

# 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)





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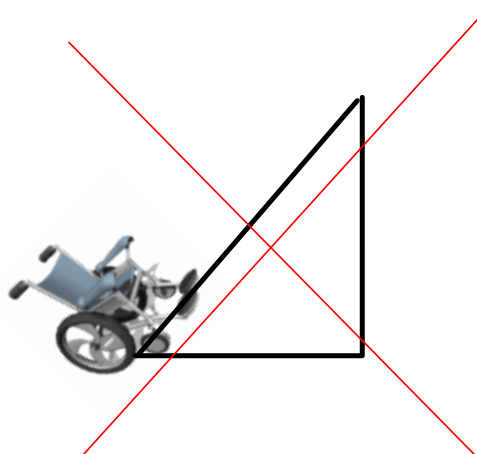
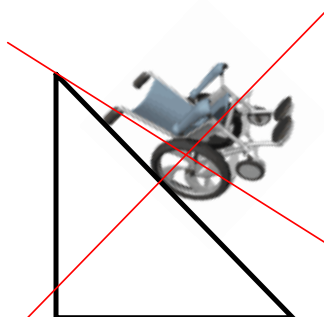


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7

A wheelchair ramp should not exceed a slope of 0.125.



8



Building stairs  
should  
not exceed  
a slope of  
0.83

6



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# Calculating slope!

Same as rate of change  
use this when you see a graph

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





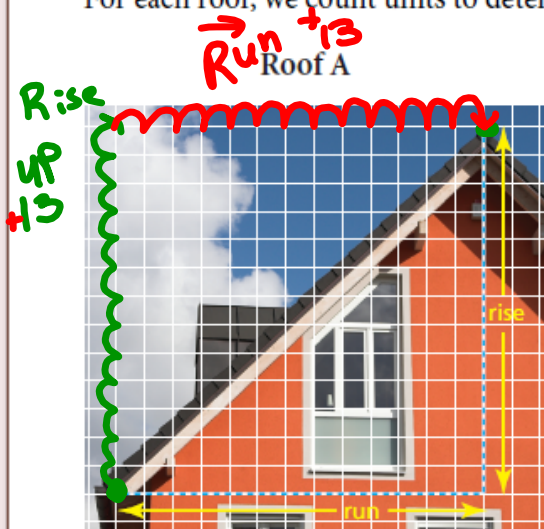
Some roofs are steeper than others. Steeper roofs are more expensive to shingle. The steepness of a roof is measured by calculating its **slope**.

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

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.



For Roof A

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{+13}{+13} = 1$$

Slope = ?

