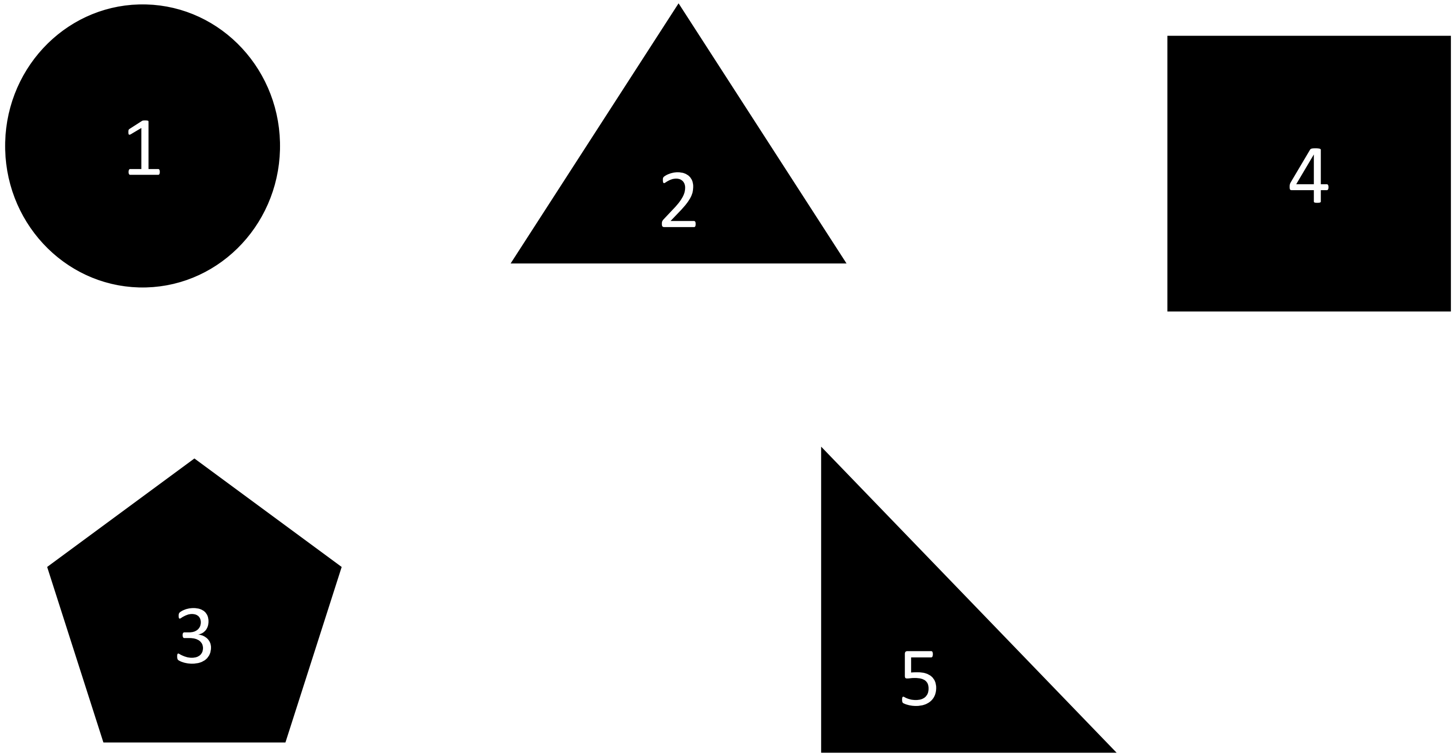
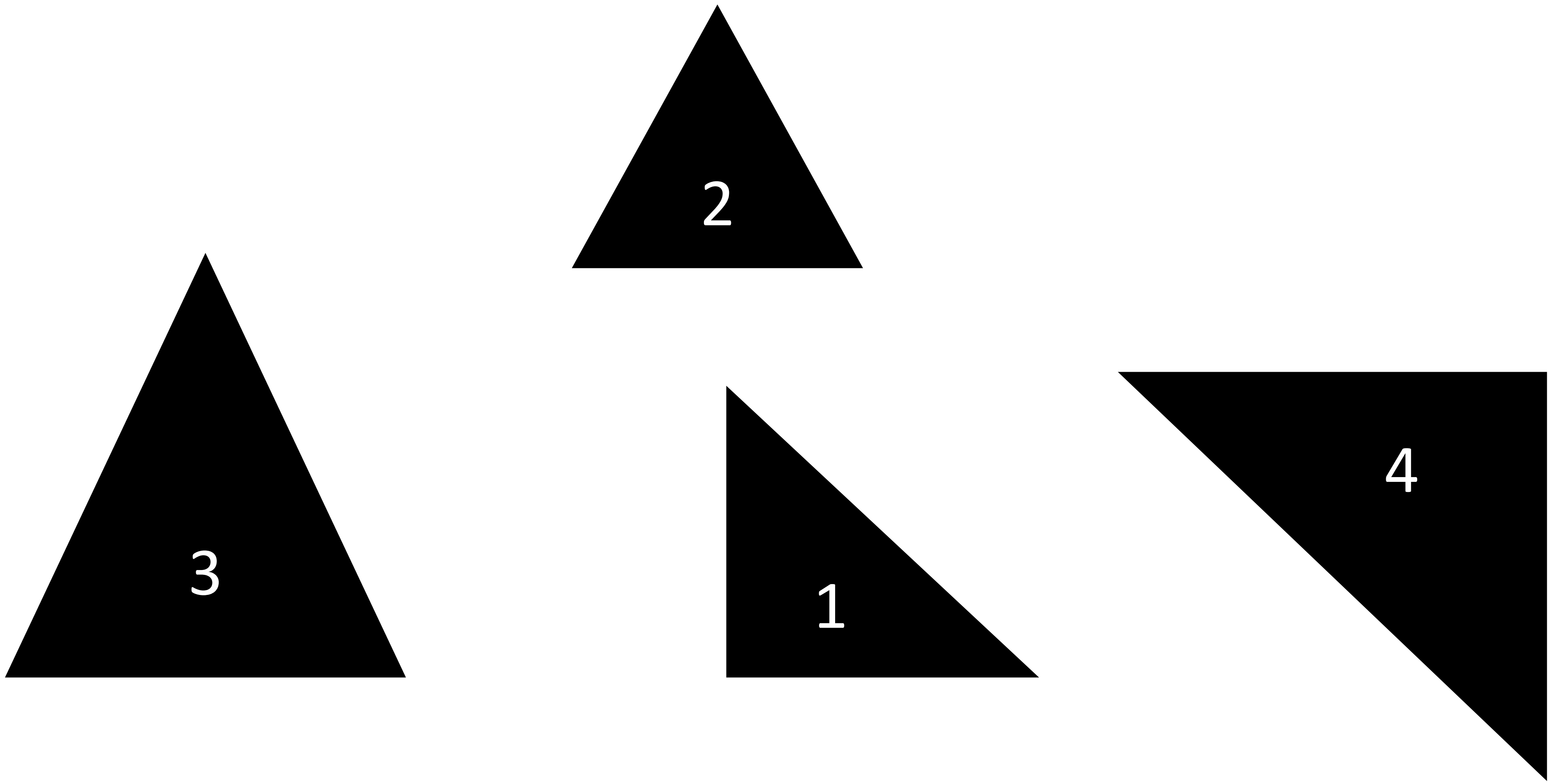
Which shapes are <u>similar</u>?



