

Day 3 – Solving Similarity Problems using Proportions – Notes

Background Skill Review: Solve for x.

a. $\frac{6}{14} = \frac{15}{x}$

$6x = 210$

$x = 35$

b. $\frac{0.9}{1.6} = \frac{x}{0.5}$

$1.6x = 0.45$

$x = .28$

c. $\frac{x+5}{5} = \frac{x+7}{3}$

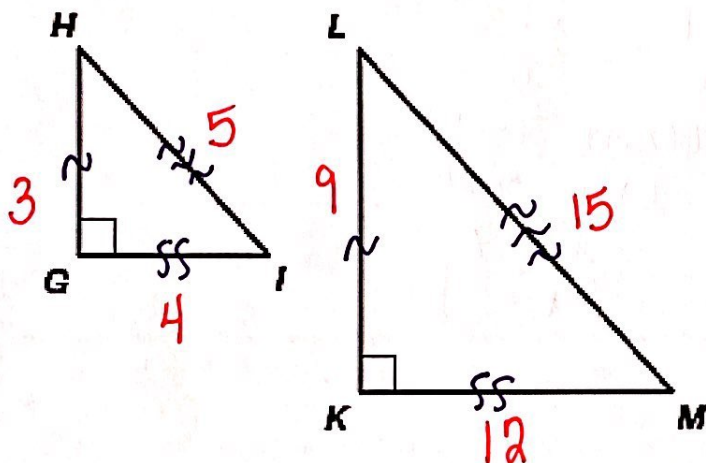
$3(x+5) = 5(x+7)$

$3x+15 = 5x+35$

$-20 = 2x$

$x = -10$

When two figures are similar, the ratio of their corresponding sides are the same, which means we can use proportions to find missing side lengths.



In the figure below, $\Delta GHI \sim \Delta KLM$.

1. Write 3 different ratios that compare a side length from ΔGHI to a corresponding side length of ΔKLM .

$\frac{HG}{LK} = \frac{GI}{KM} = \frac{HI}{LM}$

Scale Factor of 3 (small to big)

2. Suppose $GH = 3$ feet, $KL = 9$ feet, and $HI = 5$ feet. Write a proportion to calculate LM .

$\frac{3}{9} = \frac{5}{LM}$

$LM = 15 \text{ ft}$

$3x = 45$

$x = 15$

3. Suppose you know $KM = 12$ feet. Find GI .

$\frac{3}{9} = \frac{GI}{12}$

$GI = 4 \text{ ft}$

$9x = 36$

$x = 4$

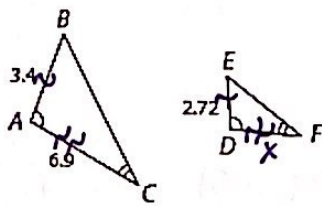
4. Calculate the ratio of the height of triangle ΔGHI to the height of ΔKLM . Then calculate the ratio of the length of the base of ΔGHI to the length of the base of ΔKLM . What do you notice?

$\frac{3}{9} = \frac{4}{12}$

The ratios are the same.

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

Example 1: Prove $\triangle ABC \sim \triangle DEF$ and then find the length of DF.



$\triangle ABC \sim \triangle DEF$ by AA

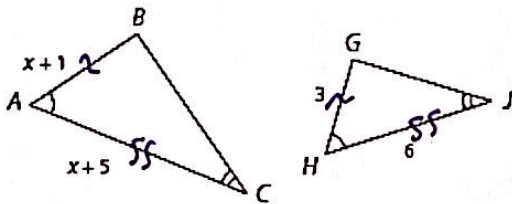
$$\frac{3.4}{2.72} = \frac{6.9}{x}$$

$$3.4x = 18.768$$

$$x = 5.52$$

$$\boxed{DF = 5.52}$$

Example 2: Determine if the triangles are similar and then create a similarity statement. Then find the value of x.



$\triangle ABC \sim \triangle HGT$ by AA

$$\frac{x+1}{3} = \frac{x+5}{6}$$

$$6(x+1) = 3(x+5)$$

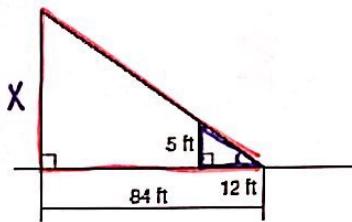
$$6x+6 = 3x+15$$

$$3x = 9$$

$$\boxed{x = 3}$$

Example 3: Minh wanted to measure the height of a statue. She lined herself up with the statue's shadow so that the tip of her shadow met the tip of the statue's shadow. She marked the spot where she was standing. Then she measured the distance from where she was standing to the tip of the shadow, and from the statue to the tip of the shadow. Are the two triangles similar? What is the height of the statue?

They are similar by AA.



$$\frac{5}{X} = \frac{12}{84}$$

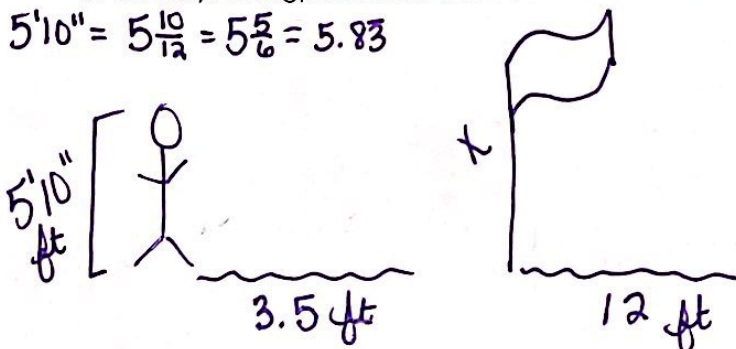
$$12X = 420$$

$$X = 35$$

The statue is 35 ft high.

Example 4: Suppose a person 5 feet 10 inches tall casts a shadow that is 3 feet 6 inches tall. At the same time of the day, a flagpole casts a shadow that is 12 feet long. To the nearest foot, how tall is the flagpole?

$$5'10'' = 5\frac{10}{12} = 5\frac{5}{6} = 5.8\bar{3}$$



$$\frac{5.8333}{X} = \frac{3.5}{12}$$

$$3.5X = 70$$

$$X = 20$$

The flagpole is 20 ft high.