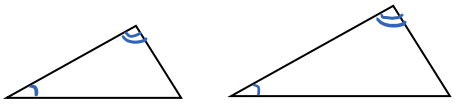
Geometry
Similar Triangles (Theorems)

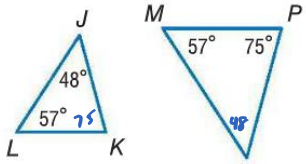
Name _____
Date _____ Period _____

There are 3 ways you can prove triangles similar WITHOUT having to use all sides and angles.

Angle- Angle Similarity (AA~) – If two angles of one triangle are congruent to two corresponding angles of another triangle, then the triangles are similar.

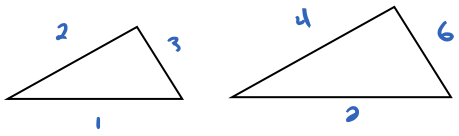


Determine if the triangles are similar by AA.

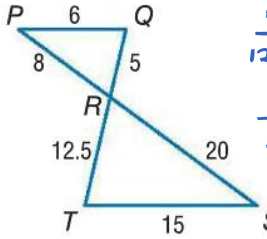


$180-48-57 = 75$
$180-57-75 =$
$\angle J \cong \angle Q$, $\angle K \cong \angle P$
yes!

Side- Side- Side Similarity (SSS~) – If the three sides of one triangle are proportional to the three corresponding sides of another triangle, then the triangles are similar.



Determine if the triangles are similar by SSS.



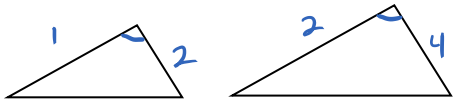
$\frac{5}{12.5} = \frac{6}{15} = \frac{8}{20}$

$\frac{5}{\frac{25}{2}} = 5 \cdot \frac{2}{25} = \frac{2}{5}$

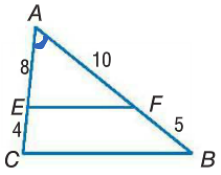
$\frac{5}{\frac{25}{2}} = \frac{2}{5} = \frac{2}{5}$

$\frac{2}{5} = \frac{2}{5} = \frac{2}{5}$ ✓ yes

Side-Angle- Side Similarity (SAS~) – If two sides of one triangle are proportional to two corresponding sides of another triangle and their included angles are congruent, then the triangles are similar.



Determine if the triangles are similar by SAS.

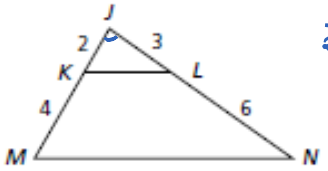


$\frac{8}{8+4} = \frac{10}{10+5}$

$\frac{8}{12} = \frac{10}{15}$

$\frac{2}{3} = \frac{2}{3}$ ✓ yes

EXAMPLES: Determine if the triangles are similar. If so, tell why and write the similarity statement and similarity ratio.



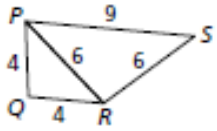
$\frac{2}{2+4} = \frac{3}{3+6}$

$\frac{2}{6} = \frac{3}{9}$

$\frac{1}{3} = \frac{1}{3}$ ✓

Similar : (Y) or N Why: SAS

Similarity Statement : $\Delta JKL \sim \Delta JMN$

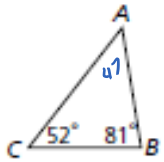


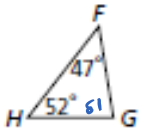
$\frac{4}{6} = \frac{4}{6} = \frac{6}{9}$

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

Similar : (Y) or N Why: SSS

Similarity Statement : $\Delta PQR \sim \Delta PSR$

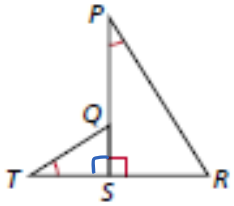




$\angle B \cong \angle G$
$\angle A \cong \angle F$

Similar : (Y) or N Why: AA

Similarity Statement : $\Delta ABC \sim \Delta FGH$

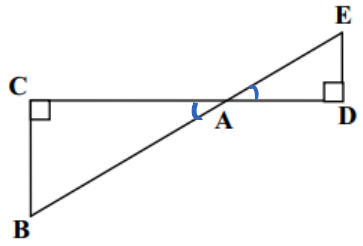


Similar : (Y) or N Why: $\angle A$

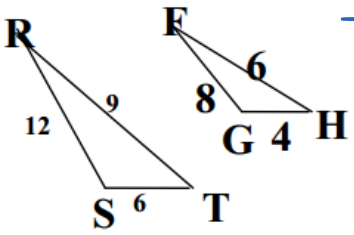
Similarity Statement : $\Delta TSQ \sim \Delta PSR$

In problems 1-8, determine whether the two triangles shown are similar.
If so, state why (AA~, SSS~, SAS~) and complete the similarity statement.

