



# Find and Use Slopes of Lines

UNIT 3 LESSON 4



# Objective

The student will be able to:

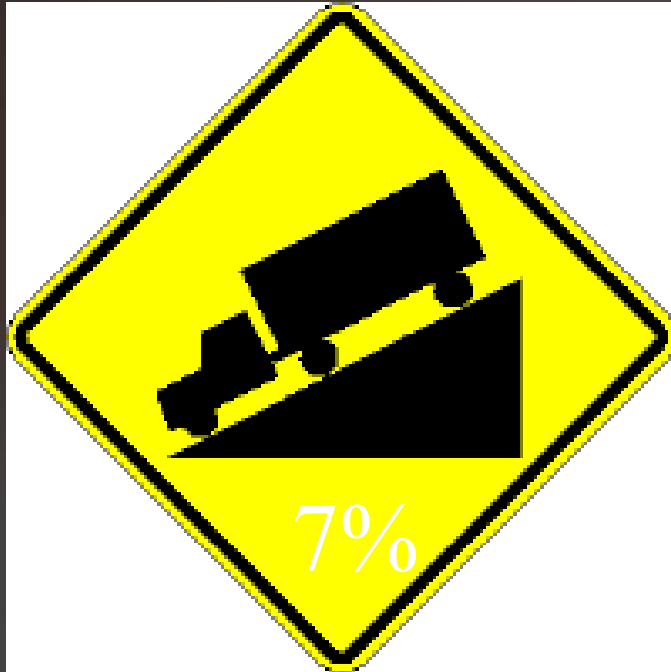
find the slope of a line given 2 points and  
a graph.

# What is the meaning of this sign



1. Icy Road Ahead
- ✓ 2. Steep Road Ahead
3. Curvy Road Ahead
4. Trucks Entering Highway Ahead

# What does the 7% mean?



7% IS THE SLOPE OF THE ROAD.  
IT MEANS THE ROAD DROPS 7 FEET  
VERTICALLY FOR EVERY 100 FEET  
HORIZONTALLY.



So, what is slope???

Slope is the steepness of a line.

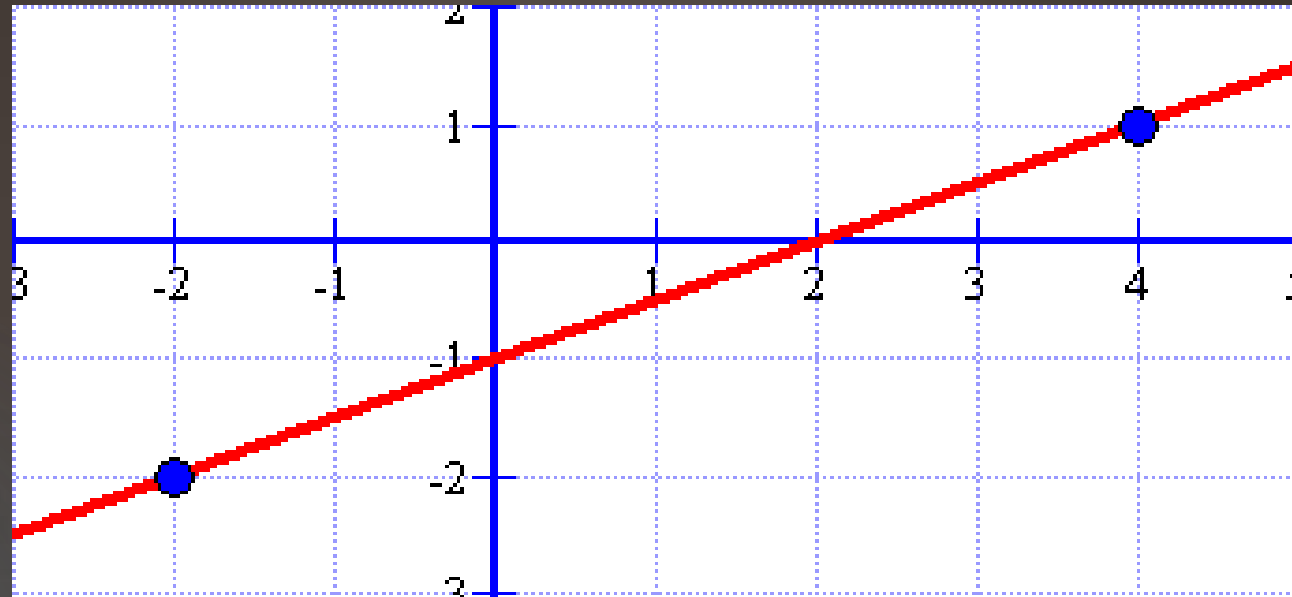
Slope can be expressed different ways:

$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{\textit{rise}}{\textit{run}} = \frac{\text{vertical change}}{\text{horizontal change}}$$

↗ A line has a positive slope if it is going uphill from left to right.

