If $d$ is the distance between two points $A(x_1, y_1)$ and $B(x_2, y_2)$ then

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad \text{or} \quad d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

If $M(x_m, y_m)$ is the midpoint of $AB$ then

$$\text{midpoint}(AB) = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

If $m$ is the slope of a line segment containing two points $A(x_1, y_1)$ and $B(x_2, y_2)$, then

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Special Cases for Slopes

(i) Slope of Horizontal Lines: $m = 0$

(ii) Slope of Vertical Lines: $m$ is undefined

(iii) Slope of Parallel Lines: $m_1 = m_2$

(iv) Slope of Perpendicular Lines: $m_1 = -\frac{1}{m_2}$ or $m_1 \times m_2 = -1$