7.2 Similar Triangle Notes Name: _Key_

7.2 Similar Triangles
a. I can determine if triangles are similar using AA~, SSS~, SAS~.
b. I can use proportions to verify if triangles are similar.

Investigation 1: Is AA~ a Similarity Shortcut?

If two angles of one triangle are congruent to two angles of another triangle, must the two triangles be similar?

Step 1: Draw any triangle ABC. Then construct a second triangle, DEF, with $\angle D \cong \angle A$ and $\angle E \cong \angle B$.

$\underline{\triangle ABC}$

$\underline{\triangle DEF}$

on patty paper

B
26mm   31mm
A   32mm   C
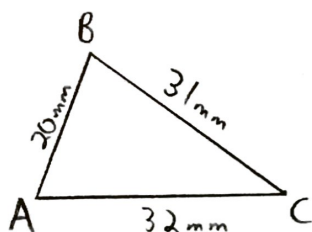
What is true about $\angle C \cong \angle F$? Why is this true?

They are congruent. Since $m\angle A + m\angle B = m\angle D + m\angle E$, then the amount for $m\angle C$ and $m\angle F$ must be the same.

Step 2: Carefully measure the lengths of the sides of both triangles. Compare the ratios of the corresponding sides. Convert your ratios to a decimal.

$$\frac{AB}{DE} = \frac{20}{40} = \frac{1}{2}$$

$$\frac{AC}{DF} = \frac{32}{64} = \frac{1}{2}$$

$$\frac{BC}{EF} = \frac{31}{62} = \frac{1}{2}$$

What do you notice? Compare your results with others near you.

The ratios of the corresponding sides are equal (proportional)
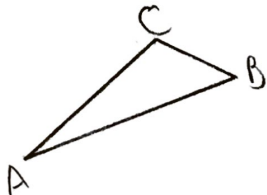
AA~ Similarity Conjecture

If __two__ angles of one triangle are congruent to __two angles__ of another triangle, then __the triangles are similar__ .

Investigation 2: Is SSS~ a Similarity Shortcut?

If three sides of one triangle are proportional to three sides of another triangles, must the two triangles be similar?

Step 1: Draw any triangle ABC. Then construct a second triangle, DEF, whose side lengths are double those of the original triangle.

$\underline{\Delta ABC}$ $\underline{\Delta DEF}$

on patty paper

Step 2: Measure the corresponding angles of the two triangles.

$m\angle A = m\angle D$ $m\angle B = m\angle E$ $m\angle C = m\angle F$

$m\angle D = m\angle A$ $m\angle E = m\angle B$ $m\angle F = m\angle C$

What do you notice? Compare your results with others near you.

The angles are congruent

Based on your results, what should be true about the two triangles?

The triangles are similar since the sides are proportional and corresponding angles are congruent.

SSS~ Similarity Conjecture

If the three sides of one triangle are proportional to the three sides of another triangle, then the two triangles are __similar__.
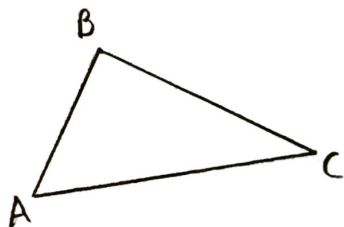
Investigation 3: Is SAS~ a Similarity Shortcut?

If two sides of a triangle are proportional to two sides of another triangles and their included angle is congruent, must the two triangles be similar?

Step 1: Construct a triangle ABC. Construct a second triangle DEF with DE twice as long as AB, EF twice as long as BC and $\angle B \cong \angle E$.

$\underline{\triangle ABC}$ $\qquad\qquad\qquad\qquad\qquad$ $\underline{\triangle DEF}$

On patty paper

Step 2: Find each of the following.

$\dfrac{DF}{AC} = \dfrac{2}{1}$ $\qquad\qquad$ $m\angle A = m\angle D$ $\qquad\qquad$ $m\angle C = m\angle F$

$\qquad\qquad\qquad\qquad\qquad$ $m\angle D = m\angle A$ $\qquad\qquad$ $m\angle F = m\angle C$

What do you notice? Compare your results with others near you.

The sides are all proportional, the angles are congruent.

Based on your results, what should be true about the two triangles?

They are similar

SAS~ Similarity Conjecture

If two sides of one triangle are proportional to two sides of another triangle and

the corresponding included angles are congruent , then the

triangles are similar .

