Module 6a: Similar Triangles Review

Math Practice(s):

-Attend to precision.

-Look for & make sense of structure.

Learning Target(s):

-Determine whether or not two triangles are similar & use similarity to solve for missing values in triangles.

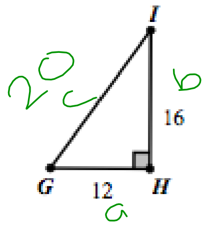
Homework:

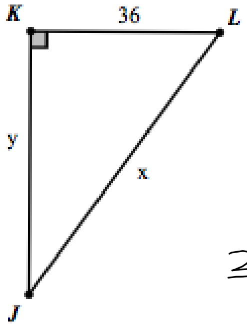
HW#6: 6a #1-3

Aug 8-12:20 PM

Warm-up

1. Given that the following two right triangles are similar, find the value of *x* and *y*.





$12^2+16^2=c^2$

$144+256=c^2$

$c^2=400$

$$\frac{IG}{JL}=\frac{GH}{LK}=\frac{HI}{KJ}$$

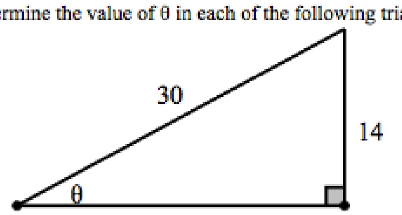
$$\frac{20}{x}=\frac{12}{36}=\frac{16}{y}=\frac{1}{3}$$

$$\frac{20}{x}=\frac{1}{3} \qquad \frac{16}{y}=\frac{1}{3}$$

$x=60$ units $y=48$ units

2. Determine the value of θ in each of the following triangles.

A.

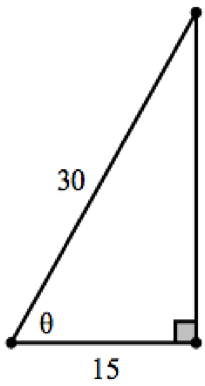


$\sin\theta=\frac{14}{30}$

$\sin^{-1}\left(\frac{14}{30}\right)=\theta$

$\theta\approx 28^\circ$

B.



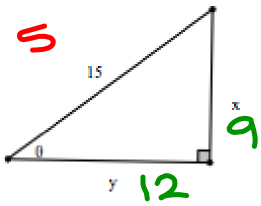
$\cos\theta=\frac{15}{30}$

$\cos^{-1}\left(\frac{15}{30}\right)=\theta$

$\theta=60^\circ$

3. In the triangle shown below, $\sin\theta=\frac{3}{5}$. Determine the value of $\tan\theta$.

5 3



4

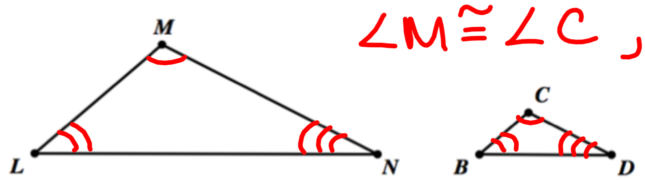
$\tan\theta=\frac{3}{4}$

(erase to show)

Two triangles are said to be **SIMILAR** if

- all corresponding pairs of angles are congruent, and
- all corresponding pairs of sides are proportional.

○ The ratio of corresponding sides, ***k***, is called the "***scale factor***" of the similar triangles. (similarity ratio)

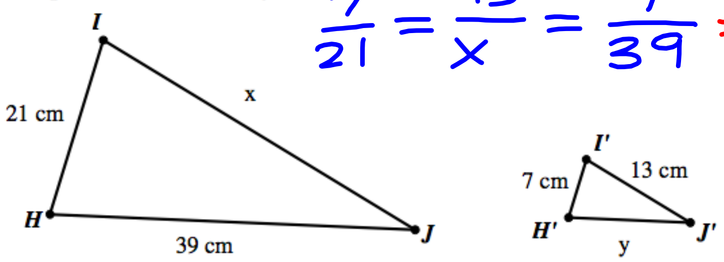


$\angle M \cong \angle C$, $\angle L \cong \angle B$, $\angle N \cong \angle D$

$$\frac{ML}{CB} = \frac{MN}{CD} = \frac{LN}{BD}$$

Example 1 (solve for x and y)

$$\frac{7}{21} = \frac{13}{x} = \frac{y}{39} \Rightarrow \frac{1}{3}$$



$$\frac{13}{x} = \frac{1}{3}$$

$$\boxed{x = 39\text{ cm}}$$

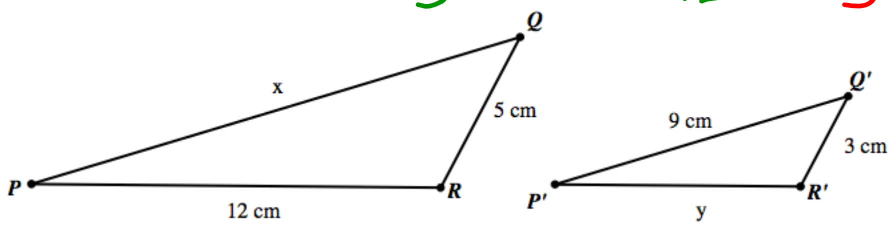
$$\frac{y}{39} = \frac{1}{3}$$

$$3y = 39$$

$$\boxed{y = 13\text{ cm}}$$

Example 2 (solve for x and y)