1. $\Delta ABC \sim \Delta$ AED by AA~



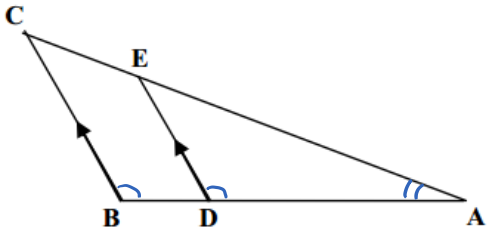
2. $\Delta RST \sim \Delta$ FGH by SSS~



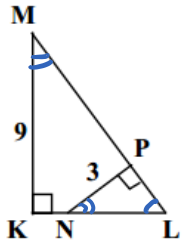
$\frac{6}{4} = \frac{9}{6} = \frac{12}{8}$

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

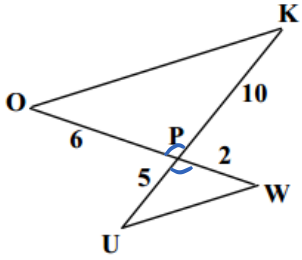
3. $\Delta ABC \sim \Delta$ ADE by AA



4. $\Delta KLM \sim \Delta$ PLN by AA



5. $\Delta OKP \sim \Delta$ _____ by _____



$\frac{2}{6} = \frac{5}{10}$

$\frac{1}{3} = \frac{1}{2}$ ✗

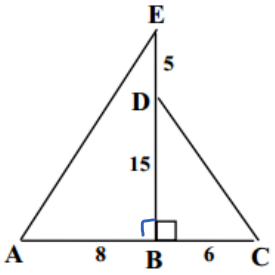
not possible

6. $\Delta ABE \sim \Delta$ CBD by SAS~

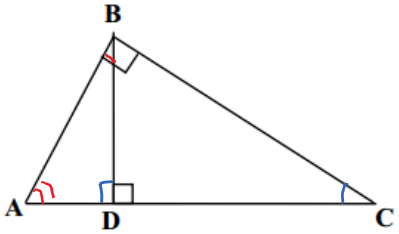
$\frac{6}{8} = \frac{15}{\text{SAS}}$

$\frac{6}{8} = \frac{15}{20}$

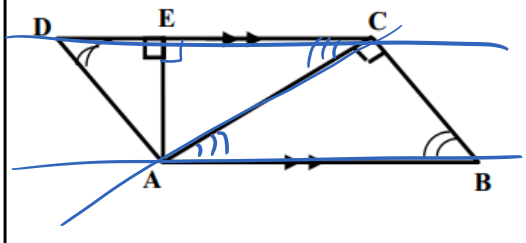
$\frac{3}{4} = \frac{3}{4}$ ✓



7. $\Delta ABC \sim \Delta$ BDC $\sim \Delta$ ADB by AA



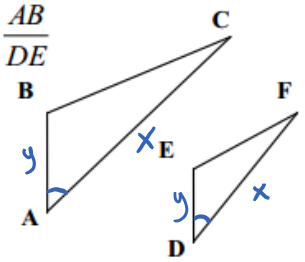
8. $\Delta ABC \sim \Delta$ CAE by AA



State whether you can conclude that ΔABC~ΔDEF from the given information.

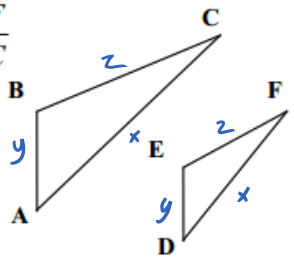
9. $\angle A \cong \angle D$, $\frac{AC}{DF} = \frac{AB}{DE}$

SAS



10. $\frac{DF}{AC} = \frac{DE}{AB} = \frac{EF}{BC}$

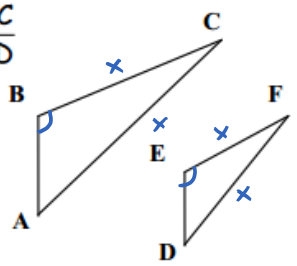
SSS



11. $\angle B \cong \angle E$, $\frac{EF}{BC} = \frac{AC}{FD}$

no

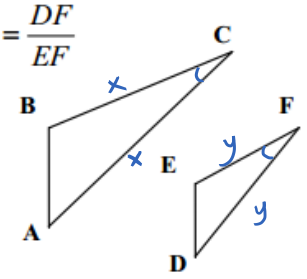
angle is not included



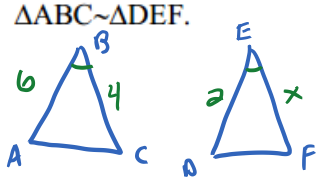
12. $\angle C \cong \angle F$, $\frac{AC}{BC} = \frac{DF}{EF}$

yes, SAS

Same as $\frac{AC}{DF} = \frac{BC}{EF}$



13. Given: ΔABC and ΔDEF, $\angle B \cong \angle E$, AB = 6. DE = 2. BC = 4. Find the length of EF for which ΔABC~ΔDEF.

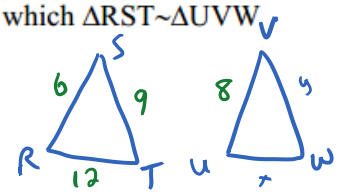


$\frac{6}{2} = \frac{4}{x}$

$6x = 8$

$x = \frac{8}{6} = \frac{4}{3}$

14. Given: ΔRST and ΔUVW, RS = 6, UV = 8. ST = 9. RT = 12. Find lengths of VW and UW for which ΔRST~ΔUVW



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

$6x = 96$

$x = 16$

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

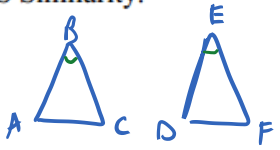
$6y = 72$

$y = 12$

UW = 16

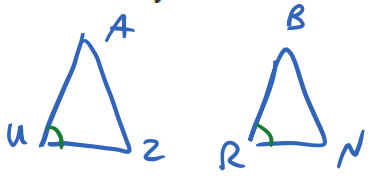
VW = 12

15. Given: ΔABC and ΔDEF. If $\angle B \cong \angle E$, state the proportion that must be true if ΔABC~ΔDEF by SAS Similarity.



$\frac{AB}{DE} = \frac{BC}{EF}$

16. Given: ΔUAZ and ΔRBN. If $\angle U \cong \angle R$, state the proportion that must be true if ΔUAZ~ΔRBN by SAS Similarity.



$\frac{UA}{RB} = \frac{UZ}{RN}$