Slope-Intercept Form

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Mathematics 9
Linear Relations
Slope-Intercept Form

A. Definitions

1. slope: ratio of the vertical change (rise) to the horizontal change (run) of a line or a line segment.

$$Slope = \frac{Rise}{Run}$$ vertical / horizontal

2. y-intercept: the y-coordinate of the point where a line or curve crosses the y-axis. It is the value of y when $x = 0$.

3. slope-intercept form: the equation of a line written in the form $y = mx + b$, where m represents the slope of the line and b represents the y-intercept of the line.

B. Understanding Slope-Intercept Form

Slope-intercept forms is one of the most useful ways to see the equation of a line presented because it gives you two of the most important pieces of information about the line; the slope and the y-intercept.

Examples

1) Determine the slope and the coordinates of the y-intercept of the following equations.

$y = mx + b$ (slope, y-int)

a) $y = -4x + 7$

Slope = -4
y-int $(0, 7)$

b) $y = \frac{3}{5}x + 1$

Slope = $\frac{3}{5}$
y-int $(0, 1)$

2) Write the equation of a line in Slope-Intercept Form with:

a) slope = $\frac{1}{2}$ (m), y-intercept = $(0,-7)$ (b)

$y = \frac{1}{2}x - 7$

b) slope = -3, y-intercept = $(0,4)$

$y = -3x + 4$

3) For the equation $y = \frac{2}{3}x + b$, what is the value of b if the line passes through the point $(6,2)$?

$y = \frac{2}{3}x + b$

$(2) = \frac{2}{3}(6) + b$

$2 = 4 + b$

$-4 \quad -4$

$-2 = b.$

$\boxed{b = -2}$

4) For the equation $y = mx - 5$, what is the value of m if the line passes through the point $(-4,-3)$?

$y = mx - 5$

$(-3) = m(-4) - 5$

$-3 = -4m - 5$

$+5 \quad +5$

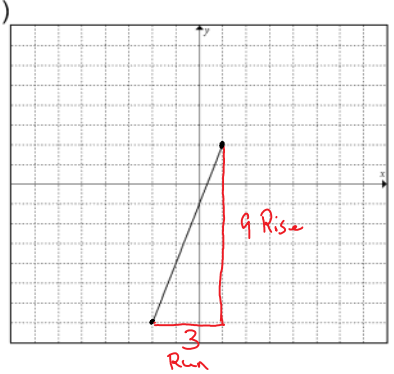
$\frac{2}{-4} = \frac{-4m}{-4}$

$\boxed{m = -\frac{1}{2}}$

C. Calculating the Slope of a Line

1) Find the slope of the following line segments.

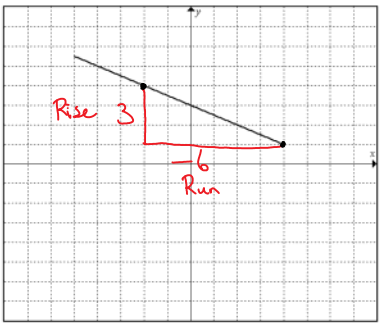
a)



$\text{Slope} = \frac{\text{Rise}}{\text{Run}}$

$\text{Slope} = \frac{9}{3} = \boxed{3}$

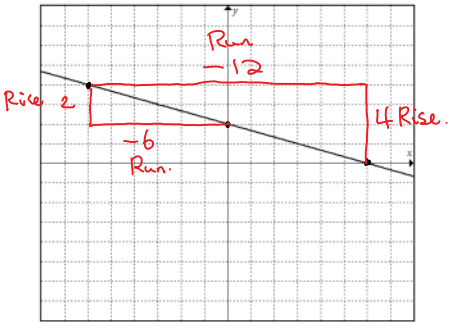
b)



$$\text{Slope} = \frac{\text{Rise}}{\text{Run}}$$

$$\text{Slope} = \frac{3}{-6} = \boxed{-\frac{1}{2}}$$

2) Find the slope of the following line.



$$\text{Slope} = \frac{\text{Rise}}{\text{Run}}$$

$$\text{Slope} = \frac{4}{-12} = \boxed{-\frac{1}{3}}$$

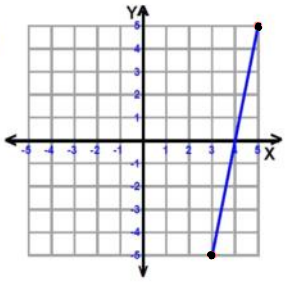
$$\text{Slope} = \frac{2}{-6} = \boxed{-\frac{1}{3}}$$

