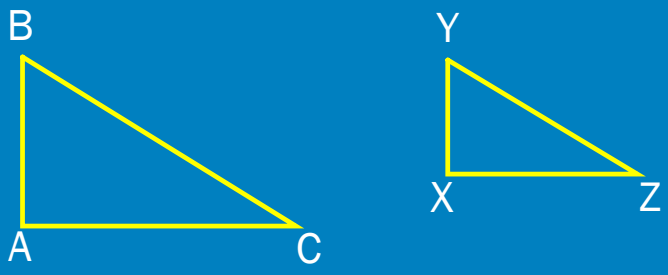
8.5 Proving Triangles are Similar

Theorem 8.2 : SSS Similarity (Side-Side-Side)

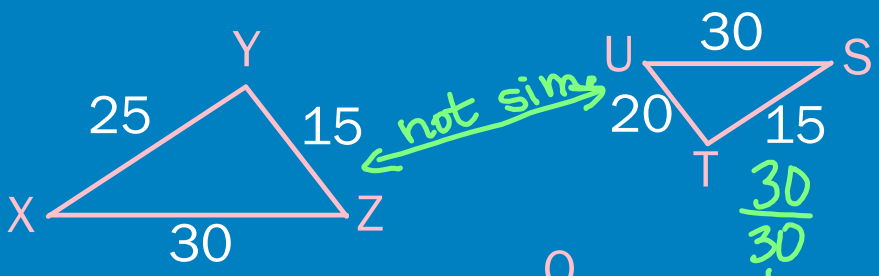
If the measures of the corresponding sides of two triangles are proportional, then the triangles are similar.



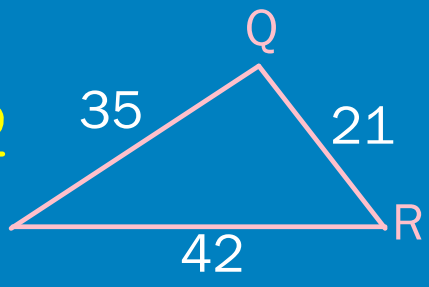
IF $\frac{AB}{XY} = \frac{BC}{YZ} = \frac{CA}{ZX}$ → THEN $\triangle ABC \sim \triangle XYZ$

Example 1

Is either $\triangle PQR$ or $\triangle STU$ similar to $\triangle XYZ$?



$\frac{30}{30} \downarrow \frac{1}{1}$ $\neq$ $\frac{25}{20} \downarrow \frac{5}{4}$ $\neq$ $\frac{15}{15} \downarrow \frac{1}{1}$

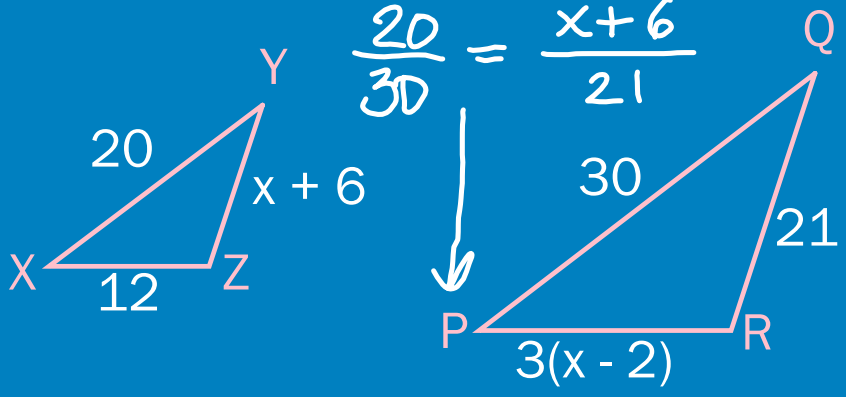


$\frac{25}{35} \downarrow \frac{5}{7}$ $\frac{15}{21} \downarrow \frac{5}{7}$ $\frac{30}{42} \downarrow \frac{5}{7}$

$\triangle XYZ \sim \triangle PQR$ b/c SSS Sim.

Example 2

Find the value of x that makes $\triangle XYZ \sim \triangle PQR$.



