

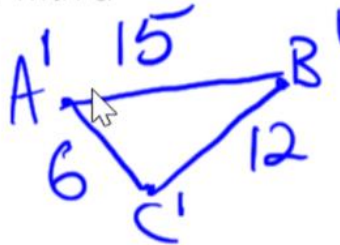
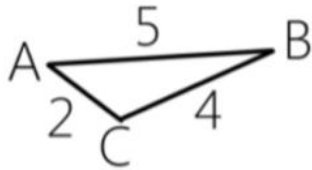
Warm-Up

Similarity and Triangles

1. What does it mean for shapes to be similar?

Answer: Sides are proportional
Angles are congruent

2. Dilate the following figure, with a scale factor of 3.



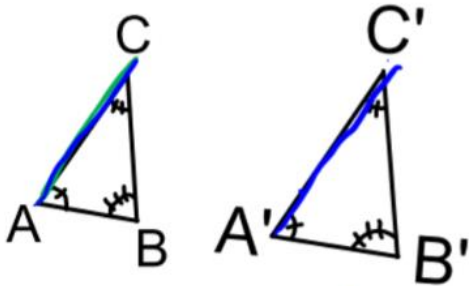
Are the triangles similar?

Yes

$$\frac{15}{5} = \frac{12}{4} = \frac{6}{2}$$

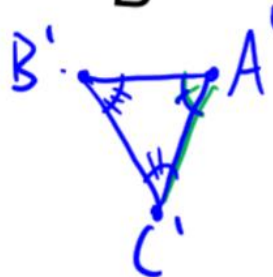
Similarity and Triangles

Corresponding - In the same relative position



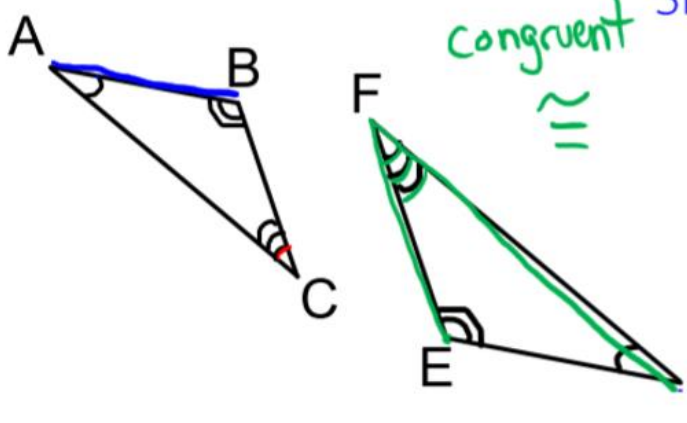
AC corresponds to A'C'.
What if it was turned?

AC would still correspond to A'C'



Notes Corresponding Parts

Similarity and Triangles



What angle would correspond to $\angle EFD$?

$\angle BCA \cong \angle EFD$

What side would correspond to \overline{AB} ?

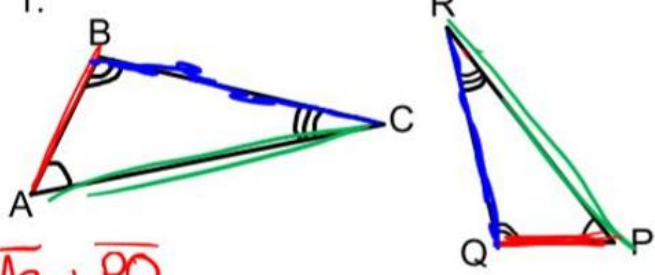
\overline{DE}

You try

Similarity and Triangles

Name a pair of corresponding sides.

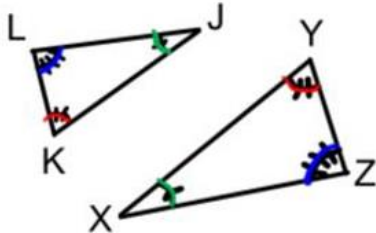
1.



