Unit 6 Lesson 4 – Proving Similar Triangles

Dilations produce Similar triangles.

S[illegible]r Triangles: Triangles that have the same Shape but **NOT NECESSARILY** the same size.

Since dilations produce similar triangles, the properties of dilations apply to similar triangles.

- In similar triangles, **corresponding angles** are congruent.
- In similar triangles, **corresponding sides** are proportional.

Symbol for similarity ~

Today we are going to test ways of determining if triangles are similar when only given certain combinations of parts.

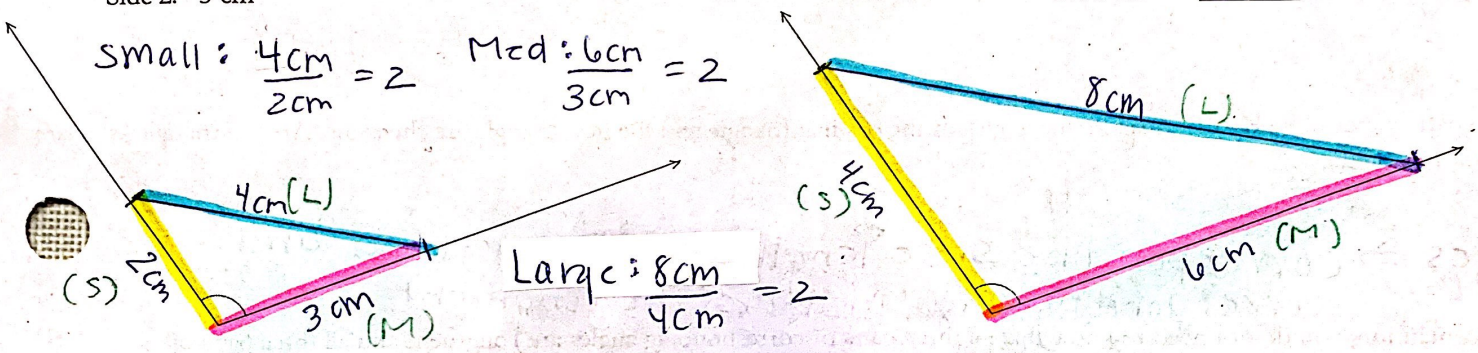
For this activity, each "A" stands for a pair of corresponding angles and each "S" stands for a pair of corresponding sides.

SAS ~ (Side-Angle-Side Similarity): The angles below are congruent. For each angle, use your ruler to measure from the vertex along each ray and mark the length of the two sides. Label the lengths.

a. Side 1: 2 cm
Side 2: 3 cm

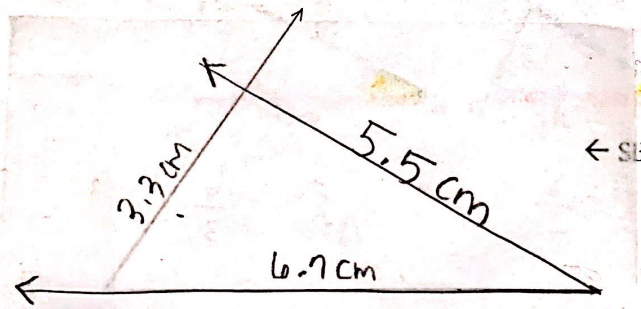
Now multiply by a scale factor of 2…

b. New Side 1: 4cm
New Side 2: 6cm



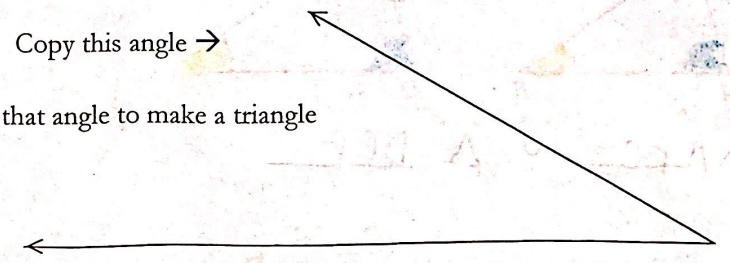
Connect the endpoints of side 1 and side 2 to form a third side for both triangles. Use your ruler to measure the third side of each triangle. Label your measurements in the pictures. Use a piece of patty paper to verify corresponding angles are congruent.
Are the triangles similar? How do you know? Yes ⇒ corresponding side lengths are proportional (k=2) and corresponding angle measures are congruent.

