1. In Fig. 1, PQ is a tangent at point C to a circle with center O. If AB is a diameter and $\angle CAB = 30^{\circ}$, find $\angle PCA$.

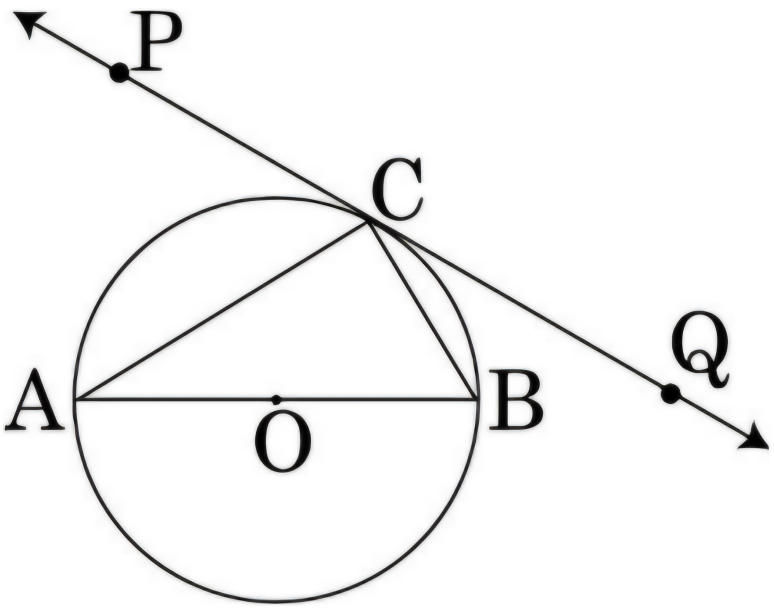

Figure 1: CircleABC

2. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, find the value of k.

3. Let P and Q be the points of trisection of the line segment joining the points $A(2, -2)$ and $B(-7, 4)$ such that P is nearer to A. find the coordinates of P and Q.

4. the 4^{th} term of an A.P. is zero. Prove that the 25^{th} term of the $A.P$ is three times its 11^{th} term.

5. In Fig. 2, O is the centre of a circle such that diameter $AB = 13cm$ and $AC = 12cm$. BC is joined. Find the area of the shaded region. (Take

$\pi = 3.14$)

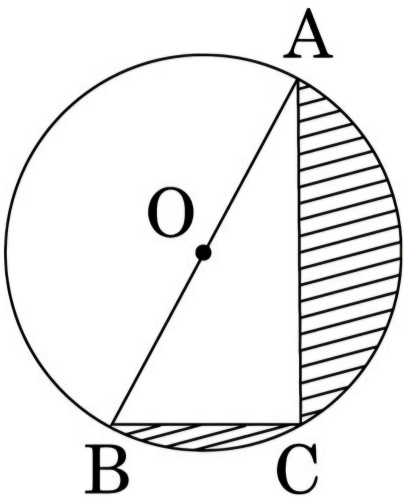

Figure 2: Circle with centre O

6. If the point $P(x, y)$ is equidistant from the points $A(a + b, b - a)$ and $B(a - b, a + b)$. prove that $bx = ay$

7. If the ratio of the sum of first n terms of two 5A.P's is $(7n+1) : (4n+27)$, find the ratio of their m^{th} terms.

8. solve for x:

$$\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} = \frac{2}{3}, x \neq 1, 2, 3 \tag{1}$$

9. A man standing on the deck of a ship,which is $10m$ 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 hill as 30°. Find the distance of the hill from the ship and the height of the hill.

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

i exactly two heads,

ii at least two heads

iii at least two tails.

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

12. Drawn a circle of radius $4cm$. Drawn two tangents to the circle inclined at an angle of 60° to each other.

13. In Fig. 3, 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. $O'D$ os perpendicular to AC. Find the value of $\frac{DO'}{CO}$.

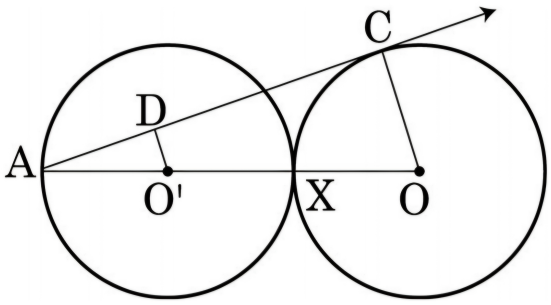

Figure 3: Two equal circles

14. solve for x :

$$\frac{1}{x+1}+\frac{2}{x+2}=\frac{4}{x+4}, x \neq -1, -2, -4 \tag{2}$$

15. the angle of elevation of the Q of a vertical tower PQ from a point X n the ground is 60°. From $Y, 40m$ vertically above X the angle of elevation

of the top Q of tower is 45°. Find the height of the tower PQ and the distance PX (use $\sqrt{3} = 1.73$)

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