

# Chapter 6: Linear Functions

[http://www.youtube.com/watch?v=tMhF-1ew\\_bM&feature=related](http://www.youtube.com/watch?v=tMhF-1ew_bM&feature=related)



1







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A wheelchair ramp should not exceed a slope of 0.125.



8



Building stairs should not exceed a slope of 0.83





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# Calculating slope!

Same as rate of change



$$\text{slope} = \frac{\text{rise}}{\text{run}}$$





Some roofs are steeper than others. Steeper roofs are more expensive to shingle. The steepness of a roof is measured by calculating its slope.

$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

The **rise** is the vertical distance from the bottom of the edge of the roof to the top.

The **run** is the corresponding horizontal distance.

For each roof, we count units to determine the rise and the run.

Roof A



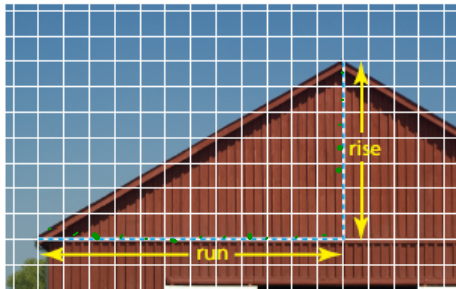
For Roof A

$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

$$\text{Slope} = ? \frac{13}{13} = 1$$

6.1 Slope of a Line

Roof B



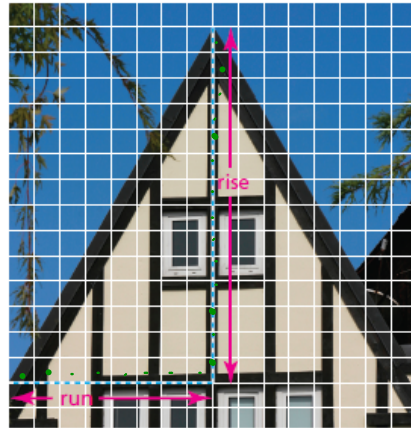
For Roof B

$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

$$\frac{7}{12}$$

Slope = ?

Roof C



For Roof C

$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

$$\frac{14}{8}$$

Slope = ?

6.1 Slope of a Line



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$$\frac{7}{12}$$

$$\frac{14}{8}$$

The slope of a line segment on a coordinate grid is the measure of its rate of change. From Chapter 5, recall that:

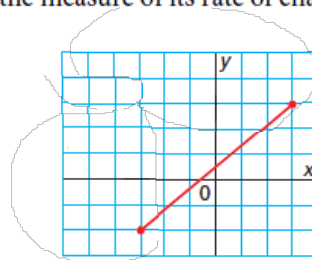
$$\text{Rate of change} = \frac{\text{change in dependent variable}}{\text{change in independent variable}}$$

$$\text{Rate of change} = \frac{\text{change in } y}{\text{change in } x}$$

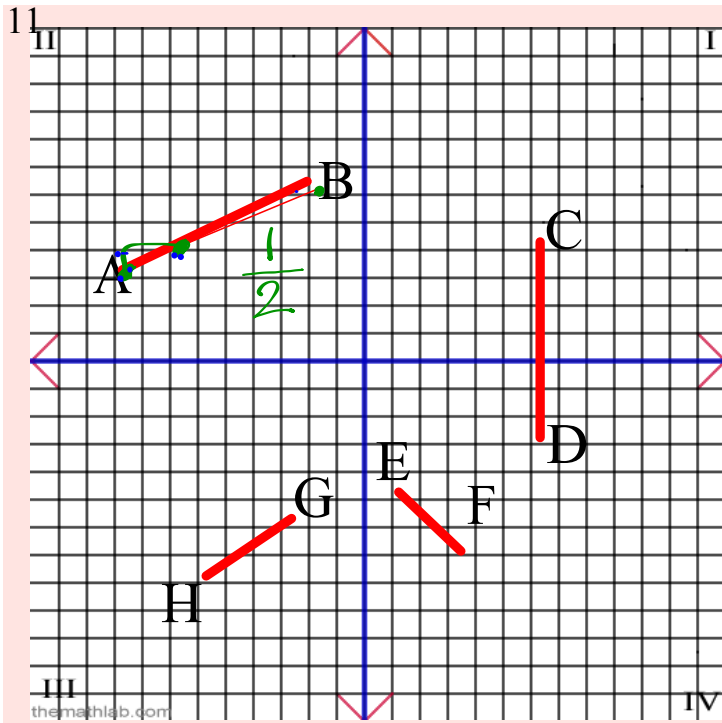
The change in  $y$  is ?

