Get out your homework and have it ready to check. Get your book out and start Warming Up on p. 561 #1 and #1 - 4. Test Friday!

Classwork - Slope and Similar Triangles

8) The shadow of a 20 feet tall house is 36 feet long. Ryan, who is standing next to the house, is 5 feet tall. How long is his shadow? SHOW WORK AND LABEL

$\frac{20ft}{5ft} = \frac{36ft}{x}$

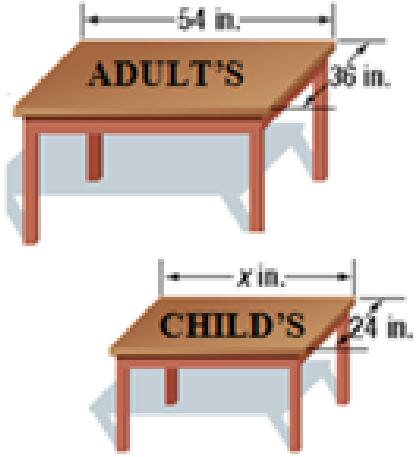
$x = 9ft$

9) A man 5.5 feet tall casts a shadow that is 10 feet long. A building right next to him casts a shadow that is 140 feet long. What is the height of the building? SHOW WORK AND LABEL

$\frac{5.5ft}{h} = \frac{10ft}{140ft}$

$h = 77ft$

10) A child's desk is made so that it is a replica of a full-size adult desk. The full size desk is 54 inches long by 36 inches wide. If the child's desk is 24 inches wide and similar to the full-size desk, what is the length? Write a proportion and solve to find each of the missing side lengths. SHOW WORK AND LABEL



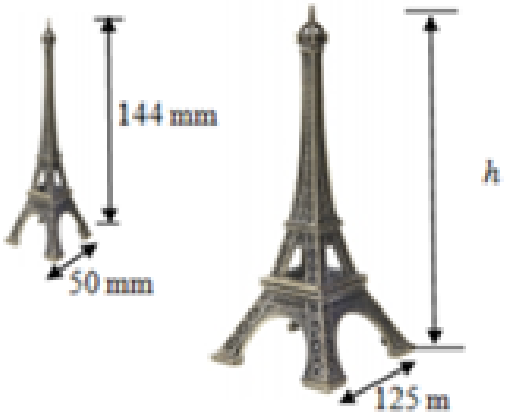
$$\frac{36\text{ in}}{24\text{ in}} = \frac{54\text{ in}}{x}$$

$$\frac{36x}{36} = \frac{1296}{36}$$

$$x = 36\text{ in}$$

$x =$ 36 in

12) Monique made a scale model of the Eiffel Tower that has a base with the length of 50 millimeters and a height of 144 millimeters. What is the height of the real Eiffel Tower if it has a base with the length of 125 meters?



$$\frac{50\text{ mm}}{125\text{ m}} = \frac{144\text{ mm}}{h}$$

$$\frac{50h}{50} = \frac{18000}{50}$$

$$h = 360\text{ m}$$

$h =$ _____

12) Monique made a scale model of the Eiffel Tower that has a base with the length of 50 millimeters and a height of 144 millimeters. What is the height of the real Eiffel Tower if it has a base with the length of 125 meters?

$\frac{50mm}{125m} = \frac{144mm}{h}$

$\frac{50h}{50} = \frac{18000}{50}$ $h = 360m$

$h = 360$

For the following problems, draw a picture to represent the similar figures given. Then write a proportion and solve that proportion to find the missing side length.

13) Derrick made a clay model of the desk in his room. The dimensions of the model he made had a length of 8 inches and a width of 5 inches. His actual desk has a length of 48 inches. Determine the width of the actual desk. SHOW WORK AND LABEL

model / actual $\frac{8in}{48in} = \frac{5in}{x}$ $x = 30 inches$

14) Mica is drawing scale picture of her living rectangular room. Her living room has a length of 20 feet and a width of 12 feet. If the length of her living room in her drawing is 15 inches, how long should the width of her room be in the drawing? SHOW WORK AND LABEL

drawing / actual $\frac{x}{12ft} = \frac{15in}{20ft}$

$\frac{20x}{20} = \frac{180}{20}$ $x = 9in$

Real-World Link

Physics In an experiment using a coiled spring toy, Zoe and Jack determined they needed to raise one side of a 5-foot board 3 feet for the toy to move.