- $\overline{AB} \leftrightarrow \overline{RP}$
- $\overline{BC} \leftrightarrow \overline{PQ}$
- $\overline{CA} \leftrightarrow \overline{RQ}$

Name a pair of corresponding angles.

2.



- $\angle LJK \cong \angle XYZ$
- $\angle LJK \cong \angle ZXY$
- $\angle JKL \cong \angle XZY$

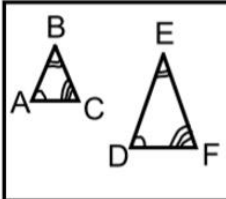
An object is similar, if and only if the **corresponding sides** are **in proportion** and the **corresponding angles** are **congruent**.

Similar Figures	
Symbol	Property
Similarity Statement	Proportion Statement

2 figures that have the same shape but different size	
Symbol	Property
Similarity Statement	Proportion Statement

Similar Figures		
$\triangle ABC \sim \triangle DEF$	~ 2 figures are similar.	Property
	Similarity Statement	Proportion Statement

Similar Figures	
Symbol	If 2 figures are similar than corresponding sides are proportional and corresponding angles are congruent
Similarity Statement	Proportion Statement

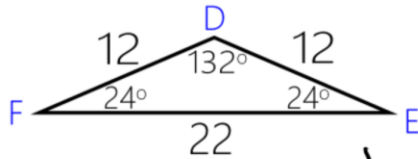
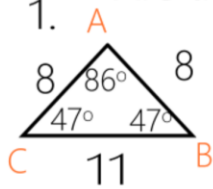
Similar Figures		
$\triangle ABC \sim \triangle DEF$	Symbol	Property
	$\triangle ABC \sim \triangle DEF$ $\angle A \sim \angle D$ $\overline{AC} \sim \overline{DF}$ $\angle C \sim \angle F$ $\overline{AB} \sim \overline{DE}$ $\angle B \sim \angle E$ $\overline{BC} \sim \overline{EF}$	Proportion Statement

Similar Figures	
Symbol	Property
Similarity Statement	Proportion Statement

$\frac{\overline{AC}}{\overline{DF}} = \frac{\overline{AB}}{\overline{DE}} = \frac{\overline{BC}}{\overline{EF}}$

Similarity and Triangles

1. Are these shapes similar?



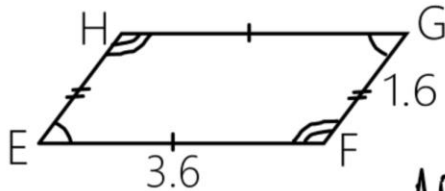
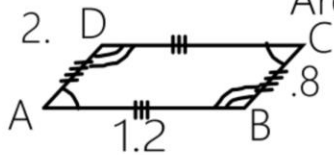
$$\angle A \neq \angle D$$

$$\triangle ABC \not\sim \triangle DEF$$

because corresponding angles are not congruent.

Similarity and Triangles

2. Are these shapes similar?



$$\frac{1.6}{0.8} = \frac{3.6}{1.2}$$

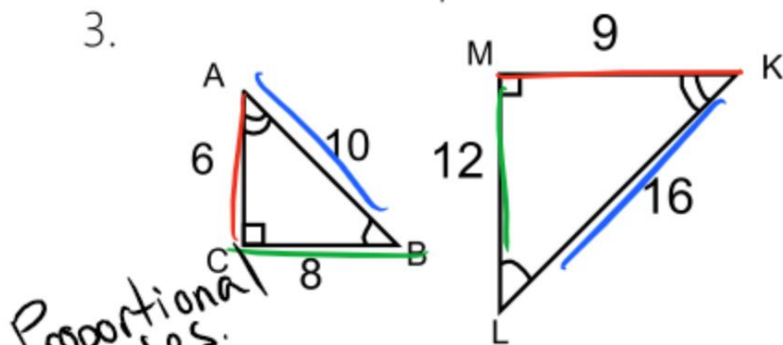
$$2 \neq 3$$

ABCD is not similar to EFGH because corresponding sides are not proportional

Similarity and Triangles

Are these shapes similar?

