Name: _____ Similarity – Day _____

Triangle Similarity 7.3 Notes

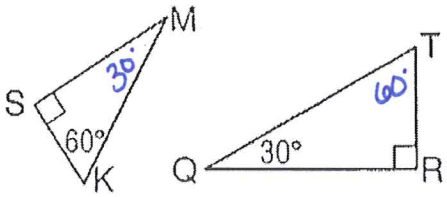
There are 3 ways to show that two triangles are similar:

AA Similarity	Two angles of one triangle are congruent to two angles of another triangle.
SSS Similarity	The measures of the corresponding sides of two triangles are proportional.
SAS Similarity	The measures of two sides of one triangle are proportional to the measures of two corresponding sides of another triangle, and the included angles are congruent.

* HINT: Be careful when matching up corresponding sides.

Determine whether the following pairs of triangles are similar. Justify your answer.

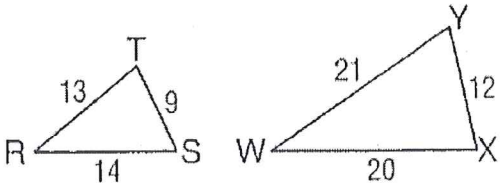
Ex 1.



Using Triangle Sum, we can find our missing angles.

By AA similarity, $\triangle SKM \sim \triangle RTQ$ (since 2 sets of angles are $\cong$)

Ex. 2.



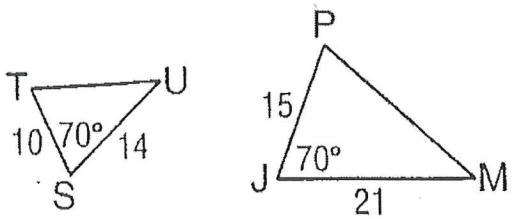
We have to check the SLRs

$\frac{RT}{WY} = \frac{13}{21}$ $\frac{RS}{WX} = \frac{14}{20} = \frac{7}{10}$

$\frac{TS}{YX} = \frac{9}{12} = \frac{3}{4}$

The sides do not have = SLRs ∴ not similar triangles

Ex. 3.



SLRs: $\frac{TS}{JP} = \frac{10}{15} = \frac{2}{3}$

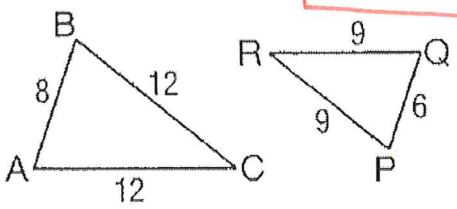
$\frac{SU}{JM} = \frac{14}{21} = \frac{2}{3}$

corresponding angles:

$\angle S \cong \angle J$

$\triangle STU \sim \triangle JPM$ because of SAS Similarity

Ex. 4.



SLRs: $\frac{AB}{QP} = \frac{8}{6} = \frac{4}{3}$

$\frac{AC}{RQ} = \frac{12}{9} = \frac{4}{3}$

$\frac{BC}{RP} = \frac{12}{9} = \frac{4}{3}$

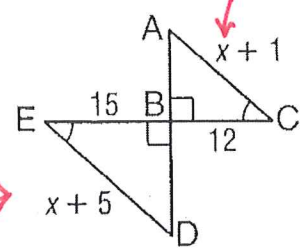
$\triangle ABC \sim \triangle PQR$ by SSS Similarity

Practice Examples

> In each problem, you will have a proportion. When you write a proportion, keep the same triangle in the numerator, and keep the same triangle in the denominator.

For each problem, (a) Identify the Similar triangles and how you know they are similar, (b) find x, (c) find the measures of the indicated sides.

1. $\overline{AC}$ and $\overline{ED}$



a) $\Delta ABC \sim \Delta DBE$ by AA Similarity

This is AA similarity because $\angle E \cong \angle C$ and $\angle EBD \cong \angle CBA$

b) Need to make a proportion to solve for x.

