

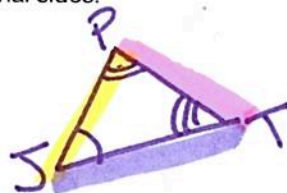
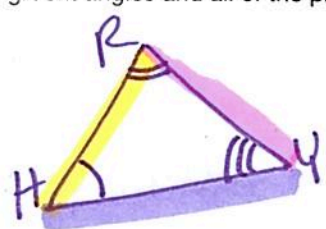
PROBLEM 5 Geometric Theorems and Similar Triangles

Similar triangles are triangles that have all pairs of corresponding angles congruent and all corresponding sides are proportional. Similar triangles have the same shape but not always the same size.



1. Triangle \underline{HRY} ~ Triangle \underline{JPT}

Draw a diagram that illustrates this similarity statement and list all of the pairs of congruent angles and all of the proportional sides.



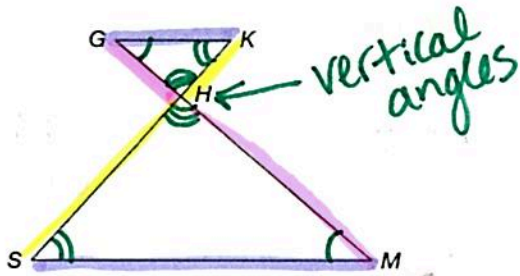
~ similar

≅ congruent

$$\begin{aligned} \angle H &\cong \angle J \\ \angle R &\cong \angle P \\ \angle Y &\cong \angle T \end{aligned}$$

$$\frac{HR}{JP} = \frac{HY}{JT} = \frac{RY}{PT}$$

2.



a. What conditions are necessary to show triangle GKH is similar to triangle MHS?

★ Write the 3 similarity statements:

$$\angle G \cong \angle M$$

$$\angle K \cong \angle S$$

$$\angle H \cong \angle H$$

$$\frac{GH}{MH} = \frac{GK}{MS} = \frac{HK}{HS}$$

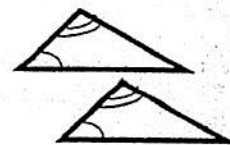
Notes: More Similar Triangles

Lauren

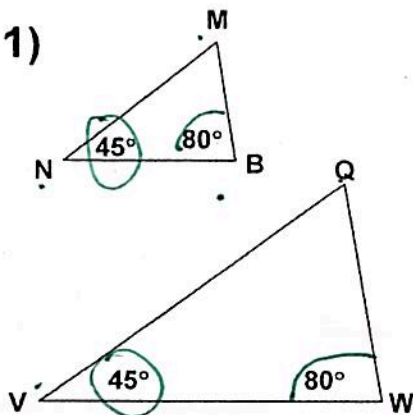
AA

Similarity

Angle - Angle Similarity
 If two angles of one triangle are congruent
 to two angles of another triangle, then the triangles are
similar.



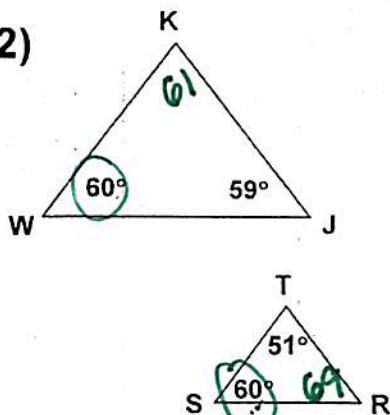
1)



YES or NO

$\Delta MNB \sim \Delta QVW$

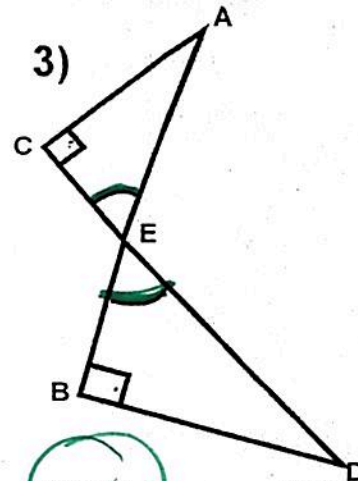
2)



YES or NO

$\Delta \underline{\hspace{1cm}} \sim \Delta \underline{\hspace{1cm}}$

3)



