line segment joining  $A(2, 6)$  and  $B(7, -4)$  in five equal parts. Find the coordinates of P and R.
16. If roots of the equation  $(c^2 - ab)x^2 - 2(a^2 - bc)x + (b^2 - ac) = 0$  in ' $x$ ' are equal, then show that either  $a = 0$  or  $a^3 + b^3 + c^3 = 3abc$ .

Solve for  $x$  and  $y$ :

$$99x + 101y = 1499$$

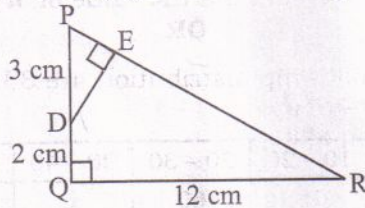
$$101x + 99y = 1501$$

In figure, ABC and DBC are two triangles on the same base BC. If AD intersects BC at O, show that  $\frac{\text{ar}(ABC)}{\text{ar}(DBC)} = \frac{AO}{DO}$ .



OR

In the given figure,  $\Delta PQR$  is right angled at Q and  $DE \perp PR$ . Prove that  $\Delta PQR \sim \Delta PED$  and find the length of PE and DE, if  $PD = 3$  cm,  $QD = 2$  cm and  $QR = 12$  cm.



19. If  $S_n$  denotes the sum of first  $n$  terms of an AP, prove that  $S_{12} = 3(S_8 - S_4)$ .

OR

If  $S_1, S_2$  and  $S_3$  represents the sum of first  $n, 2n$  and  $3n$  terms of an A.P., prove that  $S_3 = 3[S_2 - S_1]$ .

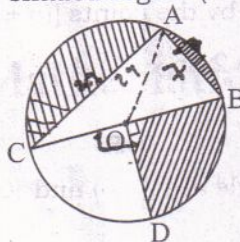
20. Two customers are visiting a particular shop in the same week (Monday to Saturday). Each is equally likely to visit the shop on any one day as on another. What is the probability that both will visit the shop on:

- (i) the same day?
- (ii) different days?
- (iii) consecutive days?

21. A circular field has a circumference of 360 km. Three cyclists start together and can cycle 60 km, 72 km and 90 km a day, around the field. After how many days will they meet again at the starting point?

22. In given figure, O is centre of circle with  $AC = 24$  cm and  $AB = 7$  cm.

If  $\angle BOD = 90^\circ$ , find the area of the shaded region (use  $\pi = 3.14$ )



### Section - D

23. A farmer connects a pipe of internal diameter 25 cm from a canal into a cylindrical tank in his field, which is 12 m in diameter and 2.5 m deep. If water flows through the pipe at the rate of 3.6 km/h, in how much time will the tank be filled? Also find the cost of water, if the canal department charges at the rate ₹0.07/m<sup>3</sup>. (Use  $\pi = \frac{22}{7}$ )

OR

A bucket is in the form of a frustum of a cone with a capacity of 12308.8 cm<sup>3</sup> of water. The radii of the top and bottom circular ends are 20 cm and 12 cm respectively. Find the height of the bucket and the area of the metal sheet used in its making. [Use  $\pi = 3.14$ ]

24. A train covered a certain distance at a uniform speed. If the train would have been 10 km/hr faster, it would have taken 2 hours less than the scheduled time. And, if the train were slower by 10 km/hr; it would have taken 3 hours more than the scheduled time. Find the distance covered by the train. What are the benefits of time management in our daily life?

OR

Rakesh donates the amount to Cancer Aid Society which is a two digit number such that the sum of this two-digit number and the number formed by interchanging its digit is 110. If 10 is subtracted from the original number, the new number is 4 more than 5 times the sum of the digits of the original number. Find the amount. Which value is depicted from this?

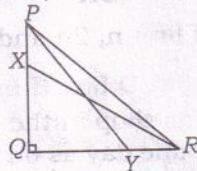
25. The sum of deviations of a set of values  $x_1, x_2, x_3, \dots, x_n$  measured from 50 is  $-10$  and the sum of deviations of the values from 46 is 70. Find the value of 'n' and the mean.

OR

The median and mode of the following distribution are 33.5 and 34 rupees respectively. Find the missing frequencies.

Daily wages (in Rs.)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	N
Frequencies	4	16	60	x	y	z	4	230

26. In figure, PQR is a triangle, right angled at Q. X and Y are the points on PQ and QR such that  $PX : XQ = 1 : 2$  and  $QY : YR = 2 : 1$ . Prove that  $9(PY^2 + XR^2) = 13PR^2$ .



27. Prove that the length of tangents drawn from an external point to a circle are equal.

Using the above, find the perimeter of  $\triangle ABC$ , if a circle touches the side BC of  $\triangle ABC$  at R and touches AB and AC produced at Q and P respectively and  $AQ = 5$  cm.

28. If  $\sin \theta + \sin^2 \theta = 1$ , then find the value of  $\cos^{12} \theta + 3\cos^{10} \theta + 3\cos^8 \theta + \cos^6 \theta + 2\cos^4 \theta + 2\cos^2 \theta - 2$

29. A pole projected outwards and upwards from a window at height of 8 m above the ground level, makes an angle of  $30^\circ$  with the wall. If angle of elevation of base and top of the pole, from a point on the ground level, is  $30^\circ$  and  $60^\circ$  respectively, find the length of the pole.

30. Find the area of the triangle formed by the points  $[(p+1), 1], [(2p+1), 3], [(2p+2), 2p]$  and show that these points are collinear if  $p = 2$  or  $-\frac{1}{2}$ .

OR

Two vertices of an equilateral triangle are  $(0, 0)$  and  $(0, 2\sqrt{3})$ . Find the third vertex.

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