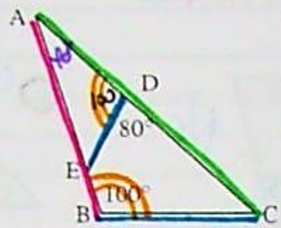
Name:______________________________ Date:______________

Geometry Worksheet: **8.3 3 Ways to Prove Triangles Similar**

① The book states that if two angles of a triangle are congruent to two angles of a second triangle, then the two triangles are similar by AA~.

a. Complete the similarity statement: ΔABC~Δ ADE.

Question: Why don't you need the third pair ≅?

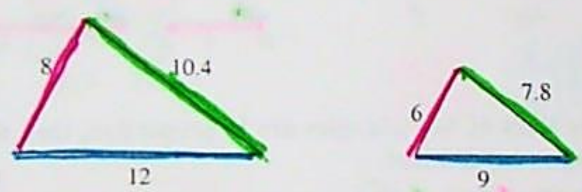


• ∡ADE ≅ ∡B
• ∡A ≅ ∡A

AA~

② The book states that if (all three pairs) the corresponding sides of two triangles reduce to the same ratio, then the two triangles are similar by SSS~.

a. Can the two triangles shown be proved similar by SSS~(yes or no)? Yes



$\frac{8}{6} = \boxed{\frac{4}{3}} = \boxed{1.\overline{3}}$

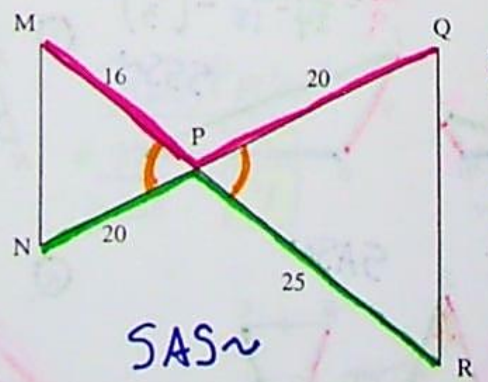
$\frac{10.4 \div 2.6}{7.8 \div 2.6} = \boxed{\frac{4}{3}} = \boxed{1.\overline{3}}$

$\frac{12}{9} = \boxed{\frac{4}{3}} = \boxed{1.\overline{3}}$

SSS~

③ The book states that if two pairs of corresponding sides of two triangles reduce to the same ratio and the included angles are congruent, then the two triangles are similar by SAS~.

a. Complete the similarity statement: ΔMPN~Δ QPR.



$\frac{MP}{PQ} = \frac{NP}{PR}$

$\frac{16}{20} = \frac{20}{25}$

$\frac{4}{5} = \frac{4}{5}$ ✓

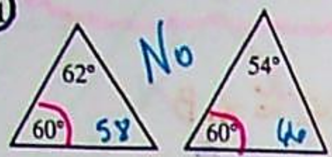
SAS~

14

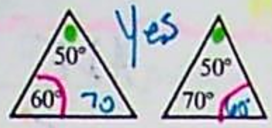
8.3

① AA Similarity Postulate If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.

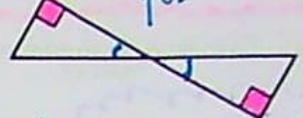
Tell whether the triangles are similar or not similar. If you can't reach a conclusion, write *no conclusion is possible.*

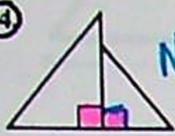
① 

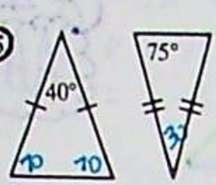
No

② 

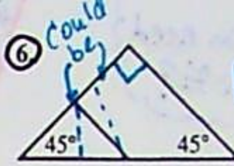
Yes

③ 
Yes

④ 
NEI

⑤ 

No

⑥ 

could be
NEI

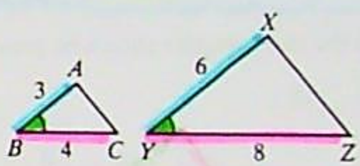
③ SAS Similarity Theorem If an angle of one triangle is congruent to an angle of another triangle and the sides including those angles are in proportion, then the triangles are similar.

