Meet Slope

Lesson 10

Building on	**5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **5.NF.B.3** Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret $3/4$ as the result of dividing 3 by 4, noting that $3/4$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $3/4$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie? **8.G.A.4** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
Addressing	**8.EE.B.6** Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.

Let’s learn about the slope of a line!

EQUAL QUOTIENTS

Warm Up 10.1

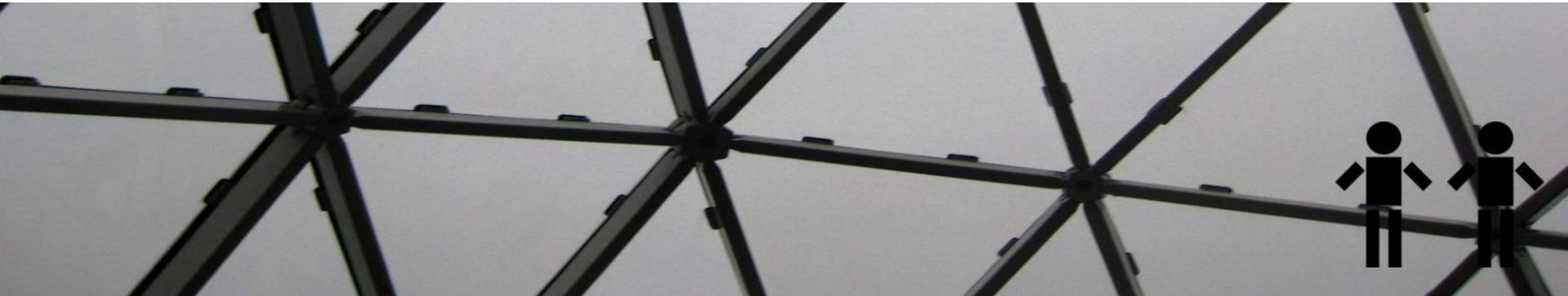
What are some different ways to write numbers that are equal to $1 \div 2$?

