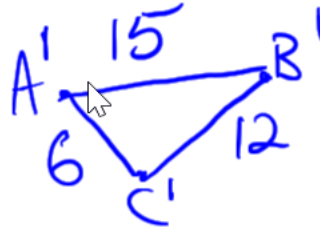
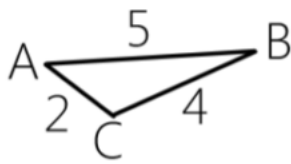


Warm-Up Similarity and Triangles

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

An object is similar to another object if their corresponding sides and angles are the same.
 Sides are proportional
 Angles are congruent

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



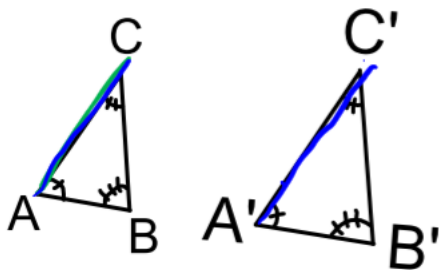
Are the triangles similar?

Yes

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

Similarity and Triangles

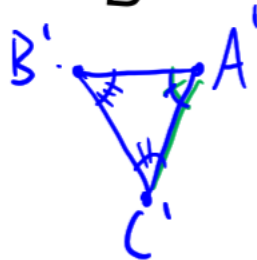
Corresponding - In the same relative position



AC corresponds to A'C'.

What if it was turned?

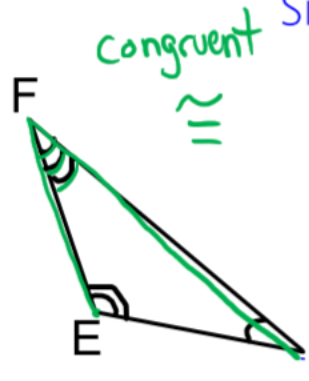
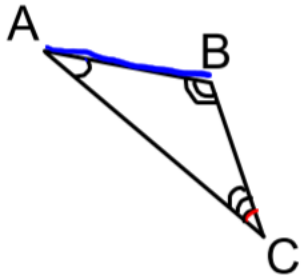
AC would still correspond to A'C'



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} ?

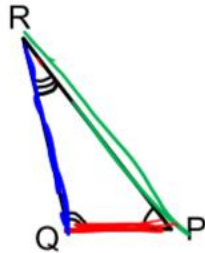
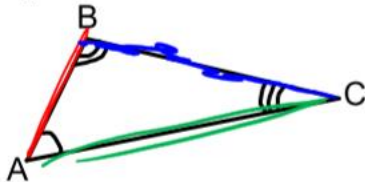
\overline{DE}

You try

Similarity and Triangles

Name a pair of corresponding sides.

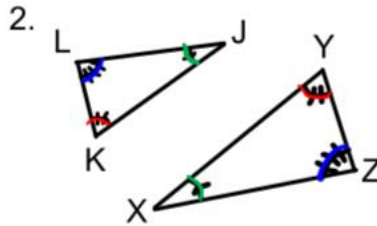
1.



$\overline{AB} \cong \overline{PQ}$
 $\overline{BC} \cong \overline{QR}$
 $\overline{CA} \cong \overline{RP}$

Name a pair of corresponding angles.

2.



$\angle JLK \cong \angle XZY$
 $\angle LJK \cong \angle ZYX$
 $\angle JKL \cong \angle XYZ$

Similarity and Triangles

Why do we need to know what it means for parts to be corresponding?

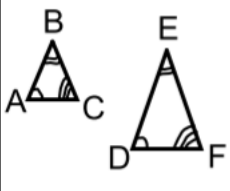
An object is similar, if and only if the corresponding sides are in proportion and the corresponding angles are congruent.

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	

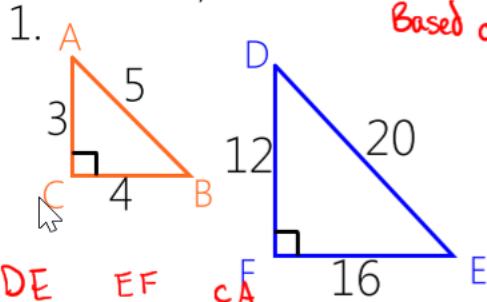
Similar Figures		
Symbol	If 2 figures are similar then corresponding sides are proportional and corresponding angles are congruent	
Similarity Statement	Proportion Statement	

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

Similarity and Triangles

So, are these shapes similar?