The change in  $x$  is ?

$$\text{So, slope} = \frac{\text{rise}}{\text{run}}$$







slope =  $\frac{\text{rise}}{\text{run}}$

This is used when you can see the graph!

$$\frac{\text{rise}}{\text{run}}$$

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# Calculating slope!

$y = 3x + 4$

$y = mx + b$

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

$(x_1, y_1)$   
 $(x_2, y_2)$

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Find the slope of a line passing through the points  $(2, -3)$  and  $(-5, 8)$ .

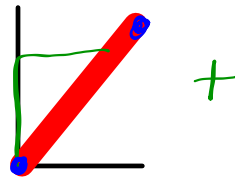
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$(x, y)$

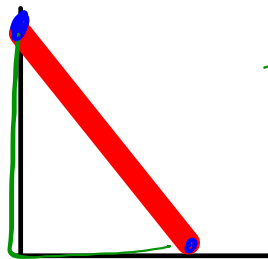
This is used when you are given co-ordinates.

$$m = \frac{8 - (-3)}{-5 - 2} = \frac{11}{-7} = -\frac{11}{7}$$

Positive Slope- the line goes up and to the right



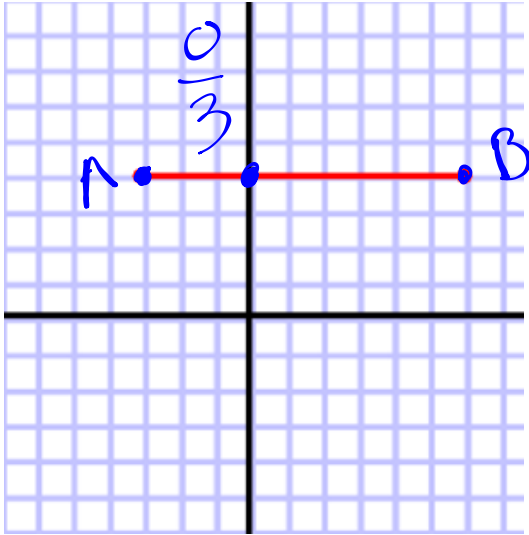
Negative Slope- the line goes down and to the right





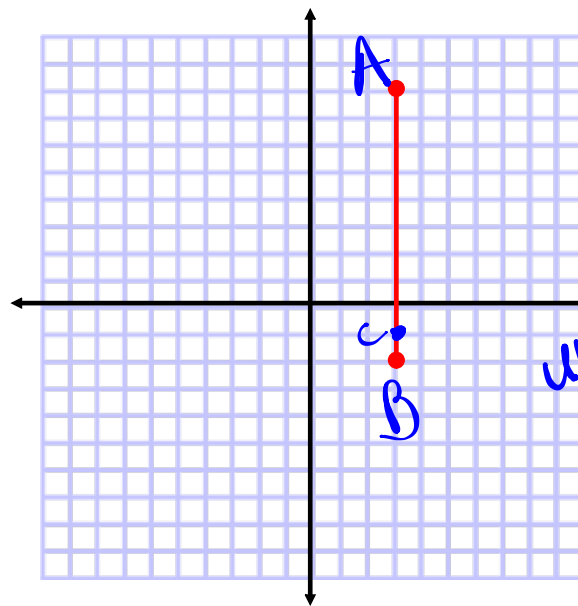
# Horizontal Line

→ slope is always zero!



$$\frac{0}{9} = 0$$

Vertical Line



$$\frac{-9}{0}$$

UDF

undefined

Vertical Line

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$\frac{8-5}{2-3}$  Calculate the slope.