$\frac{20}{30} = \frac{x+6}{21}$

$\frac{2}{3} = \frac{x+6}{21}$

$3(x+6) = 42$

$3x + 18 = 42$

$-18 \quad -18$

$3x = 24$

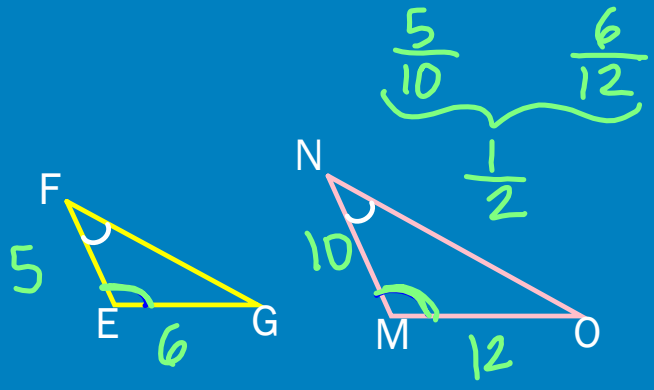
$x = 8$

Theorem 8.3: SAS Similarity (Side-Angle-Side)

If the measures of two sides of a triangle are proportional to the measures of two corresponding sides of another triangle and the included angles are congruent, then the triangles are similar.

If $\frac{FE}{NM} = \frac{FG}{NO}$

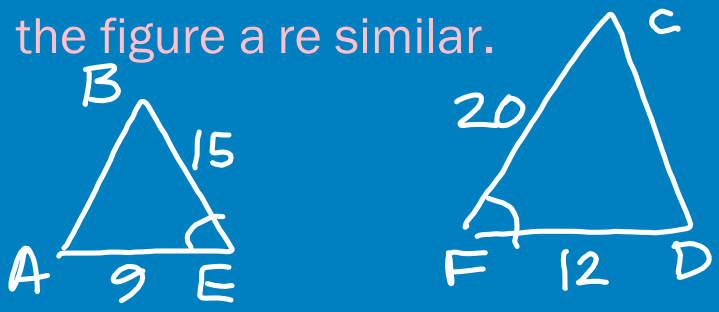
& $\angle F \cong \angle N$



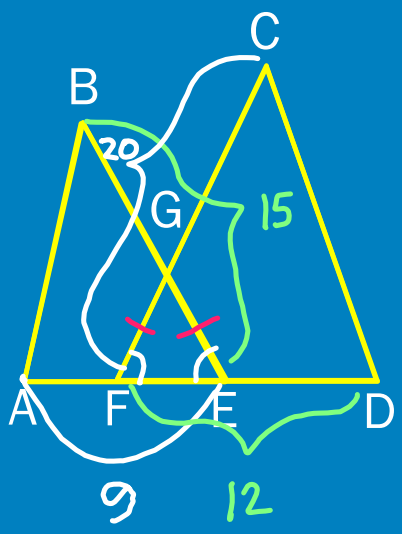
then $\triangle EFG \cong \triangle MNO$.

Example 3

In the figure below, $\overline{FG} \sim \overline{EG}$, BE = 15, CF = 20, AE = 9, and DF = 12. Determine which triangles in the figure a re similar.



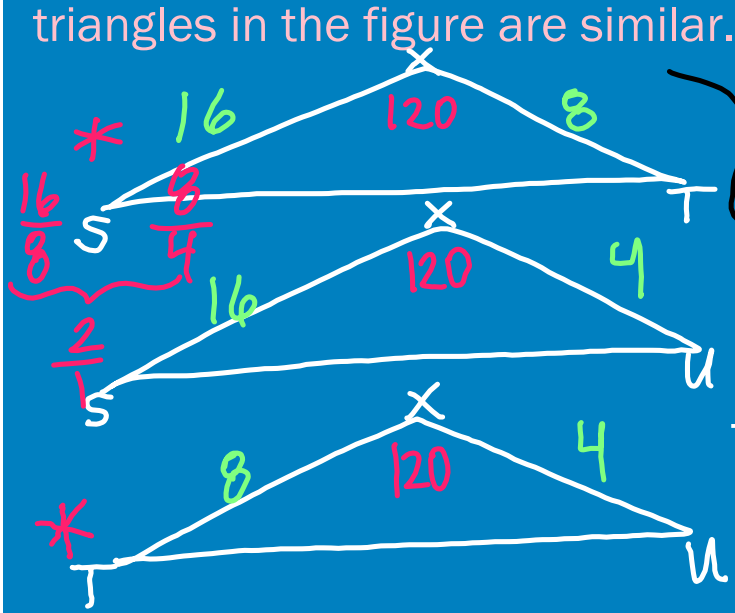
$\frac{20}{15} \rightarrow \frac{4}{3} = \frac{12}{9} \rightarrow \frac{4}{3}$

