



Math Virtual Learning

Grade 8

Slope / Constant Rate of Change

May 12, 2020



Math 8

Lesson: May 12, 2020

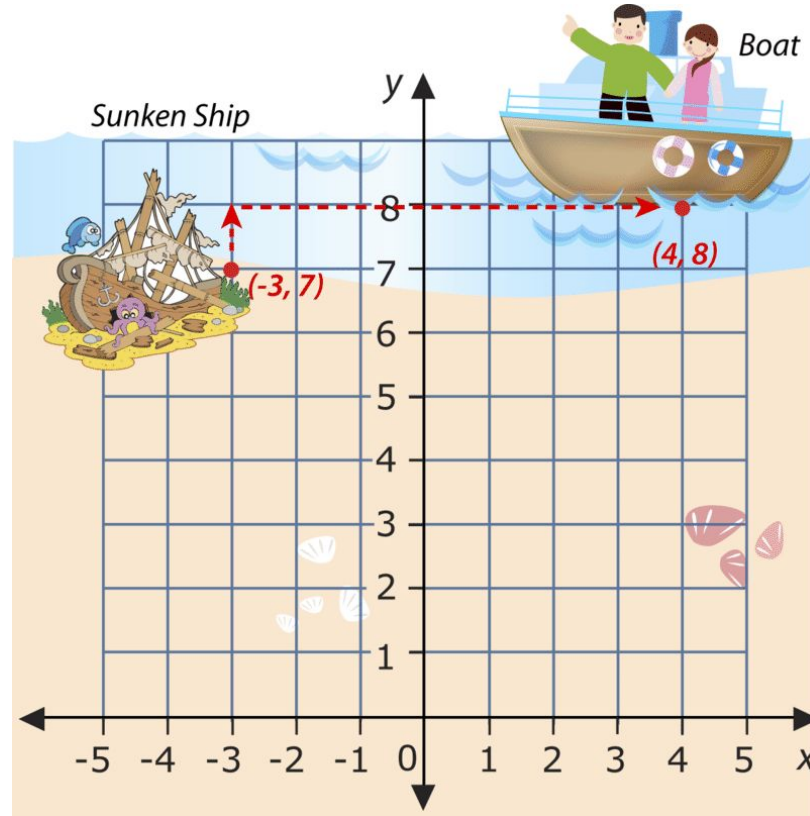
Objective/Learning Target:

I can investigate slope and understand it as the constant rate of change between two variables.

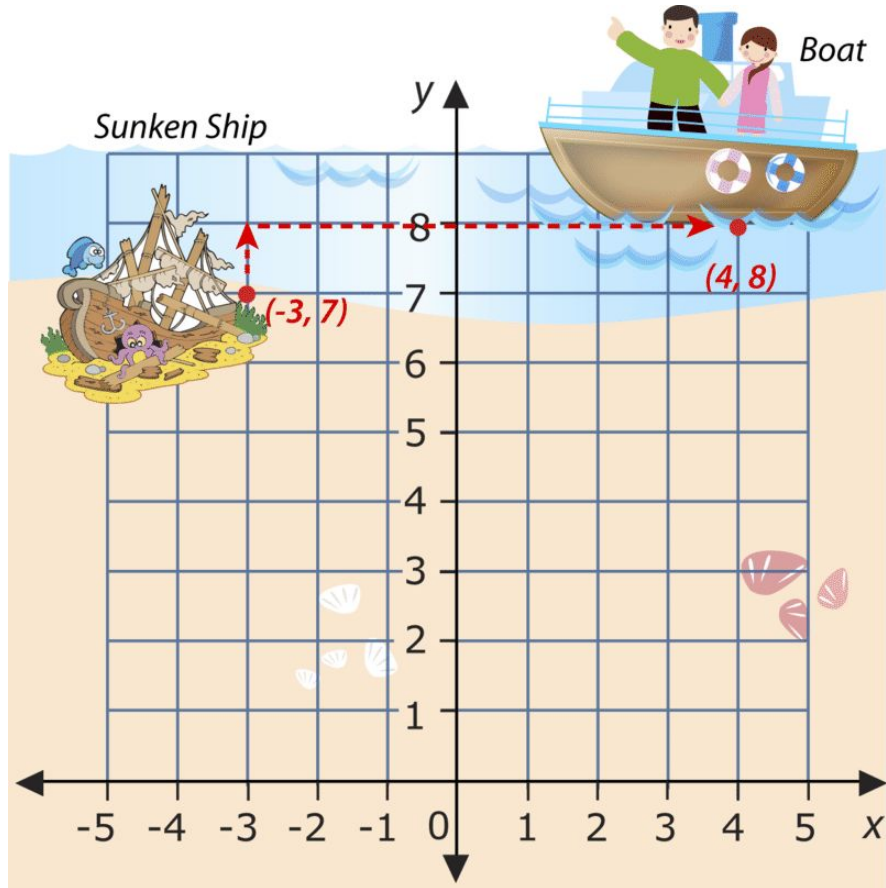
Warm-Up:

Answers on next slide

Describe how to go *from* the Sunken Ship *to* the Boat.



Warm-Up: *Answer Key*

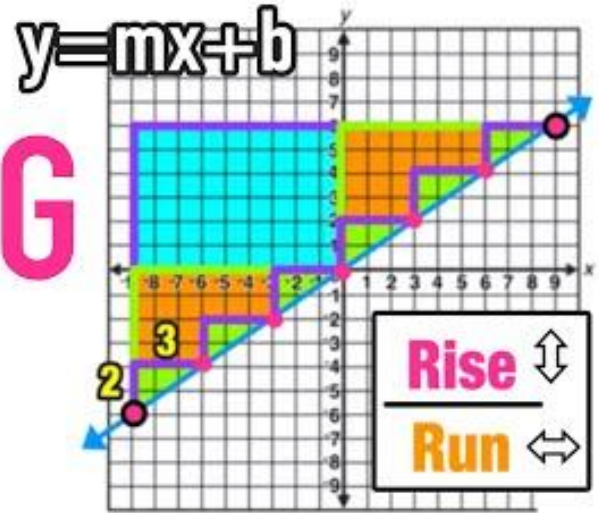


Up 1 unit, Right 7 units

Video:

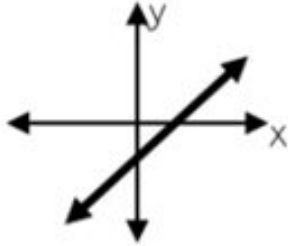
Take notes on a piece of paper as you watch this video.

INTRO TO FINDING SLOPE OF A LINE!

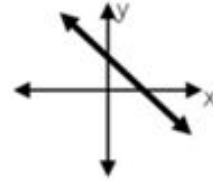


Four Types of Slope

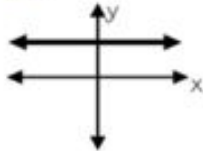
A **positive** slope increases from left to right



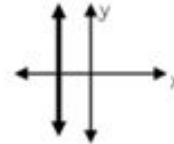
A **negative** slope decreases from left to right



A **zero** slope is a horizontal line



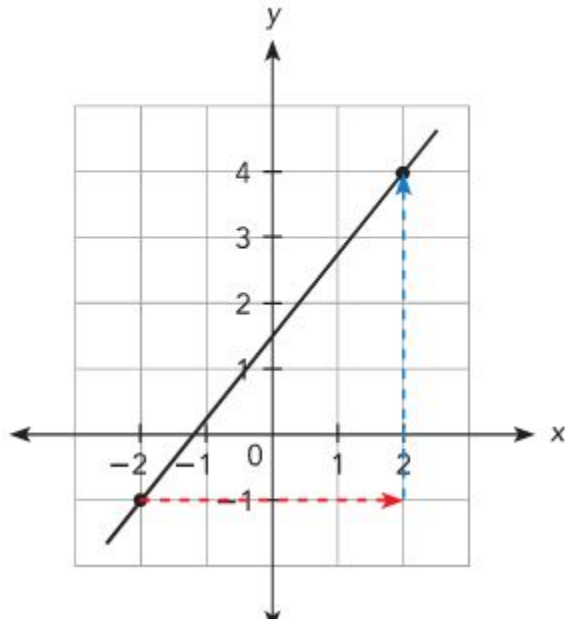
An **undefined** slope is a vertical line



