Exercise 16A

Question 1:

(i) The given points are A(9,3) and B(15,11).

$$\text{Then, } (x_1 = 9,\ y_1 = 3) \text{ and } (x_2 = 15 \text{ and } y_2 = 11)$$

$$\therefore AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(15-9)^2 + (11-3)^2} = \sqrt{6^2 + 8^2}$$

$$= \sqrt{34+64} = \sqrt{100} = 10 \text{ units}$$

(ii) The given points are A(7,4) and B(-5,1).

$$\text{Then, } (x_1 = 7,\ y_1 = -4) \text{ and } (x_2 = -5, y_2 = 1)$$

$$\therefore AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(-5-7)^2 + (1+4)^2} = \sqrt{(-12)^2 + (5)^2}$$

$$= \sqrt{144+25} = \sqrt{169} = 13 \text{ units}$$

(iii) The given points are A(-6, -4) and B(9,-12).

$$\text{Then, } (x_1 = -6,\ y_1 = -4) \text{ and } (x_2 = 9, y_2 = -12)$$

$$\therefore AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(6+9)^2 + (-12+4)^2} = \sqrt{(15)^2 + (-8)^2}$$

$$= \sqrt{225+64} = \sqrt{289} = 17 \text{ units}$$

(iv) The given points are A(1, -3) and B(4, -6).

$$\text{Then, } (x_1 = 1,\ y_1 = -3) \text{ and } (x_2 = 4, y_2 = -6)$$

$$\therefore AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(4-1)^2 + (-6+3)^2} = \sqrt{(3)^2 + (-3)^2}$$

$$= \sqrt{18} = 3\sqrt{2} \text{ units}$$

(v) The given points are P(a + b, a - b) and Q(a - b, a + b).

$$\text{Then, } [x_1 = (a+b), y_1 = (a-b)] \text{ and } [x_2 = (a-b),\ y_2 = (a+b)]$$

$$\therefore PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(a-b-a-b)^2 + (a+b-a+b)^2}$$

$$= \sqrt{(-2b)^2 + (2b)^2} = \sqrt{4b^2 + 4b^2}$$

$$= \sqrt{8b^2} = 2\sqrt{2}b \text{ units}$$

(vi) The given points are P(a sin a, a cos a) and Q(a cos a, - a sina).

$(x_1 = a\sin\alpha, y_1 = a\cos\alpha)$ and $(x_2 = a\cos\alpha, y_2 = -aa\sin\alpha)$

$$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(a\cos\alpha - a\sin\alpha)^2 + (-a\sin\alpha - a\cos\alpha)^2}$$

$$= \sqrt{a^2\cos^2\alpha + a^2\sin^2\alpha - 2a^2\cos\alpha\sin\alpha + a^2\cos^2\alpha + a^2\sin^2\alpha + 2a^2\cos\alpha\sin\alpha}$$

$$= \sqrt{a^2\cos^2\alpha + a^2\sin^2\alpha + a^2\cos^2\alpha + a^2\sin^2\alpha}$$

$$= \sqrt{a^2\left(\cos^2\alpha + \sin^2\alpha\right) + a^2\left(\cos^2\alpha + \sin^2\alpha\right)}$$

$$= \sqrt{a^2 + a^2} = \sqrt{2a^2} = \sqrt{2}a \text{ units}$$

Question 2:

(i) The given point is A(5, -12) and let O(0,0) be the origin.

$$\text{Then, } AO = \sqrt{(5-0)^2 + (-12-0)^2}$$

$$= \sqrt{5^2 + (-12)^2} = \sqrt{25 + 144} = \sqrt{169}$$

$$= 13 \text{ units}$$

(ii) The given point is B(-5, 5) and let O(0,0) be the origin.

$$\text{Then, } BO = \sqrt{(-5-0)^2 + (5-0)^2}$$

$$= \sqrt{25 + 25} = \sqrt{50} = 5\sqrt{2} \text{ units}$$

(iii) The given point is C(-4, -6) and let O(0,0) be the origin.

$$\text{Then, } CO = \sqrt{(-4-0)^2 + (-6-0)^2}$$

$$= \sqrt{16 + 36} = \sqrt{52} = 2\sqrt{13} \text{ units}$$

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