Triangle Similarity Notes

Similarity: Triangles that have same shape, but maybe not same size. Corresponding angles are congruent (≅), and corresponding sides are proportional.

There are 3 ways to tell whether two triangles are similar.

AA Triangle Similarity Theorem: If 2 corresponding angles are ≅, the triangles are similar (~).

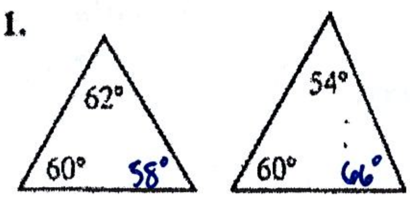
SAS Triangle Similarity Theorem: If 2 corresponding sides are proportional and the included angle is ≅, triangles are ~.

* included angle is angle between the corresponding proportional sides.

SSS Triangle Similarity Theorem: If 3 corresponding sides are proportional, the triangles are ~.

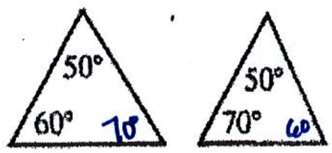
Tell whether the triangles are similar or not similar. If they are similar, what postulate or theorem can we use? If a scale factor can be found, list it from smaller triangle to larger.

1.



not similar

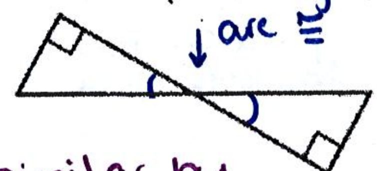
2.



similar by AA~

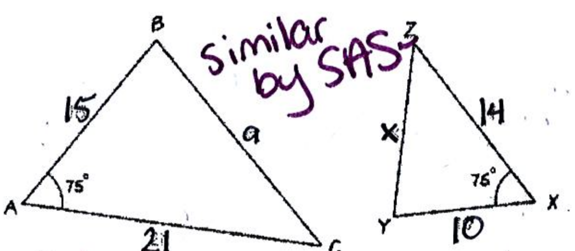
3.

vertical angles are ≅



Similar by AA~

4.

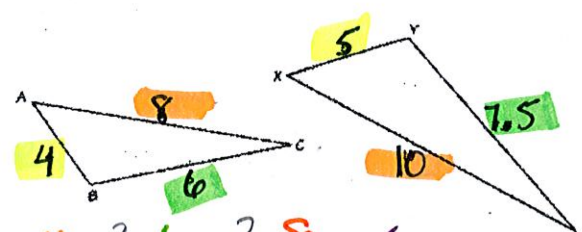


similar by SAS~

$\cancel{\frac{15}{14} \stackrel{?}{=} \frac{21}{10}}$

$\frac{15}{10} \stackrel{?}{=} \frac{21}{14}$ ✓

5.

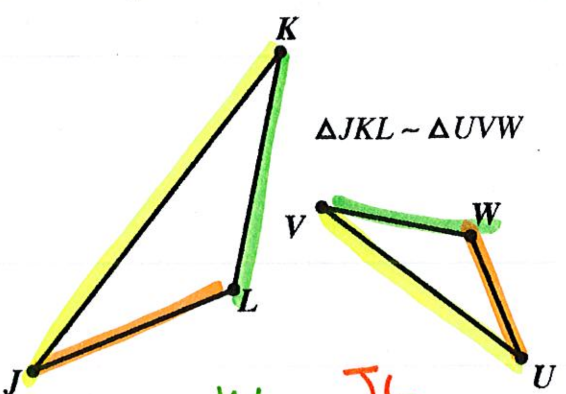


$\frac{4}{5} \stackrel{?}{=} \frac{6}{7.5} \stackrel{?}{=} \frac{8}{10}$ ✓

Similar by SSS~

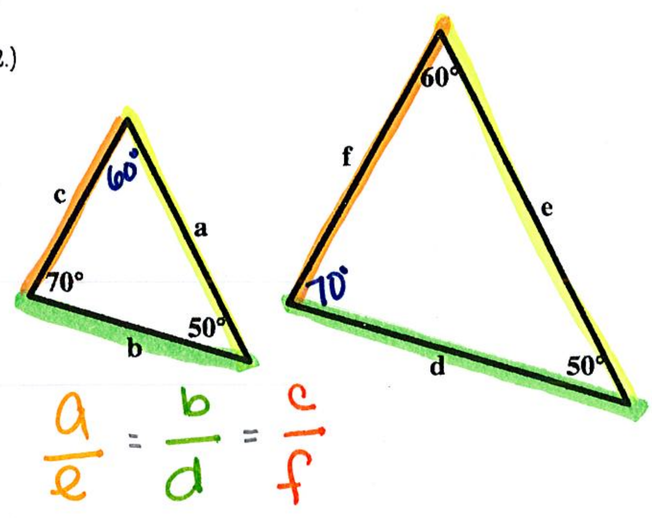
Given the triangles are similar, state the three similarity ratios

1.)