AA ~ (Angle-Angle Similarity): Use your ruler as a straightedge to help you copy the angle on the right onto patty paper. Slide your patty paper so that one of the rays is on top of the other, and the other two rays are intersecting to form a triangle. Use your ruler to help you copy the angle from your patty paper so that a triangle is formed.



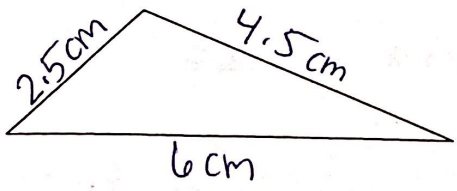
Copy this angle →

← Slide it over that angle to make a triangle



Measure all of the sides of your triangle and label your measurements on the picture. Trace your triangle on patty paper.
Compare your triangle to a person nearby. Is your triangle similar to their triangle? How do you know? Verify that corresponding angle measures are congruent and corresponding side lengths are proportional.

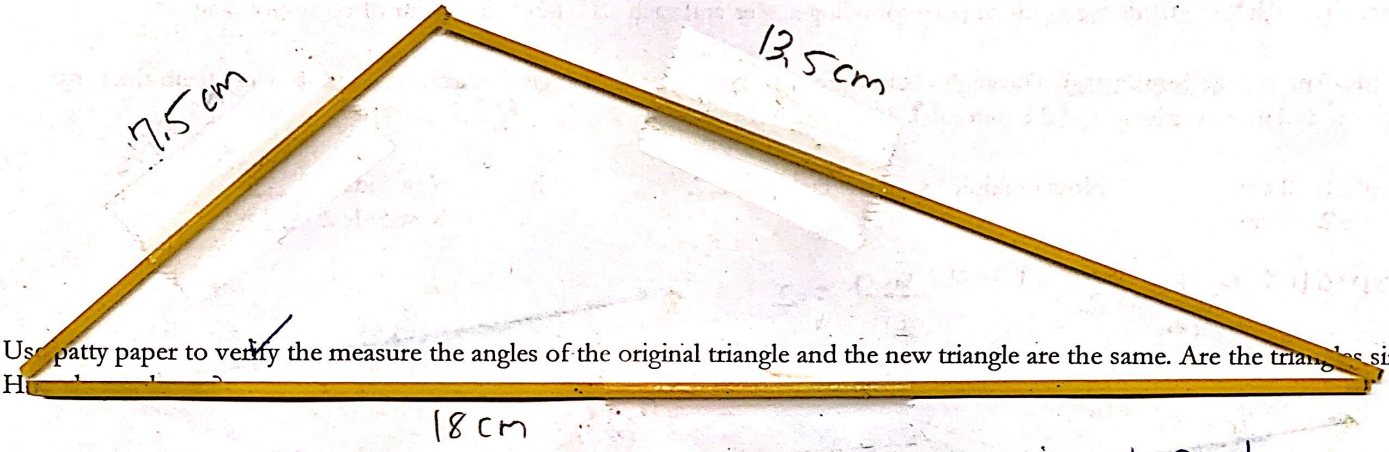
SSS ~ (Side-Side-Side Similarity): The side lengths of the triangle below are 2.5 cm, 4.5 cm, and 6 cm. Measure each side to verify these lengths and label each with the correct measurement.



Multiply by a scale factor of 3, what are the new side lengths?