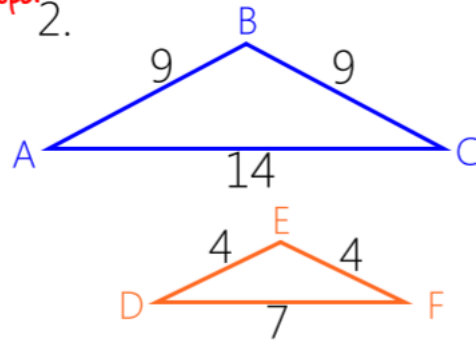
Based on proportional sides.



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

$$\frac{20}{5} = \frac{16}{4} = \frac{12}{3}$$

$$4 = 4 = 4$$



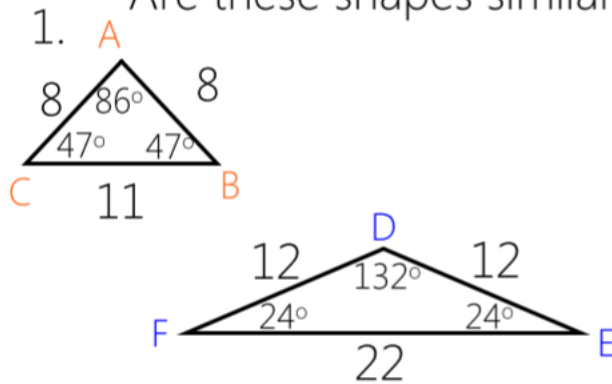
$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$$

$$\frac{9}{4} = \frac{9}{4} = \frac{14}{7}$$

$$2.25 = 2.25 \neq 2$$

Similarity and Triangles

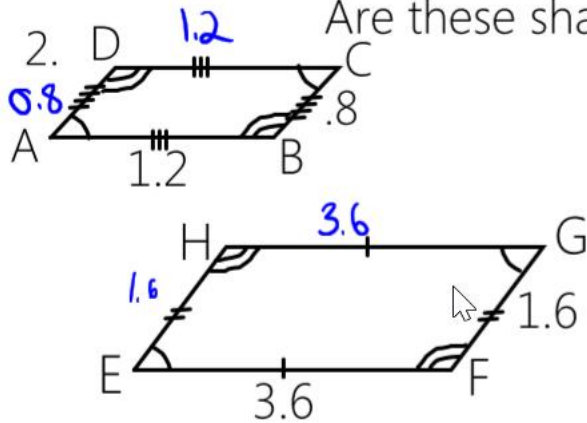
Are these shapes similar?



No the angles are not congruent.

Similarity and Triangles

Are these shapes similar?



$\angle ADC \cong \angle EHG$
 $\angle DCB \cong \angle HGF$
 $\angle CBA \cong \angle GFE$
 $\angle BAD \cong \angle FEH$

Corresponding angles congruent ✓

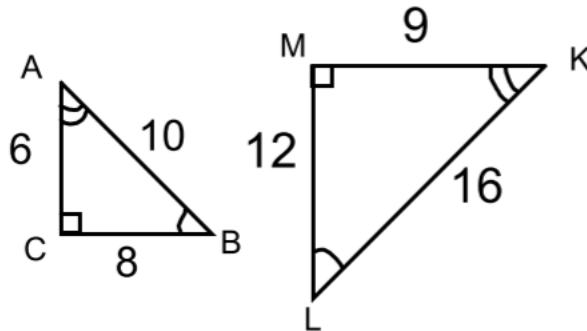
$$\frac{1.6}{0.8} = \frac{3.6}{1.2}$$

$3 = 3$ ✓ Corresponding angles are congruent

Similarity and Triangles

Are these shapes similar?

3.



