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Review of the Linear Function

- Slope = $\frac{\text{Rise}}{\text{Run}}$, represents a rate of change.

  - slope can be further described as...
    The symbol for slope is m

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

(use when given points or given a graph)

- The equation of line can be described by...

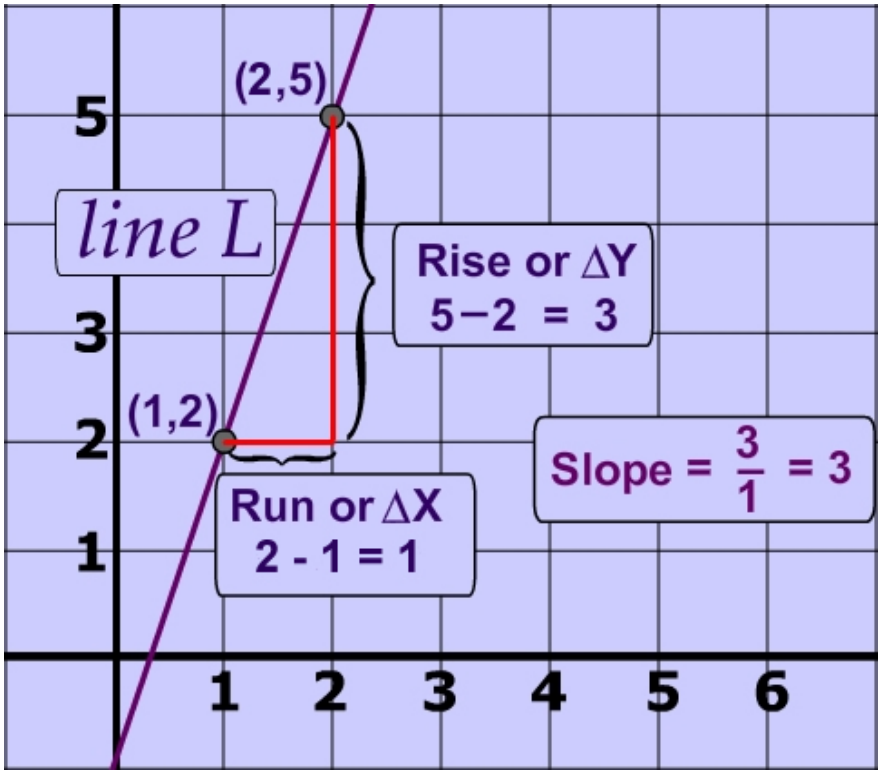
  $y = mx + b$, where m is the SLOPE

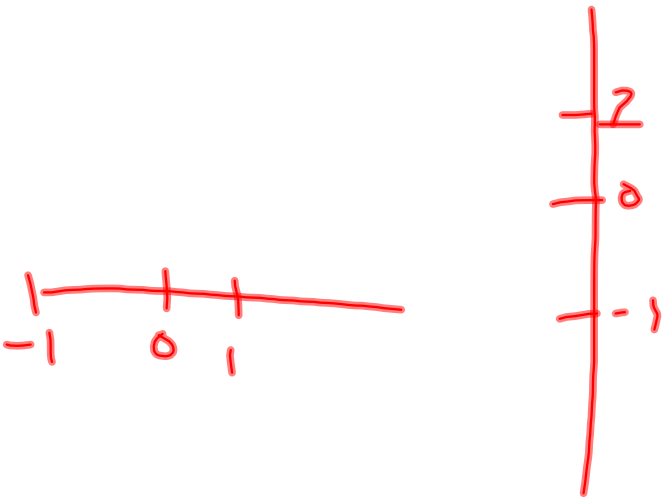
  and b is the y - intercept

- A line that rises from left to right has a positive slope. /

- A line that rises from right to left has a negative slope. \

Sample Calculation



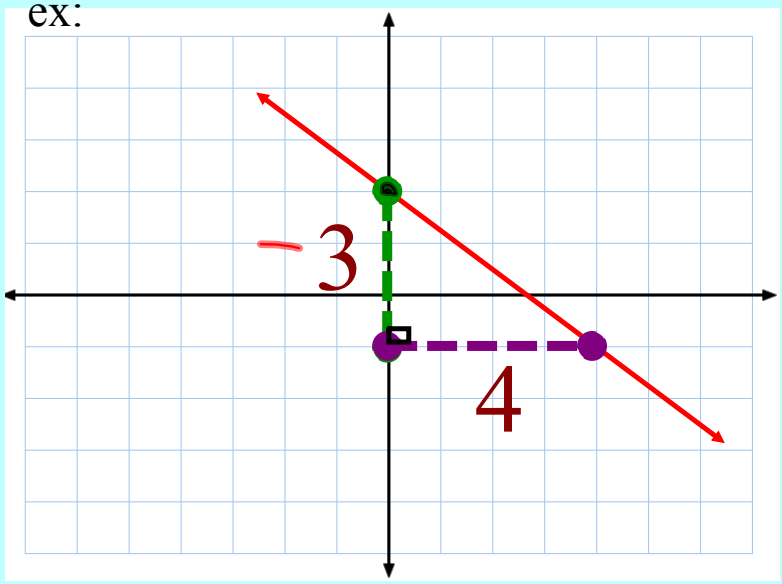


(Copy this slide in your notebooks) **Calculating Slope from...**

#1. Graph

Slope = Rise / Run

ex:



Step 1) Select 2 points from the graph

Point one is the green point
Point two is the purple point

$$m = \frac{\text{Rise}}{\text{Run}} \qquad \begin{matrix}\text{down 3}\\ \text{right 4}\end{matrix}$$

$$= \frac{-3}{4}$$

Answer

Calculating Slope from...

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#2. Two Points

$x_1\ y_1 \qquad x_2\ y_2$

ex: (-3, 5) & (1, -7)

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

Step 1) Label the point 1 (x_1, y_1) ⟶ (-3, 5)

Label the point 2 (x_2, y_2) ⟶ (1, -7)

$$\frac{-7-5}{1+3}$$

Step 2) Use $$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

erase to see answer

$$m = \frac{(-7) - (5)}{(1) - (-3)}$$

$$m = \frac{-12}{4}$$

reduce

$$m = -3$$

Calculating Slope from...

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#3. Equation

ex: Determine the slope of...

$$2x + y = 6$$

$y = mx + b$

slope

Step 1) Rearrange for y = mx + b (Make sure y is positive)