$a^2 + 3^2 = 5^2$

$a^2 + 9 = 25$

$-9 \quad -9$

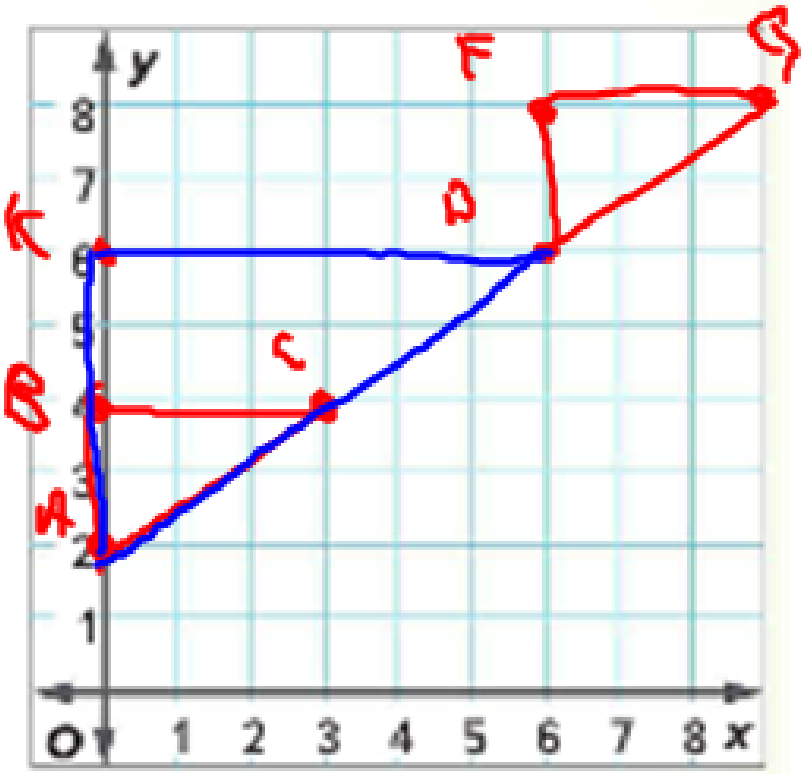
$a^2 = 16$

$a = 4$ ft

1. Find the slope of the board. (*Hint:* Use the Pythagorean Theorem to find how far the end of the board is from the books.) 3/4

Collaborate

Work with a partner. Use the graph to discover how slope triangles are related.



1. Draw the triangle formed by $A(0, 2)$, $B(0, 4)$, and $C(3, 4)$. What kind of triangle did you draw?

Right triangle

2. Draw the triangle formed by $D(6, 6)$, $F(6, 8)$, and $G(9, 8)$. How is $\triangle DFG$ related to $\triangle ABC$?

They are congruent

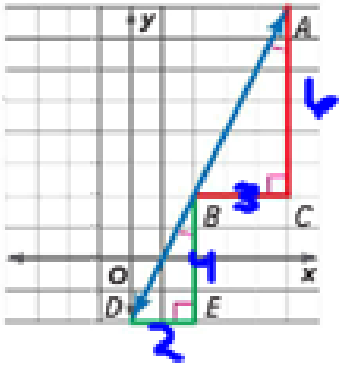
3. Draw the triangle formed by $A(0,2)$, $K(0, 6)$, and $D(6, 6)$. How is $\triangle AKD$ related to $\triangle ABC$?

They similar

4. What is true about the hypotenuses of the three triangles in Steps 1, 2, and 3?

Similar Triangles and the Coordinate Plane

In the figure shown, $\triangle ABC$ and $\triangle BDE$ are slope triangles. Slope triangles are similar.



