Slope of a Line

Grade: 7, pre-algebra

**Objective:**   Find the slope of a line, and use slope to understand graphs.

Standard: 7th grade, Algebra & Functions 3.3, Graph linear functions, noting the vertical change (change in y-value) per unit of horizontal change (change in x-value) is always the same and know the ratio ("rise over run") is called the slope of a graph.

Prerequisites: Family of Functions Lesson, this can also be done as part of this lesson.

Best Practices: Warm-ups, Syntax, Choral Response, You Trys, Side-by-side, active student engagement.

## *Part 1: What does slope mean?*

Show the graph:
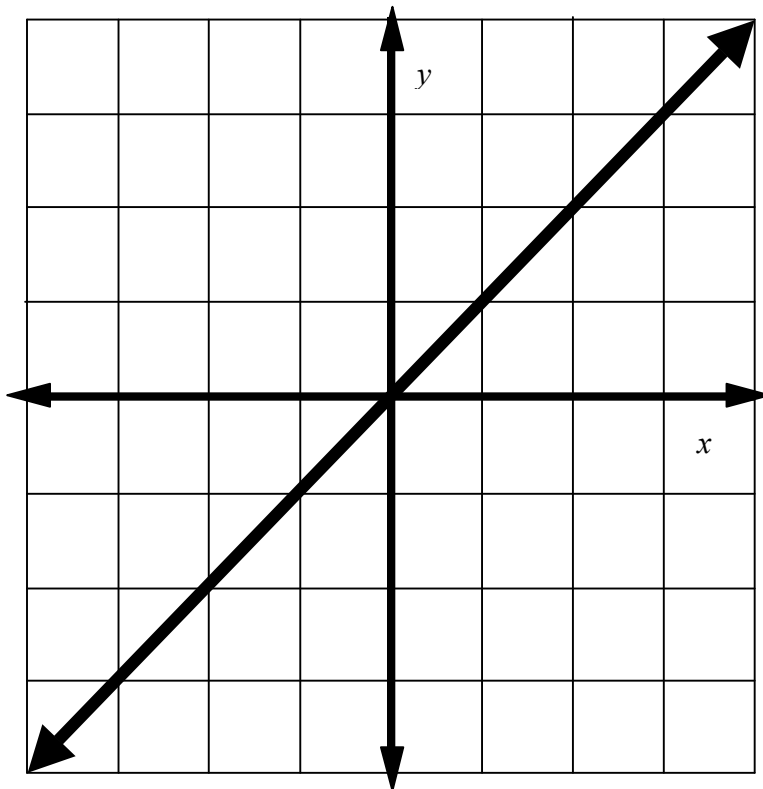
What linear function does this graph show?
[The Mother] Students should make the mother with their arms.