Write some numbers that are equal to **15 ÷ 12.**

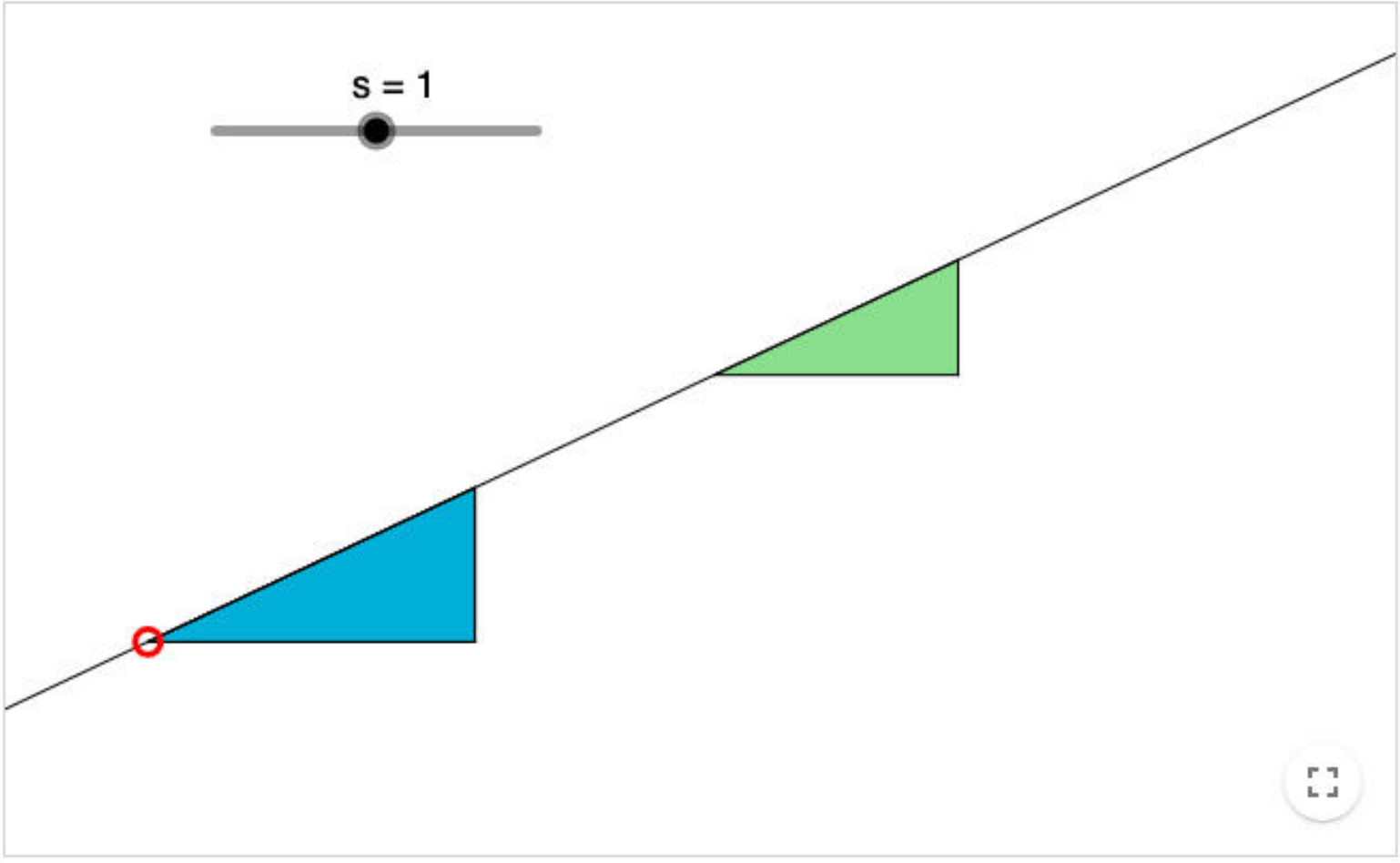
Similar Triangles on the Same Line

Activity 10.2

- Co-Craft Questions and Problems
- 5 Practices



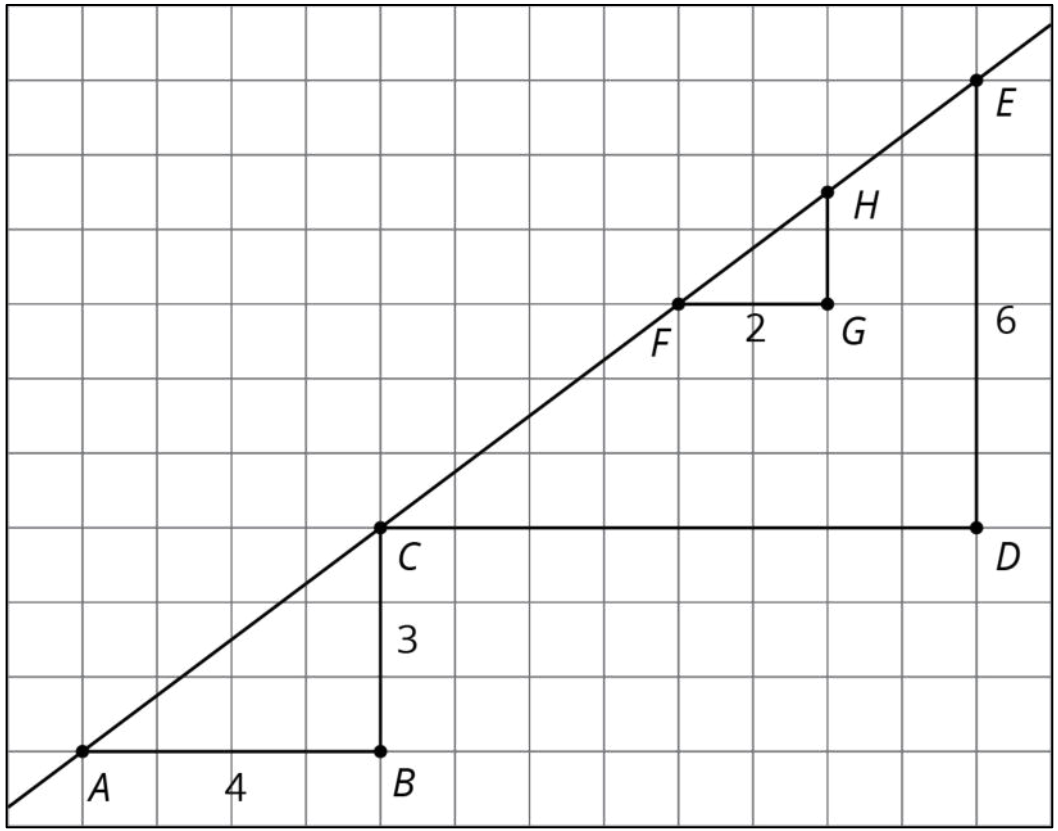
Can you match the triangles?



One partner will work with triangles *ABC* and *CDE*.

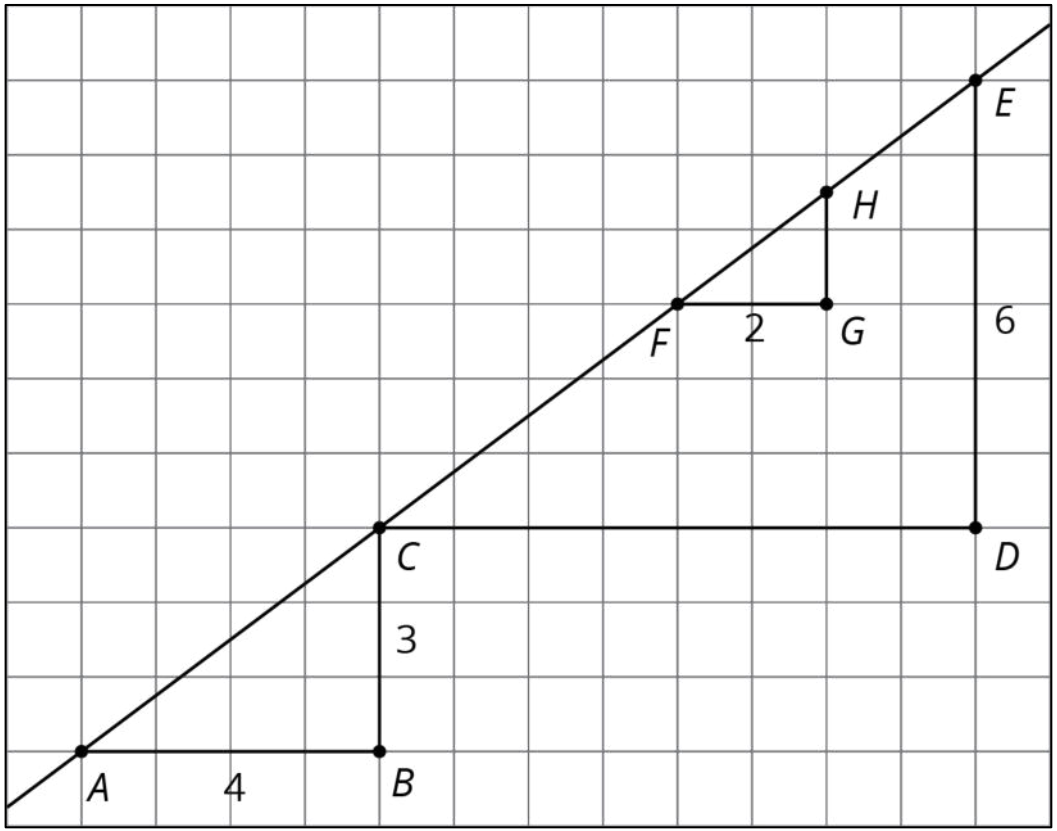
The other will work with triangles *ABC* and *FGH*.

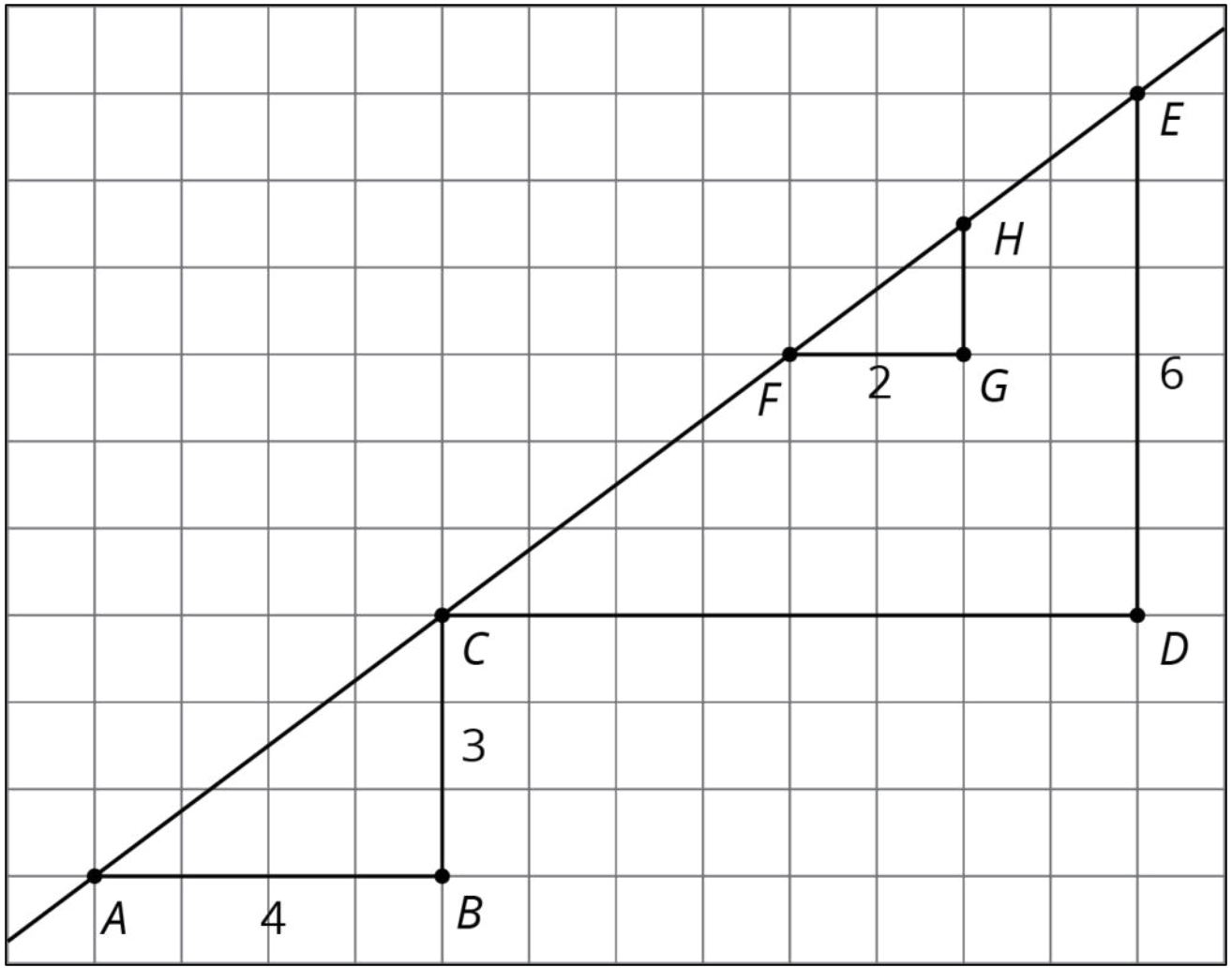
Work on your own to construct an argument for why your 2 triangles are similar. (5 min)