If $\angle B \cong \angle Y$ and $\frac{(3)}{(6)}\frac{AB}{XY} = \frac{BC}{YZ}\frac{(4)}{(8)}$,
then $\triangle ABC \sim \triangle XYZ$.

or

$$\frac{AB\ 3}{BC\ 4} = \frac{6\ XY}{8\ YZ}$$

0.75

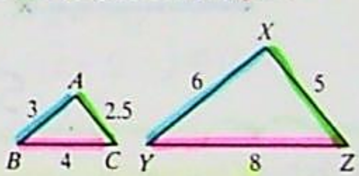


② SSS Similarity Theorem If the sides of two triangles are in proportion, then the triangles are similar.

$$\frac{3}{6} = \frac{4}{8} = \frac{2.5}{5} = \left(\frac{5}{10}\right)$$

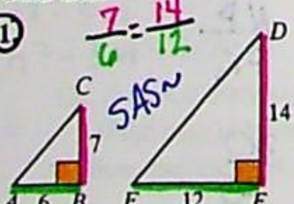
$\frac{1}{2}$

If $\frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ}$,
then $\triangle ABC \sim \triangle XYZ$.

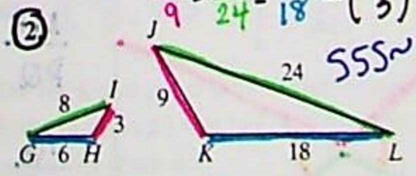


Can the two triangles shown be proved similar? If so, state the similarity and which similarity postulate or theorem you would use.

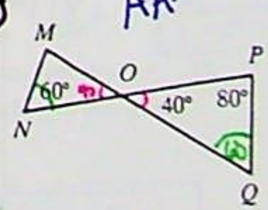
① $\frac{7}{6} = \frac{14}{12}$ SAS~



② $\frac{3}{9} = \frac{8}{24} = \frac{6}{18} = \left(\frac{1}{3}\right)$ SSS~

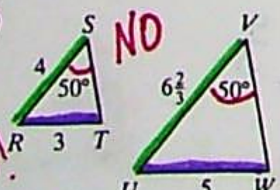


③ AA~

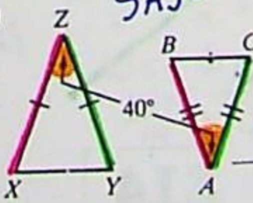


④ NO

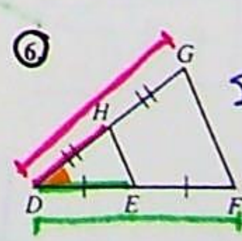
Angle NOT included!



⑤ SAS~



⑥ SAS~



Geometry: 8.3, 8.4 - Proving Δs ~

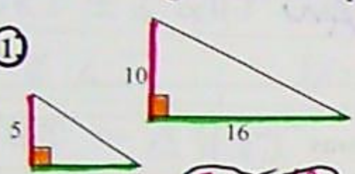
There are three ways to prove triangles similar:

AA - If 2 ∠s of a Δ are ≅ to 2 corr. ∠s of another Δ, then the Δs are ~.

SSS~ - If the sides of a Δ are ***proportional*** to the corr. sides of another Δ, then they are ~.

SAS~ - If 2 sides of a Δ are proportional to 2 corr. sides of another Δ, and the included ∠s are ≅, then the Δs are ~.

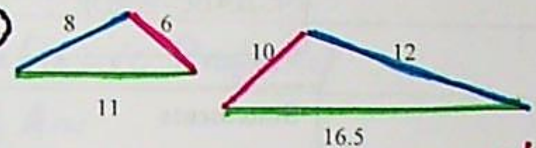
Can the triangles shown be proved similar? If so, state which theorem supports it.

① 

SAS~

$\frac{5}{8} = \frac{10}{16}$

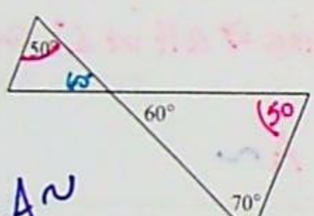
$80 = 80$

② 

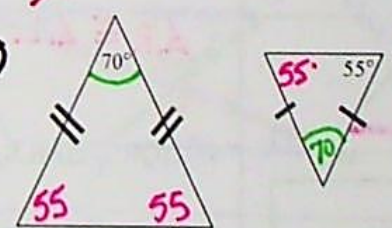
S M L

$\frac{6}{10}\left(\frac{3}{5}\right)$ ✗ $\quad \frac{8}{12}\left(\frac{2}{3}\right) \quad \frac{11}{16.5}\left(\frac{2}{3}\right)$