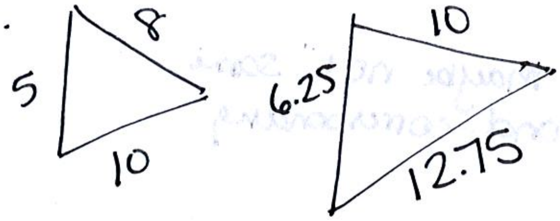
$\frac{JK}{UV} = \frac{KL}{VW} = \frac{JL}{UW}$

2.)



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

6.



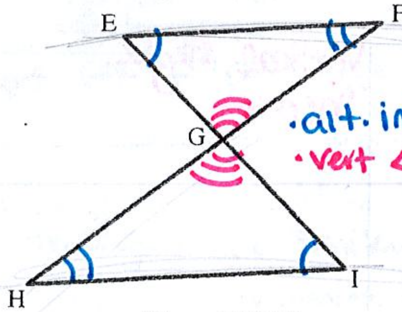
$$\frac{5}{6.25} \stackrel{?}{=} \frac{8}{10} \stackrel{?}{=} \frac{10}{12.75}$$

not similar

Proving Triangle Similarity Notes

1.) Prove $\Delta EFG \sim \Delta IHG$

AA

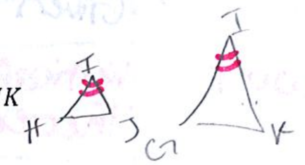


Given: EF || HI

·alt. int < thm
·vert < thm

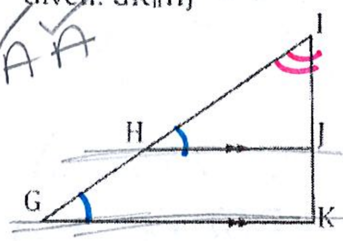
Statement	Reason
EF ∥ HI	Given
∠E ≅ ∠I, ∠H ≅ ∠F	Alternate Interior Angle Theorem
∠EGF ≅ ∠IGH	Vertical Angle Theorem
△EFG ~ △IHG	AA ~

2.) Prove $\Delta HIJ \sim \Delta GIK$



Given: $\overline{GK} \parallel \overline{HJ}$

AA

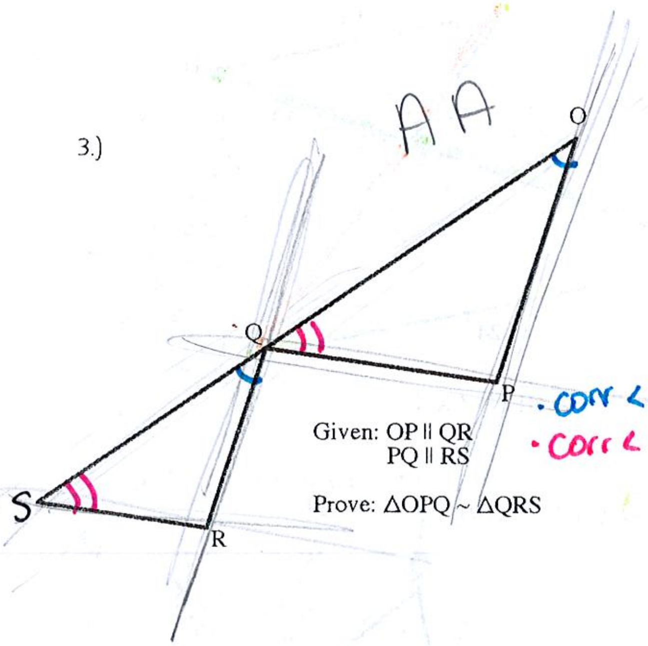


·corr < post
·refl prop

Statement	Reason
$\overline{GK}$ ∥ $\overline{HJ}$	Given
∠IHJ ≅ ∠IGK	Corresponding Angle Postulate
∠HIJ ≅ ∠GIK	Reflexive Property
△HIJ ~ △GIK	AA ~

3.)