What is the equation?
$[y = x]$

Tell what you notice about the line.
[it splits the graph exactly in two, it is exactly in between the x and y axis, it crosses both axis' at 0, it is diagonal]
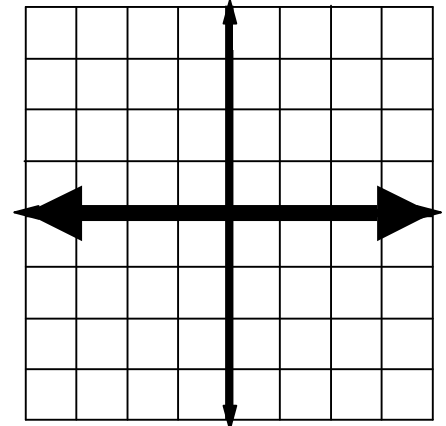
This line has a slope that is equidistant from both axis'. We can change the equation so the slope will be closer or farther from the x-axis. This will change the steepness of the line. The slope of this line is positive 1.
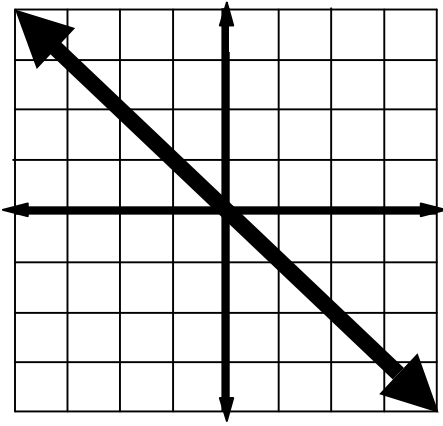
Negative slope
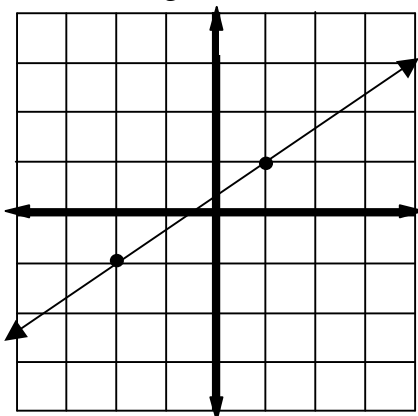$y = {}^-x$
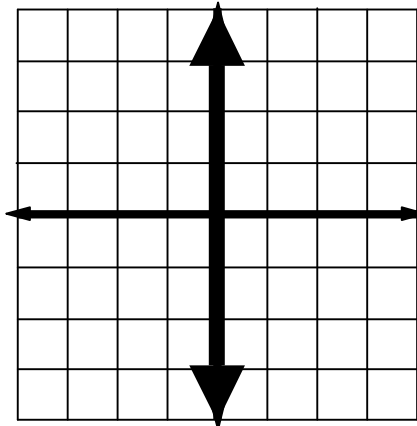
Undefined slope
$x = 0$

Zero slope
$y = 0$

Part 2: How do we find slope?

Graph

We can use a graph to determine the slope by measuring the *rise*(gain or loss vertically) in relation to the *run*(gain or loss horizontally). We write this as a fraction.

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

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

Is this line positive or negative?
[positive]
What is the rise?
[2]
What is the run?
[3]

Therefore the slope is $\frac{2}{3}$.

Table

We can use a table to determine the slope by measuring the change from point to point.

We read our graphs left to right, so we write our points in order from left to right.
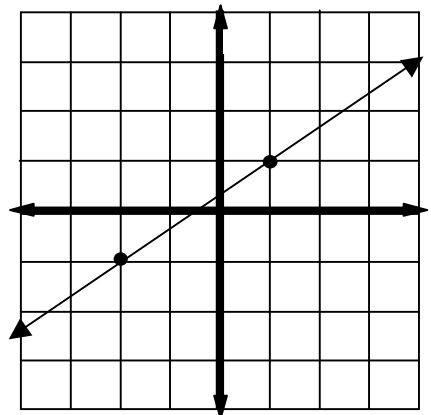
x	y
-2	-1
1	1
4	3
7	5

+3   +2
+3   +2
+3   +2

Remember:
$$\text{slope} = \frac{\text{change in } y}{\text{change in } x}$$

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

Formula

We can use a formula to determine the slope by plugging in the *x* and *y* values.

What is the first point marked on the line on the graph?
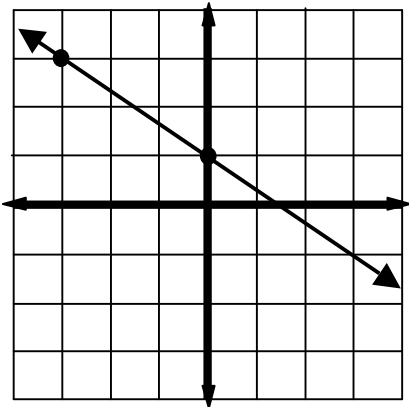$$\left[\left({}^-2, {}^-1\right)\right]$$

What is the next point on the line?
$$\left[(1, 1)\right]$$

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

$$= \frac{1 - {}^-1}{1 - {}^-2}$$

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

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Graph	**Table**	**Formula**

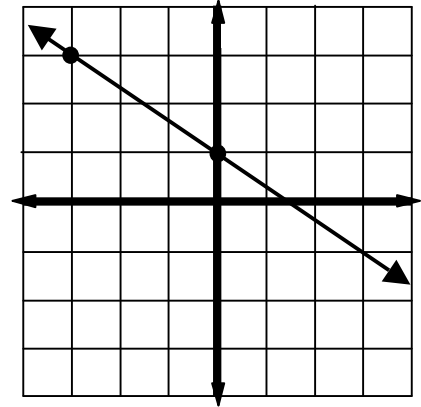| x	y
-3	3
0	1
3	-1

Is the graph positive or negative?
[negative]