Not ~

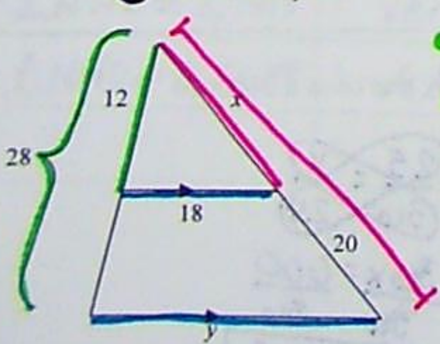
③ 

AA~

④ 

AA~ or SAS~

⑤ Find x and y.



Scale Factor

$\frac{12}{28} = \boxed{\frac{3}{7}}$

$\frac{x}{x+20} = \frac{3}{7}$

$7x = 3x + 60$

$\frac{4x}{4} = \frac{60}{4}$

$\boxed{x = 15}$

$\frac{15}{15+20} = \frac{15}{35} = \boxed{\frac{3}{7}}$

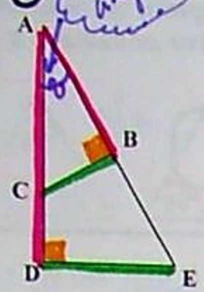
$\frac{3}{7} = \frac{18}{y}$

$\frac{3y}{3} = \frac{7 \cdot 18}{3}$

$\boxed{y = 42}$

$\frac{18}{42} = \boxed{\frac{3}{7}}$

⑥ reflexive angle!

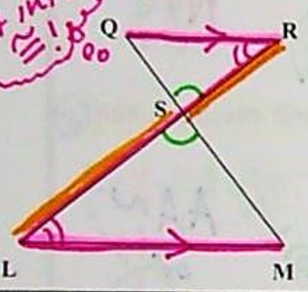


Given: $\overline{AD} \perp \overline{DE}$
$\overline{CB} \perp \overline{AE}$

Prove: $\triangle ABC \sim \triangle ADE$

Statements	**Reasons**
1. $\overline{AD} \perp \overline{DE}$	1. Given
2. $\angle D$ is a rt. $\angle$	2. $\perp$ segs form Rt $\angle$'s
3. $\overline{CB} \perp \overline{AE}$	3. Given
4. $\angle ABC$ is a rt. $\angle$	4. Same as #2
5. $\angle ABC \cong \angle D$	5. All Rt $\angle$s are $\cong$
6. $\angle A \cong \angle A$	6. Reflexive Property
7. $\triangle ABC \sim \triangle ADE$	7. AA~

|| lines → alt int ∠s ≅! ⑦



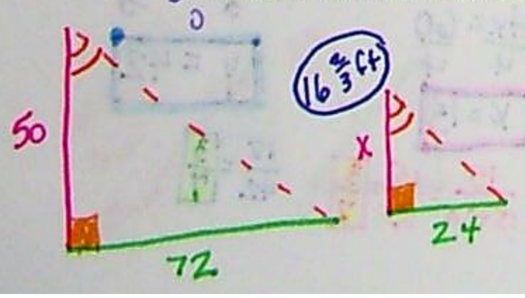
Given: $\overline{QR} \parallel \overline{LM}$

Prove: $QR \cdot LS = ML \cdot RS$

Statements	**Reasons**
1. $\angle QSR \cong \angle MSL$	1. Vertical $\angle$'s are $\cong$
2. $\overline{QR} \parallel \overline{LM}$	2. Given
3. $\angle R \cong \angle L$	3. $\parallel$ lines $\Rightarrow$ alt int $\angle$'s are $\cong$
4. $\triangle QRS \sim \triangle MLS$	4. A A~
5. $\frac{QR}{RS} = \frac{ML}{LS}$	5. CSSTP (Corresponding sides of similar triangles are proportional)
6. $QR \cdot LS = ML \cdot RS$	6. Means-Extremes Products Thm

AA~

⑧ A 50 foot tall building casts a 72 foot shadow, while a nearby tree casts a 24 foot shadow. How tall is this tree?