$$\frac{3}{5} = \frac{9}{x} = \frac{y}{12} \Rightarrow \frac{3}{5}$$



$$\frac{9}{x} = \frac{3}{5}$$

$$\boxed{x = 15\text{ cm}}$$

$$\frac{y}{12} = \frac{3}{5}$$

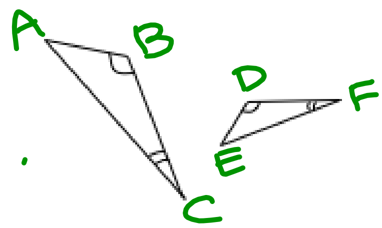
$$\frac{\cancel{5}y}{\cancel{5}} = \frac{36}{5}$$

$$\boxed{y = \frac{36}{5}\text{ cm} = 7.2\text{ cm}}$$

Determining if two triangles are similar

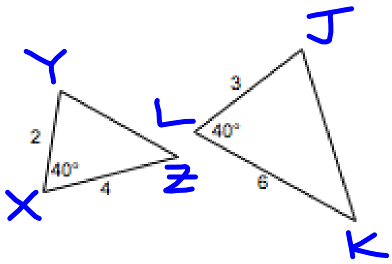
Angle-Angle Similarity Theorem (AA~) (#THM)

If $\angle B \cong \angle D$ & $\angle C \cong \angle F$,
then $\triangle ABC \sim \triangle EDF$.



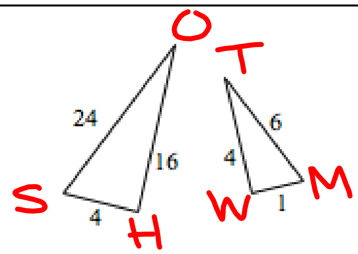
Side-Angle-Side Similarity Theorem (SAS~) (#THM)

If $\angle X \cong \angle L$ &
$\frac{XY}{LJ} = \frac{XZ}{LK}$,
then $\triangle XYZ \sim \triangle LJK$.



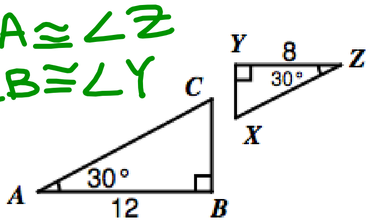
Side-Side-Side Similarity Theorem (SSS~ Theorem) (#THM)

If $\frac{SO}{MT} = \frac{SH}{MW} = \frac{OH}{TW}$,
then $\triangle SOH \sim \triangle MTW$.



Are the triangles similar?
Example 3

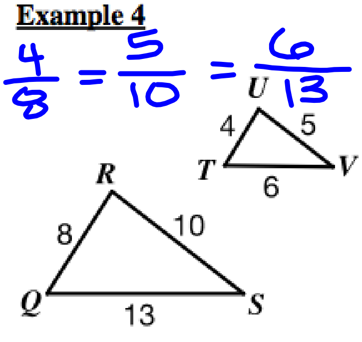
$\angle A \cong \angle Z$
$\angle B \cong \angle Y$



$\triangle CAB \sim \triangle XZY$
by AA~

Example 4

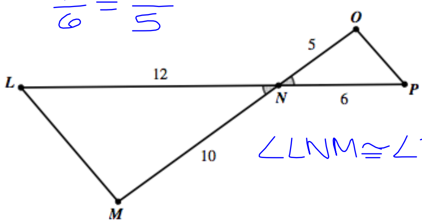
$\frac{4}{8} = \frac{5}{10} = \frac{6}{13}$



Not ~

Example 5: Determine if the two triangles shown below are similar. If they are similar, write the similarity statement and justify your answer.

A. $\frac{12}{6} = \frac{10}{5}$



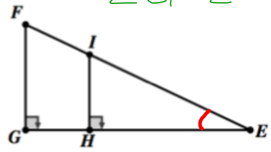
$\angle LNM \cong \angle PNO$

$\triangle LMN \sim \triangle PON$

by SAS~

B. $\angle E \cong \angle E$

$\angle G \cong \angle IHE$



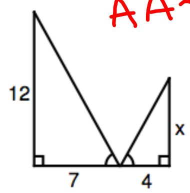
$\triangle GEF \sim \triangle HEI$

by AA~

Example 6: Each pair of triangles shown below is similar.

- First, indicate the theorem that justifies why the triangles must be similar.
- Then, determine the value of x shown in the diagram.

A. AA~



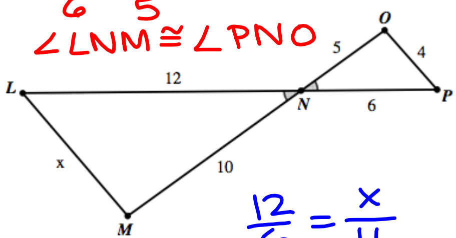
$\frac{4}{7} = \frac{x}{12}$

$\frac{\cancel{7}x}{\cancel{7}} = \frac{48}{7}$

$\boxed{x = \frac{48}{7} \text{ units} \approx 6.857 \text{ units}}$

B. $\frac{12}{6} = \frac{10}{5}$ SAS~

$\angle LNM \cong \angle PNO$

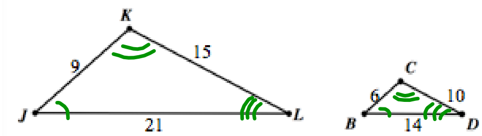


$\frac{12}{6} = \frac{x}{4}$

$6x = 48$

$\boxed{x = 8 \text{ units}}$

C.



$m\angle B = 50°$
$m\angle C = 100°$
$m\angle D = 30°$
$m\angle J = (x^2+1)°$

$\frac{9}{6} = \frac{15}{10} = \frac{21}{14}$ SSS~

$\angle J \cong \angle B$

$m\angle J = m\angle B$

$x^2 + \cancel{1} = 50$
$\quad -\cancel{1} \quad -1$

$\sqrt{x^{\cancel{2}}} = \sqrt{49}$

$x = \pm 7$

$\boxed{x = 7}$

(no units, because x does not represent ∠ or side length.)