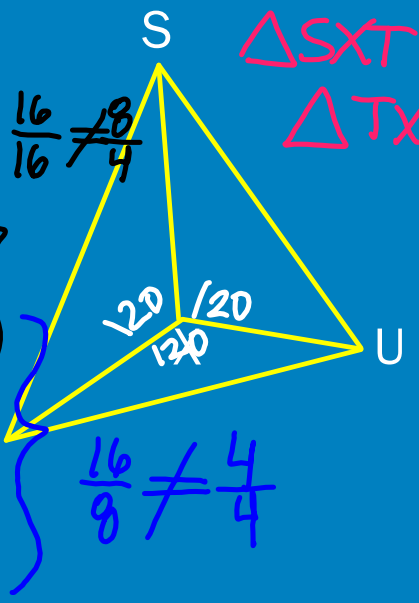


SAS Sim.
$\triangle ABE \sim \triangle DCF$

Example 4

Triangle STU has point X in its interior. If $\angle SXT$, $\angle SXU$, and $\angle TXU$ each measure 120 degrees, SX = 16, XU = 4, and XT = 8, determine which triangles in the figure are similar.



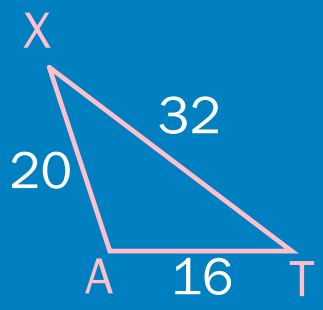


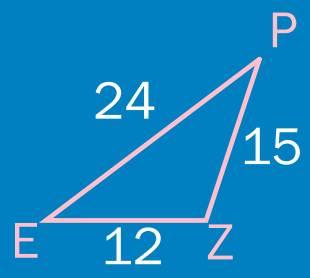
$\triangle SXT \sim \triangle TXU$

Example 5

Tell what method you would use to show that the triangles are similar. Write a similarity statement.

$\triangle XAT \sim \triangle PZE$



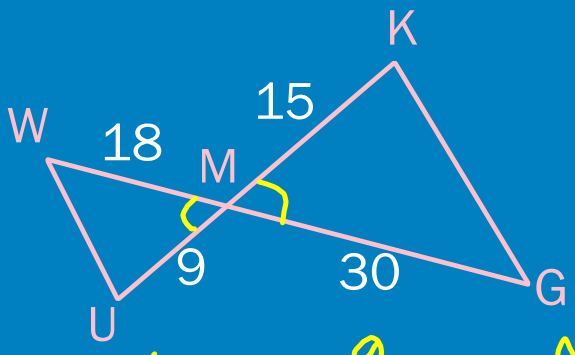


SSS Sim.

$\frac{32}{24} \rightarrow \frac{4}{3} = \frac{20}{15} \rightarrow \frac{4}{3} = \frac{16}{12} \rightarrow \frac{4}{3}$

Example 6

Tell what method you would use to show that the triangles are similar. Write a similarity statement.



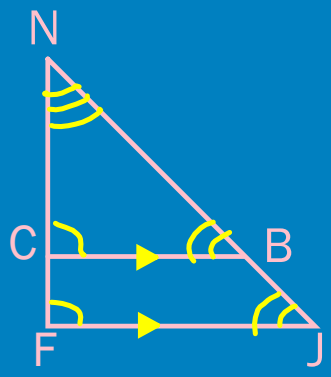
SAS Sim.

$\triangle WMU \sim \triangle GMK$

$\frac{18}{30} \rightarrow \frac{3}{5} = \frac{9}{15} \rightarrow \frac{3}{5}$

Example 7

Tell what method you would use to show that the triangles are similar. Write a similarity statement.



AA Sim.

$\triangle CNB \sim \triangle FNJ$

Example 8

The side lengths of ΔABC are 2, 5, and 6, and ΔDEF has side lengths of 12, 30, and 36. Find the ratios of the lengths of the corresponding sides of ΔABC to ΔDEF. Are the two triangles similar? Explain.

$\frac{2}{12}$ $\frac{5}{30}$ $\frac{6}{36}$

$\frac{1}{6}$

yes

SSS Sim.