Which shapes are similar?



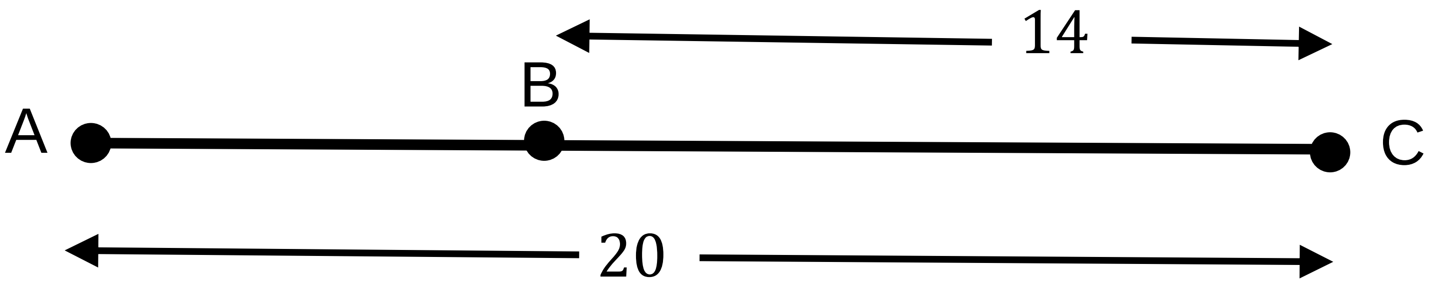
Math-2A

Lesson 9-1

Triangle Similarity

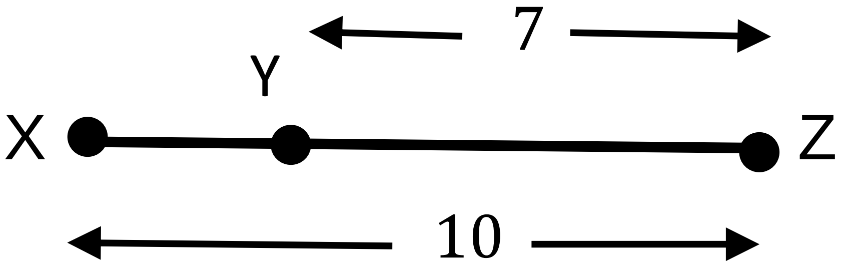
Ratio: a fraction

Compare BC to AC with a ratio.



$$\frac{BC}{AC} = ? = \frac{14}{20} = \frac{7}{10}$$

Compare YZ to XZ with a ratio.



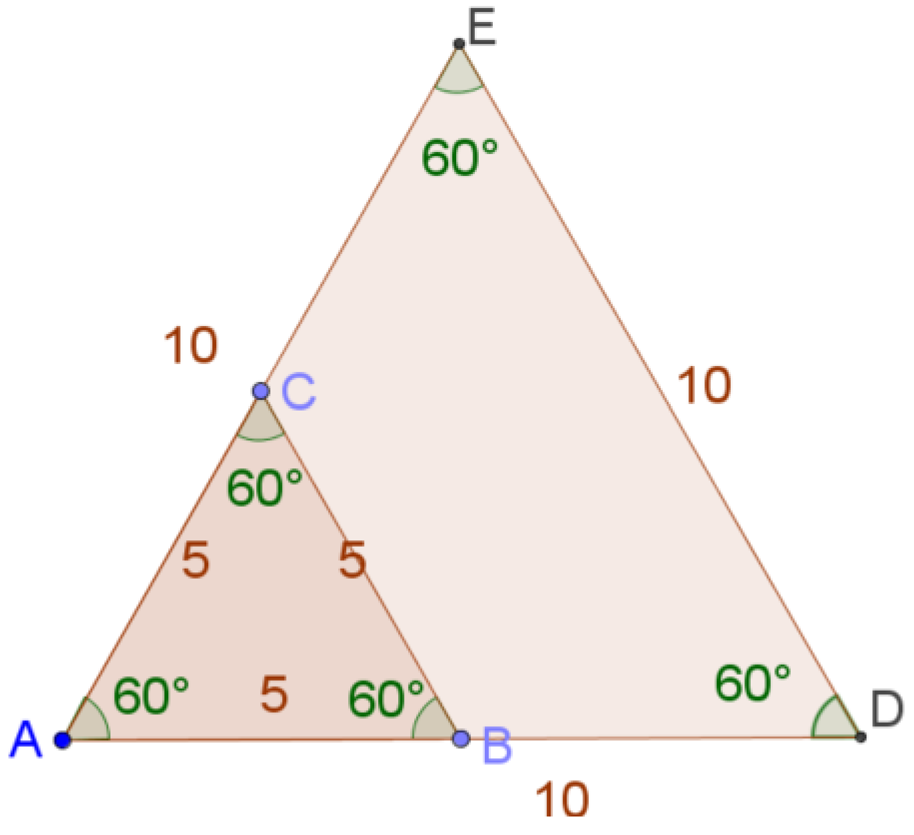
$$\frac{YZ}{XZ} = ? = \frac{7}{10}$$

Proportional: to be related by a constant ratio. We say lengths are proportional if the ratios of corresponding lengths equals the same number.

Proportional: to be related by a constant ratio. We say sides are proportional if the ratios of corresponding sides equals the same number.

