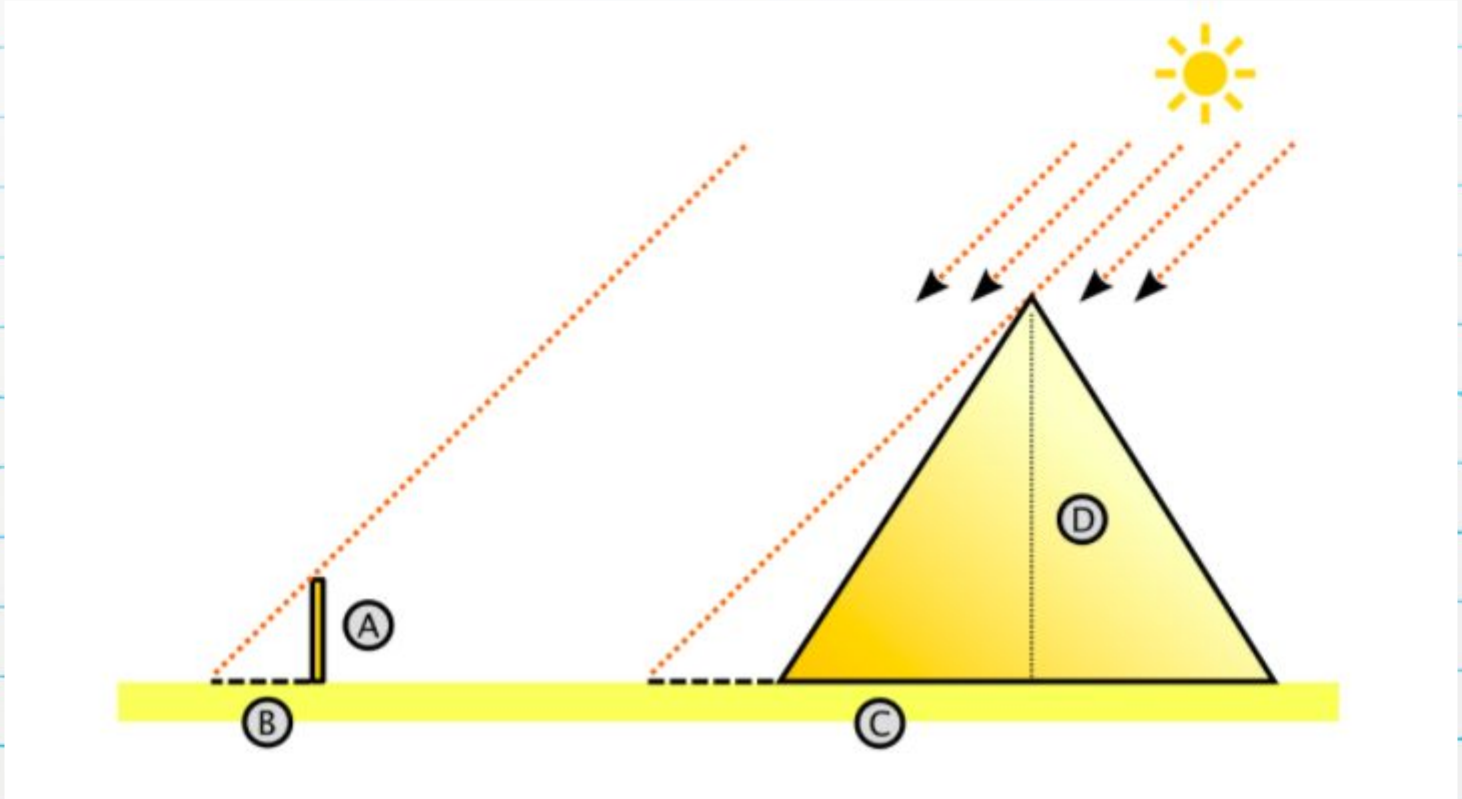
# Similar triangles:

# Ratio & Proportions

# Background

-The idea of similar triangle was used to find the heights of the Ancient Pyramids, this was done by Thales.
-He realized that in the desert the shadows created triangles that were to scale with one another, sun fell on every object at the same angle.
-It was done so by setting up a proportion, he set up a ratio of his shadow to the respects of the pyramid shadow.


A
B
C
D

# Definitions

Similar: resembling without being identical.

Triangle: plane figure with three straight sides and three angles.

Similar Triangle: are two triangles that have the same shape but do not have to be the same size.

Ratio: relative size of two quantities expressed as a quotient to one another.

Proportion: equality between two ratios.