Determine if each of the following sets of triangles are similar. If so, state which similarity conjecture is used to prove the triangle similar and write a similarity statement.
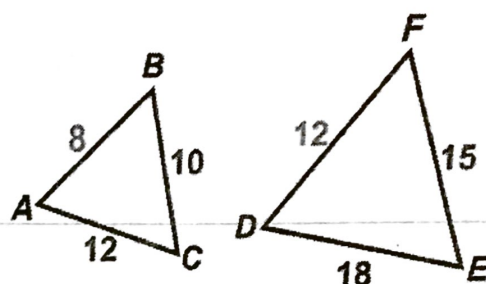
1.
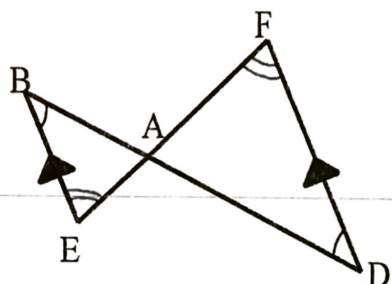
Similar Triangles? (Yes) or No
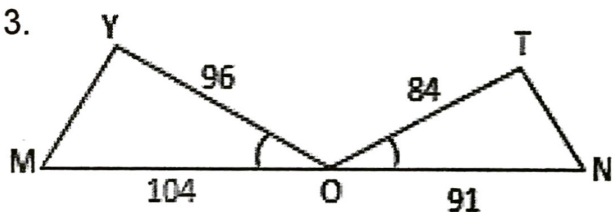
Similarity Conjecture: $AA\sim$

Similarity Statement:
$\triangle ABE \sim \triangle ADF$

2.

$\frac{8}{12} = \frac{2}{3}$

$\frac{10}{15} = \frac{2}{3}$

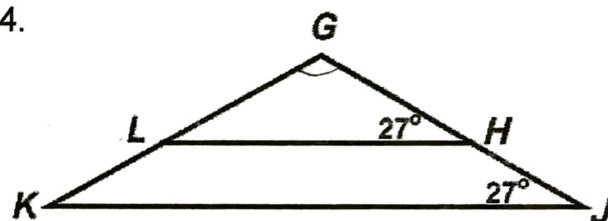$\frac{12}{18} = \frac{2}{3}$

Similar Triangles? (Yes) or No

Similarity Conjecture: $SSS\sim$

Similarity Statement:
$\triangle ABC \sim \triangle DFE$

3.

$\frac{96}{84} = \frac{8}{7}$

$\frac{104}{91} = \frac{8}{7}$

Similar Triangles? (Yes) or No

Similarity Conjecture: $SAS\sim$

Similarity Statement: $\triangle MYO \sim \triangle NTO$
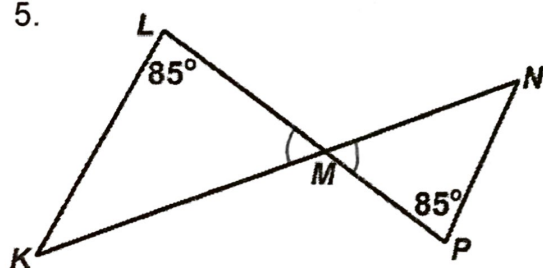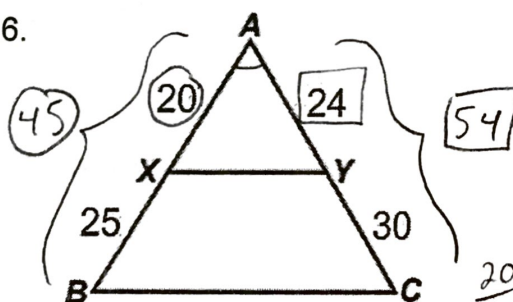
4.

Similar Triangles? (Yes) or No

Similarity Conjecture: $AA\sim$

Similarity Statement: $\triangle GLH \sim \triangle GKJ$
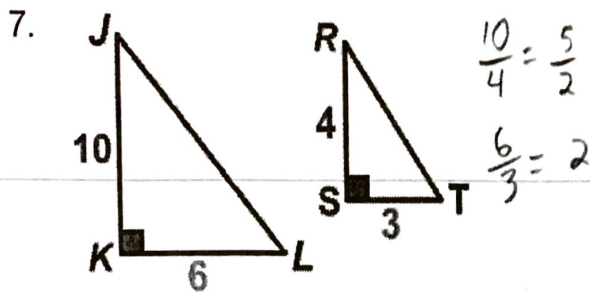
5.

Similar Triangles? (Yes) or No

Similarity Conjecture: $AA\sim$

Similarity Statement: $\triangle KLM \sim \triangle NPM$

6.