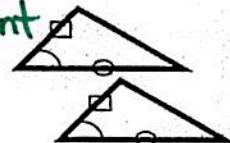
YES or NO

$\Delta ACE \sim \Delta DBE$

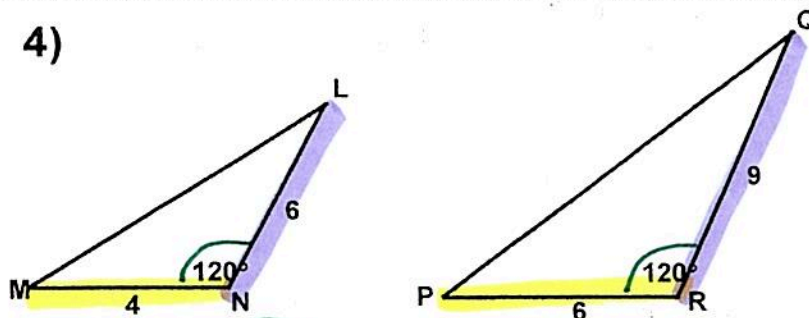
SAS

Similarity

side - Angle - Side Similarity
 In two triangles, if a pair of corresponding angles is congruent
 and the sides including the angle are
proportional, then the triangles are
similar.



4)



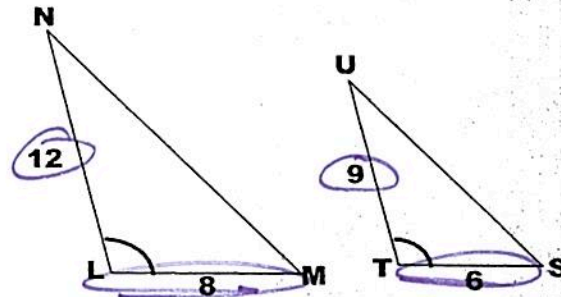
YES or NO

$\Delta MNL \sim \Delta PRQ$

$$\frac{4}{6} = \frac{6}{9}$$

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

5)



YES or NO

$\Delta NLM \sim \Delta UTS$

$$\frac{6}{8} = \frac{9}{12}$$

$$\frac{3}{4} = \frac{3}{4} \checkmark$$

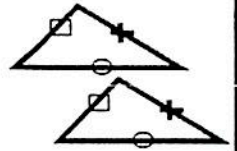
Side - side - side Similarity

SSS

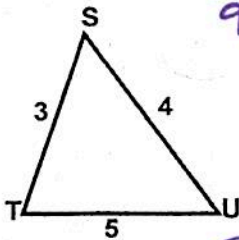
Similarity

If all three pairs of corresponding sides of two triangles are

proportional, then the two triangles are similar.

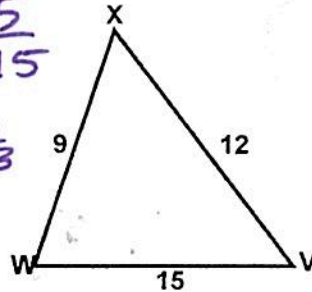


6)



$$\frac{3}{9} \quad \frac{4}{12} \quad \frac{5}{15}$$

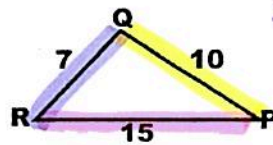
$$\frac{1}{3} = \frac{1}{3} = \frac{1}{3}$$



YES or NO

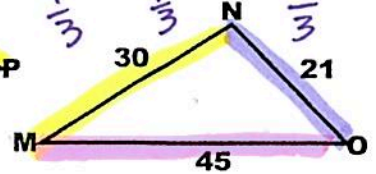
Δ STU \sim Δ XWV

7)



$$\frac{7}{21} \quad \frac{10}{30} \quad \frac{15}{45}$$

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

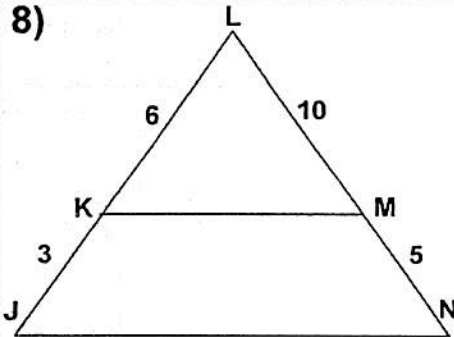


YES or NO

Δ QRP \sim Δ NOM

EXAMPLES Are the two triangles similar? If so, state how and write a similarity statement.

8)

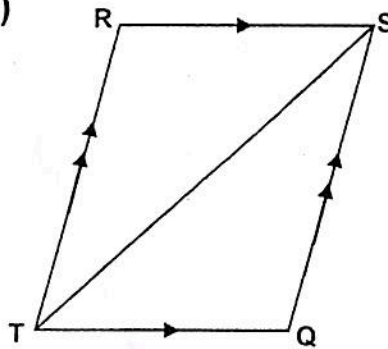


YES or NO

HOW?

