

Exercise 16A

Question 13:

Let A(1, -1), B(5, 2) and C(9, 5) are the given points. Then

AB =
$$\sqrt{(5-1)^2 + (2+1)^2} = \sqrt{(4)^2 + (3)^2}$$

= $\sqrt{16+9} = \sqrt{25} = 5$ units
BC = $\sqrt{(9-5)^2 + (5-2)^2} = \sqrt{(4)^2 + (3)^2}$
= $\sqrt{16+9} = \sqrt{25} = 5$ units
AC = $\sqrt{(9-1)^2 + (5+1)^2} - \sqrt{(8)^2 + (6)^2}$
= $\sqrt{64+36} = \sqrt{100} = 10$ units
AB + BC = $(5+5)$ units = 10 units = AC thus, AB + BC = AC

Hence the given points A, B, C are collinear.

Question 14:

Question 14:
(i) Let A (6,9), B(0,1) and C(-6, -7) be the given points. Then
$$AB = \sqrt{(0-6)^2 + (1-9)^2} = \sqrt{(-6)^2 + (-8)^2} = \sqrt{36+64}$$

$$= \sqrt{100} = 10 \text{ units}$$

$$BC = \sqrt{(-6-0)^2 + (-7-1)^2} = \sqrt{34+64} = \sqrt{100} = 10 \text{ units}$$

$$AC = \sqrt{(-6-6)^2 + (-7-9)^2} = \sqrt{(-12)^2 + (-16)^2} = \sqrt{144+256}$$

$$= \sqrt{400} = 20 \text{ units}$$

Hence the given A, B, C are collinear.

(ii) Let A(-1, -1), B(2,3) and C(8,11) be the given points. Then

AB =
$$\sqrt{(2+1)^2 + (3+1)^2} = \sqrt{(3)^2 + (4)^2} = \sqrt{9+16} = \sqrt{25} = 5$$
 units
BC = $\sqrt{(8-2)^2 + (11-3)^2} = \sqrt{(6)^2 + (8)^2} = \sqrt{36+64} = \sqrt{100} = 10$ units
AC = $\sqrt{(8+1)^2 + (11+1)^2} = \sqrt{(9)^2 + (12)^2} = \sqrt{81+144} = \sqrt{225}$
= 15 units

$$\therefore AB + BC = (5units + 10units)$$

 $\therefore AB + BC = AC$

Hence the given A, B, C are collinear.

(iii) Let P(1,1), Q(-2,7) and R(3, -3) be the given points, then

PQ =
$$\sqrt{(-2-1)^2 + (7-1)^2} = \sqrt{(-3)^2 + (6)^2}$$

= $\sqrt{9+36} = \sqrt{45}$
= $3\sqrt{5}$ units
QR = $\sqrt{(3+2)^2 + (-3-7)^2} = \sqrt{(5)^2 + (-10)^2}$
= $\sqrt{125} = 5\sqrt{5}$ units
PR = $\sqrt{(3-1)^2 + (-3-1)^2} = \sqrt{2^2 + (-4)^2} = \sqrt{20} = 2\sqrt{5}$ units

:. PQ + PR =
$$(3\sqrt{5} + 2\sqrt{5}) = 5\sqrt{5}$$
 units = QR

Thus, PQ + PR = QR

Hence, the given points P, Q, R are collinear

(iv) Let P(2,0), Q(11,6) and R(-4,-4) be the given points Then,

$$PQ = \sqrt{(11-2)^2 + (6-0)^2} = \sqrt{(9)^2 + (6)^2} = \sqrt{117} = 3\sqrt{13} \text{ units}$$

$$QR = \sqrt{(-4-11)^2 + (-4-6)^2} = \sqrt{(-15)^2 + (-10)^2} = \sqrt{325} = 5\sqrt{13} \text{ units}$$

$$PR = \sqrt{(-4-2)^2 + (-4-0)^2} = \sqrt{(-6)^2 + (-4)^2} = \sqrt{52} = 2\sqrt{13} \text{ units}$$

PQ + PR =
$$(3\sqrt{13} + 2\sqrt{13})$$
 units = $5\sqrt{13}$ unit = QR
 \therefore PQ + PR = QR

Hence the given P, Q, R are collinear.

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