↘ A line has a negative slope if it is going downhill from left to right.

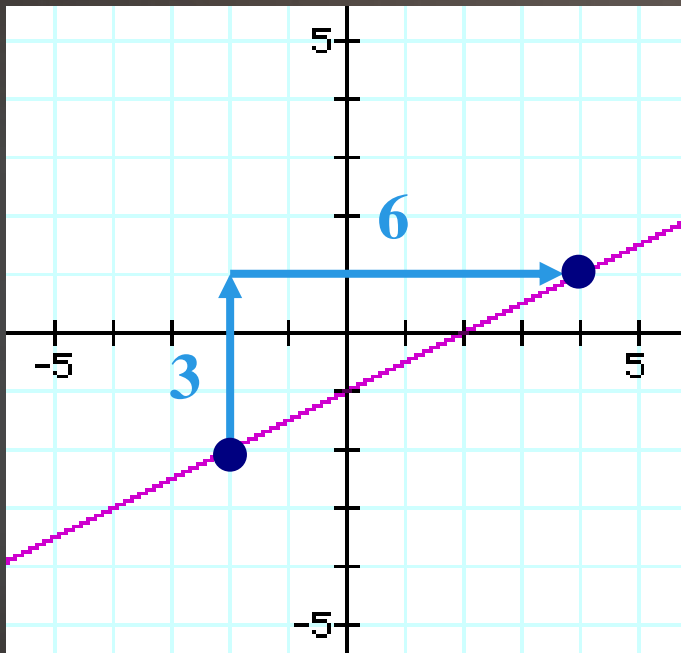
1) Determine the slope of the line.



When given the graph, it is easier to apply  
“**rise over run**”.

# Determine the slope of the line.

Start with the lower point and count how much you rise and run to get to the other point!



$$\frac{\text{rise}}{\text{run}} = \frac{3}{6} = \frac{1}{2}$$

Notice the slope is positive  
AND the line increases!

2) Find the slope of the line that passes through the points  $(-2, -2)$  and  $(4, 1)$ .

When given points, it is easier to use the formula!

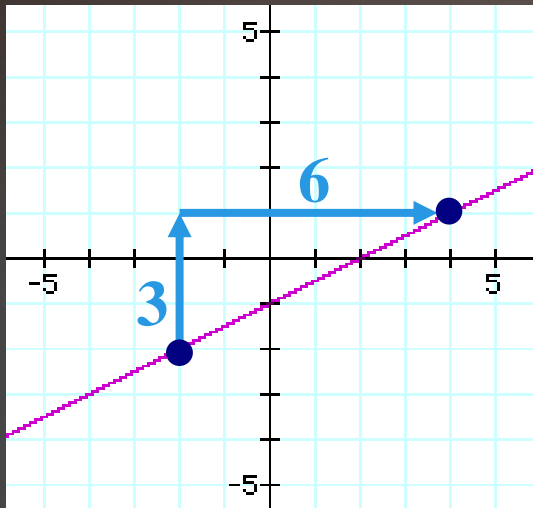
$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

$y_2$  is the  $y$  coordinate of the 2<sup>nd</sup> ordered pair ( $y_2 = 1$ )

$y_1$  is the  $y$  coordinate of the 1<sup>st</sup> ordered pair ( $y_1 = -2$ )

$$m = \frac{(1 - (-2))}{(4 - (-2))} = \frac{(1 + 2)}{(4 + 2)} = \frac{3}{6} = \frac{1}{2}$$

Did you notice that Example #1 and Example #2 were the same problem written differently?



$(-2, -2)$  and  $(4, 1)$

$$\text{slope} = \frac{1}{2}$$

You can do the problems either way!  
Which one do you think is easiest?

Find the slope of the line that passes through  $(3, 5)$  and  $(-1, 4)$ .

1. 4
2. -4
- 3.  $\frac{1}{4}$
4.  $-\frac{1}{4}$

3) Find the slope of the line that goes through the points  $(-5, 3)$  and  $(2, 1)$ .