What is the rise from left to right?
[-2]

What is the run from left to right?
[3]

When we plug in the rise over the run, what is our slope?
$[-\dfrac{2}{3}]$

Is the rate of change constant or variable?
[constant]

What is the rate of change for the y-values?
[-2]

What is the rate of change in the x-values?
[3]

When we plug in the change in y-values over the change in x-values, what is the slope of the line?
$[-\dfrac{2}{3}]$

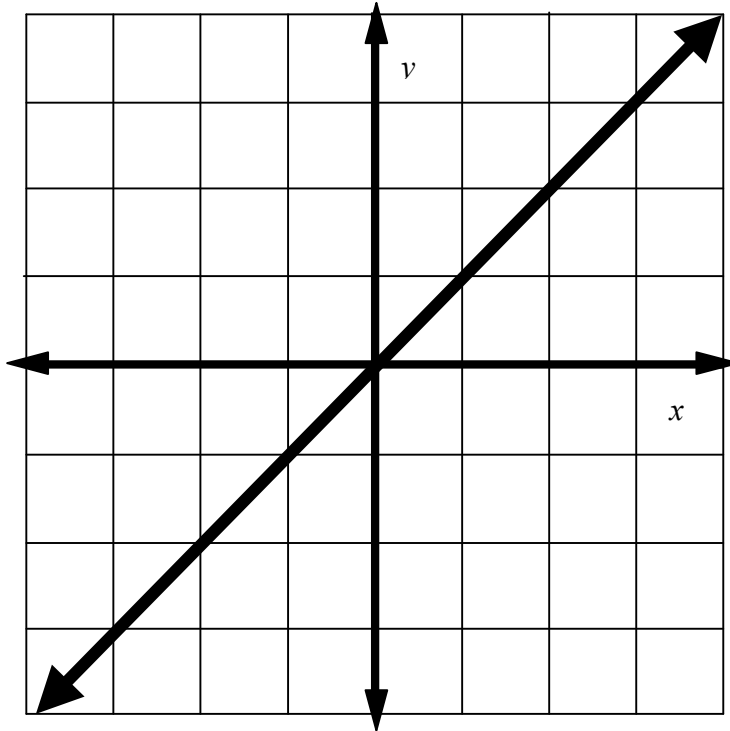What is the first point marked on the line on the graph?
[(-3,3)]

What is the next point on the line?

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

$$= \frac{3-1}{0 - ^-3}$$
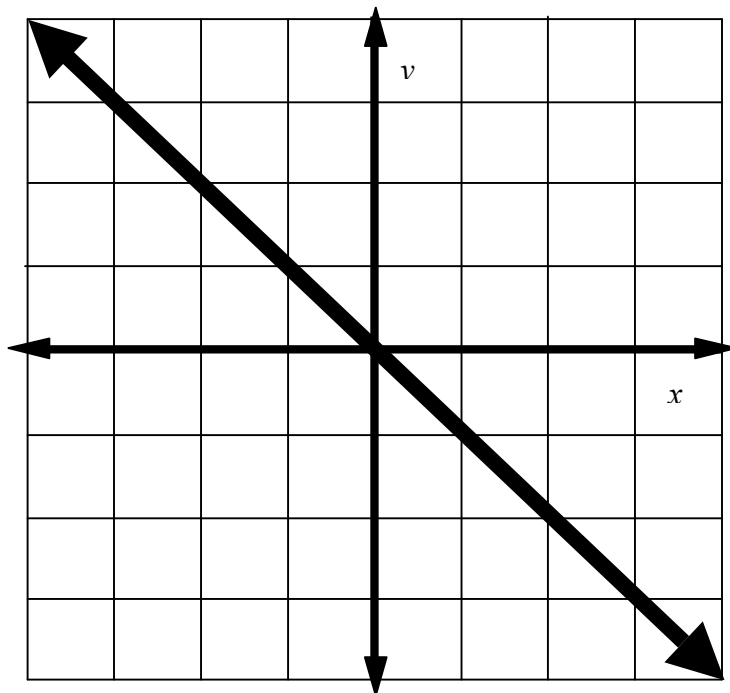
$$= -\frac{2}{3}$$

