## 3.5-3.6 (Extension): Similar Figures

Goals: *Determine if two figures are similar by setting up a proportion *Find the missing side of a figure based on similarity

Congruent figures: two figures that are both the same $\qquad$ shape $\qquad$ and the same
$\qquad$ size $\qquad$

## Symbol:

Similar Figures: two figures that are the same $\qquad$ shape $\qquad$ but do not have to be the same $\qquad$ size $\qquad$ . (They could be though)

## Symbol:

Corresponding parts: two $\qquad$ sides $\qquad$ of two similar figures that have the same relative position. They are in the "same spot"
**SIDES OF SIMILAR FIGURES ARE $\qquad$ proportional $\qquad$ **
*this means they form a $\qquad$ proportion $\qquad$
**CORRESPONDING Angles of Similar figures are $\qquad$ congruent $\qquad$ **
*this means they have the same $\qquad$ measure $\qquad$

## Decide if the given pairs of figures are similar or not.

Ex:


10 in


No,
$\frac{7}{8} ? \frac{2}{10}$ when you cross multiply you get 70 and 16 , so they do not form a proportion so they are not similar figures.


Yes, when you set up the two ratios and cross multiply they both equal 30 . So they form a proportion which means they are similar figures.

Ex: $\triangle P Q R \sim \triangle T U V$. Find the measure of each missing angle measure.

$\angle T=20^{\circ}$ because it corresponds to $\angle P$
$\angle V=110^{\circ}$ because it corresponds to $\angle R$
$\angle Q=50^{\circ}$ because the sum of angles in any triangle needs to be $180^{\circ}$.
$\angle U=50^{\circ}$ because the sum of angles in any triangle needs to be $180^{\circ}$ and it corresponds to $\angle Q$.

Ex: $\triangle J K L \sim \triangle M N P$. Find $J L$.


Ex: $\triangle E F G \sim \Delta U V W$. Find $U V$.


Ex: $A B C D \sim G H I J$. Find $A D$.

$\frac{40}{35}=\frac{x}{14}$
$x=16 \mathrm{~m}$

Ex: $J K L M \sim Q R S T$. Find $K L$.


Ex: Cape Hatteras Lighthouse in North Carolina casts a shadow 83.2 feet long. A man who is 5.8 feet tall casts a shadow of 2.5 feet.
A) Draw a diagram to represent the situation.

B) PROVE the figures are similar by showing that all angle measurements are congruent.

1) First show that you have two triangles.
2) Then show that you have two parallel lines (the height of the man and the height of the lighthouse)
3) Show that you have a transversal (the rays of the sun) because this is a line intersecting parallel lines
4) Show that there are two $90^{\circ}$ angles in each triangle (Where the heights of each meet the ground)
5) Show that two angles are congruent because they are corresponding angles formed by a transversal
6) This means that the third angle in each triangle must be the same.

Since all three angles are the same, the triangles are similar. So we can use similar triangles to find the missing height.
C) Use similar figures to find the height of the lighthouse.

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\begin{aligned}
\frac{x}{5.8} & =\frac{83.2}{2.5} \\
x & =193.024 \text { feet }
\end{aligned}
$$