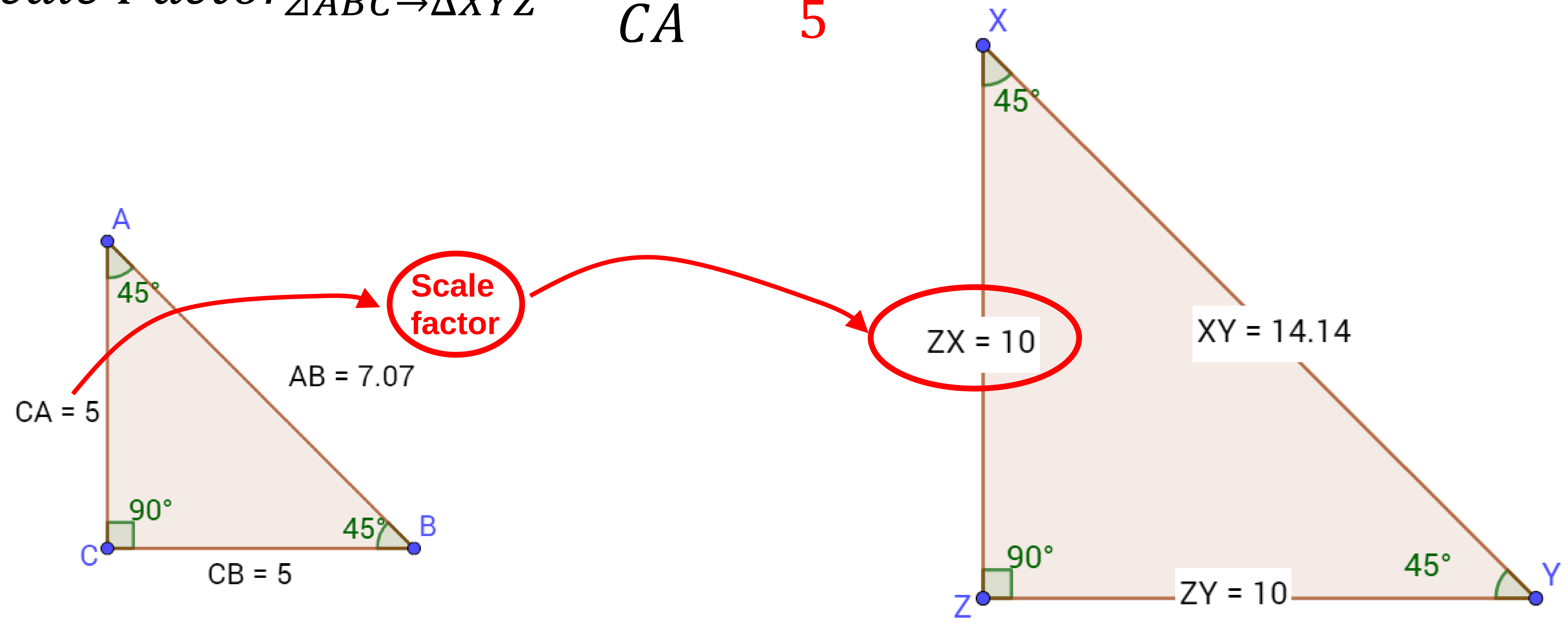
$$\frac{AE}{AC} = \frac{AD}{AB} = \frac{DE}{BC} = \frac{10}{5} = 2$$

The side lengths of ΔADE are twice as long as the side lengths in ΔABC



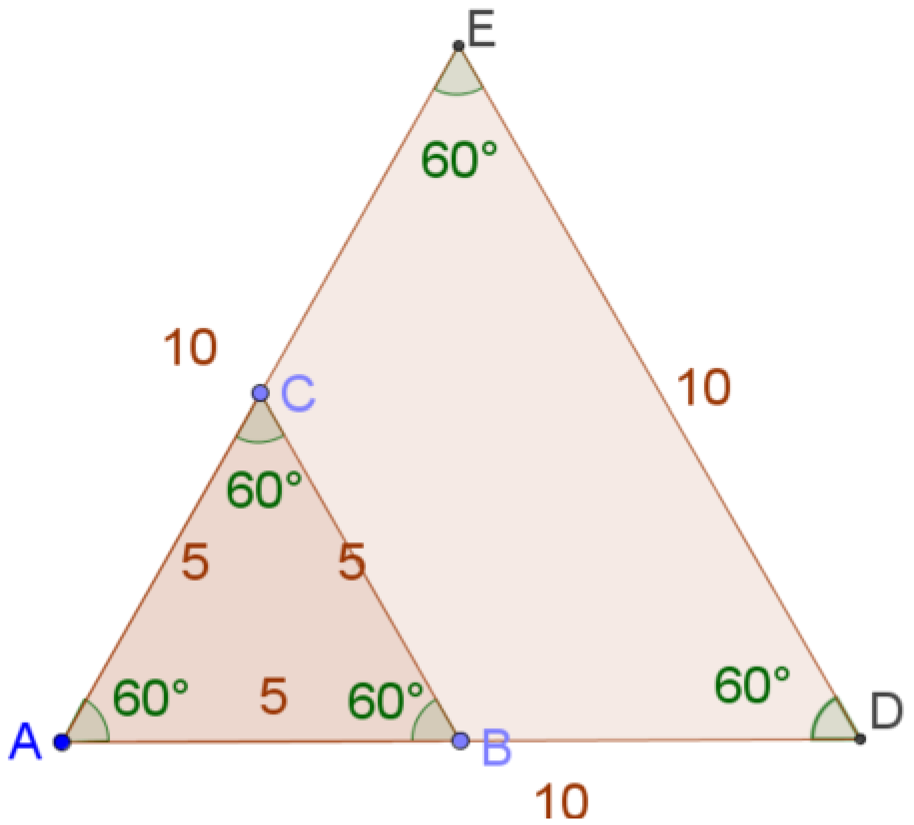
<u>Scale Factor</u>: the number that is multiplied by the length of each side of one triangle to equal the lengths of the sides of the other similar triangle.