Δ _____ \sim Δ _____

9)

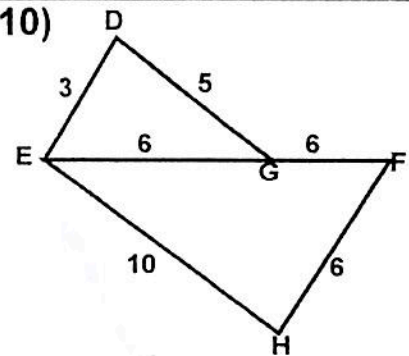


YES or NO

HOW?

Δ _____ \sim Δ _____

10)



YES or NO

HOW?

Δ _____ \sim Δ _____

Which of the following pairs of triangles must be similar? (Yes or No) Show your work, justify your answer with theorem (AA~, SAS~, SSS~) and write a similarity statement. Figures are not drawn to scale.

1.

similar? yes or no no
 thm? _____
 $\triangle ABC \sim \triangle$ _____

$\frac{4}{6} \neq \frac{6}{8}$
 $\frac{2}{3} \neq \frac{3}{4}$

2.

similar? yes or no
 thm? AA~
 $\triangle HJI \sim \triangle$ GEF

3.

similar? yes or no
 thm? SAS~
 $\triangle ATV \sim \triangle$ AMO

$\frac{6}{9} = \frac{10}{15}$
 $\frac{2}{3} = \frac{2}{3} \checkmark$

4.

similar? yes or no no
 thm? _____
 $\triangle ABC \sim \triangle$ _____

$\frac{6}{21} = \frac{5}{15}$
 $\frac{2}{7} \neq \frac{1}{3}$

5.

similar? yes or no no
 thm? _____
 $\triangle WUV \sim \triangle$ _____

$\frac{3}{2} \neq \frac{8}{4} \neq \frac{9}{6}$
 $\frac{3}{2} \neq \frac{2}{1} \neq \frac{3}{2}$

6.

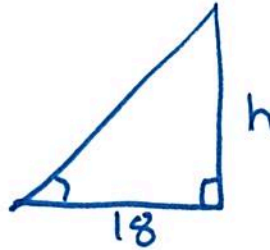
similar? yes or no
 thm? AA~
 $\triangle MQN \sim \triangle$ PON

In order to estimate the height h of a flag pole, a 5 foot tall male student stands so that the tip of his shadow coincides with the tip of the flag pole's shadow. This scenario results in two similar triangles as shown in the diagram.

7. Why are the two overlapping triangles similar?

AA ~

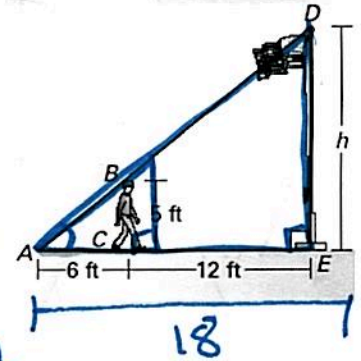
8. What is the height h (in feet) of the flag pole?



$$\frac{6}{18} = \frac{5}{h}$$

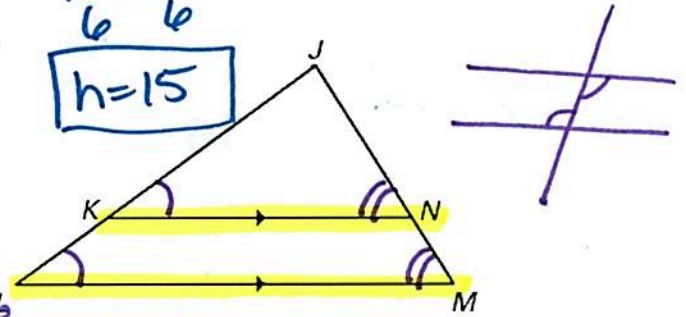
$$90 = \frac{6h}{6}$$

$$h = 15$$



9. Given: $\overline{KN} \parallel \overline{LM}$
Prove: $\triangle JKN \sim \triangle JLM$

Statements	Reasons
1. $\overline{KN} \parallel \overline{LM}$	1. Given
2. $\angle K \cong \angle L$	2. corr \angle Postulate
3. $\angle N \cong \angle M$	3. corr \angle Postulate
4. $\triangle JKN \sim \triangle JLM$	4. AA ~



10. Given: $\overline{AC} \perp \overline{BD}$ and $\overline{DE} \perp \overline{AB}$
Prove: $\triangle EFA \sim \triangle CFD$

Statements	Reasons
1. $\overline{AC} \perp \overline{BD}$; $\overline{DE} \perp \overline{AB}$	1. Given
2. $\angle 3 \cong \angle 4$	2. vertical angles are \cong
3. $\angle 1$ and $\angle 2$ are right angles	3. Def. of \perp
4. $\angle 1 \cong \angle 2$	4. All right angles congruent (Right Angle Congruency theorem)
5. $\triangle EFA \sim \triangle CFD$	5. AA ~

