

F is midpoint of AB

$$\therefore x_8 = \frac{x_1 + x_2}{2}, \quad y_8 = \frac{y_1 + y_2}{2}$$

CR:RF = 2:1, let R(x₉, y₉)

$$x_9 = \frac{2\left(\frac{x_1 + x_2}{2}\right) + x_3}{3}, \quad y_9 = \frac{2\left(\frac{y_1 + y_2}{2}\right) + y_3}{3}$$

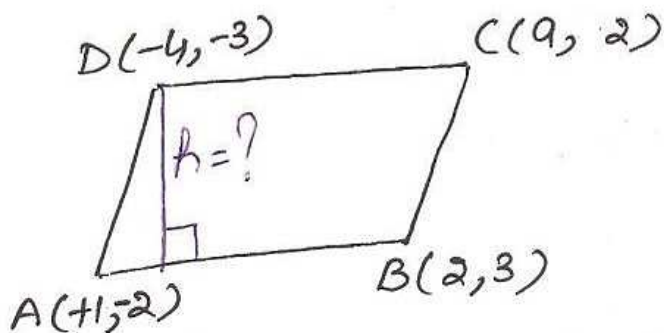
$$= \frac{x_1 + x_2 + x_3}{3}, \quad = \frac{y_1 + y_2 + y_3}{3}$$

\therefore Points P, Q, R coincide

\therefore coordinates of centroid are

$$\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3} \right)$$

(4)



diagonals of \square ABCD bisect each other
 \therefore midpoints of AC and BD coincide

$$\frac{1+a}{2} = \frac{-4+2}{2}$$

$$\Rightarrow a = -2-1$$

$$= -3$$