$$Scale\ Factor_{\Delta ABC \to \Delta XYZ} = \frac{ZX}{CA} = \frac{10}{5} = 2$$



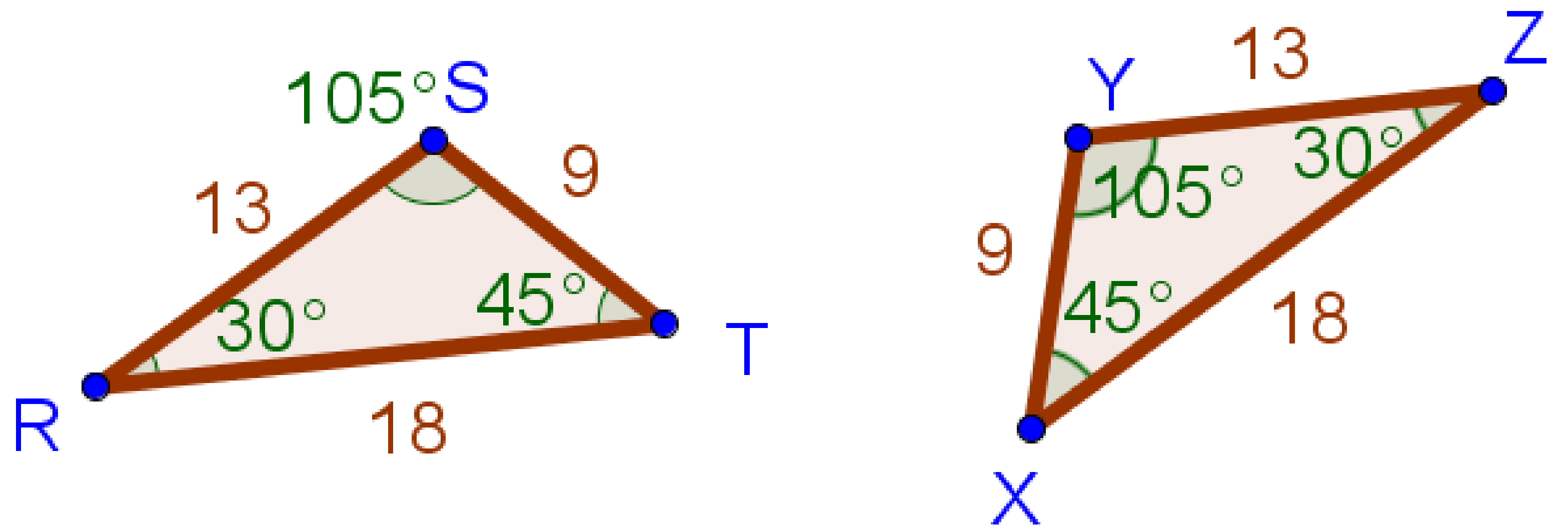
Similar: Same shape but not necessarily the same size.

Similar Symbol: $\sim$



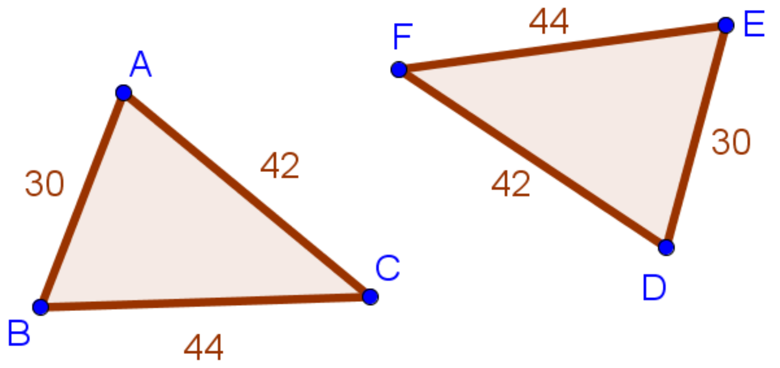
Review: Triangle Congruence

All 3 pairs of corresponding angles and all 3 pairs of corresponding sides are congruent (CPCTC)

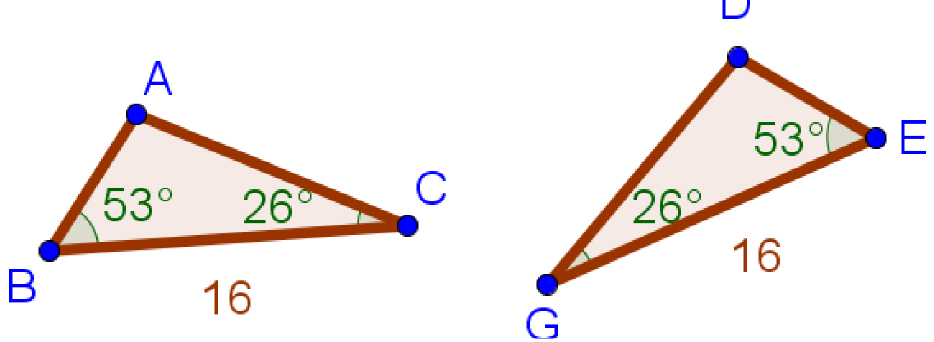


We can prove Triangle Congruence using congruence of only three pairs of corresponding parts.

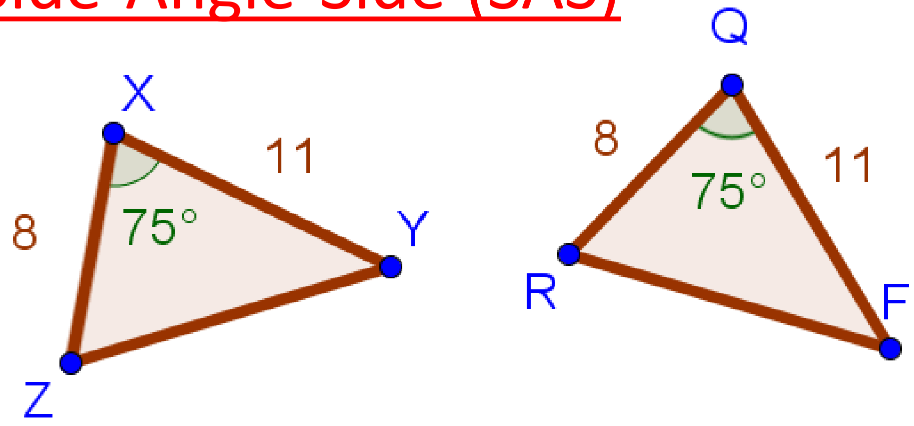
Side-Side-Side (SSS)



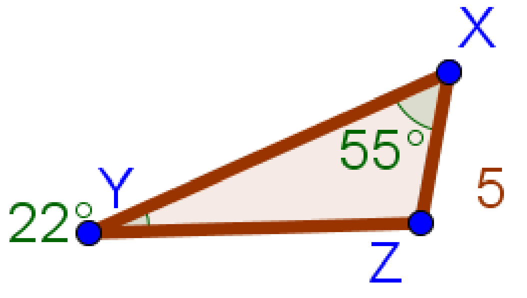
Angle-Side-Angle (ASA)

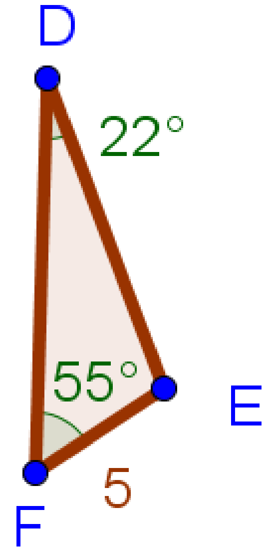


Side-Angle-Side (SAS)



Angle-Angle-Side (AAS)





Triangle Similarity: IF all corresponding angles are congruent and all corresponding sides are proportional THEN the triangles are similar.