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

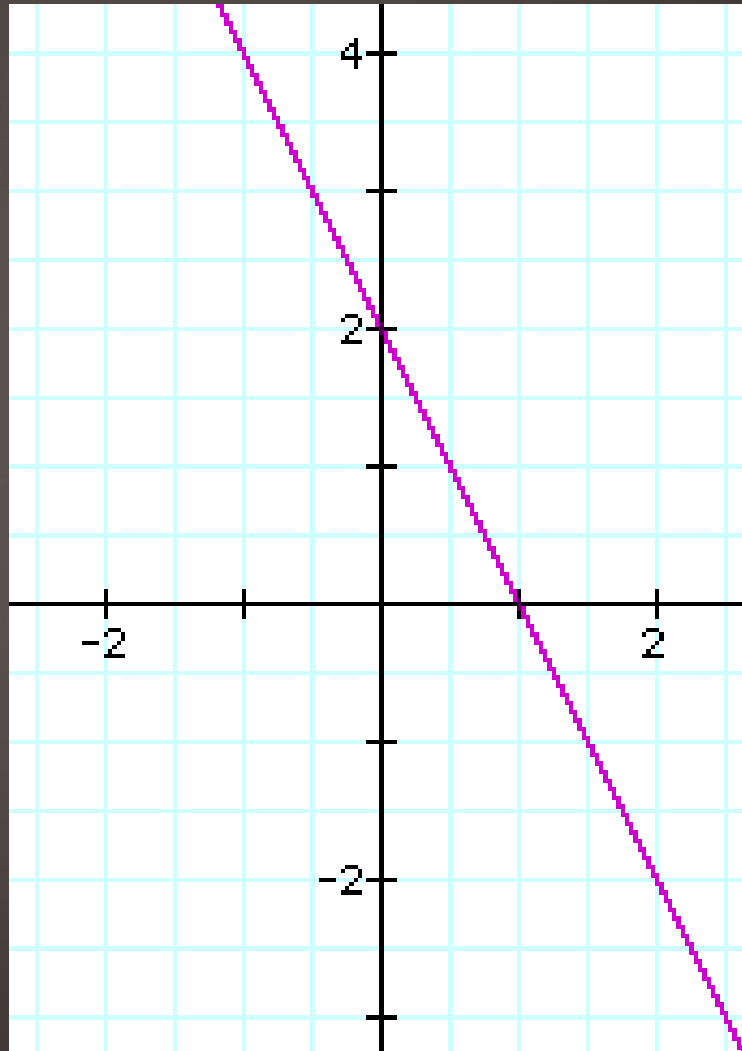
$$m = \frac{1 - 3}{2 - (-5)}$$

$$m = \frac{1 - 3}{2 + 5}$$

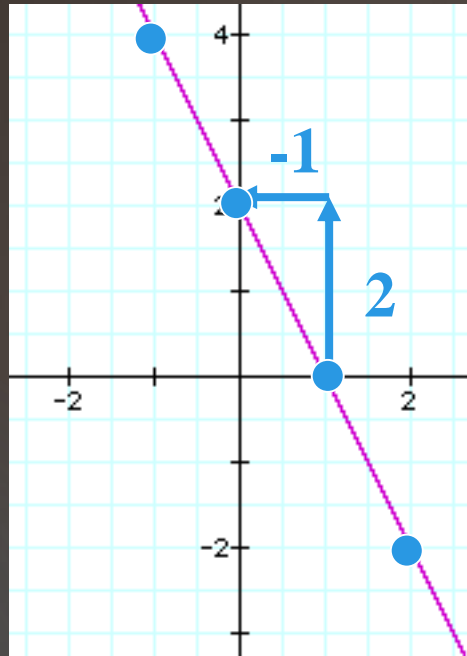
$$m = \frac{-2}{7}$$

Determine the slope of the line shown.

- ✓ 1. -2
- 2.  $-\frac{1}{2}$
- 3.  $\frac{1}{2}$
- 4. 2



Determine the slope of the line.

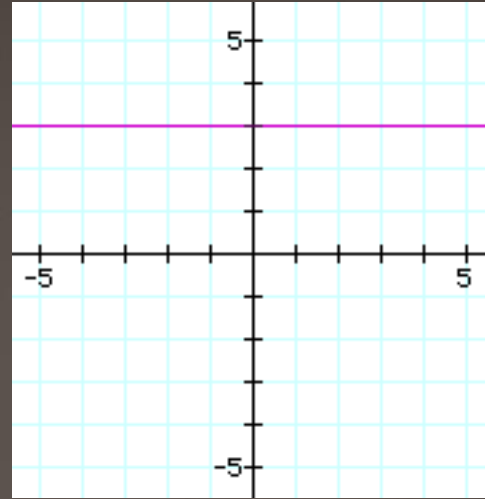


Find points on the graph.  
Use two of them and  
apply rise over run.

$$\frac{\text{rise}}{\text{run}} = \frac{2}{-1} = -2$$

The line is decreasing (slope is negative).

What is the slope of a horizontal line?

