

G6. Similar Triangles

Two Triangles are similar if they have equal angles.

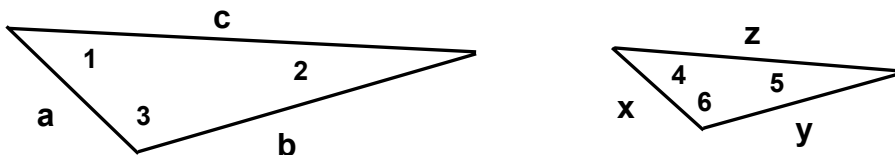
This means they have the same "shape" but may be of different sizes. If they also are the same size they are congruent.

Similar triangles appear frequently in practical problems.

Their corresponding ratios are equal, and that is what makes them so important and useful.

This often the way you set up an Equation to find an Unknown.

Note: If two sets of angles are equal, the third must be equal also, and the triangles are similar.



Given: $1 = 4$; $2 = 5$; $3 = 6$, Called corresponding angles

Corresponding sides are: $a \leftrightarrow x$; $b \leftrightarrow y$; $c \leftrightarrow z$

The Following Ratios are Equal

$$a/x = b/y = c/z \quad \text{and} \quad x/a = y/b = z/c$$

$$a/b = x/y \quad a/c = x/z \quad b/c = y/z$$

$$b/a = y/x \quad c/a = z/x \quad c/b = z/y$$

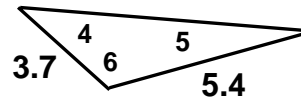
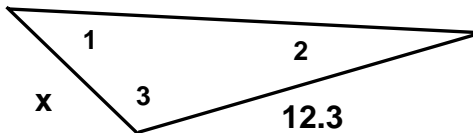
G6 Similar Triangles Problems

When you have two equal ratios with one unknown it is a simple algebra problem to solve for the unknown, X.

$$X/a = b/c, \text{ and } X = a(b/c) ; \quad X/3 = 7/12 \text{ and } X = 3x(7/12) = 1.75$$

$$a/X = b/c, \text{ and } X = a(c/b) ; \quad 3/X = 7/12 \text{ and } X = 3x(12/7) = 5.15$$

Find two similar triangles where the unknown is one side and you know three more sides, one of which is opposite the corresponding angle of the unknown.

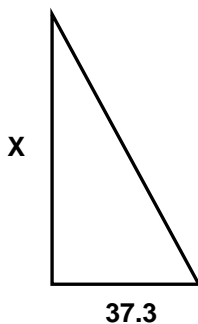


Given: 1 = 4 ; 2 = 5 ; 3 = 6 Find x

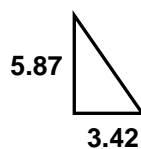
$$x/12.3 = 3.7/5.4 \text{ so } x = 12.3(3.7/5.4) = 8.4$$

$$\text{or } x/3.7 = 12.3/5.4 \text{ so } x = 3.7(12.3/5.4) = 8.4$$

Wrong: $x/3.7 = 5.4/12.3$ See why?



How tall is the Pole? The horizontal lines are shadows



$$x/5.87 = 37.3/3.42$$

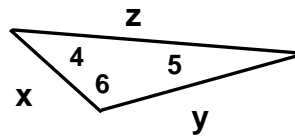
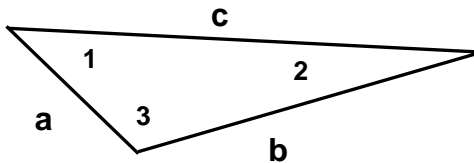
$$x = 5.87(37.3/3.42)$$

$$= 64.02 = 64.0$$

G6E Similar Triangles Exercises

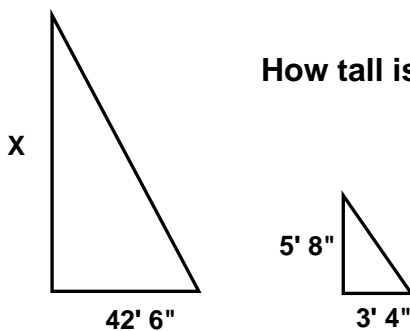
In each Exercise assume the triangles are similar.

Find lengths that you can.



Given: $\angle 1 = \angle 4$ and $\angle 2 = \angle 5$

1. What can you conclude about $\angle 3$ and $\angle 6$ and why?
2. What are the corresponding sides in pairs?
3. $a = 12.3$, $b = 18.7$, $x = 5.4$, $y = ?$, $z = ?$
4. $c = 1435$, $z = 765$, $y = 453$, What can you figure?
5. $a = .05$, $x = .02$, $y = .04$, What can you figure?
6. $c = 4$, $b = 3$, $x = 1.5$, What can you figure?
7. $b = \frac{23}{8}$, $x = \frac{3}{4}$, $y = \frac{4}{5}$, What can you figure?
8. In Drawing below, how tall is the pole?



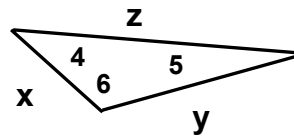
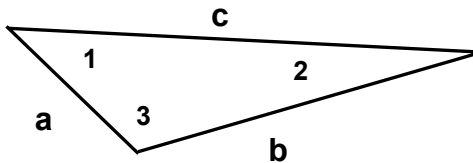
How tall is the Pole? The horizontal lines are shadows

Hint: $1'' = \frac{1}{12}'$, So, $5' 8'' = \frac{58}{12}'$

G6EA Similar Triangles Exercises Answers

In each Exercise assume the triangles are similar.

Find lengths that you can.



Given: $\angle 1 = \angle 4$ and $\angle 2 = \angle 5$

1. What can you conclude about $\angle 3$ and $\angle 6$ and why?

They are equal due to sum of angles of triangle equals 180°

2. What are the corresponding sides in pairs?

$a \leftrightarrow x$, $b \leftrightarrow y$, $c \leftrightarrow z$

3. $a = 12.3$, $b = 18.7$, $x = 5.4$, $y = ?$, $z = ?$

$y = 8.2$ Have not yet learned how to calculate z

4. $c = 1435$, $z = 765$, $y = 453$, What can you figure?

$b = 850$

5. $a = .05$, $x = .02$, $y = .04$, What can you figure?

$b = .1$

6. $c = 4$, $b = 3$, $x = 1.5$, What can you figure?

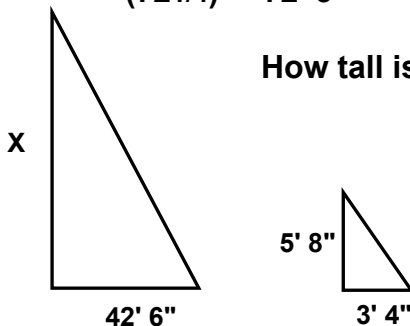
Nothing with just similar triangles.

7. $b = \frac{23}{8}$, $x = \frac{3}{4}$, $y = \frac{4}{5}$, What can you figure?

$a = \frac{229}{128} = 2.23$

8. In Drawing below, how tall is the pole?

$(\frac{721}{4})' = 72' 3''$



How tall is the Pole? The horizontal lines are shadows

Hint: $1'' = \frac{1}{12}'$, So, $5' 8'' = (\frac{58}{12})'$