1.  $(3,5)$   $(2,8)$

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

$$m = \frac{8-5}{2-3}$$

$$m = \frac{3}{-1} = -3$$

$$m = \frac{-3}{1}$$

2.  $(-9,-2)$   $(7,3)$

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

$$m = \frac{3 - (-2)}{7 - (-9)}$$

$$m = \frac{3+2}{7+9}$$

$$m = \frac{5}{16}$$

$(x, y)$

$(x_2, y_2)$   $(x_1, y_1)$

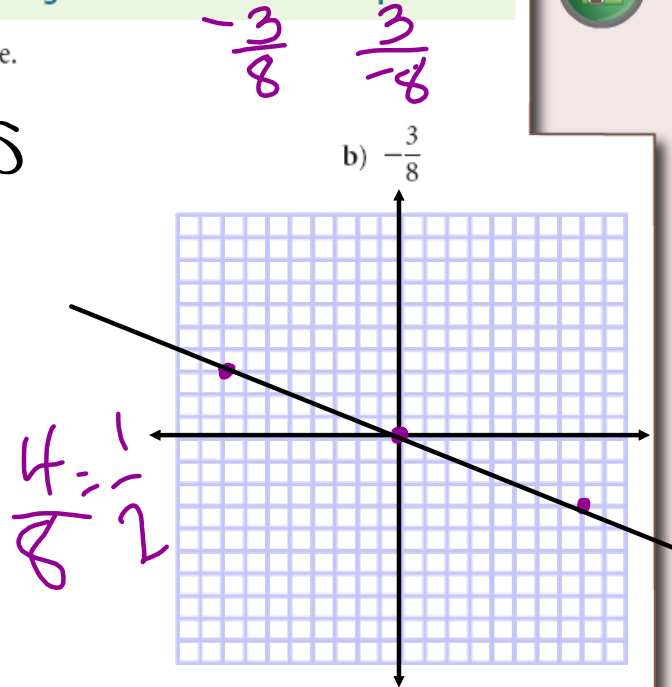
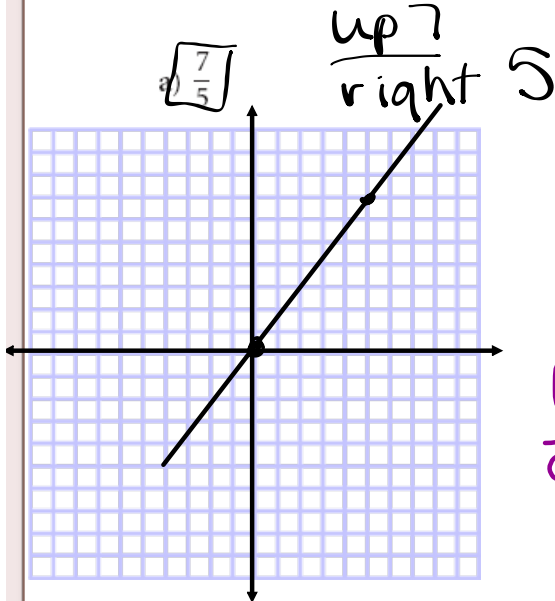
$(-9, -2)$   $(7, 3)$

$$\frac{-2 - 3}{-9 - 7} = \frac{-5}{-16}$$

$$\frac{5}{16}$$

**Example 2** Drawing a Line Segment with a Given Slope

Draw a line segment with each given slope.

