Exercise 16A

Question 9:
he point A(4,3) and B(x,5) lie on a circle. Its centre is O(2,3)

$$\Rightarrow OA = OB \quad \text{or} \quad OA^2 = OB^2$$

$$\therefore (2-4)^2 + (3-3)^2 = (2-x)^2 + (3-5)^2$$

$$\text{or} \quad 4 = 4 - 4x + x^2 + 4 \quad \text{or} \quad x^2 - 4x + 4 = 0$$

$$\text{or} \quad (x-2)^2 = 0 \Rightarrow x = 2$$

Question 10:
Let A(6, -1) and B(2,3) be the given point and P(x,y) be the required point, we get

$$PA = PB \Rightarrow (PA)^2 = (PB)^2$$

$$\Rightarrow (x-6)^2 + (y+1)^2 = (2-x)^2 + (3-y)^2$$

$$\Rightarrow 36 + x^2 - 12x + y^2 + 1 + 2y = 4 + x^2 - 4x + 9 + y^2 - 6y$$

$$\Rightarrow -12x + 4x + 2y + 6y = 4 + 9 - 1 - 36$$

$$\Rightarrow \quad -8x + 8y = -24$$

$$-8(x-y) = -24$$

$$\Rightarrow \quad x - y = 3$$

Hence, $x - y = 3$

Question 11:
Let A(11, -8) be the given point and let P(x,0) be the required point on x - axis
Then,

$$PA = 10 \text{ units} \Rightarrow PA^2 = 100$$

$$\Rightarrow (x-11)^2 + (0+8)^2 = 100$$

$$\Rightarrow x^2 + 121 - 22x + 64 = 100$$

$$\Rightarrow x^2 - 22x + 185 - 100 = 0$$

$$\Rightarrow x^2 - 22x + 85 = 0$$

$$\Rightarrow x^2 - 17x - 5x + 85 = 0$$

$$\Rightarrow x(x-17) - 5(x-17) = 0$$

$$\Rightarrow (x-17)(x-5) = 0$$

$$\Rightarrow x = 17 \text{ or } x = 5$$

Hence, the required points are (17,0) and (5,0).

Question 12:
Let the required points be P(x,y), then
PA = PB = PC. The points A, B, C are (5,3), (5, -5) and (1, -5) respectively.

$$\Rightarrow PA^2 = PB^2 = PC^2$$

$$\Rightarrow PA^2 = PB^2 \text{ and } PB^2 = PC^2$$

$$PA^2 = PB^2$$

$$\Rightarrow (5-x)^2 + (3-y)^2 = (5-x)^2 + (-5-y)^2$$

$$25 + x^2 - 10x + 9 + y^2 - 6y = 25 + x^2 - 10x + 25 + y^2 + 10y$$

$$-6y - 10y = 25 - 9 \Rightarrow -16y = 16$$

$$y = -1$$

and $PB^2 = PC^2$

$$\Rightarrow (5-x)^2 + (-5-y)^2 = (1-x) + (-5-y)^2$$

$$25 + x^2 - 10x + 25 + y^2 + 10y = 1 + x^2 - 2x + 25 + y^2 + 10y$$

$$-10x + 2x = -24 \Rightarrow -8x = -24$$

$$x = \frac{-24}{-8} = 3$$

Hence, the point P is (3, -1).

********** END **********