$$y = mx + b$$

↑ slope      ↑ y-intercept

Ex)  $y = -3x + 4$

$m = -3$

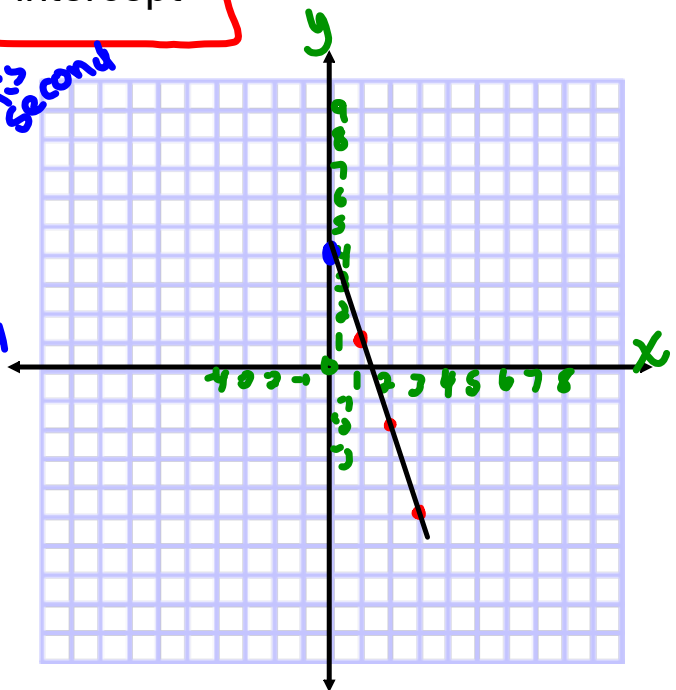
y-intercept =  $+4$

use this second

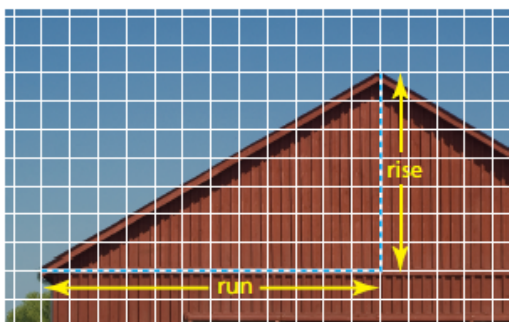
$\frac{-3}{1}$  rise  
run

← plot first

Sketch using these two pieces of information



Roof B

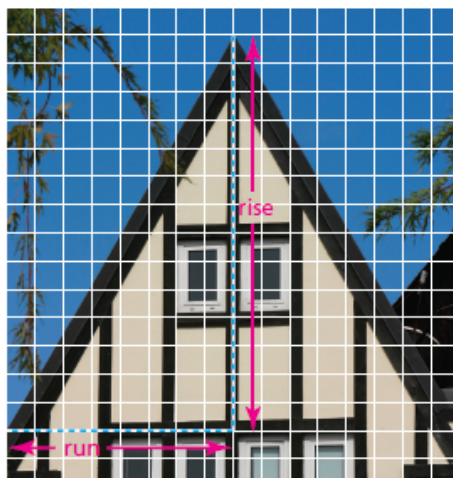


For Roof B

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

Slope = ?

Roof C



For Roof C

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

Slope = ?

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

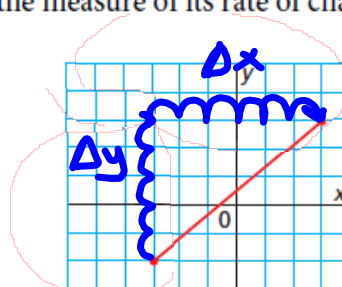
$$\text{Rate of change} = \frac{\text{change in dependent variable}}{\text{change in independent variable}}$$

$$\text{Rate of change} = \frac{\text{change in } y}{\text{change in } x} = \frac{+5}{+6} = \frac{5}{6}$$

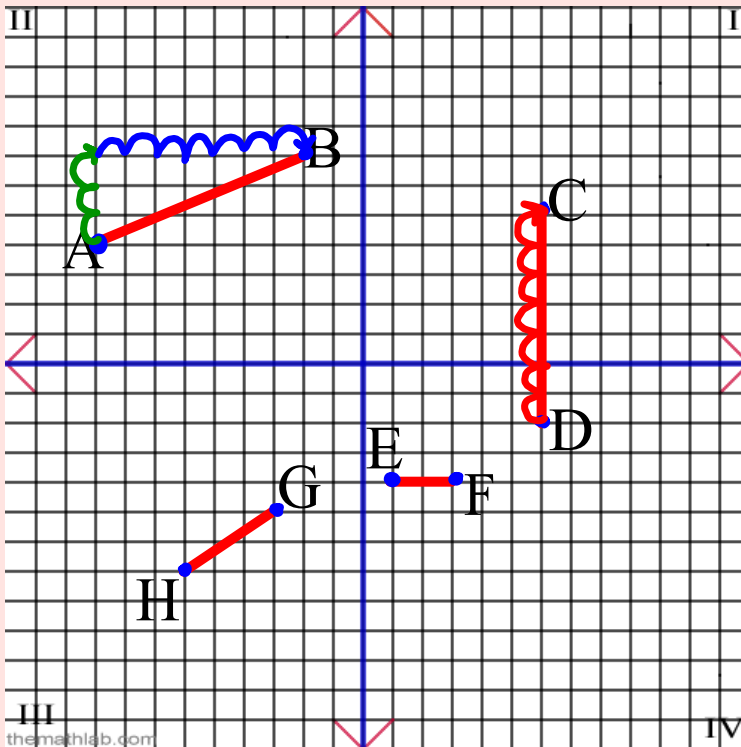
The change in  $y$  is ?

