

Section 6.5: Prove Triangles Similar by SSS and SAS

Essential Question: How do you prove two triangles are similar using the SSS or SAS similarity theorems?

PREVIOUS VOCABULARY:

Ratio

The ratio a to b

$\frac{a}{b}$ OR $a:b$

Proportion

An equation stating that two ratios are equal

$\frac{a}{b} = \frac{c}{d}$

Similar Polygons

Two polygons are similar (\sim) if
 ① corresponding sides are proportional
AND

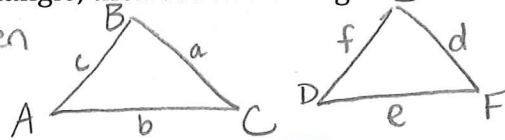
② Angles are congruent

If $\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$

then $\triangle ABC \sim \triangle DEF$

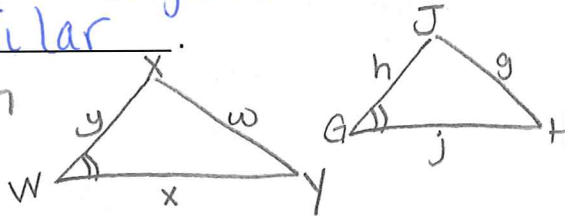
Theorem 6.2: Side-Side-Side Similarity Theorem

If the 3 sides of one triangle are proportional to the 3 sides of a second triangle, then the two triangles are similar.



Theorem 6.3: Side-Angle-Side Similarity Theorem

If the 2 sides of one triangle are proportional to the 2 sides of a second triangle and the included angles of the triangles are congruent, then the two triangles are similar.



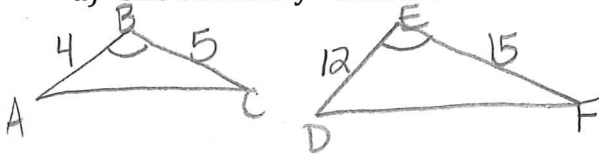
If $\frac{y}{h} = \frac{w}{g}$ and $\angle W \cong \angle G$

then $\triangle WXY \sim \triangle GJH$

EXAMPLES:

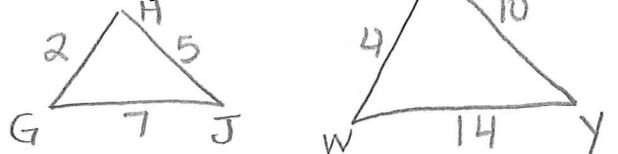
A1. Sketch two labeled triangles that are similar by the given similarity theorem and give a similarity statement.

a) SAS Similarity Theorem



$\triangle ABC \sim \triangle DEF$

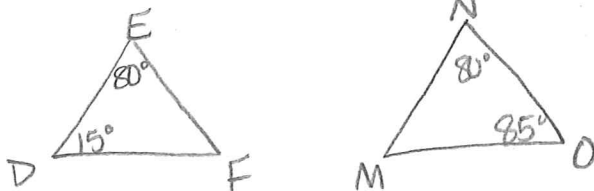
b) SSS Similarity Theorem



$\triangle GHJ \sim \triangle WXY$

A2. Sketch the described triangles. Explain if the pair can be similar.

$\triangle DEF, m\angle D = 15^\circ$ and $m\angle E = 80^\circ$
 $\triangle MNO, m\angle N = 80^\circ$ and $m\angle O = 85^\circ$

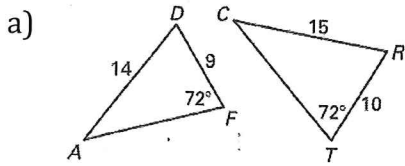


$\angle F = 180$
 -80
 -15
 $\hline 85^\circ$

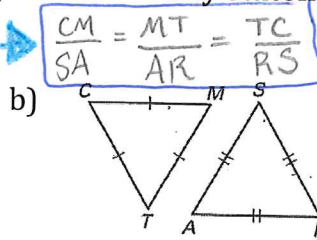
$\angle F \cong \angle O$
 $\angle E \cong \angle N$ 2 \angle 's \cong

Yes, AA \sim

A3. Determine whether or not the triangles are similar and give the reason for the determination. If they are similar give a similarity statement and a statement of proportionality.

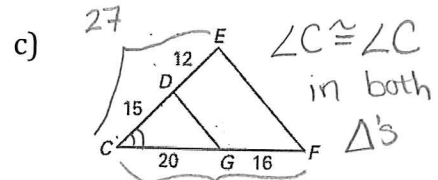


Cannot determine if similar because the 72° angle is NOT included. Not Similar



If Δ is equilateral then it is equiangular
 $\therefore \Delta$'s are similar

$AA \sim \Delta CMT \sim \Delta SAR$

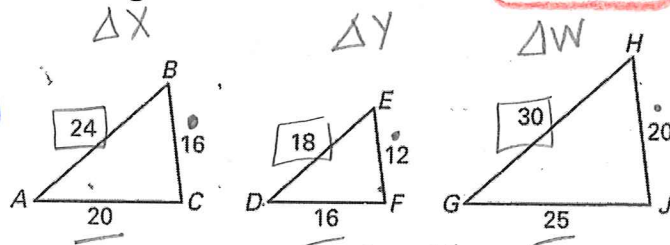


$\angle C \cong \angle C$ in both Δ 's
 $\frac{15}{27} \stackrel{?}{=} \frac{20}{36}$
 $\frac{5}{9} \stackrel{?}{=} \frac{5}{9}$ yes ✓
 $SAS \sim$

$\Delta DCG \sim \Delta ECF$
 $\frac{DC}{EC} = \frac{CG}{CF} = \frac{DG}{FE}$

A4. Determine what two triangles are similar. Give the scale factor.

$\Delta ABC \sim \Delta GHJ$
 by SSS sim.



$\frac{\Delta X}{\Delta Y} = \frac{24}{18} = \frac{20}{16} = \frac{16}{12}$
 $\frac{4}{3} \neq \frac{5}{4}$

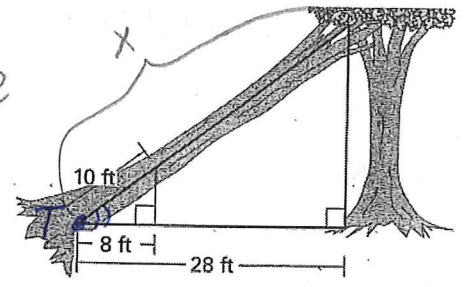
$\frac{\Delta X}{\Delta W} = \frac{24}{30} = \frac{20}{25} = \frac{16}{20}$
 $K = \frac{4}{5} = \frac{4}{5} = \frac{4}{5}$ proportional

$\frac{\Delta W}{\Delta Y} = \frac{30}{18} = \frac{25}{16} = \frac{20}{12}$
 $\frac{15}{9} \neq \frac{25}{16}$

A5. Use the figure of trees to find the length of the tree trunk leaning on the upright tree.

Share an angle and have a right angle
 \therefore similar by AA

$\frac{10}{X} = \frac{8}{28}$
 $8X = 280$
 $X = 35$ ft length of leaning tree



Section 6.5 Summary:

- If all three corresponding sides of two triangles are proportional, then the triangles are similar by SSS similarity.

If $\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$, then Δ 's are similar.
- If the included angle of two Δ 's are congruent AND the two sides are proportional, then the triangles are similar by SAS similarity.