- distance between the points $P(x_1, y_1)$ and $Q(x_2, y_2)$ is

$$PQ = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$$

- Mid-point of two points $P(x_1, y_1)$ and $Q(x_2, y_2)$ is

$$x\text{-coordinate} = \frac{x_2-x_1}{2}$$

$$y\text{-coordinate} = \frac{y_2-y_1}{2}$$

- Area of triangle whose vertices are (x_1, y_1), (x_2, y_2) and (x_3, y_3) is

$$\frac{1}{2}\left|x_1(y_2-y_3) + x_2(y_3-y_1) + x_3(y_1-y_2)\right|$$

- condition for co-linearity of three points $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$.

slope of AB = slope of BC = slope of AC

$$\frac{(y_2-y_1)}{(x_2-x_1)} = \frac{(y_3-y_2)}{x_3-x_2} = \frac{y_3-y_1}{x_3-x_1}$$