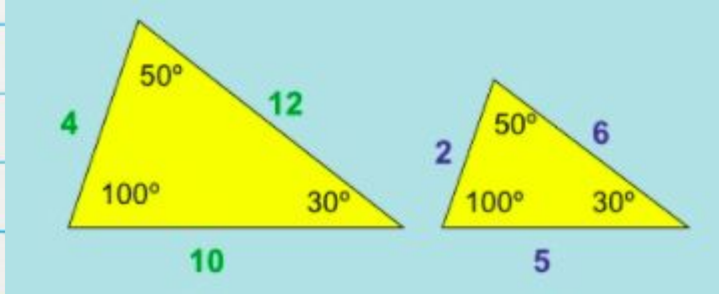
# Similar triangles:

They unlike congruent triangles

- Congruent triangle have the same angle AND same side measures

Similar triangles have the SAME angle measure but one of the side triangles might be bigger than the other

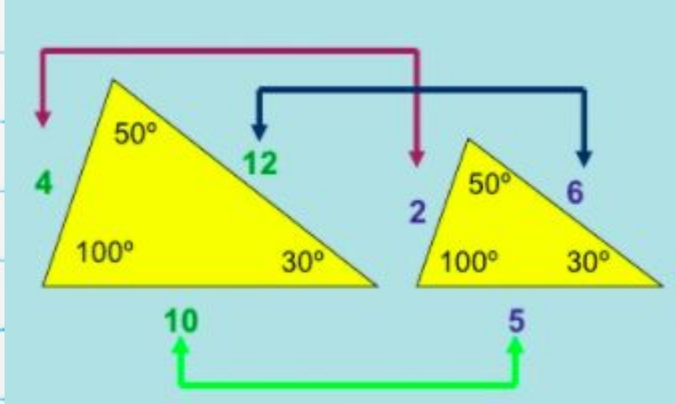
Example:



# How this works:

The length of the corresponding side are in proportion!

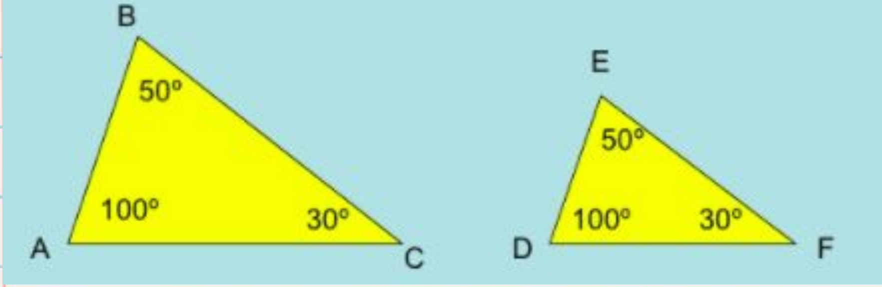
How to do so set up equations to show the proportion between the sides.




$$\frac{4}{2} = \frac{12}{6} = \frac{10}{5}$$

# Setting up proportions:

To set up a proportion you need to know that what sides correspond to one another.  The congruent sides are ones that are between two sides that have the same angle.




Since side AB and DE both have the angle of 100 degrees.

This implies that:

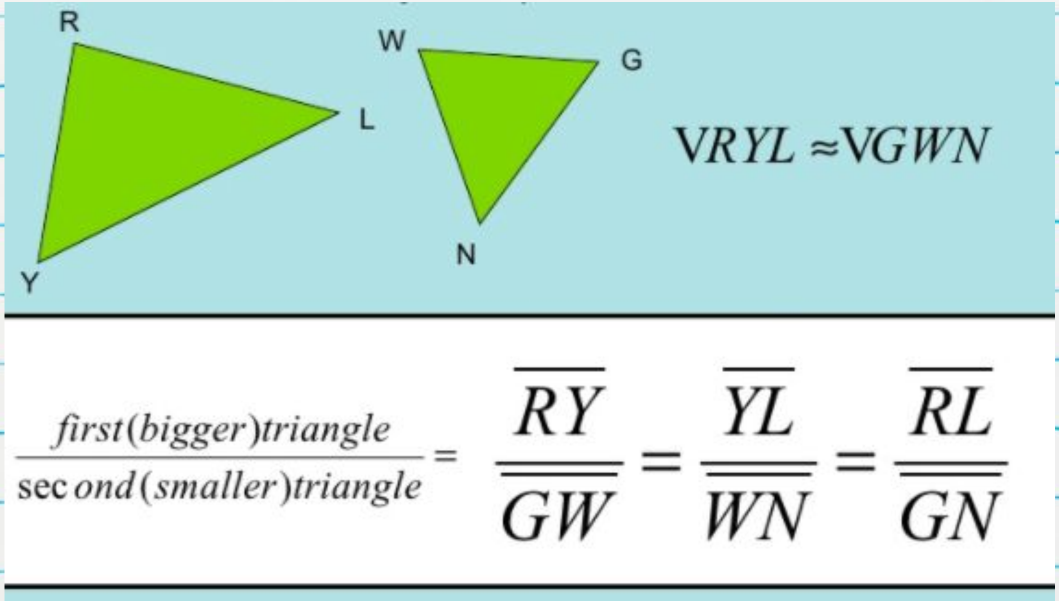
$$\overline{AB} \approx \overline{DE}$$
$$\overline{BC} \approx \overline{EF}$$
$$\overline{CA} \approx \overline{FD}$$