How To: Count Slope from a Graph

Find the slope of each line.

a)



Move from $(-2, -1)$ to $(2, 4)$:

$$\begin{aligned}\text{Vertical change} &= 4 - (-1) \\ &= 5 \text{ units}\end{aligned}$$

$$\begin{aligned}\text{Horizontal change} &= 2 - (-2) \\ &= 4 \text{ units}\end{aligned}$$

So, the rise is 5 units, and the run is 4 units.

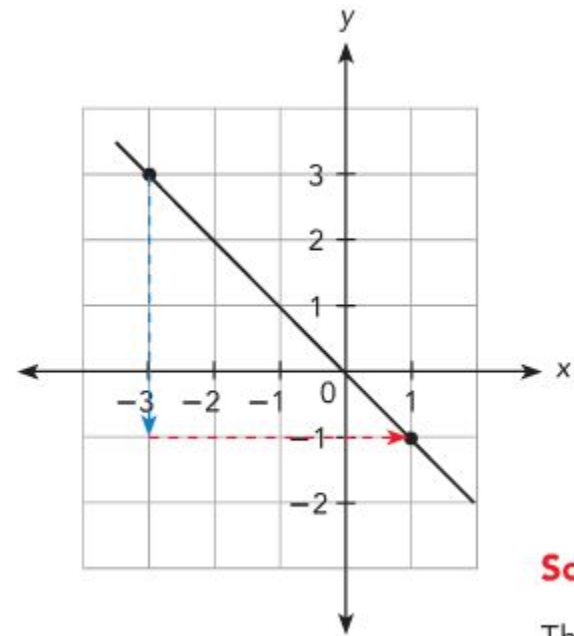


Solution

The graph passes through the points $(-2, -1)$ and $(2, 4)$.

$$\begin{aligned}\text{Slope} &= \frac{\text{Rise}}{\text{Run}} \\ &= \frac{4 - (-1)}{2 - (-2)} \\ &= \frac{5}{4}\end{aligned}$$

How To: Count Slope from a Graph *cont'd*



Move from $(-3, 3)$ to $(1, -1)$:

$$\begin{aligned}\text{Vertical change} &= -1 - 3 \\ &= -4 \text{ units}\end{aligned}$$

$$\begin{aligned}\text{Horizontal change} &= 1 - (-3) \\ &= 4 \text{ units}\end{aligned}$$

So, the rise is -4 units, and the run is 4 units.

Solution

The graph passes through the points $(-3, 3)$ and $(1, -1)$.

$$\begin{aligned}\text{Slope} &= \frac{\text{Rise}}{\text{Run}} \\ &= \frac{-1 - 3}{1 - (-3)} = \frac{-4}{4} = -1\end{aligned}$$

The slope is -1 .

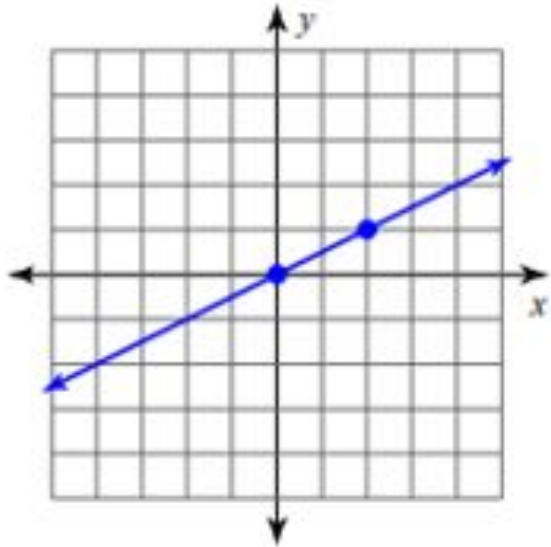


Practice 1:

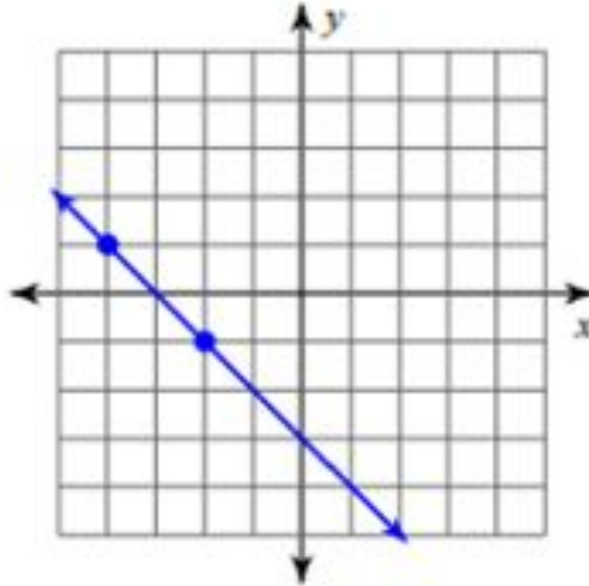
Answers on next slide

Find the slope of each line. (Two points along the line are given. Assume the x- and y-scales are both 1.)

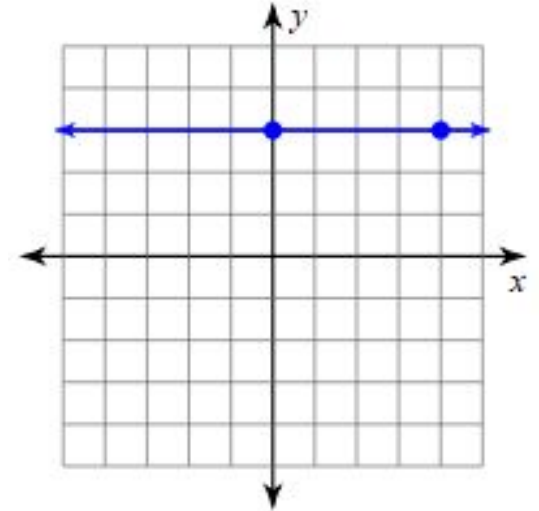
①



②



③



Practice 1:

Answer Key

① $\frac{1}{2}$

② -1

③ 0

Slope Formula

If you're given two points (x_1, y_1) and (x_2, y_2) , the slope of the line that passes through the points is:

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

When using the formula, follow the steps below:

Step 1: Label the points.

Step 2: Plug the values into the formula.

Step 3: Write the slope as a simplified fraction.

How To: Use Slope Formula

Find the slope of the line through the points (2,5) and (4,8).

Step 1: Label the points. It doesn't matter which one you pick as "Point 1" and "Point 2."

Remember the x's are listed first in an ordered pair and the y's are listed second.

$$\begin{array}{ccc} (2,5) & \text{and} & (4,8) \\ \uparrow \quad \uparrow & & \uparrow \quad \uparrow \\ x_1 \quad y_1 & & x_2 \quad y_2 \end{array}$$

Step 2: Plug in the values. Subtract the y's on the top, subtract the x's on the bottom. Make sure to subtract in the same order in the numerator and denominator.

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 5}{4 - 2} = \frac{3}{2}$$

Step 3: Make sure your answer is simplified. $3/2$ cannot be reduced, so we leave the answer as $3/2$.

Now You Try: Use the Slope Formula

Answer provided on the next slide.

Find the slope of the line that passes through (9, 1) and (5, 6). Simplify your answer and write it as an improper fraction, proper fraction or an integer.

$-\frac{2}{7}$

$-\frac{5}{9}$

$-\frac{1}{6}$

$-\frac{5}{4}$

Now You Try: Use the Slope Formula

Find the slope of the line that passes through (9, 1) and (5, 6). Simplify your answer and write it as an improper fraction, proper fraction or an integer.