AA



Given: OP || QR
PQ || RS

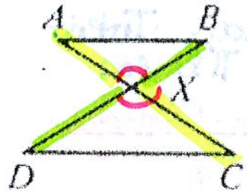
Prove: ΔOPQ ~ ΔQRS

·corr < post
·corr < post

Statement	Reason
OP ∥ QR, PQ ∥ RS	Given
∠O ≅ ∠SQR ∠S ≅ ∠OQP	Corresponding Angle Postulate
△OPQ ~ △QRS	AA ~

4.) Given: $\frac{AX}{XC} = \frac{BX}{XD}$

Prove Prove $\Delta ABX \sim \Delta CDX$

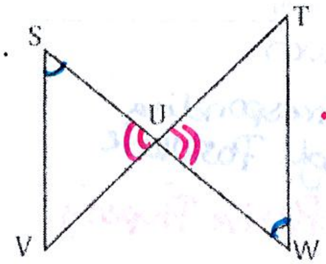


SAS
vert < thm

Statement	Reason
$\frac{AX}{XC} = \frac{BX}{XD}$	Given
$\angle AXB \cong \angle CXD$	Vertical Angle Theorem
$\Delta ABX \sim \Delta CDX$	SAS~

5.) Given $\angle S \cong \angle W$

Prove $\Delta SUV \sim \Delta WUT$

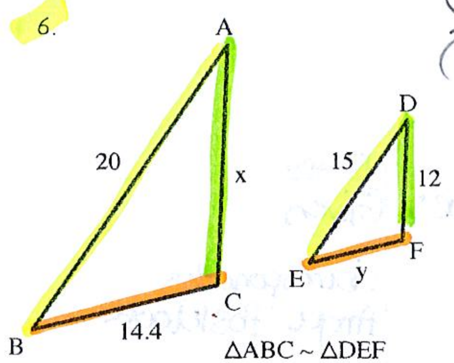


AA
•VAT

Statement	Reason
$\angle S \cong \angle W$	Given
$\angle SUV \cong \angle WUT$	Vertical Angle Theorem
$\Delta SUV \sim \Delta WUT$	AA~

For questions 6 – 9, solve for the variables.

6.



$\Delta ABC \sim \Delta DEF$

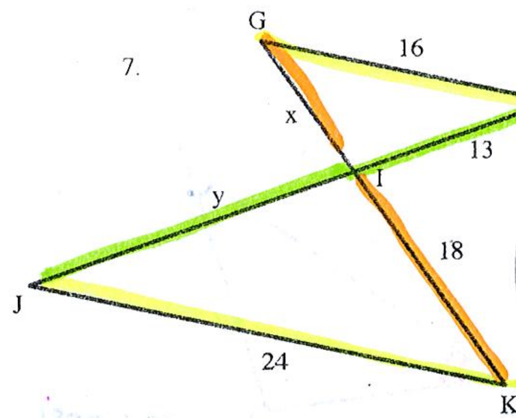
$\frac{20}{15} = \frac{x}{12}$

$\frac{240}{15} = \frac{15x}{15}$

$\boxed{16 = x}$

$\boxed{y = 10.8}$

7.



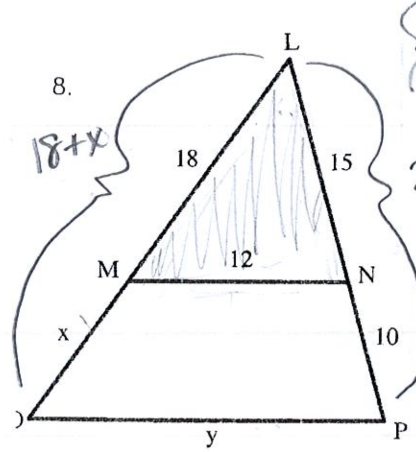
$\Delta GHI \sim \Delta KJI$

$\frac{16}{24} = \frac{x}{18}$

$\boxed{x = 12}$

$\boxed{19.5 = y}$

8.



$\Delta LMN \sim \Delta LOP$

$\frac{15}{25} = \frac{18}{(18+x)}$

$450 = 270 + 15x$

$25 \quad -270 \quad -270$

$\frac{180}{15} = \frac{15x}{15}$

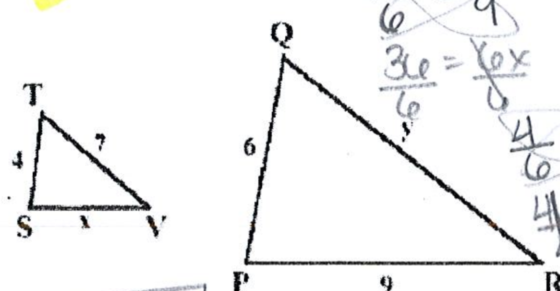
$\boxed{12 = x}$

$\frac{15}{25} = \frac{12}{y}$

$\frac{15y}{15} = \frac{300}{15}$

$\boxed{y = 20}$

9. $\Delta TVS \sim \Delta QRP$



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

$\frac{36}{6} = \frac{6x}{6}$

$\frac{4}{6} = \frac{7}{y}$

$\frac{4y}{4} = \frac{42}{4}$

$\boxed{x = 6}$

$\boxed{y = 10.5}$