Share your reasoning with your partner and listen to your partner's explanation for why the triangles are similar.

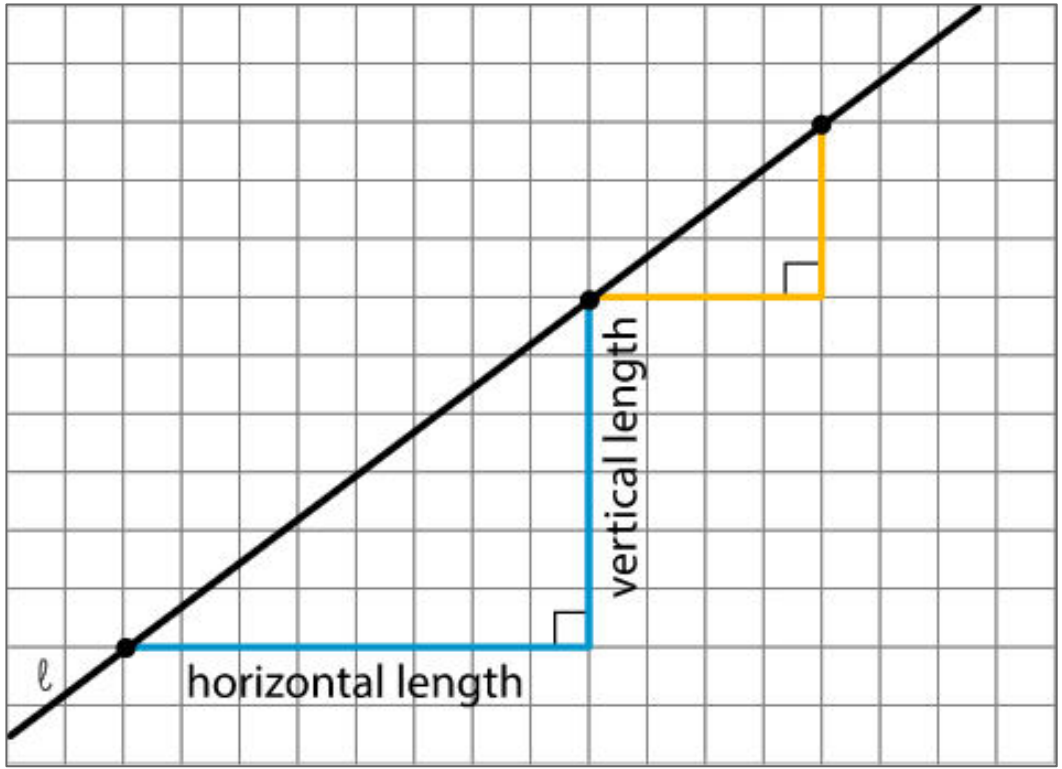
Work with your partner to finish the activity.



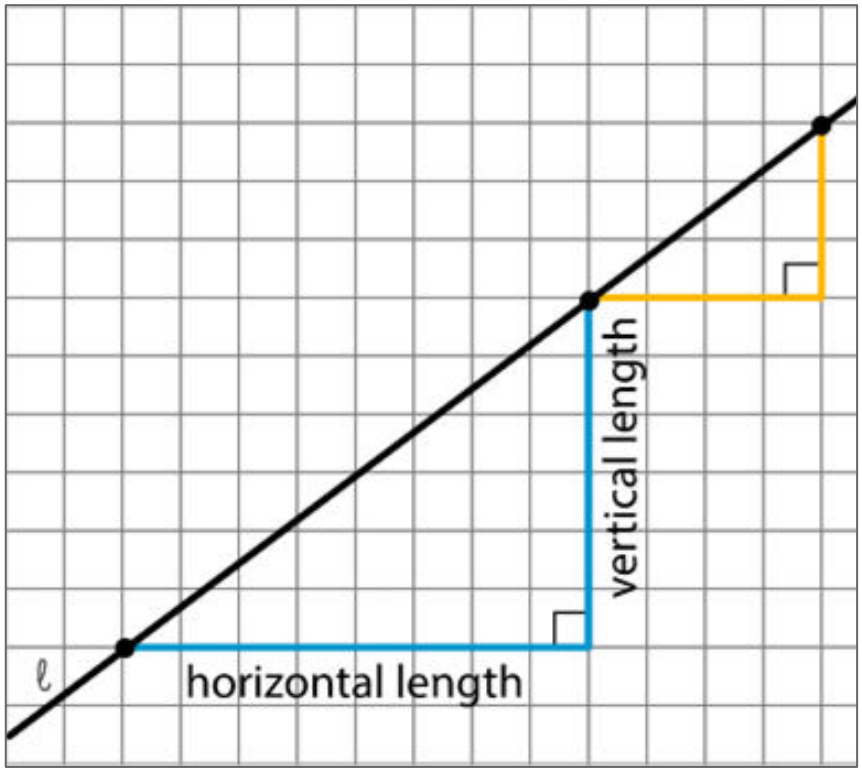

E
H
F
2
G
6
C
D
3
A
4
B

When we have a line like this, we can construct triangles like these where one side is horizontal and one side is vertical.