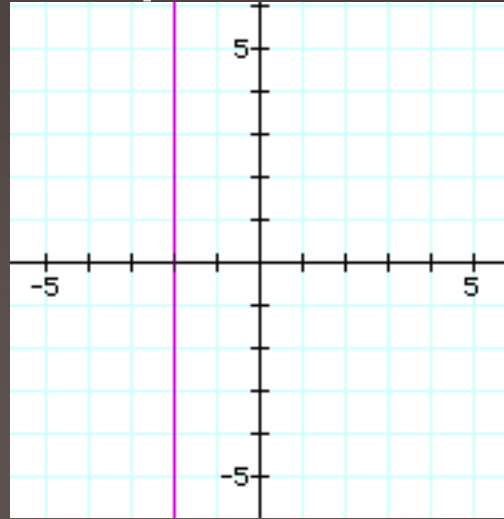


The line doesn't rise!

$$m = \frac{0}{\text{number}} = 0$$

All horizontal lines have a slope of 0.

What is the slope of a vertical line?



The line doesn't run!

$$m = \frac{\textit{number}}{0} = \textit{undefined}$$

All vertical lines have an undefined slope.

Remember the word “VUXHOY”

**V**ERTICAL LINES

**U**NDEFINED SLOPE

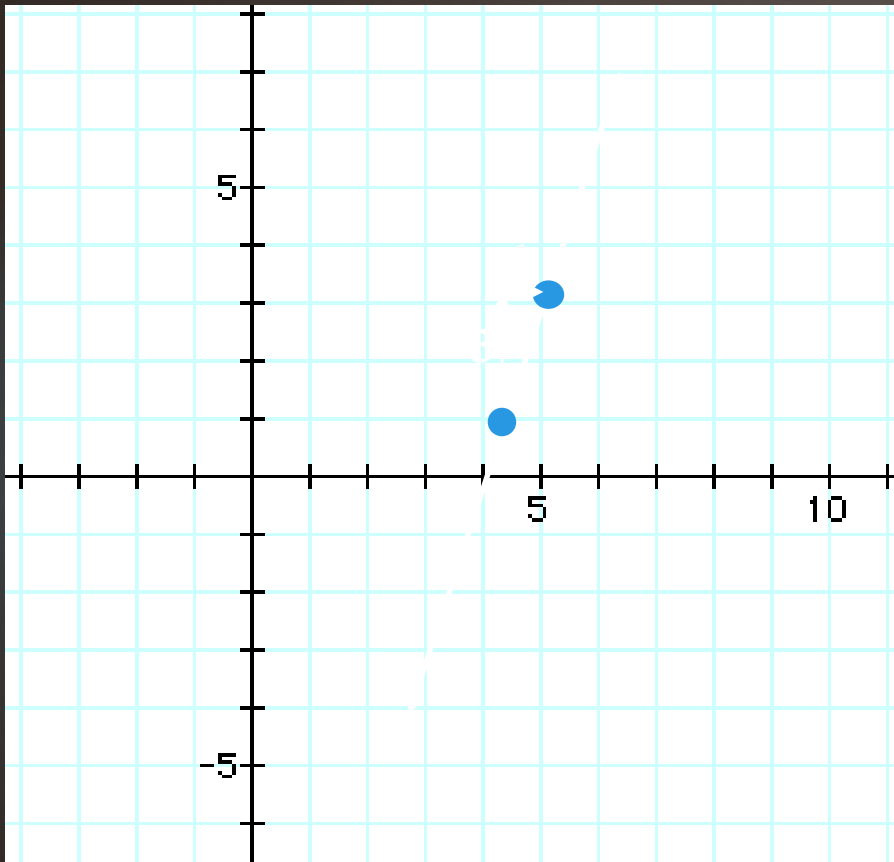
**X** = NUMBER; THIS IS THE EQUATION OF THE LINE.

**H**ORIZONTAL LINES

**0** - ZERO IS THE SLOPE

**Y** = NUMBER; THIS IS THE EQUATION OF THE LINE.

Draw a line through the point  $(2,0)$  that has a slope of 3.



1. Graph the ordered pair  $(2, 0)$ .
2. From  $(2, 0)$ , apply rise over run (write 3 as a fraction).
3. Plot a point at this location.
4. Draw a straight line through the points.

The slope of a line that goes through the points  $(r, 6)$  and  $(4, 2)$  is 4. Find  $r$ .

To solve this, plug the given information into the formula

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

$$4 = \frac{2 - 6}{4 - r}$$

To solve for  $r$ , simplify and write as a proportion.

$$4 = \frac{2-6}{4-r} \quad \longrightarrow \quad \frac{4}{1} = \frac{-4}{4-r}$$

Cross multiply.

$$\frac{4}{1} = \frac{-4}{4-r}$$

$$1(-4) = 4(4-r)$$

Simplify and solve the equation.

$$1(-4) = 4(4 - r)$$

$$\begin{array}{r} -4 = 16 - 4r \\ -16 \quad -16 \\ \hline -20 = -4r \\ \hline -4 \quad -4 \\ 5 = r \end{array}$$

The ordered pairs are (5, 6) and (4, 2)