3.



Proportional sides:

$$\frac{16}{10} = \frac{9}{6} = \frac{12}{8}$$

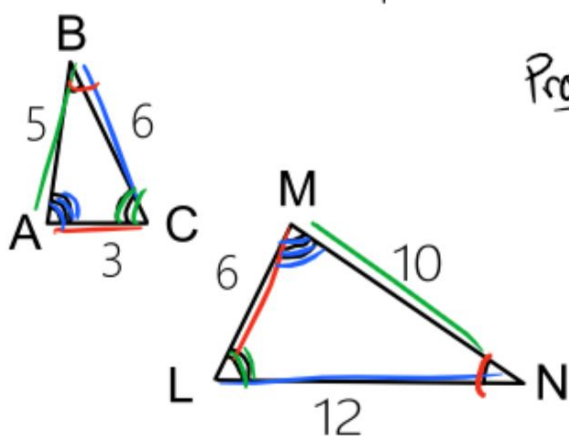
$$1.6 \neq 1.5 = 1.5$$

$\triangle ABC \not\sim \triangle KLM$ because corresponding sides are not proportional

Similarity and Triangles

Are these shapes similar?

4.



Proportional sides

$$\frac{12}{6} = \frac{10}{5} = \frac{6}{3}$$

$$2 = 2 = 2 \quad \checkmark$$

Congruent angles

$$\angle N \cong \angle B$$

$$\angle C \cong \angle L \quad \checkmark$$

$$\angle A \cong \angle M$$

$$\triangle ABC \cong \triangle MNL$$

because all corresponding sides are proportional and all corresponding angles are congruent.

Similarity and Triangles

To show similarity we had to check that each pair of **corresponding sides** was proportional and that each pair of **corresponding angles** was congruent.

That took some WORK!

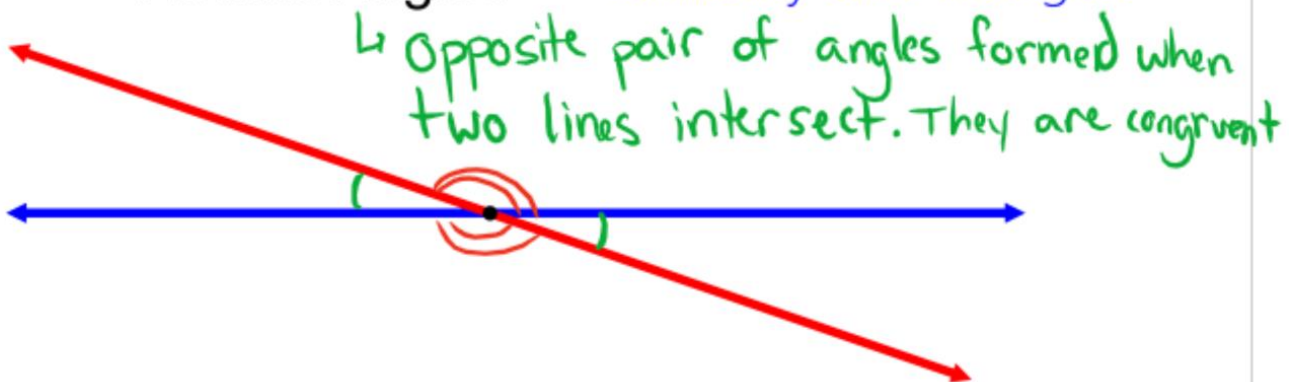
So... is there a faster way to check for similarity of triangles?

Similarity and Triangles

There is! But before we can learn about it we have to talk about a few properties.

