Exercise 16C

Question 5:
The given points are A(-3, 12), B(7, 6) and C(x, 9)

$\therefore\ (x_1 = -3, y_1 = 12), (x_2 = 7, y_2 = 6), (x_3 = x, y_3 = 9)$

The given A, B, C are collinear if

$\Rightarrow x_1(y_2 - y_1) + x_2(y_3 - y_1) + x_3(y_1 - y_2) = 0$

$\Rightarrow (-3)(6 - 9) + 7(9 - 12) + x(12 - 6) = 0$

$\Rightarrow 9 - 21 + 6x = 0$

$\Rightarrow 6x = 12 \quad \Rightarrow x = 2$

Question 6:
Let P(1, 4), Q(3, y) and R(-3, 16)

$(x_1 = 1, y_1 = 4), (x_2 = 3, y_2 = y), (x_3 = -3, y_3 = 16)$

The given points P, Q, R are collinear if

$\Rightarrow x_1(y_2 - y_1) + x_2(y_3 - y_1) + x_3(y_1 - y_2) = 0$

$\Rightarrow 1(y - 16) + 3(16 - 4) - 3(4 - y) = 0$

$\Rightarrow y - 16 + 36 - 12 + 3y = 0$

$\Rightarrow 4y = -8 \Rightarrow y = -2$

Question 7:
The given points are A(x, y), B(-5, 7) and C9-4, 5)

$\therefore\ (x_1 = x, y_1 = y), (x_2 = -5, y_2 = 7)(x_3 = -4, y_3 = 5)$

The given points A, B, C are collinear

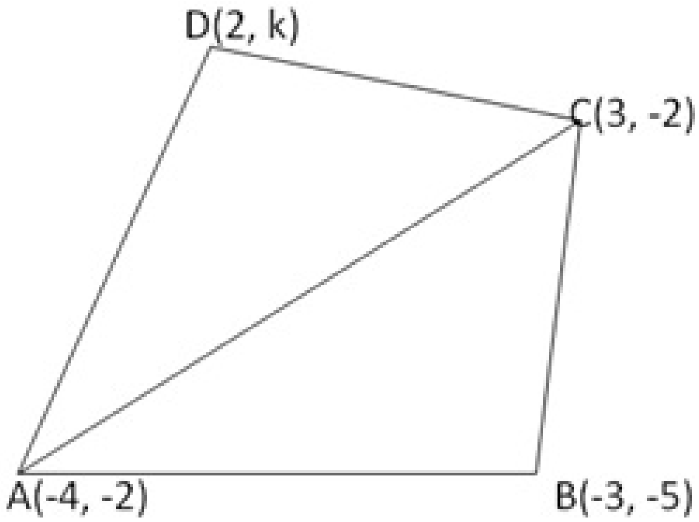
$\Rightarrow x_1(y_2 - y_1) + x_2(y_3 - y_1) + x_3(y_1 - y_2)$

$\Rightarrow x(7 - 5) + (-5)(5 - y) + (-4)(y - 7) = 0$

$\Rightarrow 2x - 25 + 5y - 4y + 28 = 0$

$\Rightarrow 2x + y + 3 = 0$

Question 8:
The vertices of a quadrilateral ABCD are (-4, -2), B(-3, -5), C(3, -2) and D(2, k)
Join AC.



Area of quadrilateral ABCD = Area of ΔABC + Area of ΔACD
Now area of ΔABC

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

$$= \frac{1}{2}\left[12+0+9\right] = \frac{21}{2}$$

$$\text{Area of } \Delta ACD = \frac{1}{2}\left[-4(-2-k)+3\times(k+2)+2\times(-2+2)\right]$$

$$= \frac{1}{2}\times\left[4(k+2)+3(k+2)+0\right] = \frac{1}{2}\left[7k+14\right]$$

$$\text{Area of quad.ABCD} = \text{Area of } \Delta ABC + \text{Area of } \Delta ACD$$

$$= \frac{21}{2}+\frac{1}{2}(7k+14)$$

$$= \frac{1}{2}(21+7k+14)$$

$$= \frac{1}{2}(7k+35) \text{ sq.units}$$

But area of quadrilateral ABCD = 28 sq. units

$$\Rightarrow \frac{1}{2}(7k+35) = 28$$

$$\Rightarrow 7k = 56-35 = 21$$

$$\therefore k = \frac{21}{7} = 3$$

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