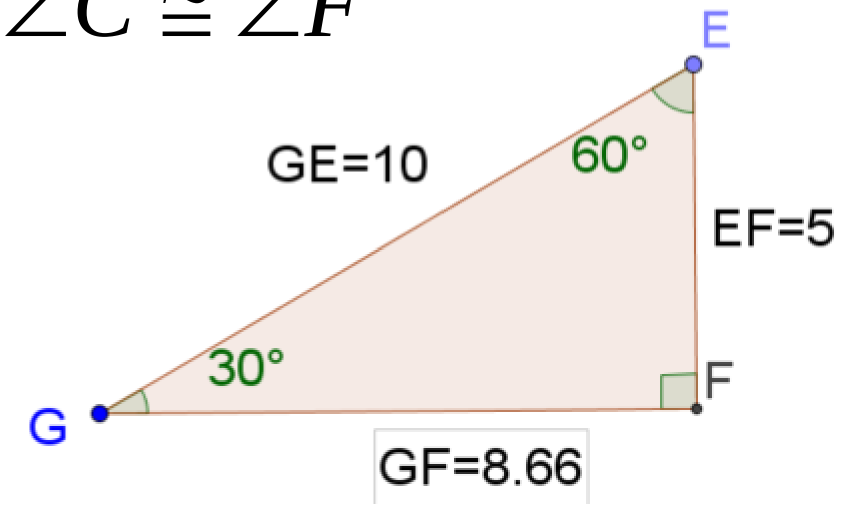
$$\angle A \cong \angle G$$
$$\angle B \cong \angle E$$
$$\angle C \cong \angle F$$

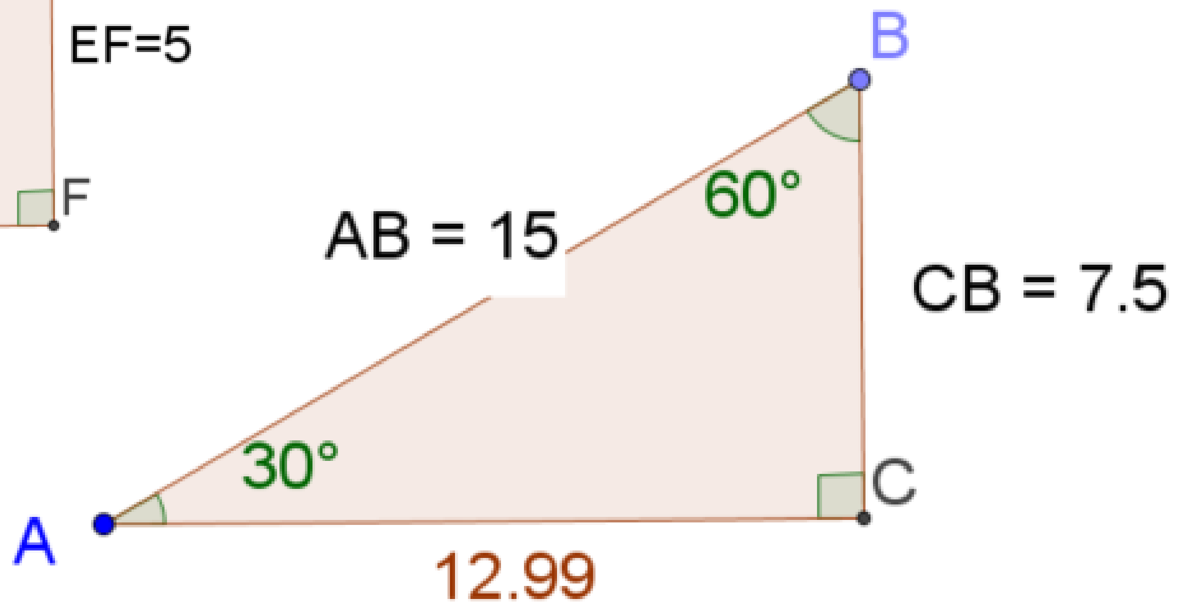
$$\frac{AB}{GE} = \frac{15}{10} = \frac{3}{2} \qquad \frac{BC}{EF} = \frac{7.5}{5} = \frac{3}{2}$$

$$\frac{AC}{GF} = \frac{12.99}{8.66} = \frac{3}{2}$$

$$\Delta ABC \sim \Delta GEF$$

Similarity statement.



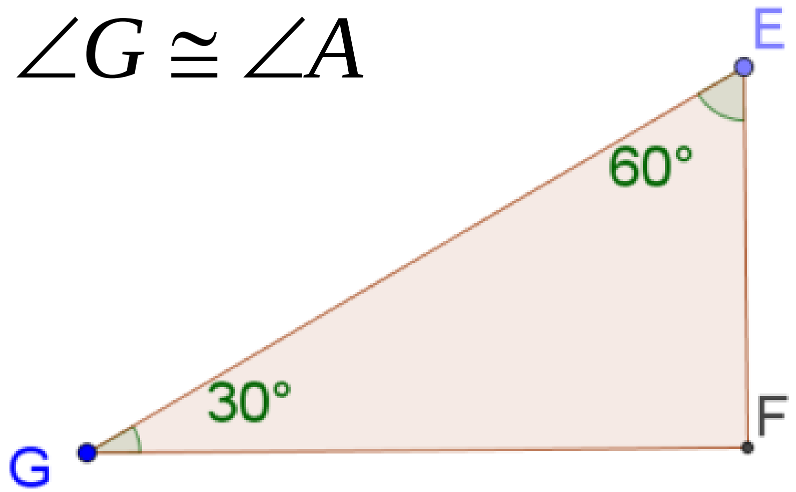


Triangle Similarity: But we don't need all corresponding angles are congruent and all corresponding sides are proportional.

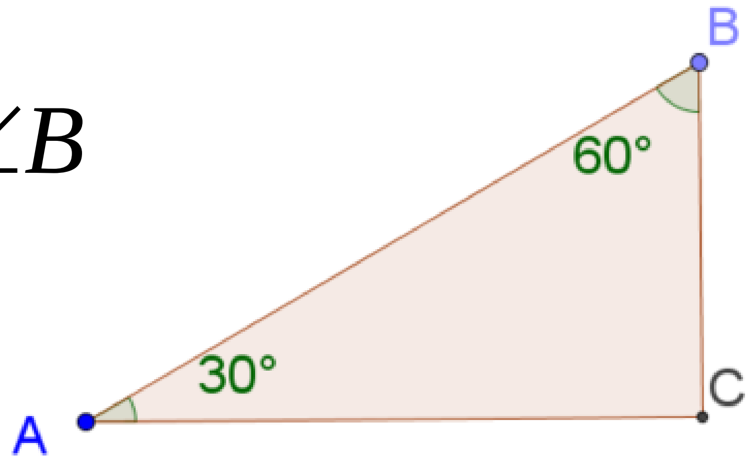
We can get by with the following patterns: AA, SSS, and SAS

Angle-Angle (AA) Triangle Similarity: IF two pairs of corresponding angles are congruent THEN the triangles are similar.