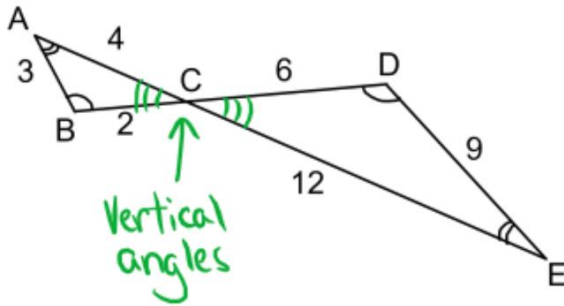
- Triangle Sum Theorem → sum of interior angles of a triangle is 180°
- Vertical Angles
- Reflexive Property

Vertical Angles Similarity and Triangles



Similarity and Triangles

Vertical Angles in similar triangles



proportional sides

$$\frac{12}{4} = \frac{9}{3} = \frac{6}{2}$$

$$3 = 3 = 3 \quad \checkmark$$

Congruent angles

$$\angle A \cong \angle E$$

$$\angle D \cong \angle B$$

$$\angle DCE \cong \angle BCA$$

$$\triangle ABC \sim \triangle EDC.$$

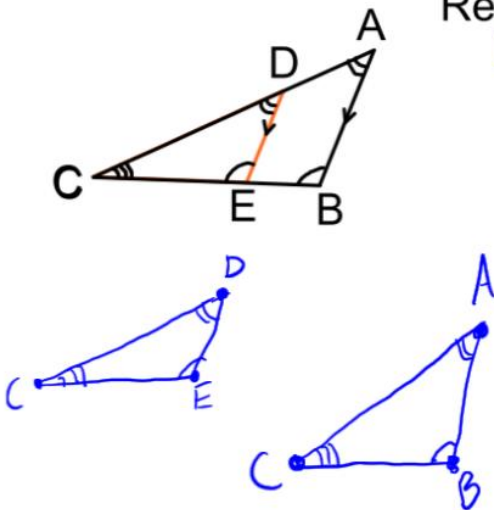
All corresponding sides prop.

All corresponding angles \cong

Similarity and Triangles

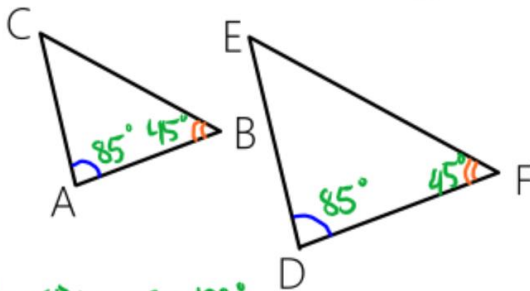
Reflexive Property

↳ A figure is congruent to itself. often a shared part such as an angle or a side.



Similarity and Triangles

Are these triangles similar?



What do we know?

$$\angle F \cong \angle B$$

$$\angle D \cong \angle A$$

What can we find out?

$\angle C \cong \angle E$ by triangle sum theorem.

$$m\angle A + m\angle B + m\angle C = 180^\circ$$

$$85 + 45 + m\angle C = 180^\circ$$

$$130 + m\angle C = 180$$

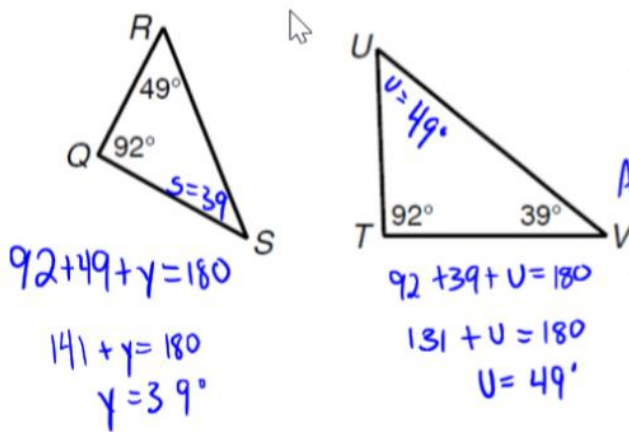
$$m\angle C = 50^\circ$$

Because $\angle D$ and $\angle F$ are congruent to $\angle A$ and $\angle B$, $\angle E$ must be congruent to $\angle C$.