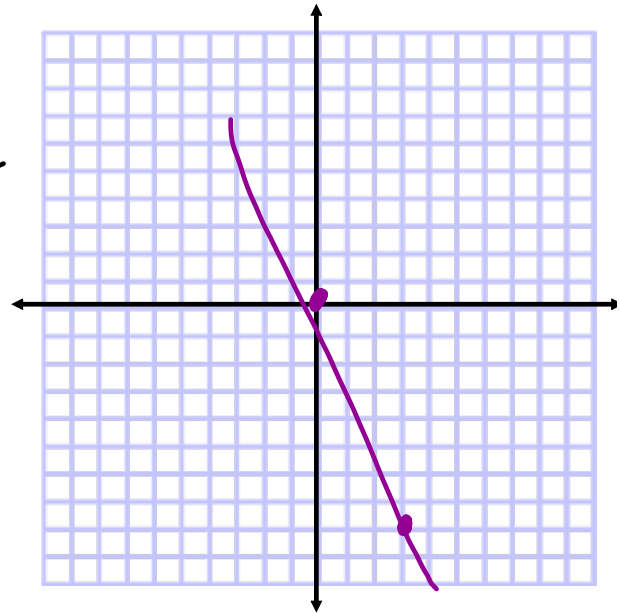
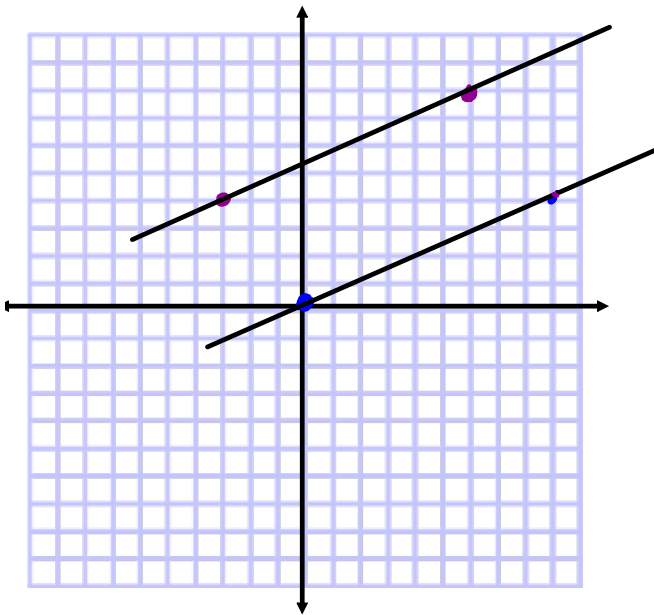




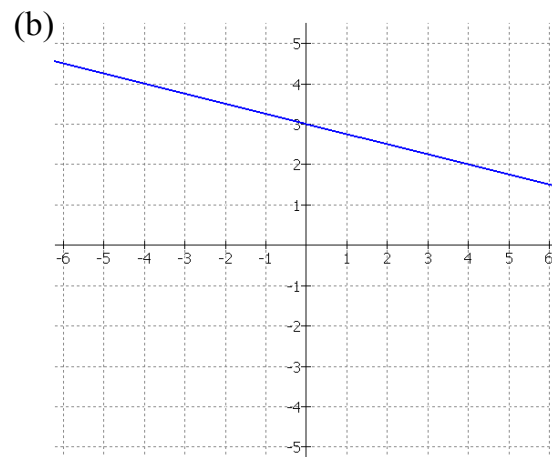
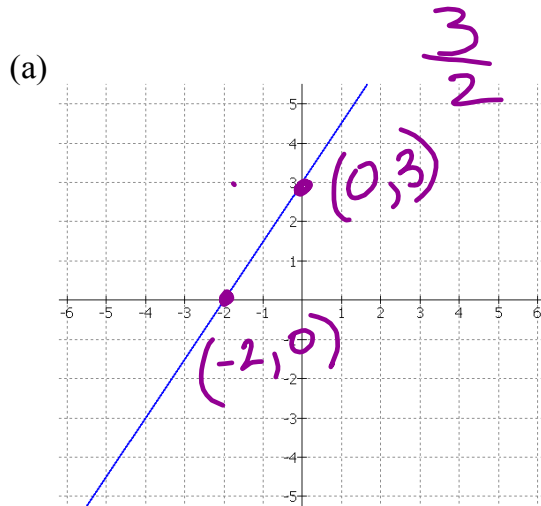
2. Draw a line segment with each slope.

a)  $\frac{4}{9} = \frac{-4}{-9}$

b)  $\frac{8}{3}$



Determine the slope of each of the following lines:



Which ordered pairs should we use to make our calculation?

$$\text{slope} = \frac{\Delta y}{\Delta x}$$

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

$$\text{slope} = \frac{\Delta y}{\Delta x}$$

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