The quotient of the length of the vertical side and the horizontal side will always be the same. This number is called the **slope** of the line.



SLOPE



The slope is...

$$\frac{\text{vertical length}}{\text{horizontal length}}$$

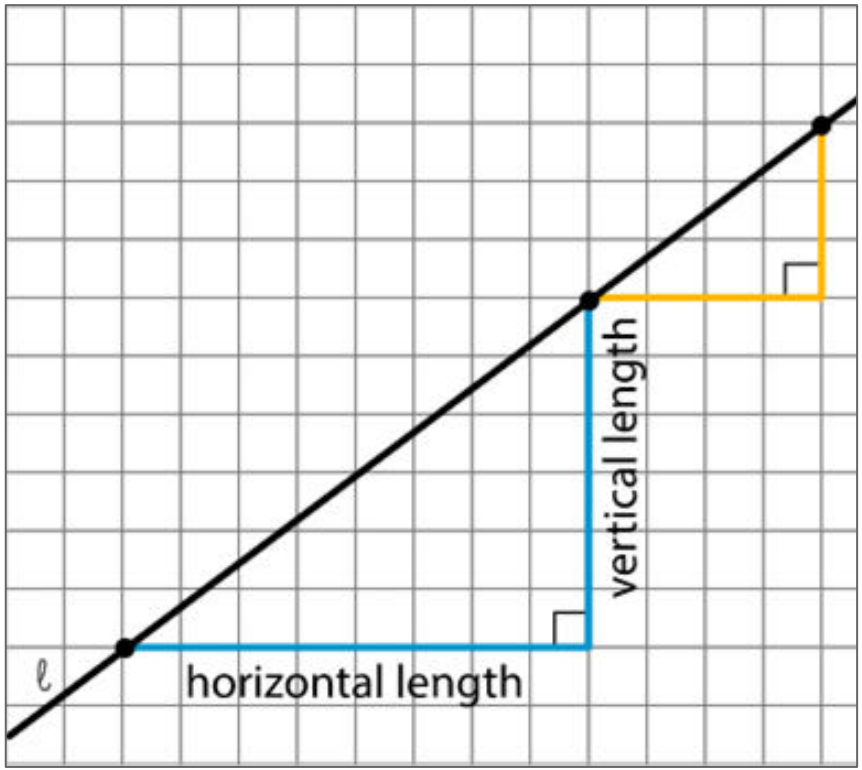
The slope of line ℓ can be written as 6/8, 3/4, 0.75, or any equal value.

Multiple Lines with the Same Slope

Activity 10.3

- Discussion Supports

SLOPE

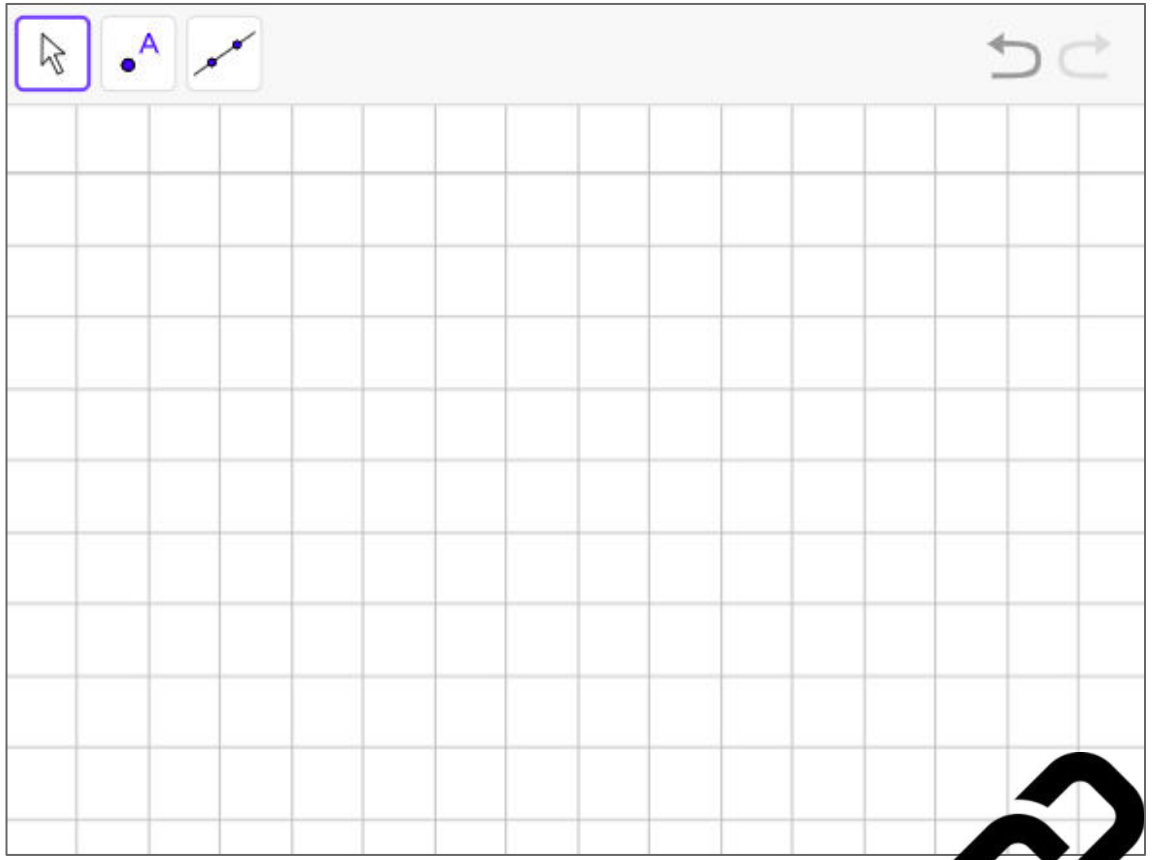


The slope is...

$$\frac{\text{vertical length}}{\text{horizontal length}}$$

The slope of line ℓ can be written as 6/8, 3/4, 0.75, or any equal value.