The change in  $x$  is ?

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



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

This is used  
when you  
can see the  
graph!



$$M_{AB} = \frac{\text{rise}}{\text{run}} = \frac{3}{7}$$

Vertical line

$$M_{CD} = \frac{\text{rise}}{\text{run}} = \frac{7}{0} = \text{undefined}$$

Horizontal lines

$$M_{EF} = \frac{\text{rise}}{\text{run}} = \frac{0}{2} = 0$$

$$M_{HG} = \frac{\text{rise}}{\text{run}} = \frac{2}{3}$$

# Calculating slope!

use this equations when  
Given Points

1st  
point

$(x_1, y_1)$

slope

2nd  
Point

$(x_2, y_2)$

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

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

$x_1$   $y_2$

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

This is used when you are given co-ordinates.

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

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

← tidy up signs

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

$$m = \frac{11}{-7}$$

## YOU TRY

Find the slope of a line passing through the points  $(7,5)$  and  $(8,-2)$ .

$x_1$   $y_1$   
 $x_2$   $y_2$

OR

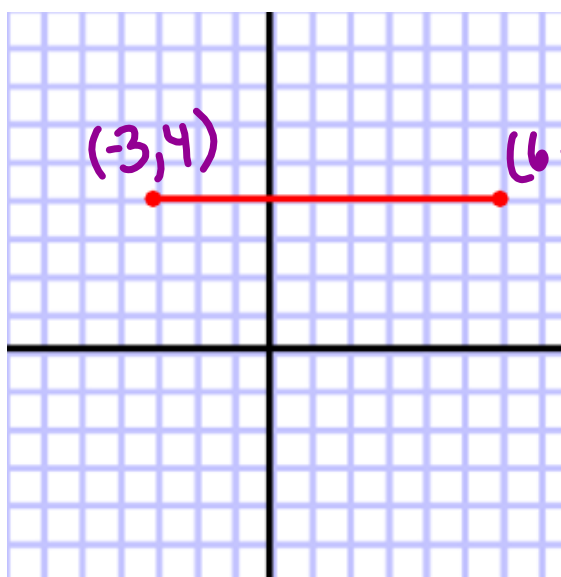
$$\frac{5 - -2}{7 - 8} = \frac{5+2}{7-8} = \frac{7}{-1}$$

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{(-2) - (5)}{8 - 7} \\ &= \frac{-7}{1} \end{aligned}$$



# Horizontal Line

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



Pick two points

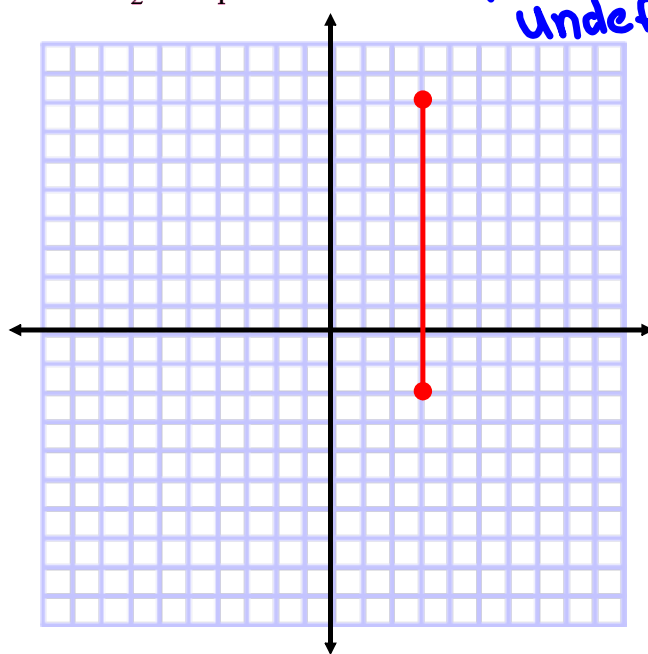
$$\frac{4 - 4}{6 - (-3)} = \frac{0}{9} = 0$$

Horizontal lines  
have a slope  
of zero.

Vertical

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

Study Vertical lines have Slopes that are Undefined.



Line