Use choral response to the above questions, also have students discuss how the different use of methods increases their understanding.
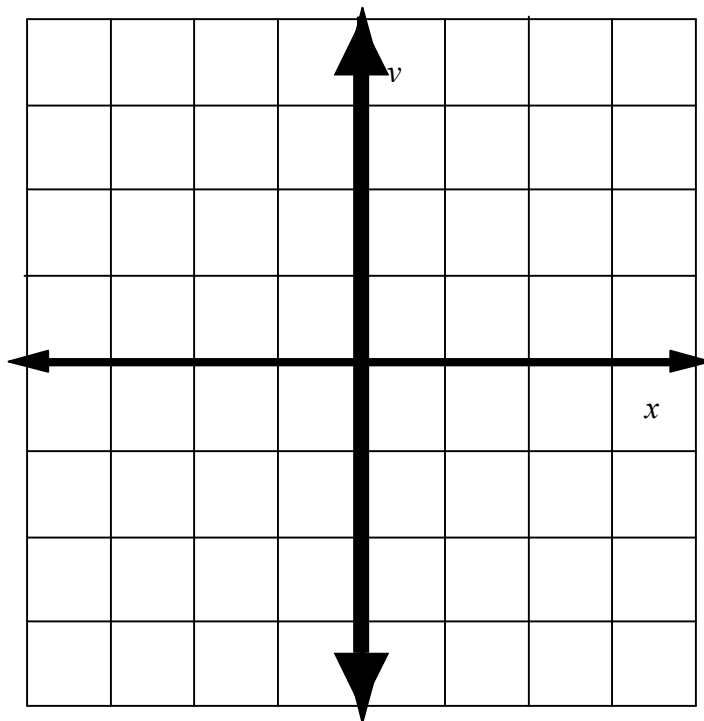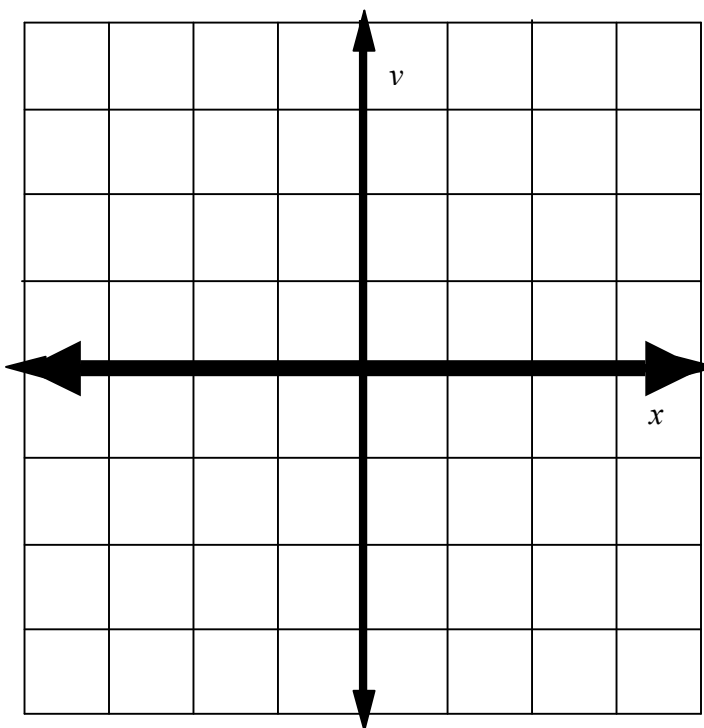
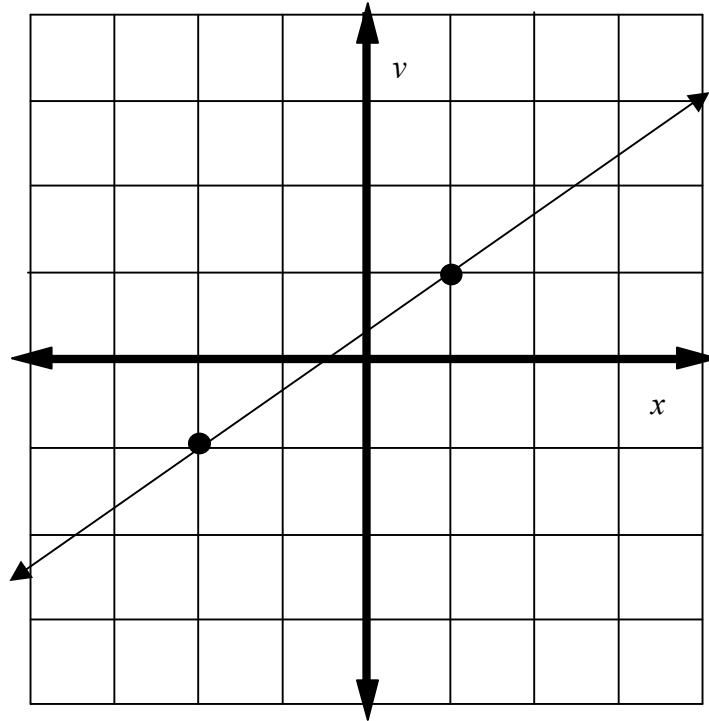# Graphs for the lesson