$\angle G \cong \angle A$



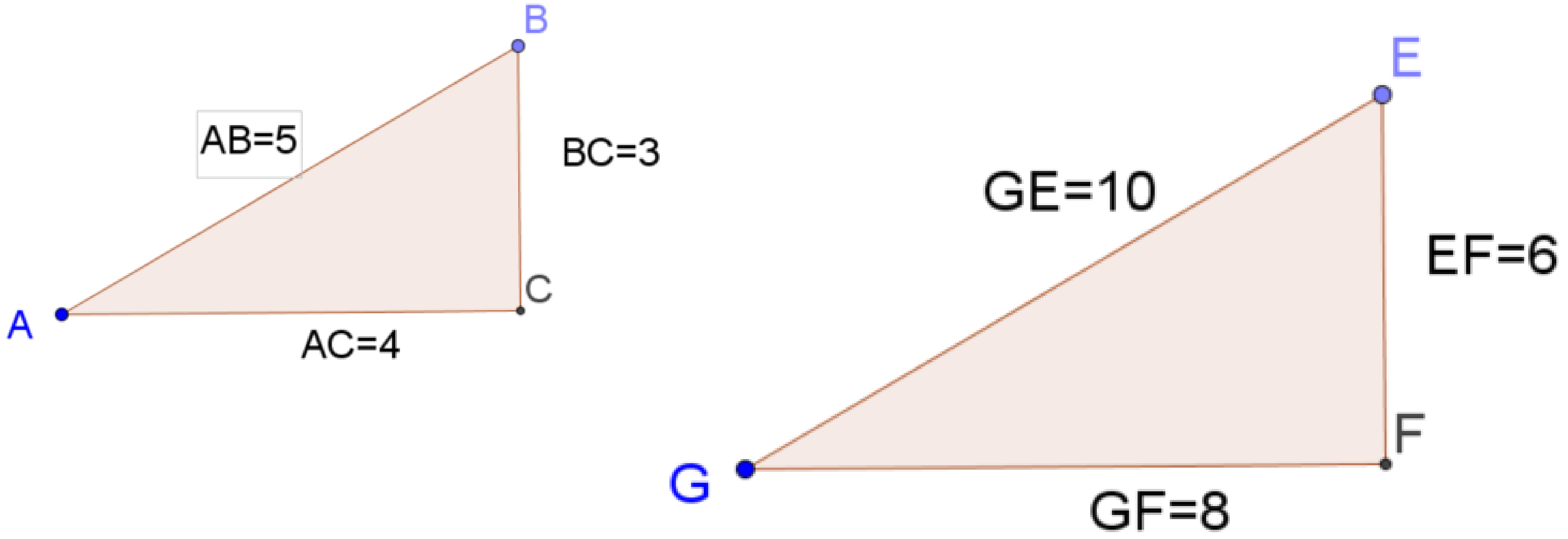
$\angle E \cong \angle B$



Why don't we need AAA?

Side-Side-Side (SSS) Triangle Similarity: IF all three pairs of corresponding sides are proportional THEN the triangles are similar.

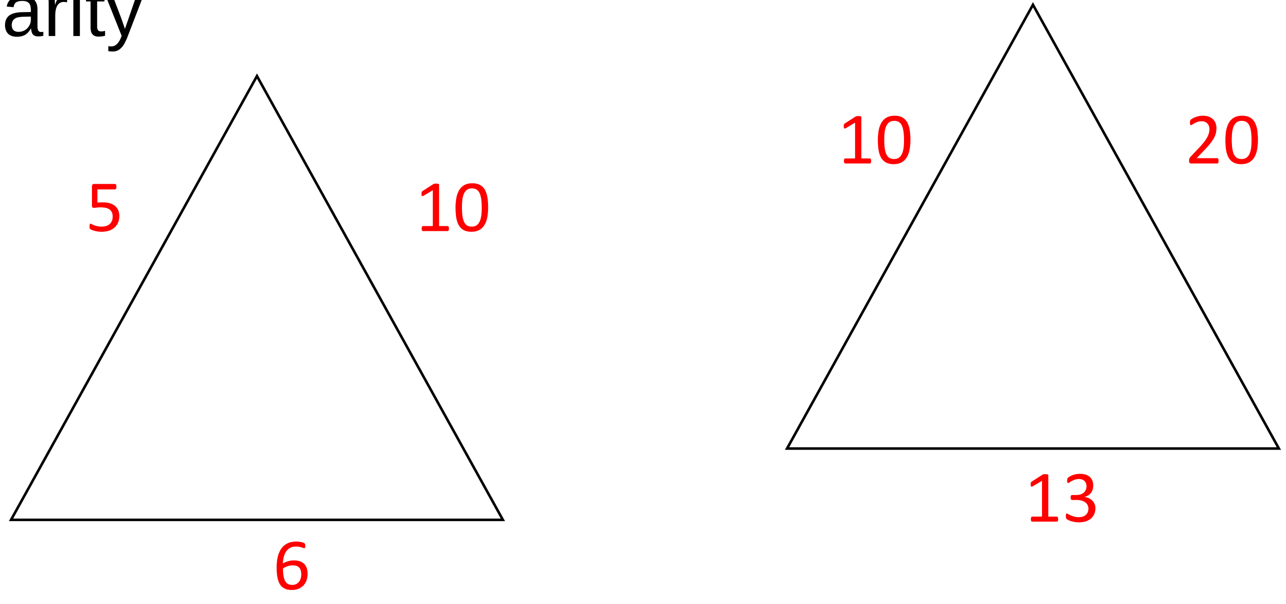
$$\frac{AB}{GE} = \frac{BC}{EF} = \frac{AC}{GF} = \frac{5}{10} = \frac{1}{2}$$