$\frac{20}{45} = \frac{4}{9}$

$\frac{24}{54} = \frac{4}{9}$

Similar Triangles? (Yes) or No

Similarity Conjecture: $SAS\sim$

Similarity Statement: $\triangle AXY \sim \triangle ABC$
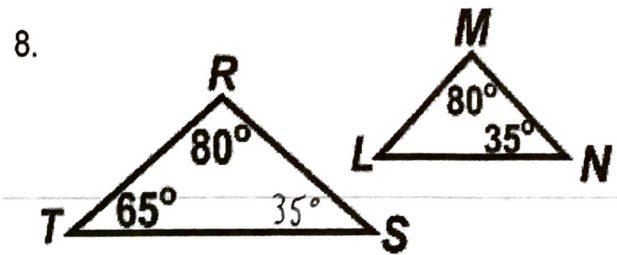
Determine if each of the following sets of triangles are similar. If so, state which similarity conjecture is used to prove the triangle similar and write a similarity statement.

7.

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

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

Similar Triangles? Yes or No (No)
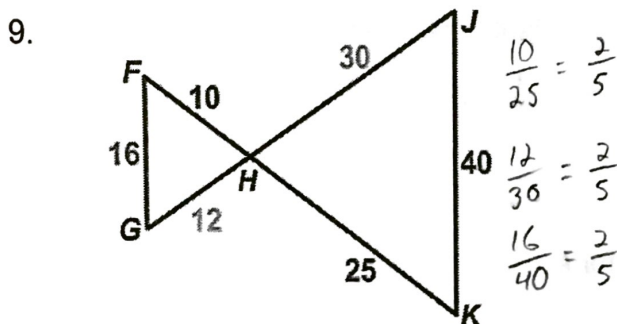
Similarity Conjecture:

Similarity Statement:

8.

Similar Triangles? Yes or No (Yes)

Similarity Conjecture: $AA\sim$

Similarity Statement: $\triangle TRS \sim \triangle LMN$

9.

$$\frac{10}{25} = \frac{2}{5}$$

$$\frac{12}{30} = \frac{2}{5}$$

$$\frac{16}{40} = \frac{2}{5}$$

Similar Triangles? (Yes) or No
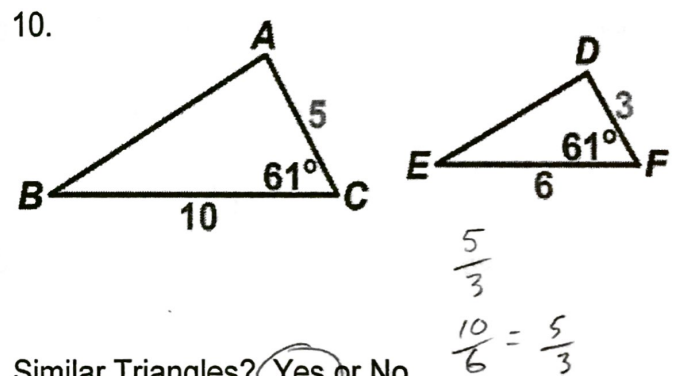
Similarity Conjecture: $SSS\sim$

Similarity Statement: $\triangle FGH \sim \triangle JKH$

10.

Similar Triangles? (Yes) or No

Similarity Conjecture: $SAS\sim$

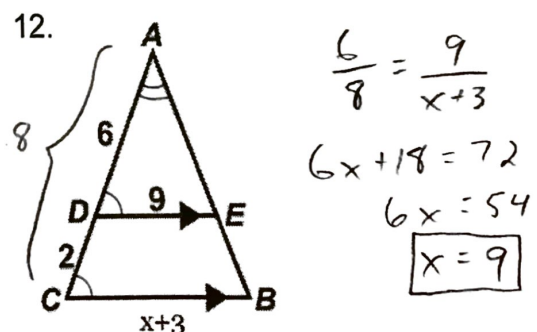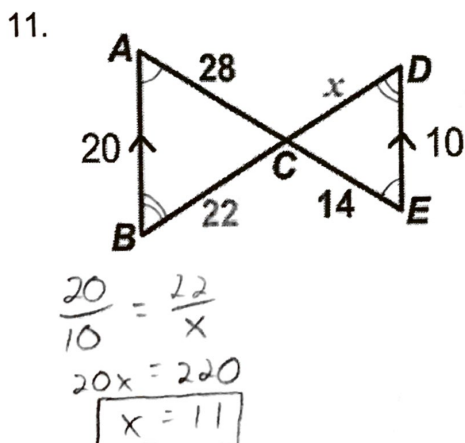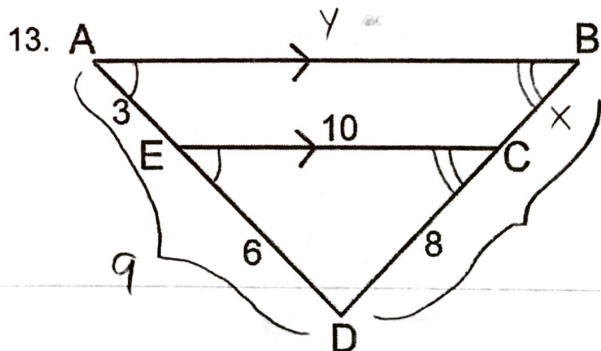Similarity Statement: $\triangle ABC \sim \triangle DEF$