$y = x$

negative slope

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undefined slope

(coordinate grid with vertical line through origin, labeled y axis and x axis)

zero slope

(coordinate grid with horizontal line through origin, labeled y axis and x axis)

Problem #1

You Try #1

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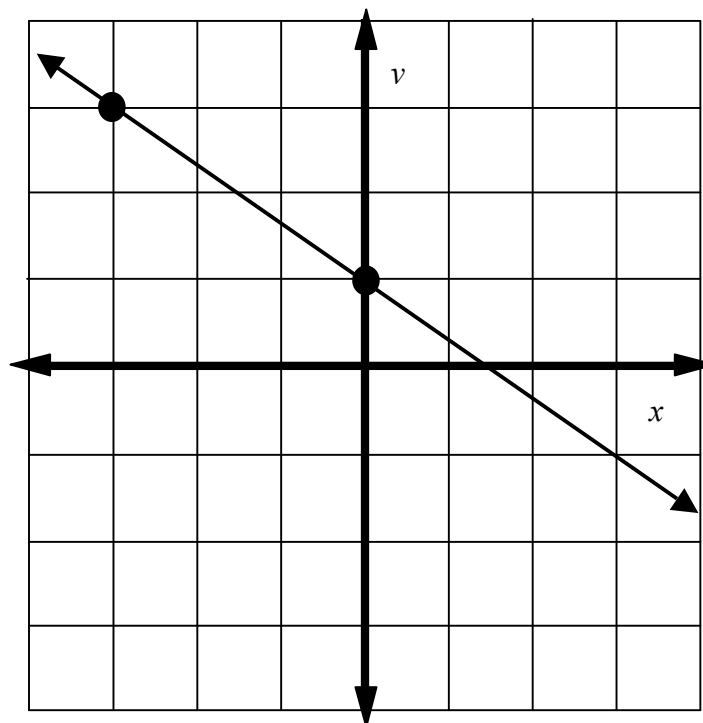
Date: _____

