

## Trigonometry

1. If a tower 30 meters high casts a shadow  $10\sqrt{3}$  meters long on the ground, what is the angle of elevation of the sun?

## Probability

2. The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap?

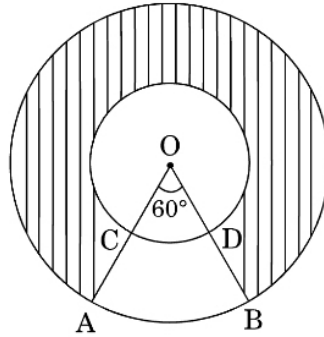
## Progressions

3. What is the common difference of an A.P. in which  $a_{21} + a_7 = 84$ ?
4. Which term of the A.P. 8, 14, 20, 26, ... will be 72 more than its 41st term?

## Geometry

5. If the angle between two tangents drawn from an external point  $P$  to a circle of radius  $a$  and center  $O$  is  $60^\circ$ , then find the length of  $OP$ .
6. Prove that the tangents drawn at the endpoints of a chord of a circle make equal angles with the chord.
7. A circle touches all the four sides of a quadrilateral  $ABCD$ . Prove that  $AB + CD = BC + DA$ .
8. The dimensions of a solid iron cuboid are  $4.4\text{ m} \times 2.6\text{ m} \times 10\text{ m}$ . It is melted and recast into a hollow cylindrical pipe of 30 cm inner radius and thickness 5 cm. Find the length of the pipe.
9. In the given figure, two concentric circles with center  $O$  have radii 21 cm and 42 cm. If  $\angle AOB = 60^\circ$ , find the area of the shaded region.

[ Use  $\pi = \frac{22}{7}$  ]



10. Water in a canal, 5.4 m wide and 1.8 m deep, is flowing with a speed of 25 km/hour. How much area can it irrigate in 40 minutes, if 10 cm of standing water is required for irrigation?
11. In what ratio does the point  $\left(\frac{24}{11}, y\right)$  divide the line segment joining the points  $P(2, 2)$  and  $Q(3, 7)$ ? Also, find the value of  $y$ .
12. On a straight line passing through the foot of a tower, two points  $C$  and  $D$  are at distances of 4 m and 16 m from the foot respectively. If the angles of elevation from  $C$  and  $D$  of the top of the tower are complementary, then find the height of the tower.

## Coordinate Geometry

13. A line intersects the y-axis and x-axis at the points  $P$  and  $Q$  respectively. If  $(2, 5)$  is the mid-point of  $PQ$ , then find the coordinates of  $P$  and  $Q$ .
14. If the distances of  $P(x, y)$  from  $A(5, 1)$  and  $B(-1, 5)$  are equal, then prove that  $3x = 2y$ .

## Polynomial

15. Find the value of  $p$ , for which one root of the quadratic equation  $p \cdot x^2 - 14x + 8 = 0$  is 6 times the other.