Similarity and Triangles

AA Postulate

If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.



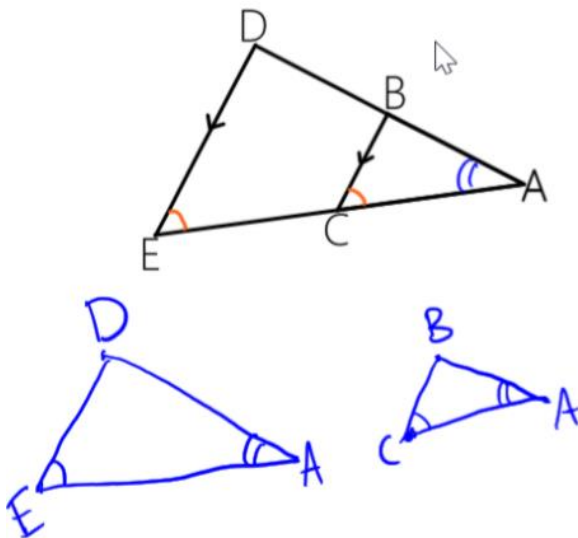
Similarity and Triangles

Are the following triangles similar? **Yes**

How do you know?

AA $\angle SQR \cong \angle VTU$, $\angle QRS \cong \angle TUV$
If they are, write a similarity statement.

$$\Delta QRS \sim \Delta TUV$$



Similarity and Triangles

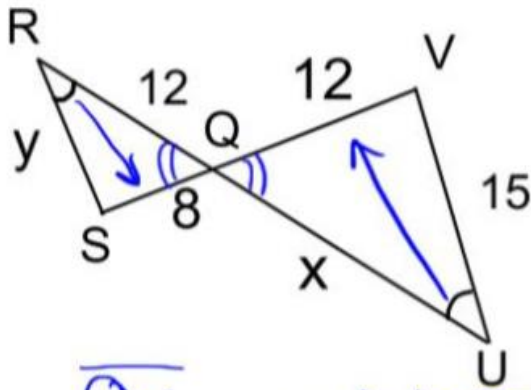
Are the following triangles similar?

How do you know?

AA, $\angle DEA \cong \angle BCA$ $\angle BAC \cong \angle DAE$
If they are, write a similarity statement.

$$\Delta ABC \sim \Delta ADE$$

Similarity and Triangles



If $\Delta RQS \sim \Delta UQV$, find the value of x and y .

\overline{QV} corresponds to \overline{QS}

We can use these as the proportion $\frac{QV}{QS}$

$$\frac{12}{8} = \frac{15}{y}$$

$$12y = 120$$

$$\frac{12y}{12} = \frac{120}{12}$$

$$y = 10 \checkmark$$

should be middle length side

$$\frac{12}{8} = \frac{x}{12}$$

$$8x = 144$$

$$\frac{8x}{8} = \frac{144}{8}$$

$$x = 18 \checkmark$$

should be longest side

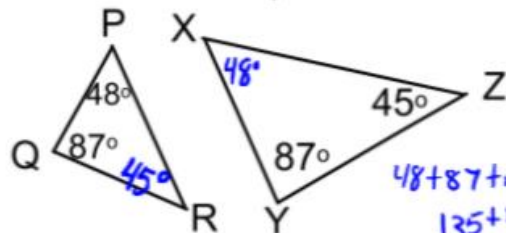
Review

Similarity and Triangles

Determine if the following triangles are similar. If so, write a similarity statement.

Yes by AA $\angle RQP \cong \angle ZYX$ \checkmark
 $\angle QPR \cong \angle YXZ$

$$\Delta PQR \sim \Delta XYZ$$



$$48 + 87 + m\angle PRQ = 180$$

$$135 + m\angle PRQ = 180$$

$$m\angle PRQ = 45$$

How did you determine if the triangles were similar?

Use the triangle sum theorem to find the missing angle. This shows that the two triangles have two pairs of corresponding congruent angles, which makes them similar by AA.