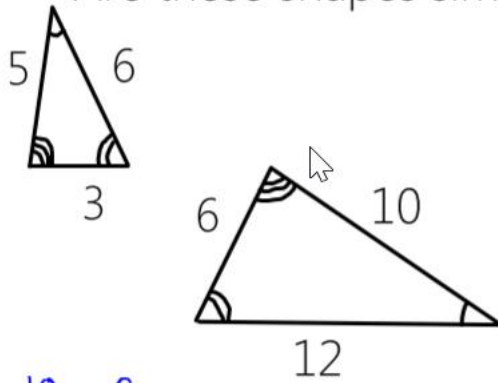
$$\frac{16}{10} = \frac{12}{8} = \frac{9}{6}$$

$\frac{8}{5} \neq \frac{3}{2} = \frac{3}{2}$ sides are not proportional

Similarity and Triangles

Are these shapes similar?

4.



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

$2 = 2 = 2$ ✓ corresponding sides are proportional

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

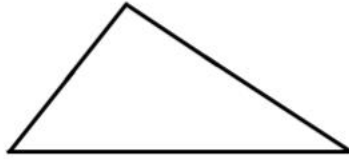
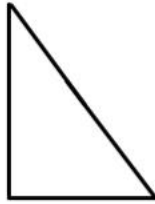
There is! But before we can learn about it we have to talk about a few properties.

- Triangle Sum Theorem
- Vertical Angles
- Reflexive Property

Similarity and Triangles

Property of Triangles

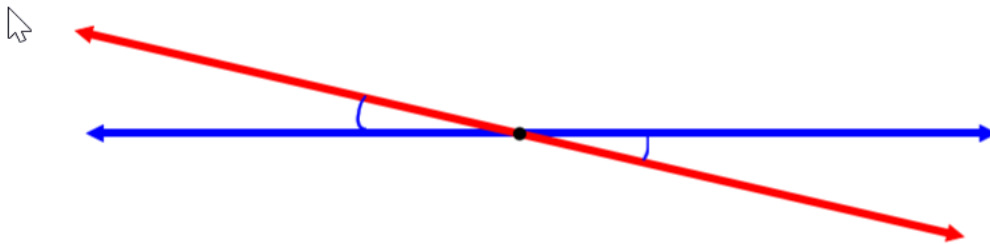
What is the sum of the interior angles of a triangle?



↓
180°

Vertical Angles

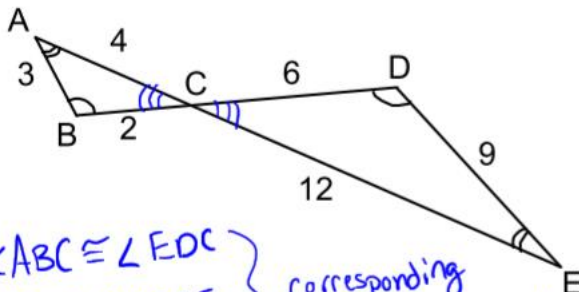
Similarity and Triangles



The angles opposite of each other when two lines cross.
These opposite angles are also congruent.

Similarity and Triangles

Vertical Angles in similar triangles



$\angle ABC \cong \angle EDC$
 $\angle BCA \cong \angle DCE$
 $\angle CAB \cong \angle CED$

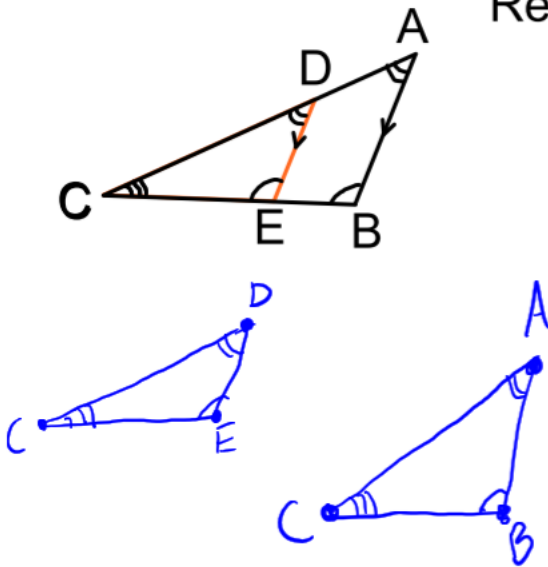
} corresponding angles congruent

Both shortest sides: $\frac{6}{2} = \frac{9}{3} = \frac{12}{4}$
 Both middle length sides:
 Both longest side:
 $3 = 3 = 3$