7.5cm, 13.5cm, 18cm

Now, use your ruler and pencil to mark your spaghetti for each of the new lengths. Use your thumbnail to break your spaghetti at each mark. Use the spaghetti to create a new triangle in the space below. Mark the vertices of your triangle, remove the spaghetti, and use your ruler to draw in the sides of the triangle. Label the measures of the sides in your picture.



Use patty paper to verify the measure the angles of the original triangle and the new triangle are the same. Are the triangles similar? How do you know?

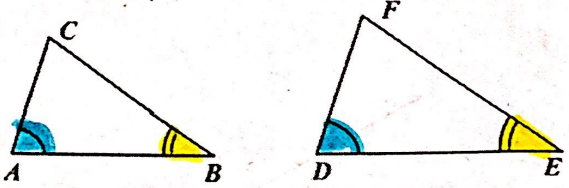
Yes ⇒ corresponding side lengths are proportional and corresponding angle measures are congruent.

In conclusion, you do not need to know that all three pairs of corresponding angles are congruent and all three pairs of corresponding sides are proportional to determine that two triangles are similar.

At minimum, you need only one of the following combinations of corresponding parts: SAS~, AA~, or SSS~.

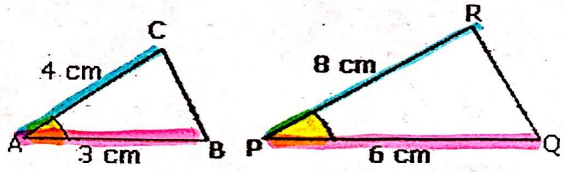
Determine if the triangles below are similar. If they are similar, write a similarity statement and show all necessary work to justify your statement.

1. AA~



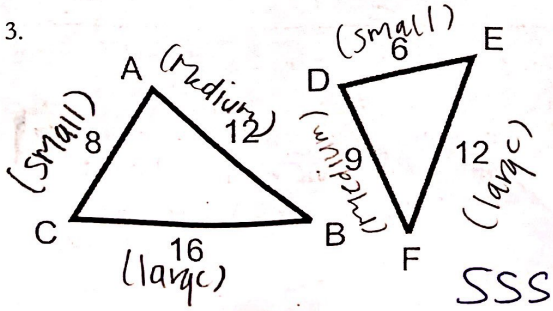
△ABC ~ △DEF

2. SAS~ △CAB ~ △RPQ



$\frac{RP}{CA} = \frac{8}{4} = 2$ $\frac{PQ}{AB} = \frac{6}{3} = 2$

3.



Small $\frac{AC}{DE} = \frac{8}{6} = \frac{4}{3}$ Med $\frac{AB}{DF} = \frac{12}{9} = \frac{4}{3}$ Lg $\frac{CB}{EF} = \frac{16}{12} = \frac{4}{3}$

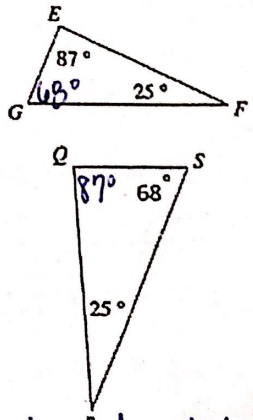
SSS~ △ABC ~ △DFE

Small Med Lg.

$\frac{HG}{NM} = \frac{9}{18} = \frac{1}{2}$ $\frac{GF}{ML} = \frac{10}{20} = \frac{1}{2}$ $\frac{HF}{NL} = \frac{13}{26} = \frac{1}{2}$

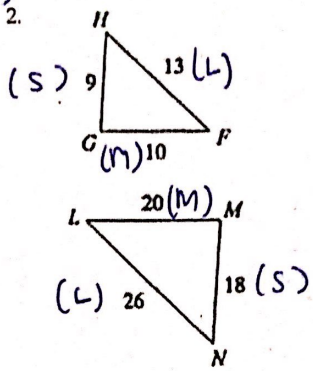
Tell whether the triangles are similar or not similar. If they are similar, write a similarity statement and show all necessary work to justify your statement.