$\angle BAC \cong \angle DBE$	Given
$\angle ACB \cong \angle BED$	Given
$\triangle ABC \sim \triangle BDE$	Angle-Angle Similarity

You can use the properties of similar triangles to show the ratios of the rise to the run for each right triangle are equal.

Example

Tutor

1. Write a proportion comparing the rise to the run for each of the similar slope triangles shown above. Then find the numeric value.

$\frac{AC}{BE} = \frac{BC}{DE}$	Corresponding sides of similar triangles are proportional.
$AC \cdot DE = BE \cdot BC$	Find the cross products.
$\frac{AC \cdot DE}{BC \cdot DE} = \frac{BE \cdot BC}{BC \cdot DE}$	Division Property of Equality
$\frac{AC}{BC} = \frac{BE}{DE}$	Simplify.
$\frac{6}{3} = \frac{4}{2}$	$AC = 6, BC = 3, BE = 4, DE = 2$

So, $\frac{AC}{BC} = \frac{BE}{DE}$, or $\frac{6}{3} = \frac{4}{2}$.

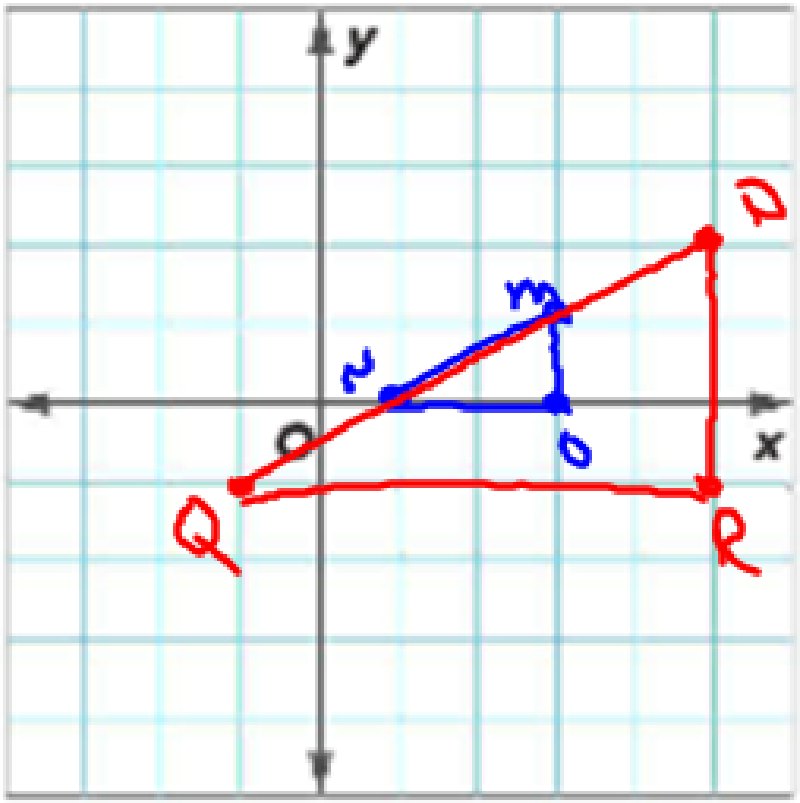
$\frac{6}{3} = \frac{4}{2}$

$2 = 2$

$1 \quad 1$

Got it? **Do this problem to find out.**

a. Graph $\triangle MNO$ with vertices $M(3, 1)$, $N(1, 0)$, and $O(3, 0)$, and $\triangle PQR$ with vertices $P(5, 2)$, $Q(-1, -1)$, and $R(5, -1)$. Then write a proportion comparing the rise to the run for each of the similar slope triangles and find the numeric value.



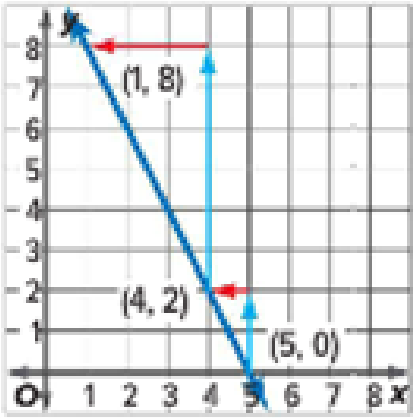
$\frac{MO}{NO} = \frac{PR}{QR}$

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

Similar Triangles and Slope

Words The ratio of the rise to the run of two slope triangles formed by a line is equal to the slope of the line.