$-\frac{2}{7}$

$-\frac{5}{9}$

$-\frac{1}{6}$

$-\frac{5}{4}$

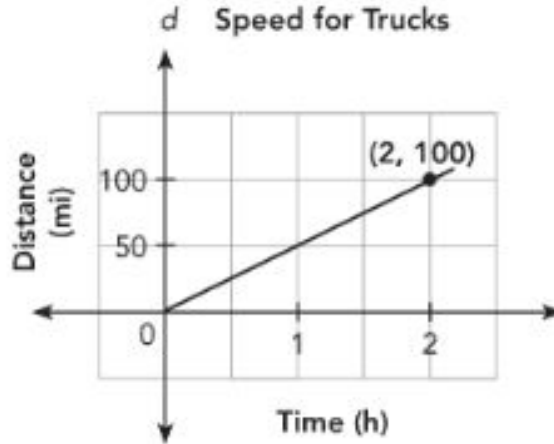
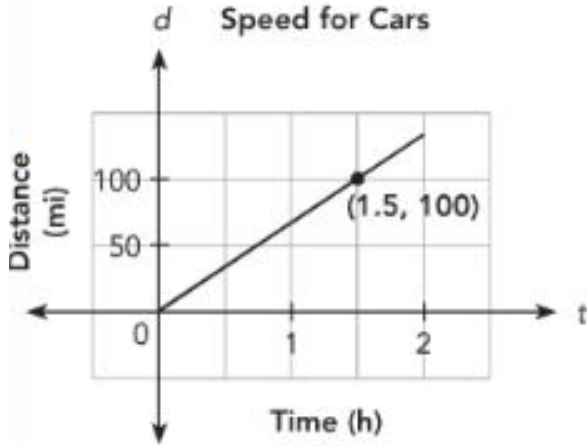
$$y_2 - y_1 = 1 - 6 = -5$$

$$x_2 - x_1 = 9 - 5 = 4$$

$$\text{slope: } -\frac{5}{4}$$

Example 1: Comparing Slopes

The graphs give information about the distance, d miles, traveled over time, t hours, by cars and trucks on a highway. Which graph shows a slower **constant rate of change** (slope)?



To find the **constant rate of change**, you need to find the slope of each line. (Use the slope formula.)

Rate of change:

$$\frac{100 - 0}{1.5 - 0} = \frac{100}{1.5} = \frac{20}{0.3} = \frac{66.7}{1}$$

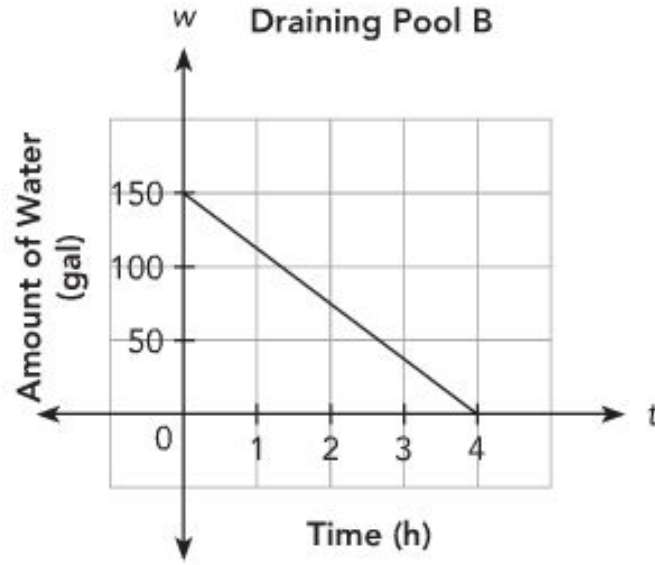
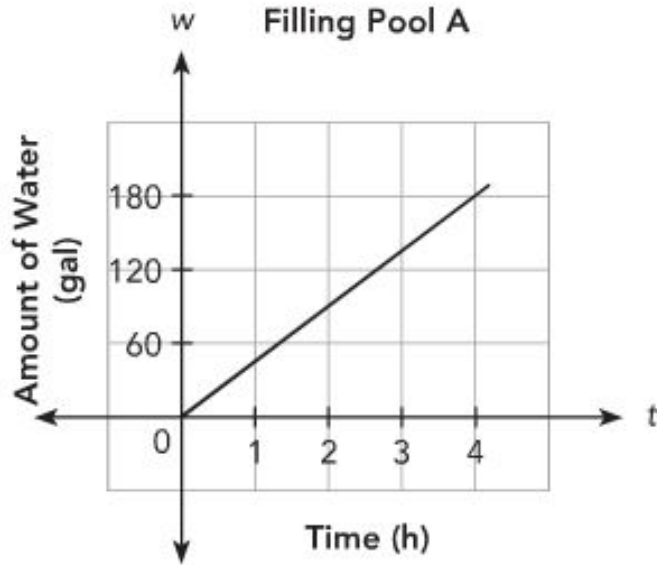
$$\frac{100 - 0}{2 - 0} = \frac{100}{2} = \frac{50}{1}$$