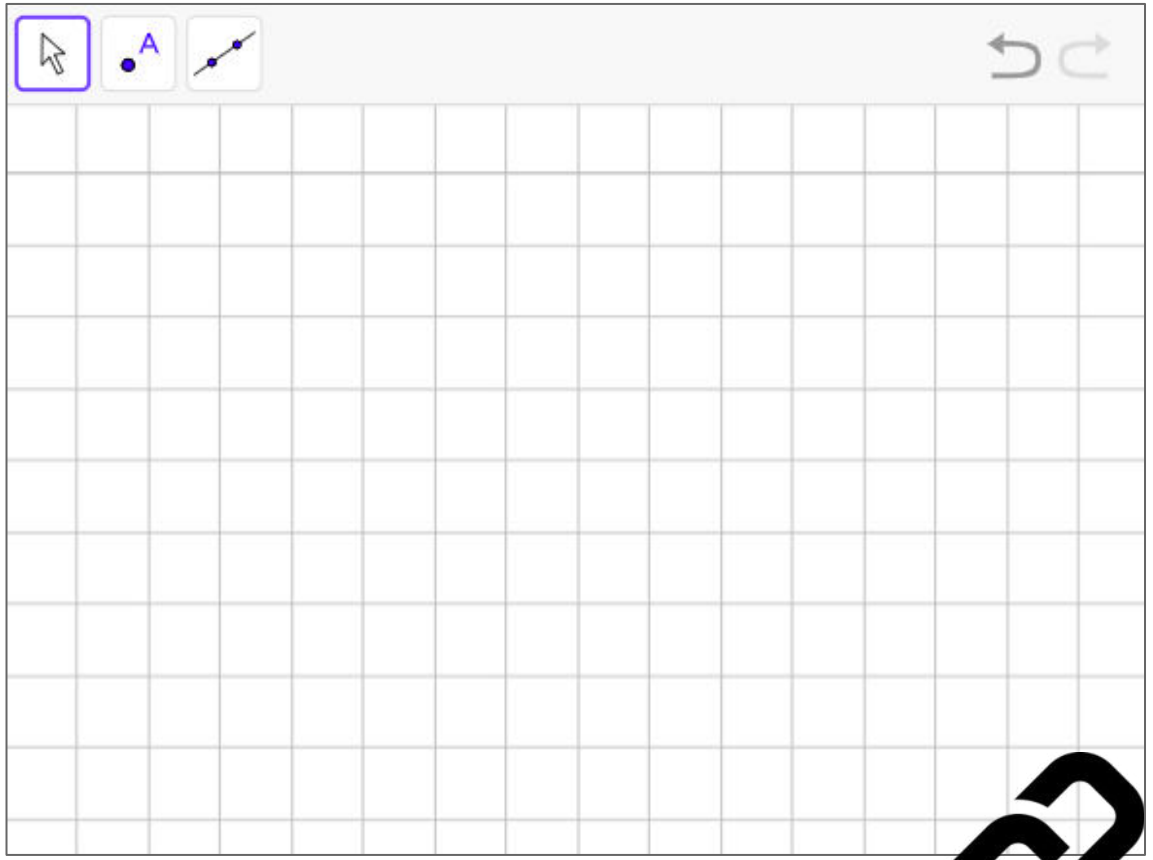
Let’s apply the new idea of **slope** introduced in the previous activity while drawing and studying properties of some lines with different slopes!



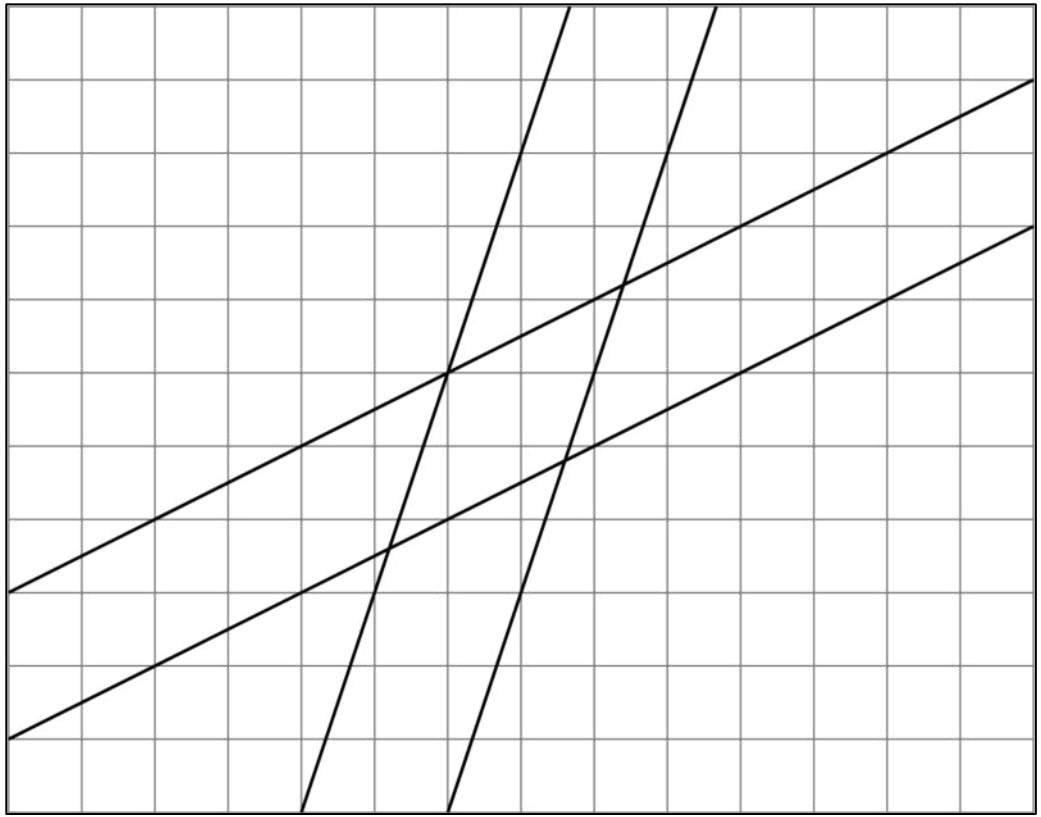
How did you find lines with slope 3?

How did you draw lines with slope ½?

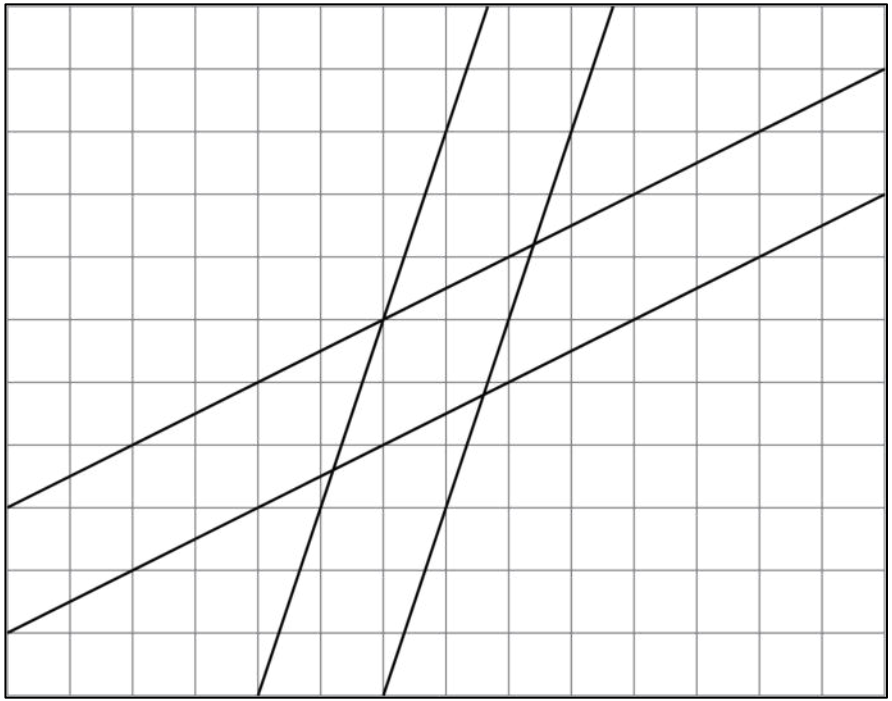
What do you notice?