Example



Larger Triangle

$\frac{\text{rise}}{\text{run}} = \frac{6}{-3}$, or -2

Smaller Triangle

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

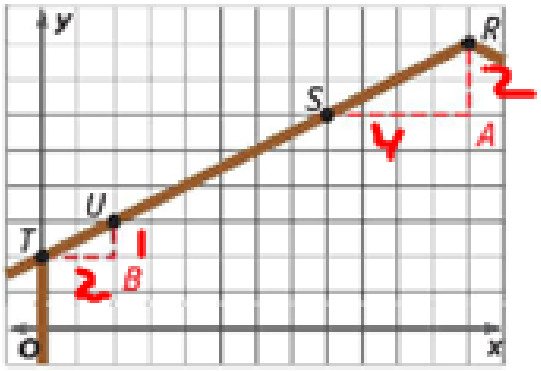
$\text{slope} = \frac{-2}{1}$, or -2

The ratios of the rise to the run of the two similar slope triangles in Example 1 are the same as the slope of the line. Since the ratios are equal, the slope m of a line is the same between any two distinct points on a non-vertical line in the coordinate plane.

Example

Tutor

2. **The pitch of a roof refers to the slope of the roof line. Choose two points on the roof and find the pitch of the roof shown. Then verify that the pitch is the same by choosing a different set of points.**



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

$m = \frac{8 - 6}{12 - 8}$ Use the points S and R. $(x_1, y_1) = (8, 6)$ and $(x_2, y_2) = (12, 8)$

$m = \frac{2}{4}$ or $\frac{1}{2}$ Simplify.

The pitch of the roof is $\frac{1}{2}$. Verify that the pitch is the same using two other points.

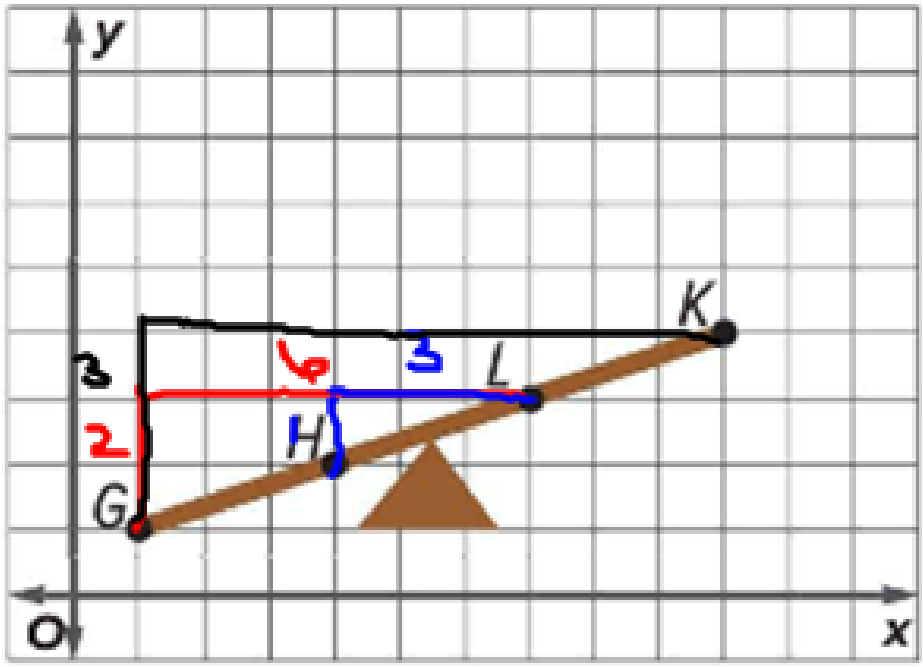
$m = \frac{y_2 - y_1}{x_2 - x_1}$ Formula for slope

$m = \frac{2 - 3}{0 - 2}$ Use the points U and T. $(x_1, y_1) = (2, 3)$ and $(x_2, y_2) = (0, 2)$

$m = \frac{-1}{-2}$ or $\frac{1}{2}$ Simplify. The pitch is the same.

