## SECTION - D

19. A man standing on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30°. Find the distance of the hill from the ship and the height of the hill.

20. Three different coins are tossed together. Find the probability of getting

    (a) exactly two heads

    (b) at least two heads

    (c) at least two tails

**Question numbers 21 to 31 carry 4 marks each.**

21. Due to heavy floods in a state, thousands were rendered homeless. Fifty schools collectively offered to the state government to provide place and canvas for 1500 tents. The lower part of each tent is cylindrical of base radius 2.8 m and height 3.5 m with a conical upper part of the same base radius and height 2.1 m. If the canvas used to make the tents costs Rs. 120 per sq.m, find the amount shared by each school. Use $\pi = \frac{22}{7}$.

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

23. Draw a circle of radius 4 cm. Draw two tangents to the circle inclined at an angle of 60° to each other.

24. In the figure, two equal circles with centres $O$ and $O'$ touch each other at $X$. $OO'$ produced meets the circle with centre $O'$ at $A$. $AC$ is tangent to the circle with centre $O$ at the point $C$. $O'D$ is perpendicular to $AC$. Find the value of $\frac{DO'}{CO}$.
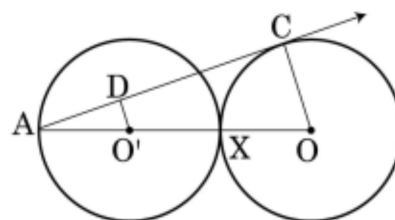


Figure 1:

25. Solve for $x$:
    $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}, \quad x \neq -1, -2, -4$

26. The angle of elevation of the top $Q$ of a vertical tower $PQ$ from a point $X$ on the ground is 60°. From a point $Y$, 40 m vertically above $X$, the angle of elevation of the top $Q$ of the tower is 45°. Find the height of the tower $PQ$ and the distance $PX$. Use $\sqrt{3} = 1.73$.

27. The houses in a row are numbered consecutively from 1 to 49. Show that there exists a value of $X$ such that the sum of the numbers of houses preceding the house numbered $X$ is equal to the sum of the numbers of houses following $X$.

28. In the figure, the vertices of $\triangle ABC$ are $A(4, 6)$, $B(1, 5)$ and $C(7, 2)$. A line

segment $DE$ is drawn to intersect the sides $AB$ and $AC$ at $D$ and $E$ respectively such that:

$$\frac{AD}{AB} = \frac{AE}{AC} = \frac{1}{3}. \qquad (1)$$

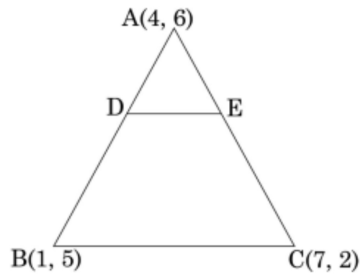Calculate the area of $\triangle ADE$ and compare it with the area of $\triangle ABC$.



Figure 2:

29. A number $x$ is selected at random from the numbers 1, 2, 3 and 4. Another number $y$ is selected at random from the numbers 1, 4, 9 and 16. Find the probability that the product of $x$ and $y$ is less than 16.

30. In the figure, a sector $OAP$ of a circle with centre $O$ containing angle $\theta$ is shown. $AB$ is perpendicular to the radius $OA$ and meets $OP$ produced at $B$. Prove that the perimeter of the shaded region is:

$$r\left(\tan\theta + \sec\theta + \frac{\pi\theta}{180} - 1\right) \qquad (2)$$
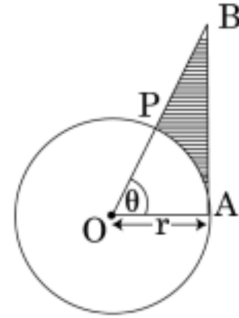


Figure 3:

31. A motor boat whose speed is 24 km/h in still water takes 1 hour more to go 32 km upstream than to return downstream to the same spot. Find the speed of the stream.