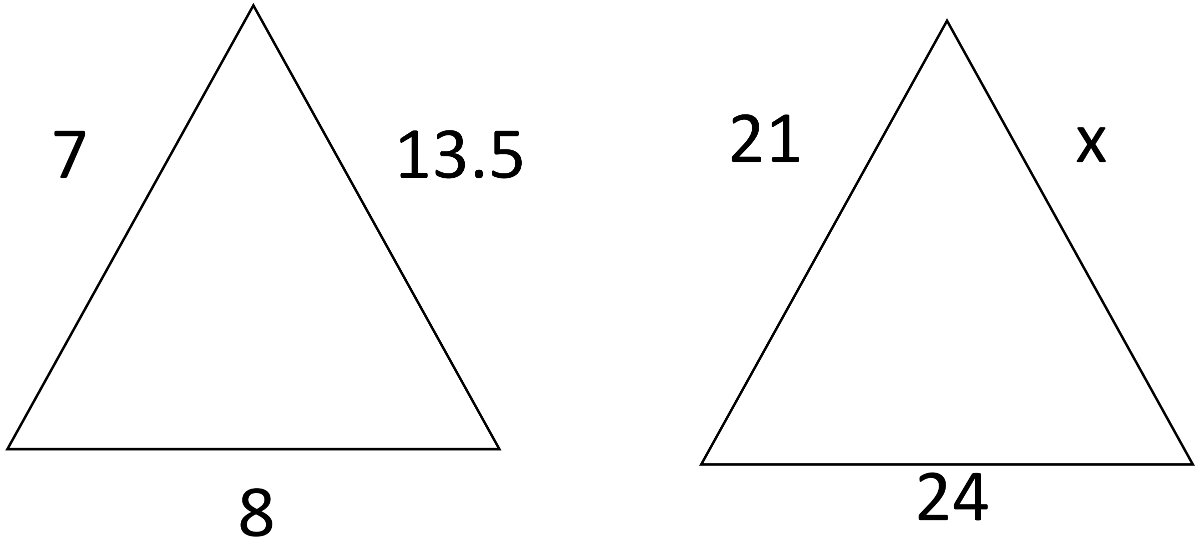
Examples of SSS Triangle similarity

$$\frac{side_{Tri-1}}{side_{Tri-2}} = \frac{10}{5} = \frac{20}{10} \neq \frac{13}{6}$$

NOT similar



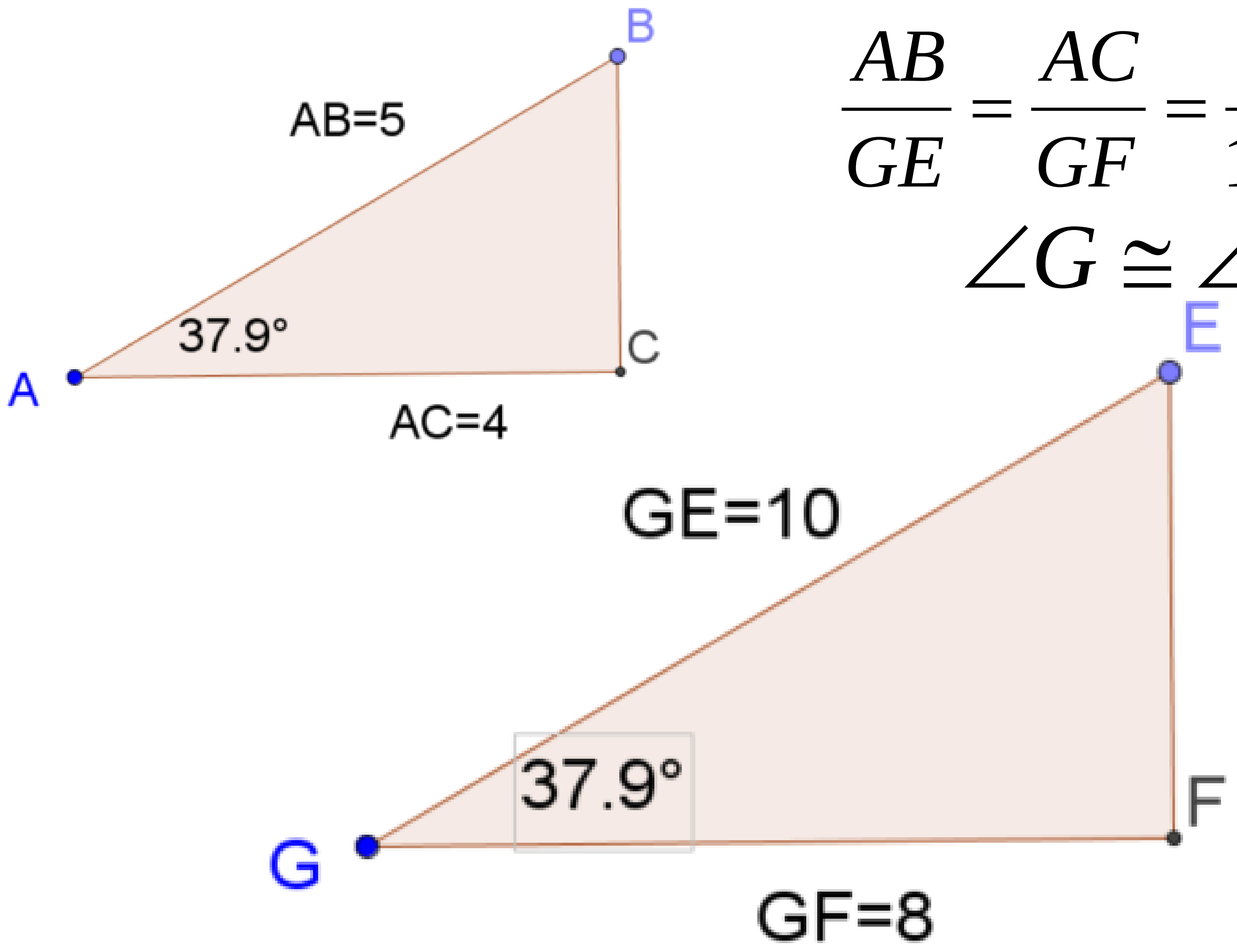
If the triangles to the right are similar, what must be the value of ‘x’?



Side-Angle-Side (SAS) Triangle Similarity: IF two pairs of corresponding sides are proportional and the included angles are congruent THEN the triangles are similar.