Got it? **Do this problem to find out.**

b. The plans for a teeter-totter are shown at the right. Using points G and L, find the slope of the teeter-totter. Then verify that the slope is the same at a different location by choosing a different set of points.



G → L

$\frac{2}{6} = \frac{1}{3}$

H → L

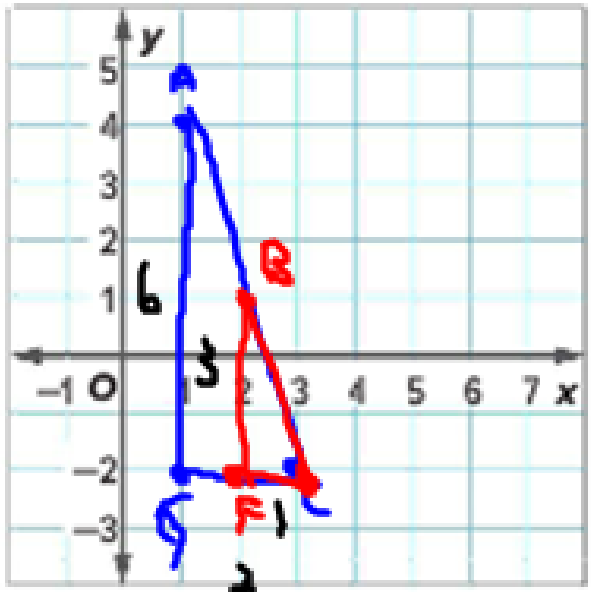
$\frac{1}{3}$

G → H

$\frac{1}{3}$

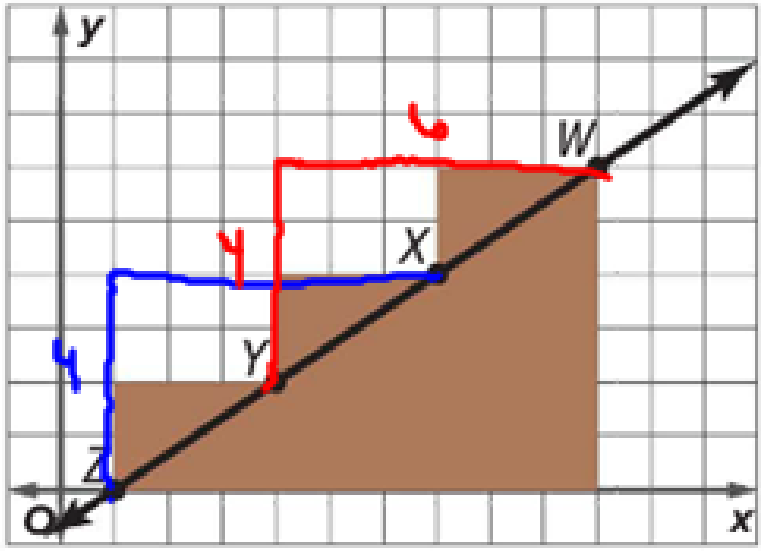
Guided Practice

1. Graph $\triangle ACG$ with vertices $A(1, 4)$, $C(3, -2)$, and $G(1, -2)$, and $\triangle BCF$ with vertices $B(2, 1)$, $C(3, -2)$, and $F(2, -2)$. Then write a proportion comparing the rise to the run for each of the similar slope triangles and find the numeric value. (Example 1)



$\frac{AG}{GC} = \frac{BF}{FC}$ $\quad \frac{-6}{2} = \frac{3}{1}$ $\quad -3 = -3$

2. The plans for a set of stairs are shown below. Using points X and Z, find the slope of the line down the stairs. Then verify that the slope is the same at a different location by choosing a different set of points. (Example 2)



$X \to Z$ $\quad \frac{4}{6} = \frac{2}{3}$

$Y \to W$ $\quad \frac{4}{6} = \frac{2}{3}$