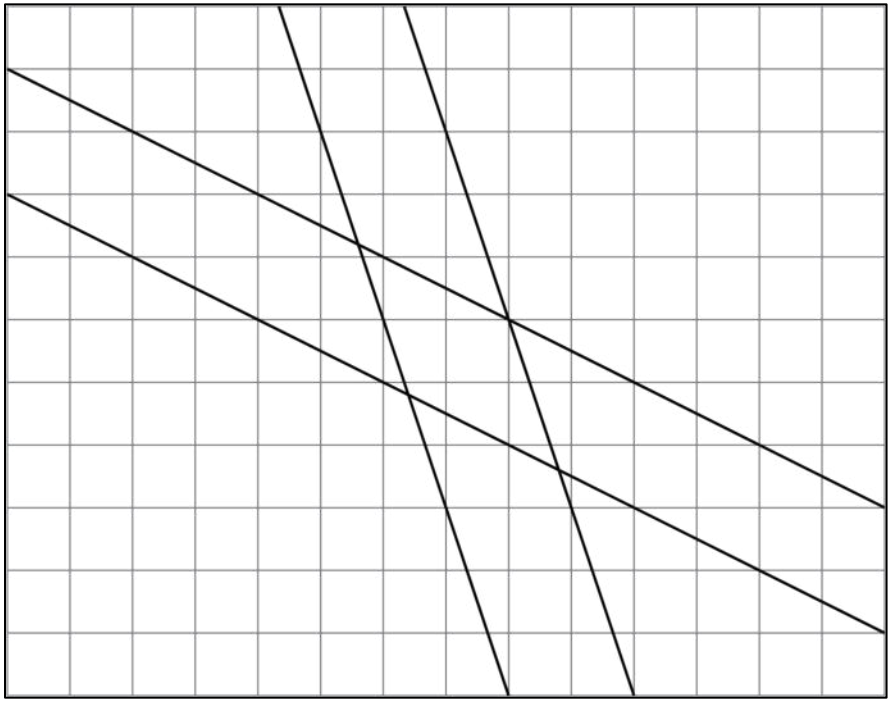


- The lines of slope 3 are parallel and so are the two lines with slope ½!
- The lines of slope 3 are “steeper” than the lines of slope ½.



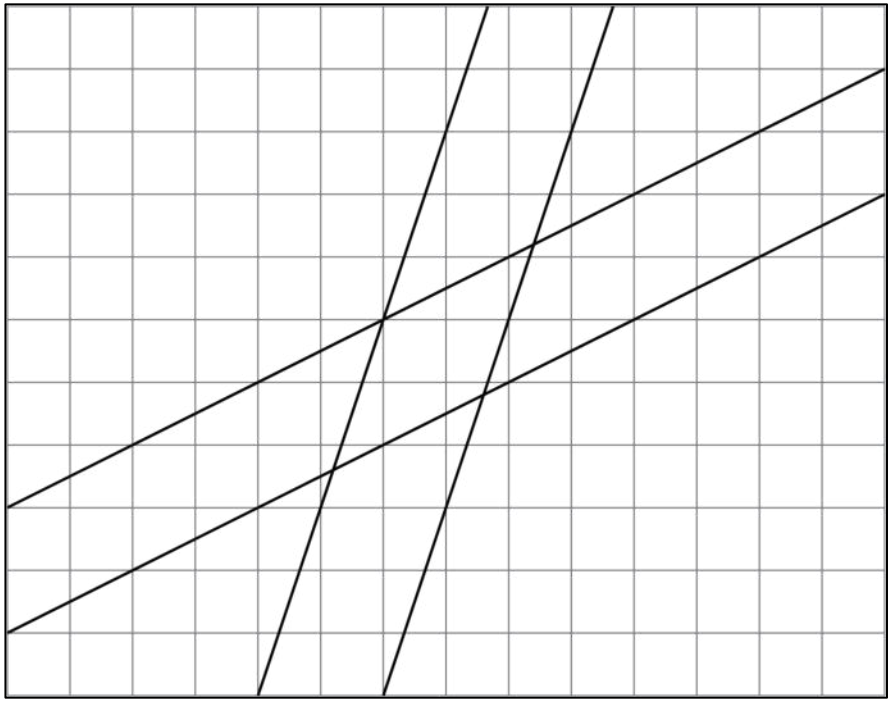
How are these alike and different?



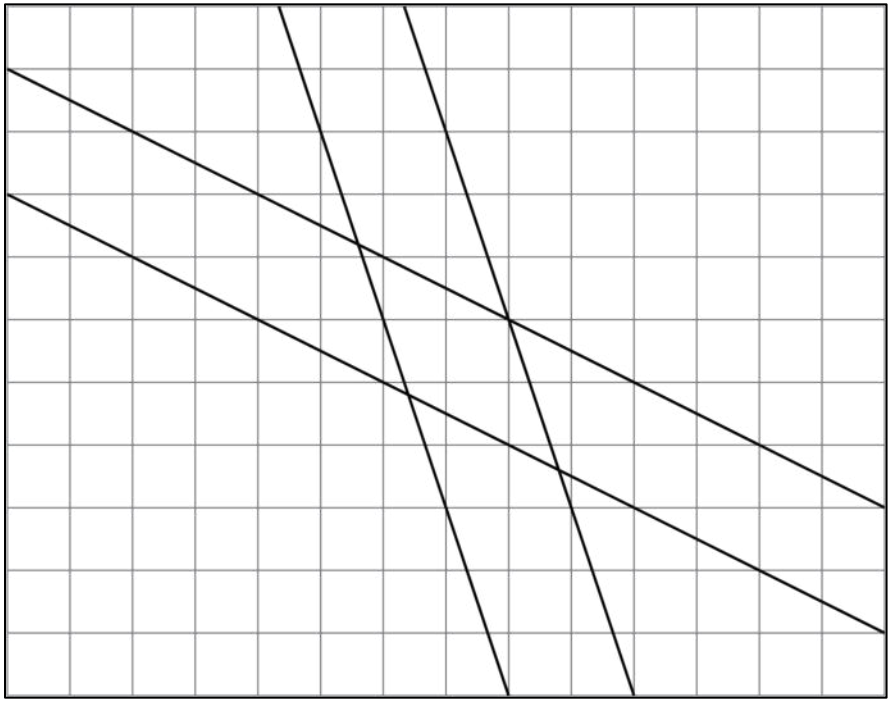


The “uphill” lines (leaning right) are positive.

The “downhill” lines (leaning left) are negative.



POSITIVE SLOPE



NEGATIVE SLOPE

“Are you ready for more?”