$$\frac{5}{3}$$

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

Explain how the triangles are similar. Then find the value of x.

11.

$$\frac{20}{10} = \frac{22}{x}$$

$$20x = 220$$

$$\boxed{x = 11}$$

12.

$$\frac{6}{8} = \frac{9}{x+3}$$

$$6x + 18 = 72$$

$$6x = 54$$

$$\boxed{x = 9}$$

13.

a. Explain why $\triangle ABD$ and $\triangle ECD$ are similar.

corresponding angles are congruent, so the triangles are similar by AA~.

b. Solve for BC.

$$\frac{6}{9} = \frac{8}{8+x}$$
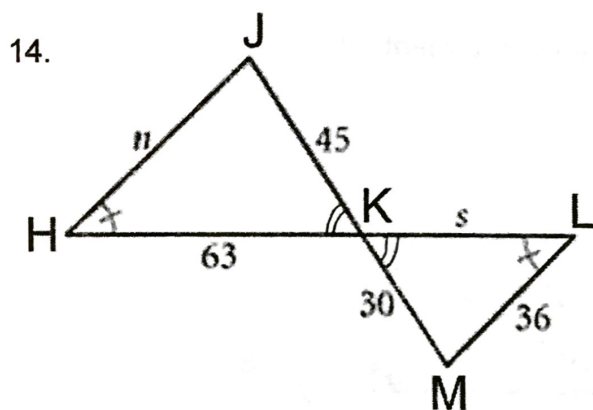
$48 + 6x = 72$

$6x = 24$

$x = 4$

$$\boxed{BC = 4}$$

c. Solve for AB.

$$\frac{6}{9} = \frac{10}{y}$$

$6y = 90$

$y = 15$

$$\boxed{AB = 15}$$

14.

a. Explain why the two triangles are similar.

The triangles have two congruent angles, so they are similar by AA~.

b. Write a similarity statement for the two triangles.

$$\triangle JKH \sim \triangle MKL$$

c. Solve for n.

$$\frac{36}{n} = \frac{30}{45}$$

$30n = 1620$

$$\boxed{n = 54}$$
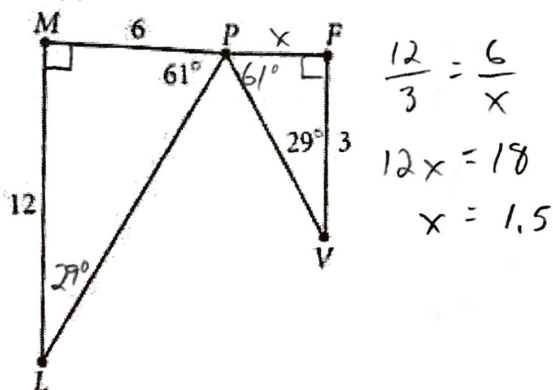
d. Solve for s.

$$\frac{63}{s} = \frac{45}{30}$$

$45s = 1890$

$$\boxed{s = 42}$$

15. Suppose $\triangle MPL \sim \triangle FPV$.
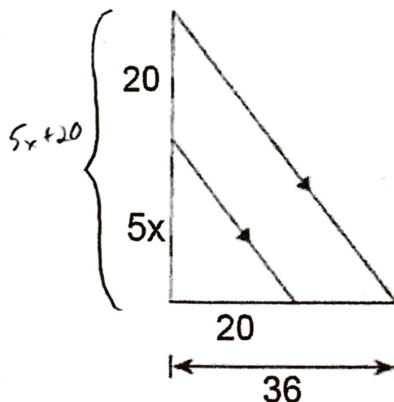

$$\frac{12}{3} = \frac{6}{x}$$

$12x = 18$

$x = 1.5$

a. Find $m\angle F$.

$90°$

b. Find PF.

1.5

16. Solve for x.

$$\frac{5x}{5x+20} = \frac{20}{36}$$

$180x = 100x + 400$

$80x = 400$

$$\boxed{x = 5}$$