Assignment : Slope-Intercept Form Assignment

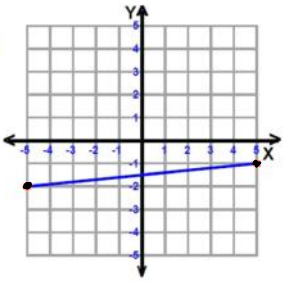
Name:_____

Slope-Intercept Form Assignment

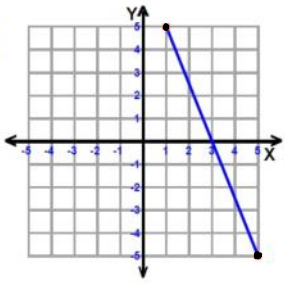
A. Find the slope of the following lines.

1) 

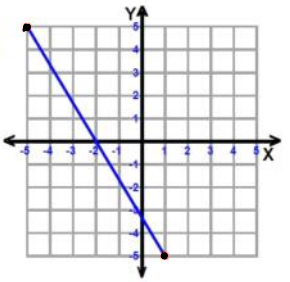
slope = _____

2) 

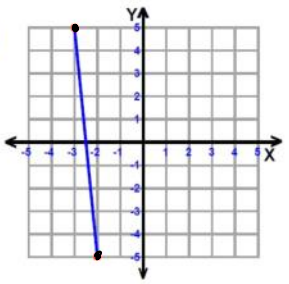
slope = _____

3) 

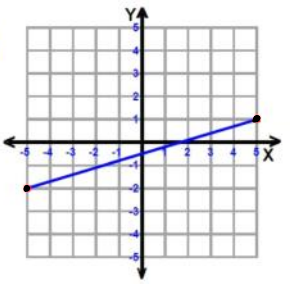
slope = _____

4) 

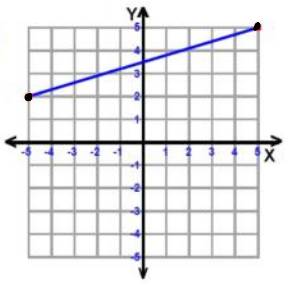
slope = _____

5) 

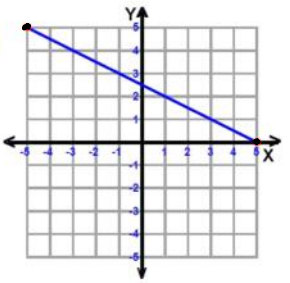
slope = _____

6) 

slope = _____

7) 

slope = _____

8) 

slope = _____

B. Determine the slope and the coordinates of the y-intercept of the following equations.

1) $y = -3x + 4$

2) $y = \frac{3}{5}x - 3$

3) $y = -\frac{1}{4}x - 5$

4) $y = 8x + 1$

C. Write the equation of a line in Slope-Intercept Form with:

1) slope = -6, y-intercept = $(0,-2)$

2) slope = $-\frac{1}{3}$, y-intercept = $(0,4)$

3) slope = $\frac{2}{5}$, y-intercept = $(0,9)$

4) slope = 12, y-intercept = $(0,-15)$

D. For equation $y = \frac{1}{2}x + b$, what is the value of b if the line passes through the point $(8,-2)$?

E. For the equation $y = mx + 4$, what is the value of m if the line passes through the point $(2,-2)$?

F. For the equation $y = mx - 3$, what is the value of m if the line passes through the point $(5,7)$?

G. For the equation $y = -\frac{2}{3}x + b$, what is the value of b if the line passes through the point $(9,-4)$?

Answers

A. 1) $Slope = 5$ 2) $Slope = \frac{1}{10}$

3) $Slope = -\frac{5}{2}$ 4) $Slope = -\frac{5}{3}$

5) $Slope = -10$ 6) $Slope = \frac{3}{10}$

7) $Slope = \frac{3}{10}$ 8) $Slope = -\frac{1}{2}$

B. 1) $Slope = -3$ 2) $Slope = \frac{3}{5}$

$y - \text{int}(0,4)$ $y - \text{int}(0,-3)$

3) $Slope = -\frac{1}{4}$ 4) $Slope = 8$

$y - \text{int}(0,-5)$ $y - \text{int}(0,1)$

C. 1) $y = -6x - 2$ 2) $y = -\frac{1}{3}x + 4$

3) $y = \frac{2}{5}x + 9$ 4) $y = 12x - 15$

D. $b = -6$

E. $m = -3$

F. $m = 2$

G. $b = 2$