As we learn more about lines, we will occasionally have to consider perfectly vertical lines as a special case and treat them differently.

Think about applying what you have learned in the last couple of activities to the case of vertical lines.

What is the same? What is different?

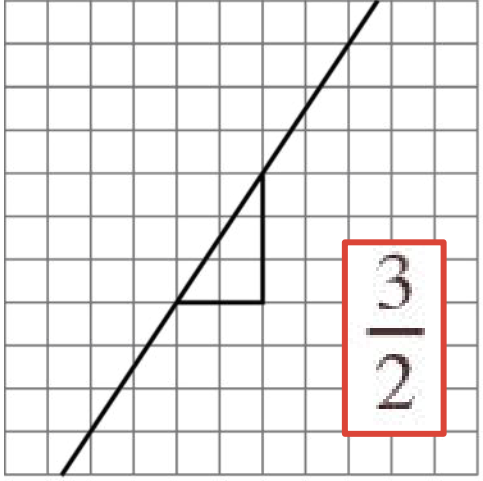
Different Slopes of Different Lines

Activity 10.4

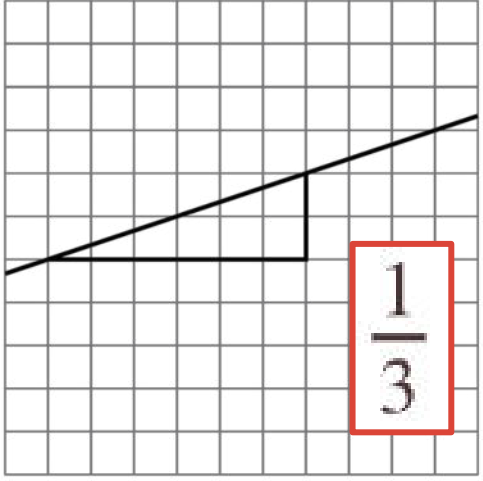
- Collect and Display

Work on your own.

Match each slope to a line and draw the line for the slope that does not have a match.



A



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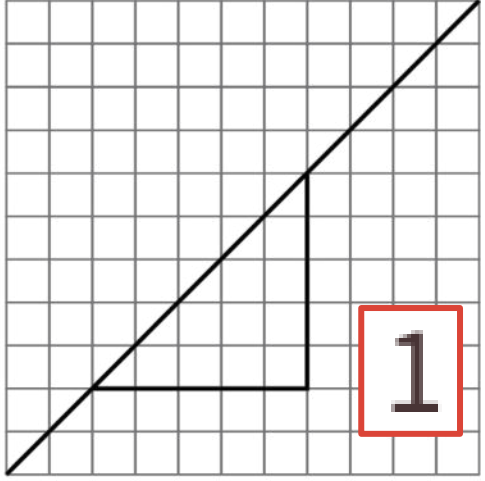

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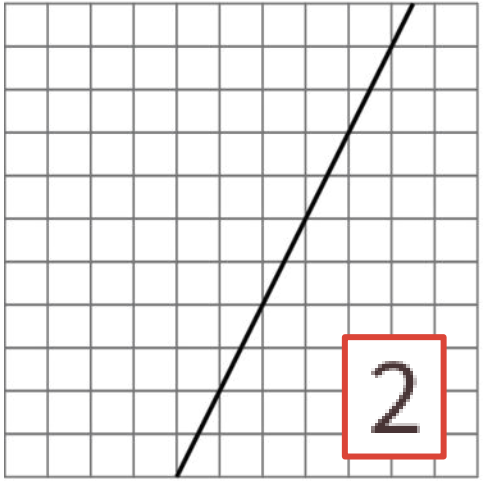

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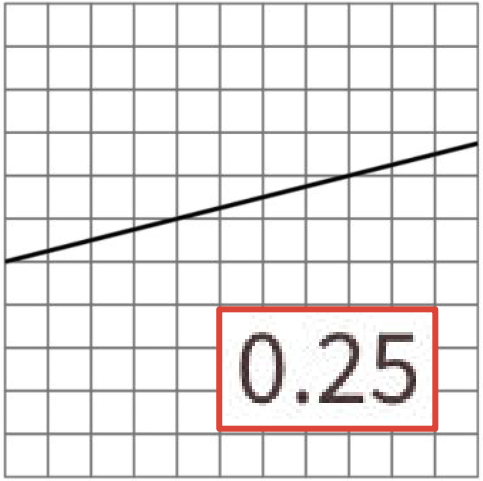

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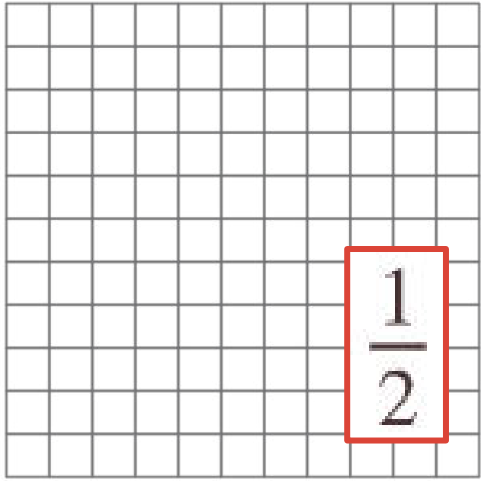
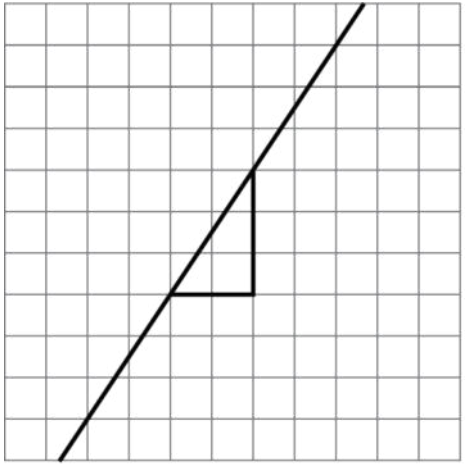


F

Given a line on a grid, we can draw a right triangle whose longest side is on the line, and then use the quotient of the vertical and horizontal sides to find the slope!