*All the angles on triangle ABC match triangle DEF

# Things to remember

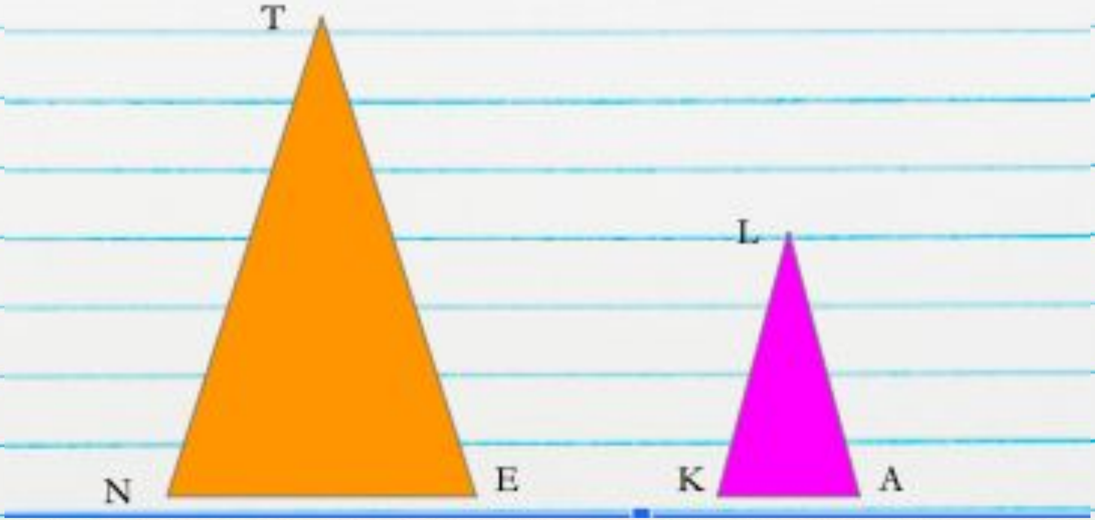
When you are setting up your proportion for similar triangles if you put the first triangle in the numerator it have to stay in the numerator for all the equations.

For example:



# Example:

Triangle NTE is similar to triangle KLA. If TE= 16 and EN=24 and KA=3, what is the length of LA?



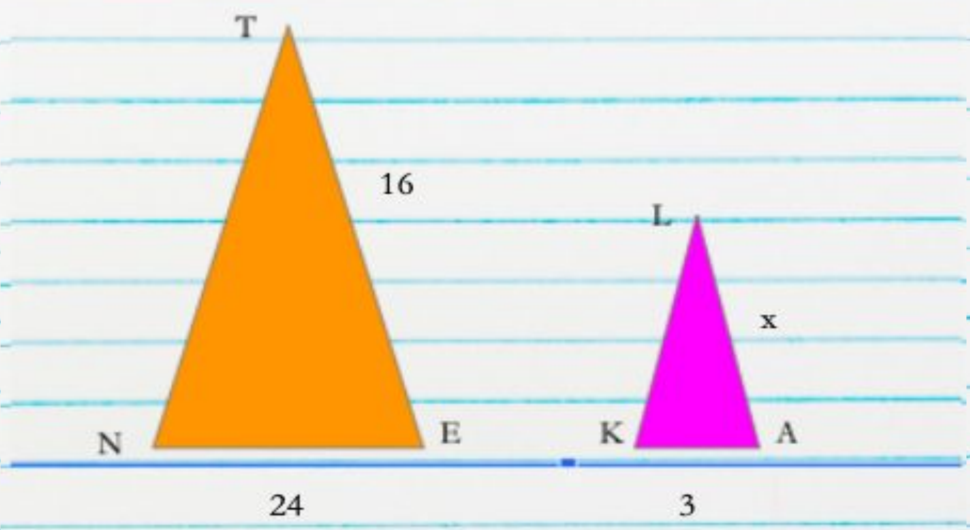
Then you will set up a ratio of the given triangles:

$$\frac{TE}{LA} = \frac{EN}{AK}$$

$$\frac{16}{x} = \frac{24}{3}$$

Cross Multiple

$24x=48$

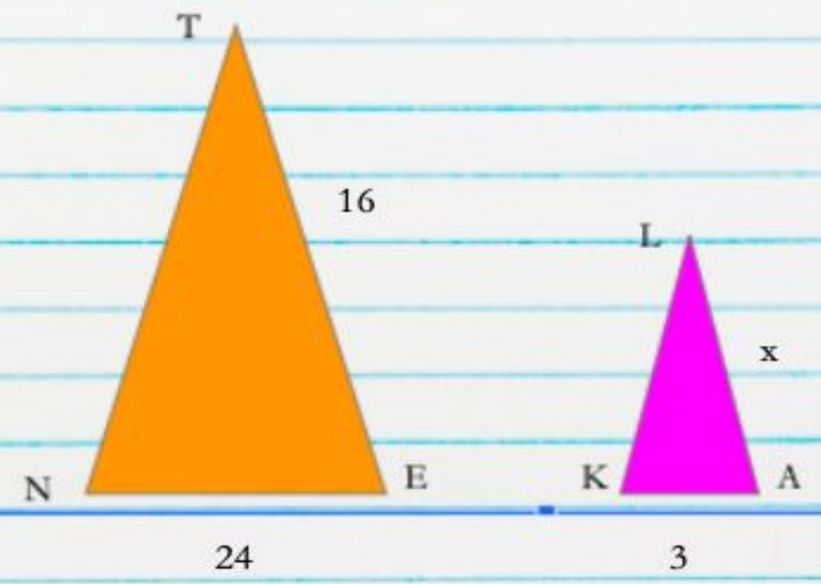



Solve for x:

$x=2$

# Solution

Since the problem stated that the two triangle were similar we were able to set up a ratio and find that LA side is equal to 2.



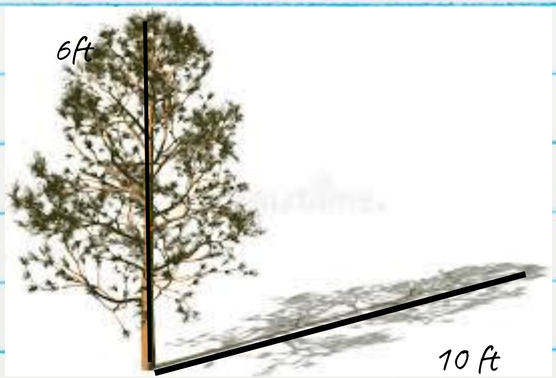
# Similar triangles

-From this problem we see that similar triangle can be a scaled up or down version of one another.

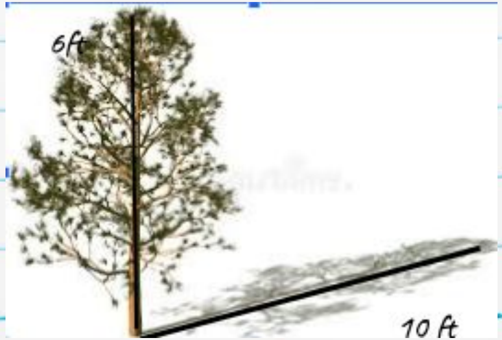
-Compared to congruent triangles were the triangles would have to be identical.

# Now let's try a real world example:

We will be comparing our shadows to that of a tree. The tree is 6 feet tall and cast a shadow of 10 feet.



You can see that the tree and it shadow create a triangle. Now take your height which will not be a whole number.




First we are going to need to set up our ratio:

$$\frac{\text{Tree Height}}{\text{Your Height}} = \frac{\text{Tree shadow}}{\text{Your Shadow}}$$

In our problem what would be the "x" your shadow height.

Now set up your ratio:

$$\frac{6 \text{ feet}}{5.8 \text{ feet}} = \frac{10 \text{ feet}}{x}$$

Then cross multiple:

$6x=10(5.8)$

Solve for x:

$x= 9.6$ feet

# SOLUTION:

Since the tree and the shadow create a shadow that creates a triangle. We can compare similar triangles to our height and our shadows. We are able to set up a ratio to the corresponding sides.

In my case my shadow will be about 9.6 feet.