$\frac{\text{right } \Delta}{\text{left } \Delta}$ and each ratio has corresponding sides. In a bowtie, it is twisted so opposite sides are corresponding! Look at these examples to see how!

corresponding hypotenuse: $\frac{AC}{ED} = \frac{BC}{EB}$ corresponding legs

$\frac{x+1}{x+5} = \frac{12}{15}$

now cross multiply: $15(x+1) = 12(x+5)$

$15x + 15 = 12x + 60$

$3x = 45$

$x = 15$

c) now plug x in to find the missing sides

$AC = x+1 = 15+1$ $\boxed{AC = 16}$

$ED = x+5 = 15+5$ $\boxed{ED = 20}$

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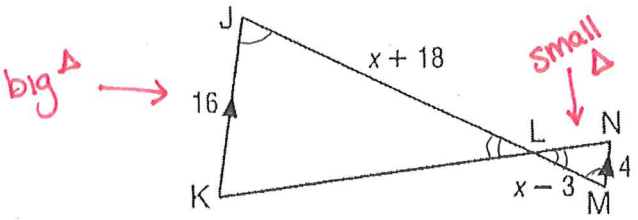
2. $\overline{JL}$ and $\overline{LM}$



b) $\frac{\text{big } \Delta}{\text{small } \Delta}$ $\frac{JL}{LM} = \frac{JK}{MN}$ $\frac{x+18}{x-3} = \frac{16}{4}$

now cross multiply:

$4(x+18) = 16(x-3)$

$4x + 72 = 16x - 48$

$120 = 12x$

$\boxed{10 = x}$

a) $\Delta JKL \sim \Delta MNL$ by AA similarity

This is AA similarity because

$\angle J \cong \angle M$ by alternate interior angles are $\cong$

$\angle JLK \cong \angle MLN$ by vertical angles are $\cong$

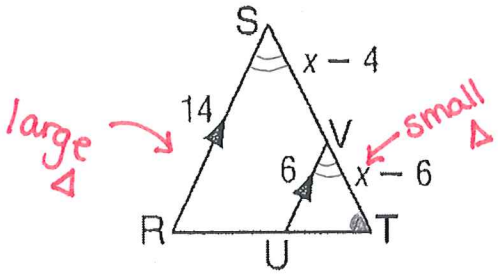
we also know $\angle K \cong \angle N$ by alternate interior angles are $\cong$

c) now plug x in to find the missing sides

$JL = x+18 = 10+18$ $\boxed{JL = 28}$

$LM = x-3 = 10-3$ $\boxed{LM = 7}$

3. $\overline{VT}$ and $\overline{ST}$



a) $\triangle TVU \sim \triangle TSR$ by AA similarity

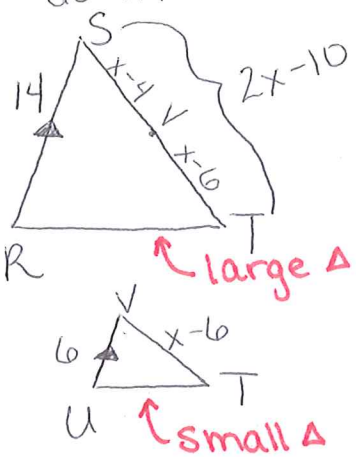
This is AA similarity because:

$\angle RSV \cong \angle UVT$ corresponding $\angle$s are $\cong$

$\angle T \cong \angle T$ reflexive

$\angle SRU \cong VUT$ corresponding $\angle$s are $\cong$

b) Need to make a proportion. Remember, there is a smaller triangle inside the larger one. If you need to draw each one separately, do it!



To find the entire side, ST, we had to add the 2 pieces together.

$x-4+x-6=2x-10$

$$\frac{\text{Small } \triangle}{\text{large } \triangle} \quad \frac{VT}{ST} = \frac{UV}{SR}$$

$$\frac{x-6}{2x-10} = \frac{6}{14}$$

now cross multiply...

$14(x-6) = 6(2x-10)$

$14x - 84 = 12x - 60$

$2x = 24$

$\boxed{x = 12}$

c) now plug x in to find the missing sides

$VT = x-6 = 12-6$ $\boxed{VT = 6}$

$ST = 2x-10 = 2(12)-10$ $\boxed{ST = 14}$