

Slope Revisited

The slope of a line that passes through the points (x_1, y_1) and (x_2, y_2) can be determined using the formula:

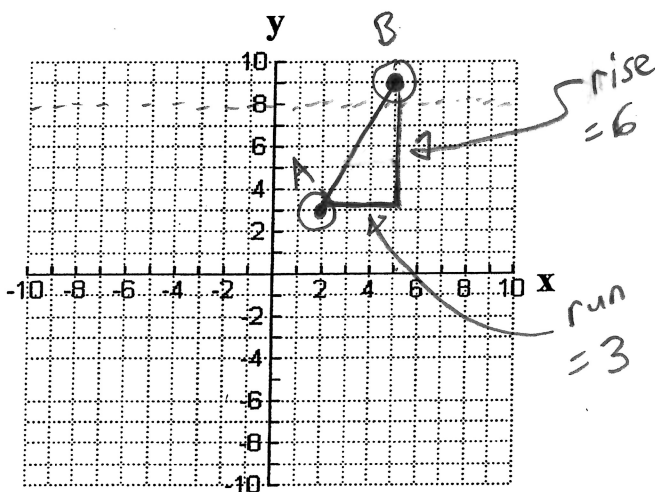
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

1. Determine the slope of the line that passes through the points A(2, 3) and B(5, 9).

$$x_1, y_1 \quad x_2, y_2$$

Method 1 (Use Graph)

Method 2 (Use Formula)



(slope)

$$m = \frac{\text{rise}}{\text{run}}$$
$$= \frac{6}{3}$$
$$= 2$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{(9) - (3)}{(5) - (2)}$$
$$= \frac{6}{3}$$
$$= 2$$

2. Use the formula to determine the slope of the line that passes through the points:

a) A(1, 5) and B(-2, -4)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{(-4) - (5)}{(-2) - (1)}$$
$$= \frac{-9}{-3}$$
$$= 3$$

b) A(-8, 4) and B(-12, 6)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{(6) - (4)}{(-12) - (-8)}$$
$$= \frac{2}{-4}$$
$$= -\frac{1}{2}$$

Creating equations in the form $y = mx + b$

Algebraically, to determine the equation of a line you require:

- the slope (m) and y-intercept (b) or ...
- the slope and a point on the line or ...
- two points on the line ...

3. Determine the equation of the line that...

- a) goes through the point $(1, 5)$ and has a slope of -2 .

$$\begin{aligned}y &= mx + b \\5 &= -2(1) + b \\5 &= -2 + b \\5 + 2 &= b \\7 &= b\end{aligned}$$

$$\begin{aligned}y &= mx + b \\y &= -2x + 7\end{aligned}$$

- b) goes through the point $(-2, 5)$ and has a slope of $\frac{1}{2}$.

$$\begin{aligned}y &= mx + b \\5 &= \left(\frac{1}{2}\right)\left(\frac{-2}{1}\right) + b \\5 &= \frac{-2}{2} + b\end{aligned}$$

$$\begin{aligned}5 &= -1 + b \\5 + 1 &= b \\6 &= b\end{aligned}$$

$$\begin{aligned}y &= mx + b \\y &= \frac{1}{2}x + 6\end{aligned}$$

4. Determine the equation of the line that...

- a) goes through the points $(2, 5)$ and $(4, 1)$.

$$\begin{aligned}m &= \frac{y_2 - y_1}{x_2 - x_1} \\&= \frac{(1) - (5)}{(4) - (2)} \\&= \frac{-4}{2} \\m &= -2\end{aligned}$$

$$\begin{aligned}y &= mx + b \\(5) &= (-2)(2) + b \\5 &= -4 + b \\5 + 4 &= b \\9 &= b\end{aligned}$$

$$\begin{aligned}y &= mx + b \\y &= -2x + 9\end{aligned}$$

- b) goes through the points $(-3, 6)$ and $(3, 8)$.

$$\begin{aligned}m &= \frac{y_2 - y_1}{x_2 - x_1} \\&= \frac{(8) - (6)}{(3) - (-3)} \\&= \frac{2}{6} \\m &= \frac{1}{3}\end{aligned}$$

$$\begin{aligned}y &= mx + b \\(8) &= \frac{1}{3}\left(\frac{3}{1}\right) + b \\8 &= \frac{3}{3} + b \\8 &= 1 + b \\8 - 1 &= b \\7 &= b\end{aligned}$$

$$\begin{aligned}y &= mx + b \\y &= \frac{1}{3}x + 7\end{aligned}$$