Exercise 16D

Question 5:
The vertices of ΔABC are (a, b), (b, c) and (c, a)
Centroid is

$$\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right) \text{ or } \left(\frac{a+b+c}{3}, \frac{b+c+a}{3}\right)$$

But centroid is (0, 0)
⇒ a + b + c = 0

Question 6:
The vertices of ΔABC are A(2, 2), B(-4, -4) and C(5, -8)
Centroid of ΔABC is given by

$$\frac{x_1+x_2+x_3}{3} = \frac{2-4+5}{3} = 1$$

$$\frac{y_1+y_2+y_3}{3} = \frac{2-4-8}{3} = \frac{-10}{3}$$

$$\therefore \text{Required centroid is } \left(1, \frac{-10}{3}\right)$$

Question 7:
Let the point C(4, 5) divides the join of A(2, 3) and B(7, 8) in the ratio k : 1
The point C is $\left(\frac{7k+2}{k+1}, \frac{8k+3}{k+1}\right)$
But C is (4, 5)

$$\Rightarrow \frac{7k+2}{k+1} = 4 \text{ or } 7k+2 = 4k+4$$

$$\text{or } 3k = 2 \therefore k = \frac{2}{3}$$

Thus, C divides AB in the ratio 2 : 3

Question 8:
The points A(2, 3), B(4, k) and C(6, -3) are collinear if area of ΔABC is zero

$$\text{Area of } \Delta ABC = \frac{1}{2}[2\times(k+3)+4\times(-3-3)+6\times(3-k)]$$

$$= \frac{1}{2}[2k+6-24+18-6k] = \frac{1}{2}[-4k]$$

$$= -2k$$

But area of ABC = 0,

$\Rightarrow k = 0$

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