Solution: The rate of change (slope) is slower for the trucks.

Practice 2:

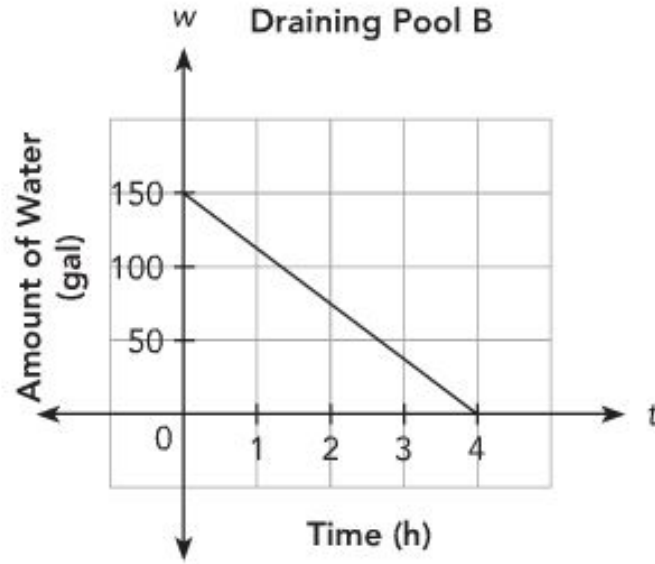
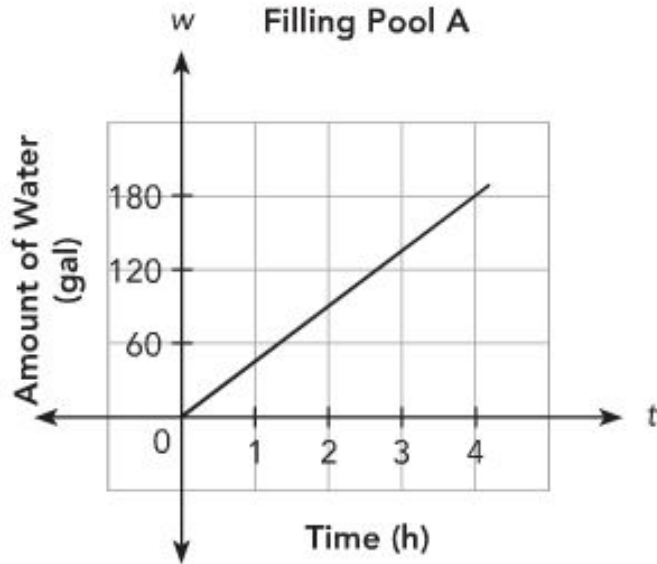
Answer provided on the next slide.

The graphs represent the amount of water, w gallons, over time, t hours, in Pools A and B. Which graph shows a faster **constant rate of change** (slope), despite the water level?



Practice 2:

The graphs represent the amount of water, w gallons, over time, t hours, in Pools A and B. Which graph shows a faster **constant rate of change** (slope), despite the water level?