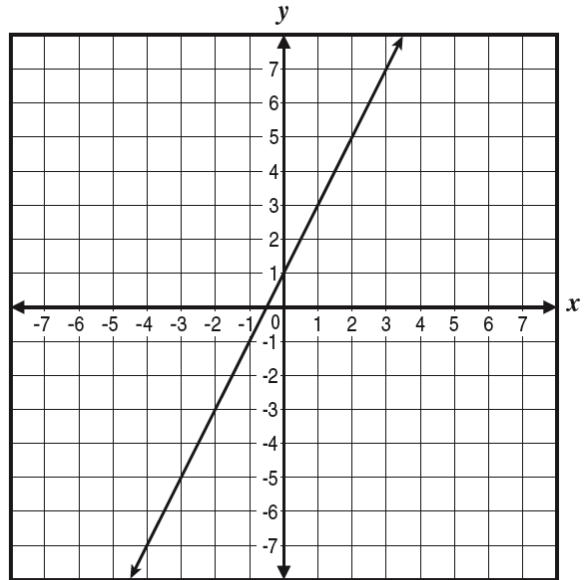# Warm-Up

52 Which graph shows a line with a slope of 2?
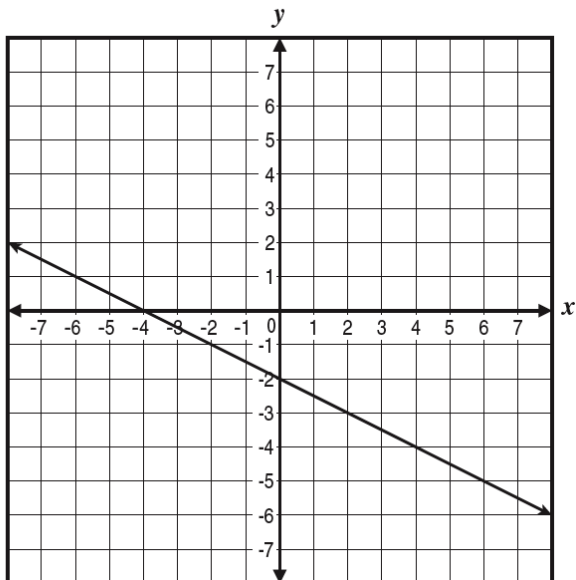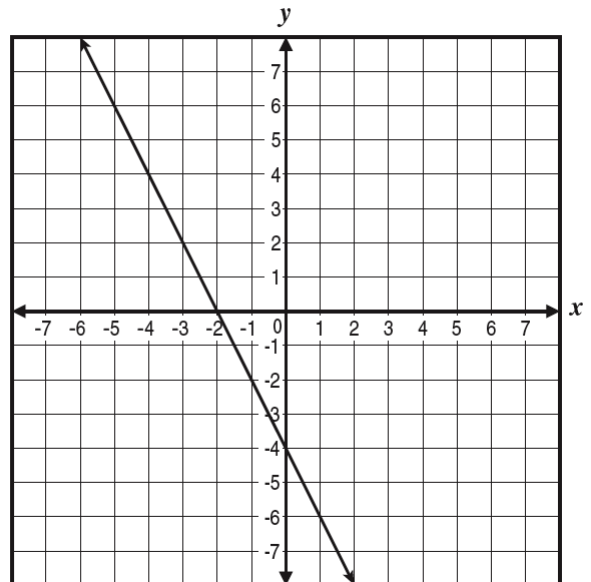
A
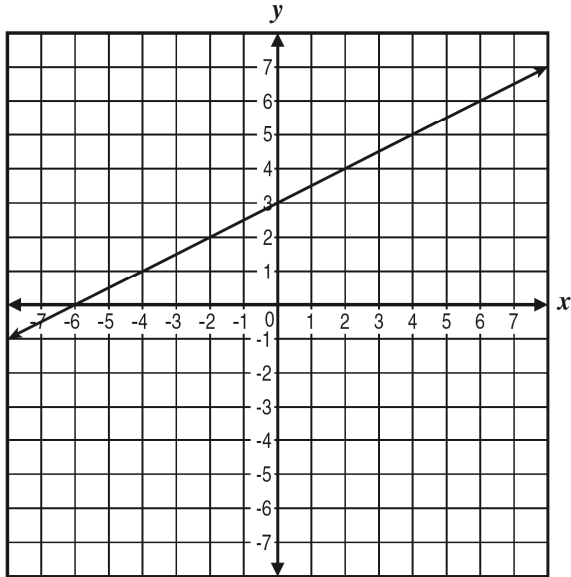
C

B

D

*Name the line for each graph. Tell whether it is positive or negative.