$$2x + y = 6$$

$$2x - 2x + y = 6 - 2x$$

$$y = -2x + 6$$

Step 2) Locate the value of "m"

The slope of the line is -2

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Finding Intercepts

- ***x* - intercept**: - a point where the graph crosses the *x*-axis.

  - to find the *x*-intercept $\Rightarrow$ let $y = 0$ & solve for x.

- ***y* - intercept**: - a point where the graph crosses the *y*-axis.

  - to find the *y*-intercept $\Rightarrow$ let $x = 0$ & solve for y.

Example: Find both intercepts given the line...

$$3x - 6y = 12$$

x intercept

$$3x - 6y = 12$$
$$3x - 6(0) = 12$$
$$3x = 12$$

solve for x

$$\frac{3x}{3} = \frac{12}{3}$$

$$x = 4$$

(4,0)

y intercept

$$3x - 6y = 12$$
$$3(0) - 6y = 12$$
$$-6y = 12$$

solve for y

$$\frac{-6y}{-6} = \frac{12}{-6}$$

$$y = -2$$

(0, -2)

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Collinear

Show that P(3,2), Q(-3, -2), and R(6,4) are collinear. What does "collinear" mean???

Step1: Find the slope of all three pairs of points.

P(3,2) Q(-3, -2)

$$m_{PQ} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m_{PQ} = \frac{(-2) - (2)}{(-3) - (3)}$$

$$= \frac{(-4)}{(-6)}$$

reduce

$$= \frac{(2)}{(3)}$$

Q(-3, -2) R(6,4)

$$m_{QR} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m_{QR} = \frac{(4) - (-2)}{(6) - (-3)}$$

$$= \frac{(6)}{(9)}$$

reduce

$$= \frac{(2)}{(3)}$$

P(3,2) R(6,4)

$$m_{PR} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m_{PR} = \frac{(4) - (2)}{(6) - (3)}$$

$$= \frac{(2)}{(3)}$$

reduce

$$= \frac{(2)}{(3)}$$

Step2: If the slope of all three pairs of points is the same, the points lie on the same straight line. Thus, the 3 points are collinear.

#1 AB
P Q

#2

#3 a b c d e f

4a

#5a

#7abcd