Similarity and Triangles

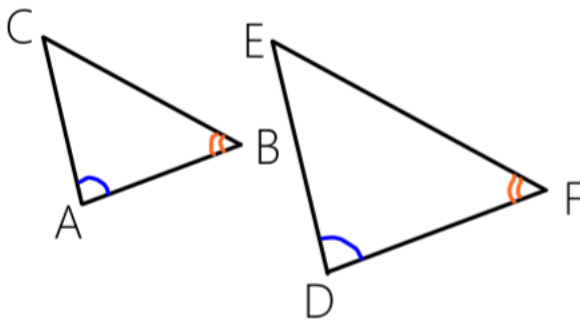
Reflexive Property

↳ 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?

$$\angle CAB \cong \angle EDF$$

$$\angle ABC \cong \angle DFE$$

What can we find out?

$$\angle BCA \cong \angle FED$$

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

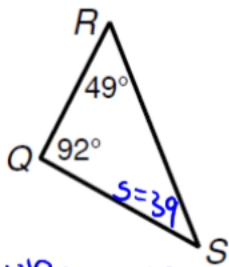
Are the following triangles similar? **Yes**

How do you know?

AA $\angle SQR \cong \angle VTU$, $\angle QRS \cong \angle TVU$

If they are, write a similarity statement.

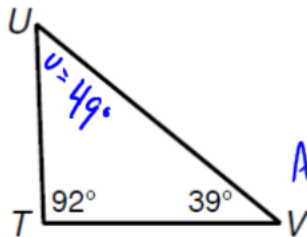
$$\Delta QRS \sim \Delta TVU$$



$$92 + 49 + \gamma = 180$$

$$141 + \gamma = 180$$

$$\gamma = 39^\circ$$



$$92 + 39 + U = 180$$

$$131 + U = 180$$

$$U = 49^\circ$$

Similarity and Triangles

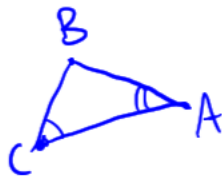
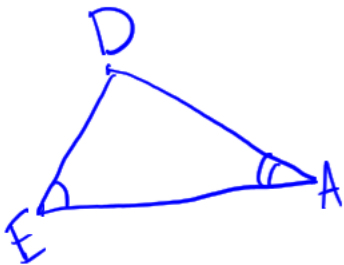
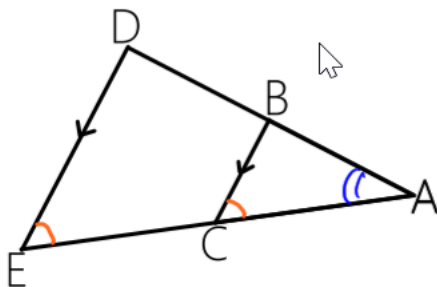
Are the following triangles similar?

How do you know?

AA, $\angle DEA \cong \angle BCA$ $\angle BAC \cong \angle DAE$

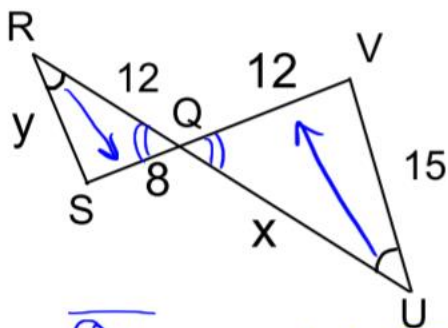
If they are, write a similarity statement.

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



Assume Similarity

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 $\frac{QV}{QS}$

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

$$12y = 120$$

$$y = 10 \checkmark$$

should be middle length side

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

$$8x = 144$$

$$x = 18 \checkmark$$

should be longest side

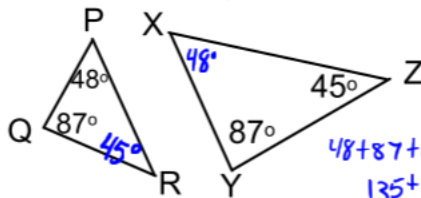
Review

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.