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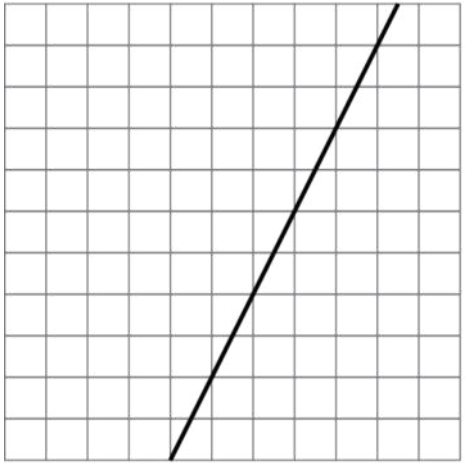
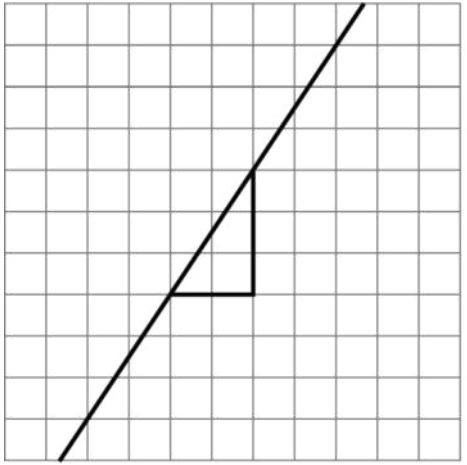


D

Given a slope, we can draw a right triangle using vertical and horizontal lengths corresponding to the slope, and then extend the longest side of the right triangle to create a line with that slope!



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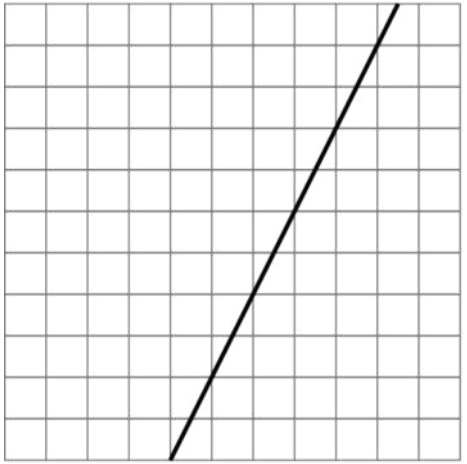


D

What is a slope triangle for a line?

A triangle whose long side is on the line and whose other sides are horizontal and vertical.

How can you use a slope triangle to find the slope of a line?

Divide the length of the vertical side by the length of the horizontal side.

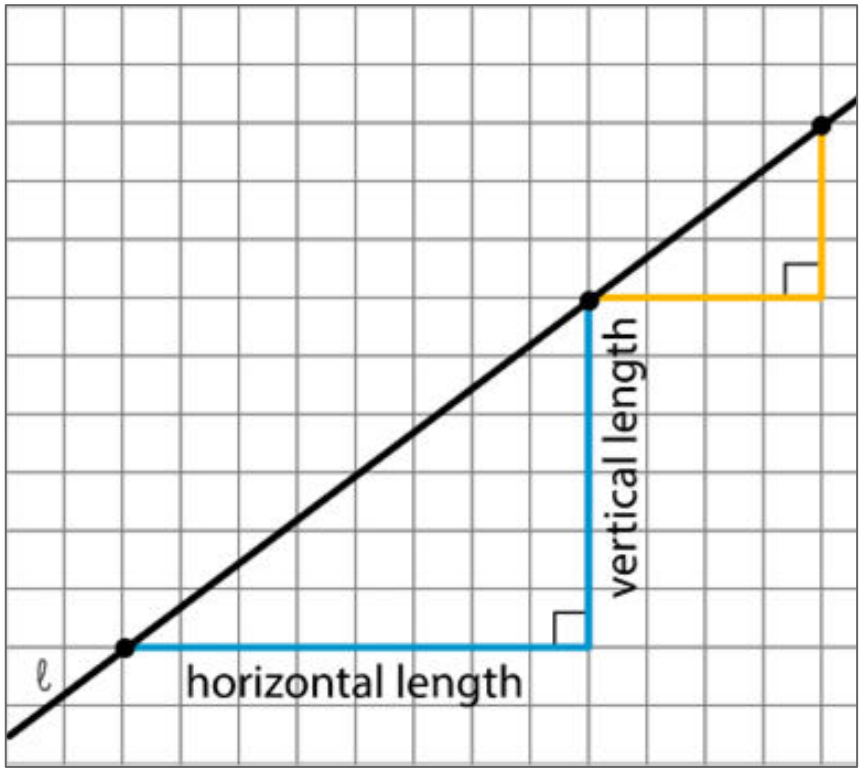
Does it matter which 2 points you use to create the slope of a triangle? Why?

No. Any two slope triangles are similar! So the quotient of the two corresponding sides will give the same value.

Why are any two slope triangles similar?

They are right triangles whose other angles are corresponding angles for a transverse meeting parallel grid lines.

SLOPE



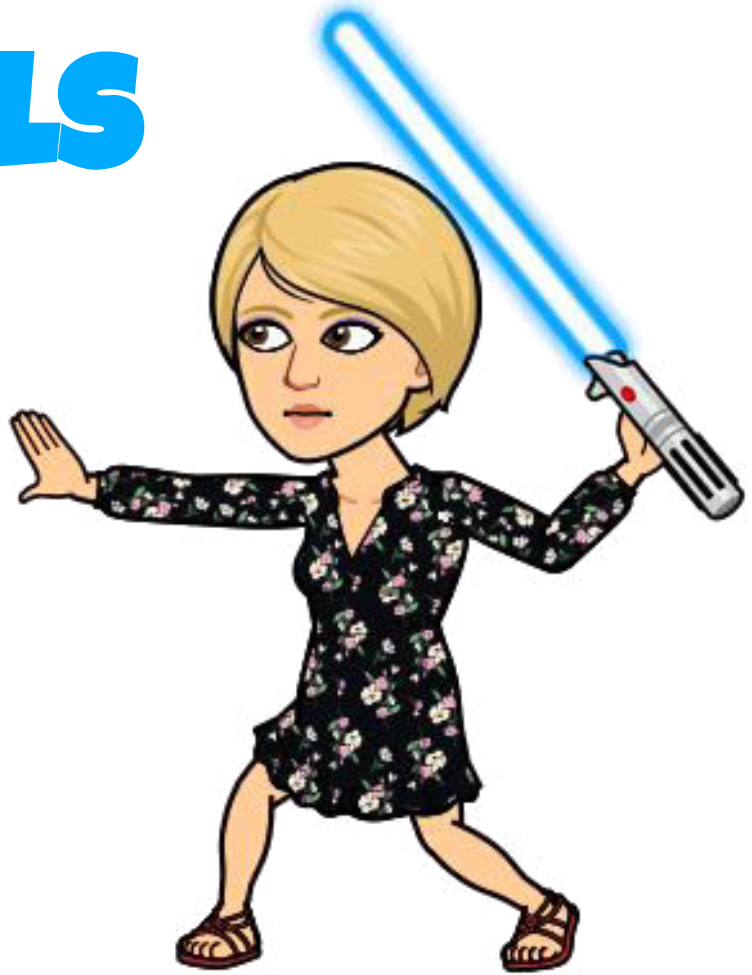
The slope is...

$$\frac{\text{vertical length}}{\text{horizontal length}}$$

The slope of line ℓ can be written as 6/8, 3/4, 0.75, or any equal value.

TODAY'S GOALS

- ❏ I can draw a line on a grid with a given **slope**.
- ❏ I can find the **slope of a line** on a grid.



Finding Slope and Graphing Lines

Cool Down 10.5