$16\frac{2}{3}$ ft

$\frac{ht}{sh.}$ $\frac{50}{72} : \frac{25}{36} = \frac{x}{24}$

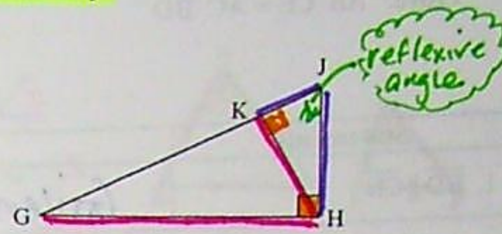
$\frac{36x}{36} = \frac{600}{36}$

$\boxed{x = 16\frac{2}{3}}$

Name:______________________________________ Date:____________________

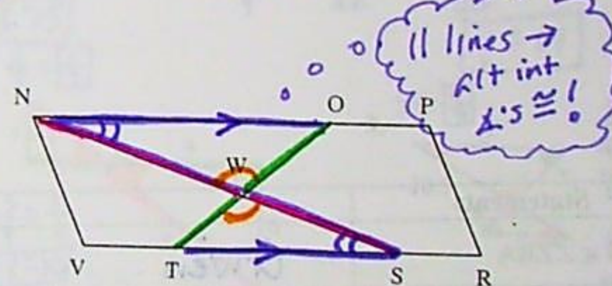
Geometry

8.3/8.4 Proofs Involving Similarity



1. Given: $\overline{KH}$ is the altitude to hypotenuse $\overline{GJ}$
   Prove: $\Delta KHJ \sim \Delta HGJ$

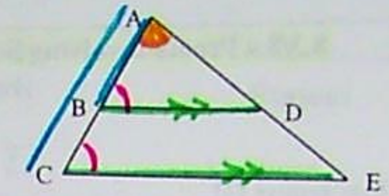
Statements	Reasons
1. $\overline{KH}$ is the altitude to hypotenuse $\overline{GJ}$	1. Given
2. ∠HKJ is Rt ∠	2. A △ alt forms Rt ∠'s on opp side
3. ∠GHJ is Rt ∠	3. If △ has a hypotenuse, then it is opposite to a rt ∠.
4. ∠HKJ ≅ ∠GHJ (A)	4. All Rt ∠'s are ≅
5. ∠J ≅ ∠J (A)	5. Reflexive Property
6. △KHJ ~ △HGJ	6. AA~



2. Given: NPRV is a ▱
   Prove: $\Delta NWO \sim \Delta SWT$

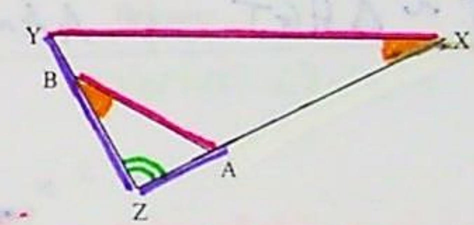
Statements	Reasons
1. NPRV is a ▱	1. Given
2. $\overline{NP} \parallel \overline{VR}$	2. If ||gram, both pairs opp sides ||
(A) 3. ∠ONS ≅ ∠TSN	3. || lines ⇒ alt int ∠'s are ≅
(A) 4. ∠NWO ≅ ∠SWT	4. Vertical ∠'s are ≅
5. △NWO ~ △SWT	5. AA~
6.	6.

3. Given: $\overleftrightarrow{BD} \parallel \overleftrightarrow{CE}$
Prove: $AB \cdot CE = AC \cdot BD$



Statements	Reasons
1. $\overleftrightarrow{BD} \parallel \overleftrightarrow{CE}$	1. Given
(A) 2. $\angle ABD \cong \angle ACE$	2. ∥ lines ⇒ corr ∠'s are ≅
(A) 3. $\angle A \cong \angle A$	3. Reflexive Property
4. $\triangle ABD \sim \triangle ACE$	4. AA~
5. $\frac{AB}{BD} = \frac{AC}{CE}$	5. CSSTP
6. $AB \cdot CE = AC \cdot BD$	6. Means-Extremes Products Thm

4. Given: $\angle X \cong \angle ZBA$
Prove: $AZ \cdot XY = AB \cdot ZY$



Statements	Reasons
(A) 1. $\angle X \cong \angle ZBA$	1. Given
(A) 2. $\angle Z \cong \angle Z$	2. Reflexive Property
3. $\triangle BZA \sim \triangle XZY$	3. AA~
4. $\frac{AZ}{ZY} = \frac{AB}{XY}$	4. CSSTP
5. $AZ \cdot XY = AB \cdot ZY$	5. Means-Extremes Products Thm
6.	6.