1.



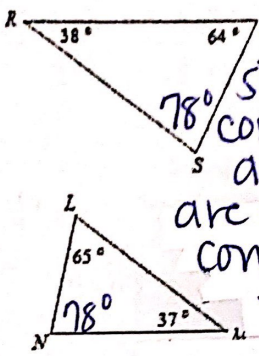
similar by AA~
$\triangle GEF \sim \triangle SQR$

2.



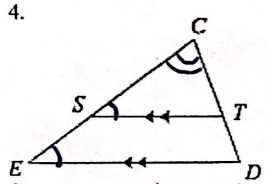
similar by SSS~
$\triangle HGF \sim \triangle NML$

3.



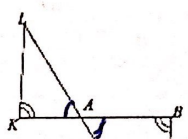
Not similar! correspond. angles are not congruent.

4.



Similar by AA~
$\triangle CST \sim \triangle CED$

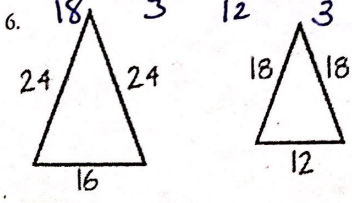
5.



similar by AA~
$\triangle LKA \sim \triangle CBA$

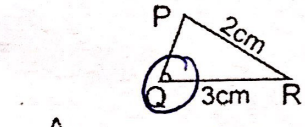
6.

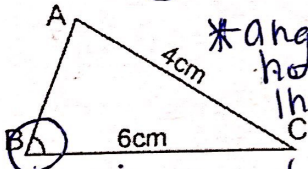
$\frac{24}{18} = \frac{4}{3}$ $\frac{16}{12} = \frac{4}{3}$



similar by SSS~
* Cannot write similarity statement

7.

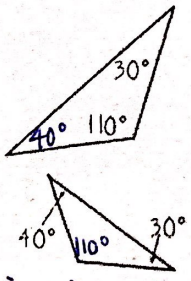




*angle is not included

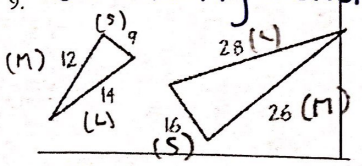
Not similar!
*not an example of AA, SAS, or SSS.

8.



Similar by AA~
*cannot write similarity statement.

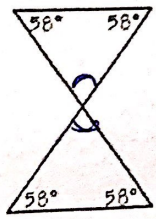
9.



$\frac{Sm}{9}$ $\frac{Med}{\frac{12}{26} = \frac{6}{13}}$ $\frac{Lg}{\frac{14}{28} = \frac{1}{2}}$

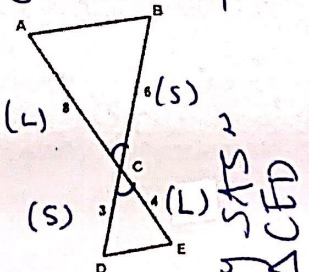
* not similar side lengths are not proportional.

10.



Similar by AA~
*Cannot write Similarity statement

11.

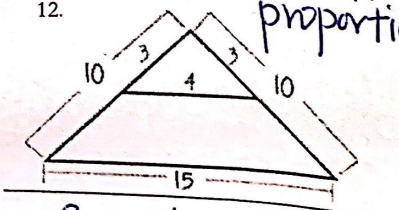


$\frac{CB}{CD} = \frac{6}{3} = 2$

$\frac{CA}{CE} = \frac{8}{4} = 2$

similar by SAS $\triangle CAB \sim \triangle CED$

12.



$\frac{3}{10}$ $\frac{4}{15}$ $\frac{3}{10}$

Not similar — side lengths are not proportional.