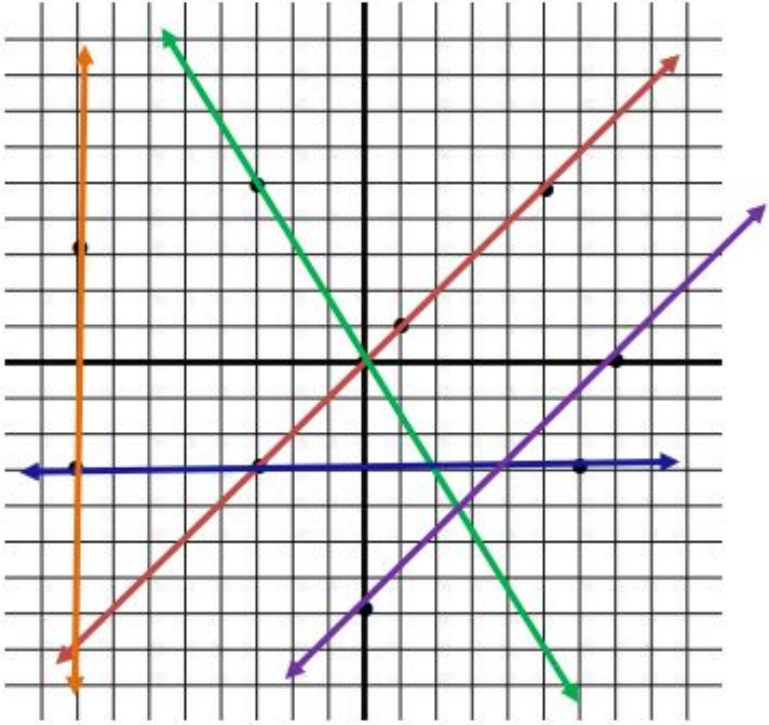


Answer: Pool A is filling at a rate of 45 gal/hr, Pool B is draining at a rate of 37.5 gal/hr. Thus, Pool A has a faster constant rate of change.

Exit Ticket: Show what you know!

Answers on next slide

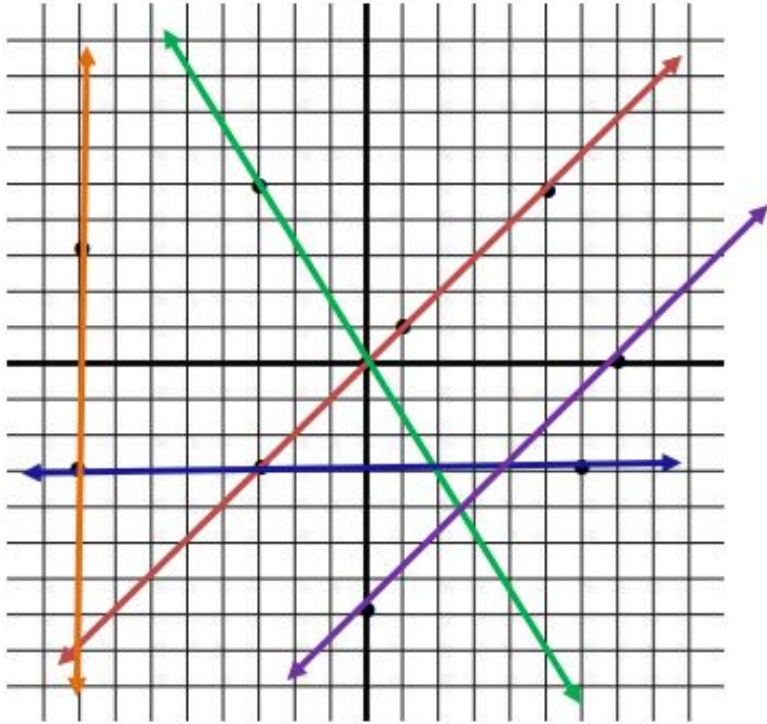
Answer each of the questions below.



1. Which line(s) has/have a positive slope?
2. Which line(s) has/have an undefined slope?
3. Which line(s) has/have a negative slope?

Exit Ticket:

Answer Key



1. Which line(s) has/have a positive slope?

red purple

2. Which line(s) has/have an undefined slope?

orange

3. Which line(s) has/have a negative slope?

green

Additional Resources:

[Find the Slope Between Two Points - Online Practice](#)

[Find the Slope of a Graph - Online Practice](#)

[Practice Slope - Khan Academy](#)