Exercise 16C

Question 1:

(i) Let A(1, 2), B(-2, 3) and C(-3, -4) be the vertices of the given Δ ABC, then

$(x_1 = 1,\ y_1 = 2), (x_2 = -2, y_2 = 3)$ and $(x_3 = -3, y_3 = -4)$

$$\text{Area of } \Delta ABC = \frac{1}{2}\left[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right]$$

$$= \frac{1}{2}\left[1(3+4) - 2(-4-2) - 3(2-3)\right]$$

$$= \frac{1}{2}\left[7 + 12 + 3\right] = \frac{22}{2} = 11 \text{ sq. units}$$

(ii) The coordinates of vertices of Δ ABC are A(-5, 7), B(-4, -5) and C(4, 5)

Here, $x_1 = -5$, $y_1 = 7$; $x_2 = -4$, $y_2 = -5$; $x_3 = 4$, $y_3 = 5$

$$x = \frac{x_2 + x_1}{2} \quad \text{and} \quad y = \frac{y_2 - y_1}{2}$$

$$1 = \frac{-2 + 2a}{2} \quad \text{and} \quad 2a + 1 = \frac{3b + 4}{2}$$

$$2 = -2 + 2a \quad \text{and} \quad 4a + 2 = 3b + 4 - - - (1)$$

$$a = 2 - - (2)$$

Putting $a = 2$ in (1), we get

$$4 \times 2 + 2 = 3b + 4 \quad \Rightarrow 10 - 4 = 3b$$

$$\Rightarrow 3b = 6 \quad \Rightarrow b = \frac{6}{3} = 2$$

Hence, $a = 2$ and $b = 2$

(iii) The coordinates of Δ ABC are A(3, 8), B(-4, 2) and C(5, -1)

Here, $x_1 = 3,\ y_1 = 8;\ x_2 = -4,\ y_2 = 2,\ x_3 = 5,\ y_3 = -1$

$$\text{Area of } \Delta ABC = \frac{1}{2}\left[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right]$$

$$= \frac{1}{2}\left[3 \times (2+1) + (-4) \times (-1-8) + 5 \times (8-2)\right]$$

$$= \frac{1}{2}(9 + 36 + 30) = \frac{1}{2} \times 75 = 37.5 \text{ sq. units}$$

(iv) Let P(10, -6), Q(2, 5) and R(-1, 3) be the vertices of the given Δ PQR. Then,

$(x_1 = 10, y_1 = -6)$, $(x_2 = 2, y_2 = 5)$; $(x_3 = -1,\ y_3 = 3)$

$$\text{Area of } \Delta PQR = \frac{1}{2}\left[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right]$$

$$= \frac{1}{2}\left[10(5-3) + 2(3+6) + (-1)(-6-5)\right]$$

$$= \frac{1}{2}(20 + 18 + 11) = \frac{49}{2} = 24.5 \text{ sq.units}$$

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