$$\frac{AB}{GE} = \frac{AC}{GF} = \frac{5}{10} = \frac{4}{8} = \frac{1}{2}$$

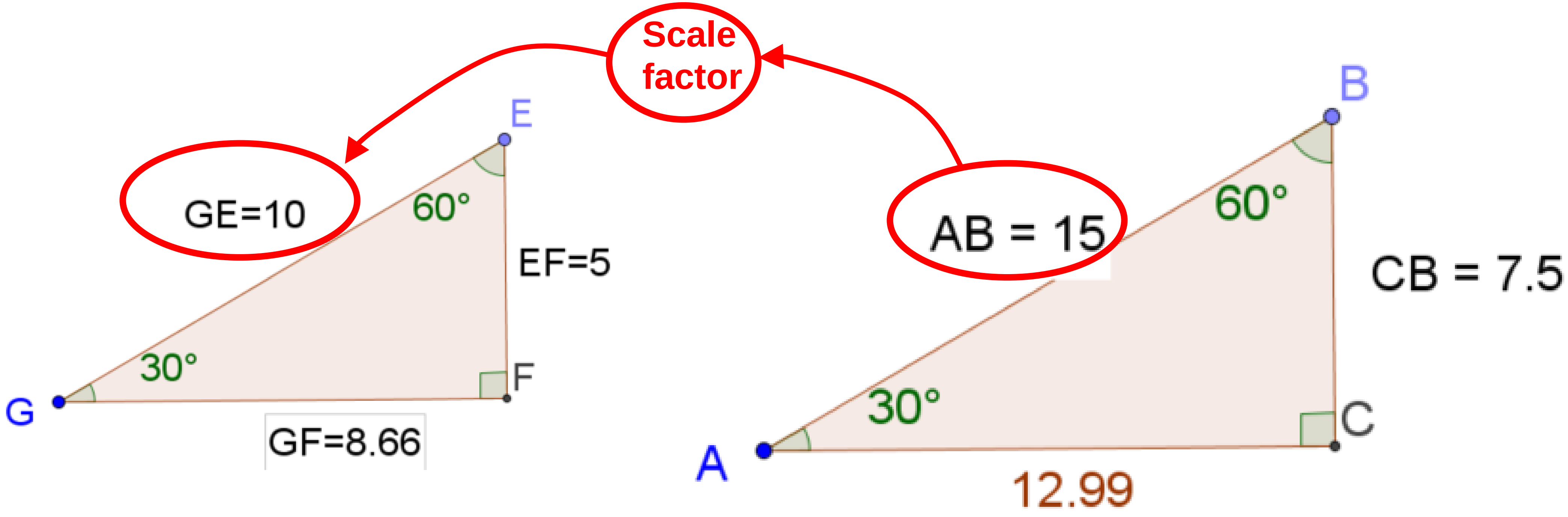
$$\angle G \cong \angle A$$



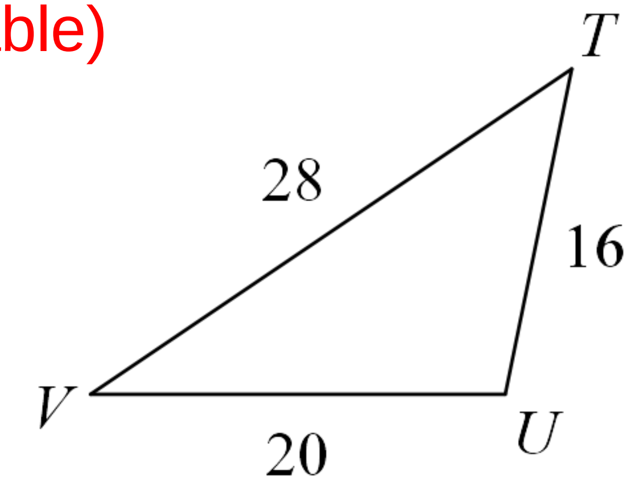
Scale Factor: the number that is multiplied by the length of each side of one triangle to equal the lengths of the sides of the other similar triangle.

$$AB(\text{scale factor}) = GE$$

$$\text{scale factor}_{\Delta ABC \to \Delta GEF} = \frac{GE}{AB} = \frac{10}{15} = \frac{2}{3}$$



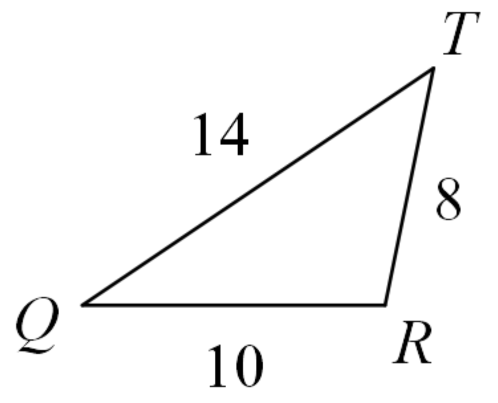
If the triangles are similar:
a) Show that the triangles are similar using ratios (if applicable)
b) give the similarity theorem
c) write the similarity statement.
d) write the scale factor (small Δ to large Δ)



$$\frac{VT}{QT} = \frac{28}{14} = 2 \qquad \frac{TU}{TR} = \frac{16}{8} = 2 \qquad \frac{VU}{QR} = \frac{20}{10} = 2$$

SSS Triangle Similarity

$\Delta TUV \sim \Delta TRQ$

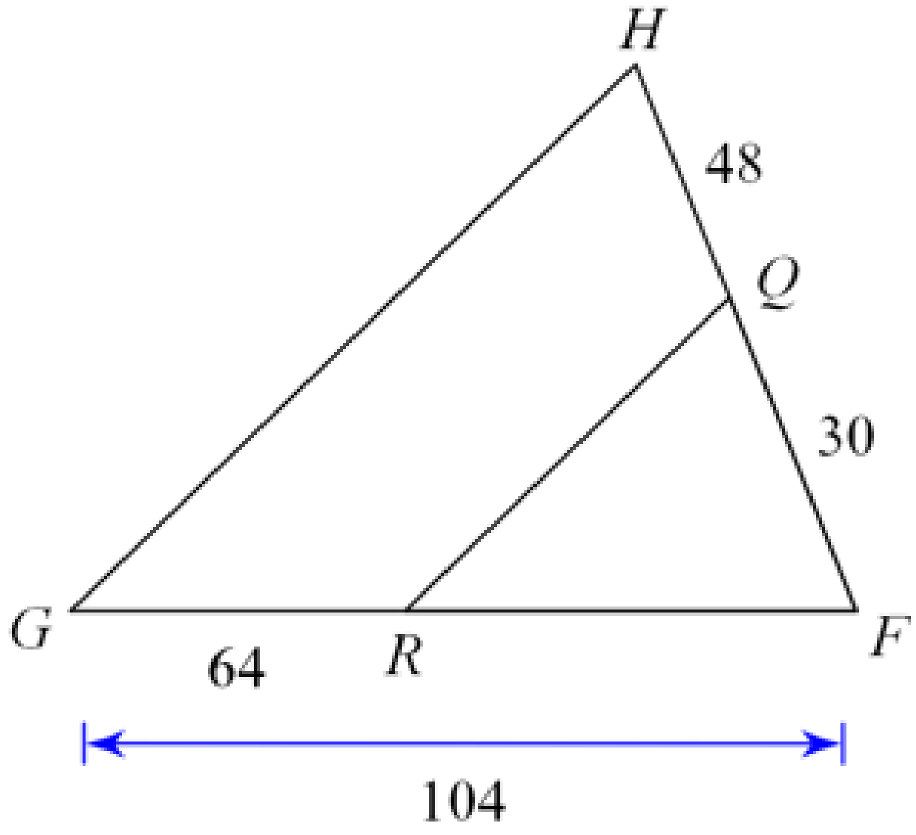


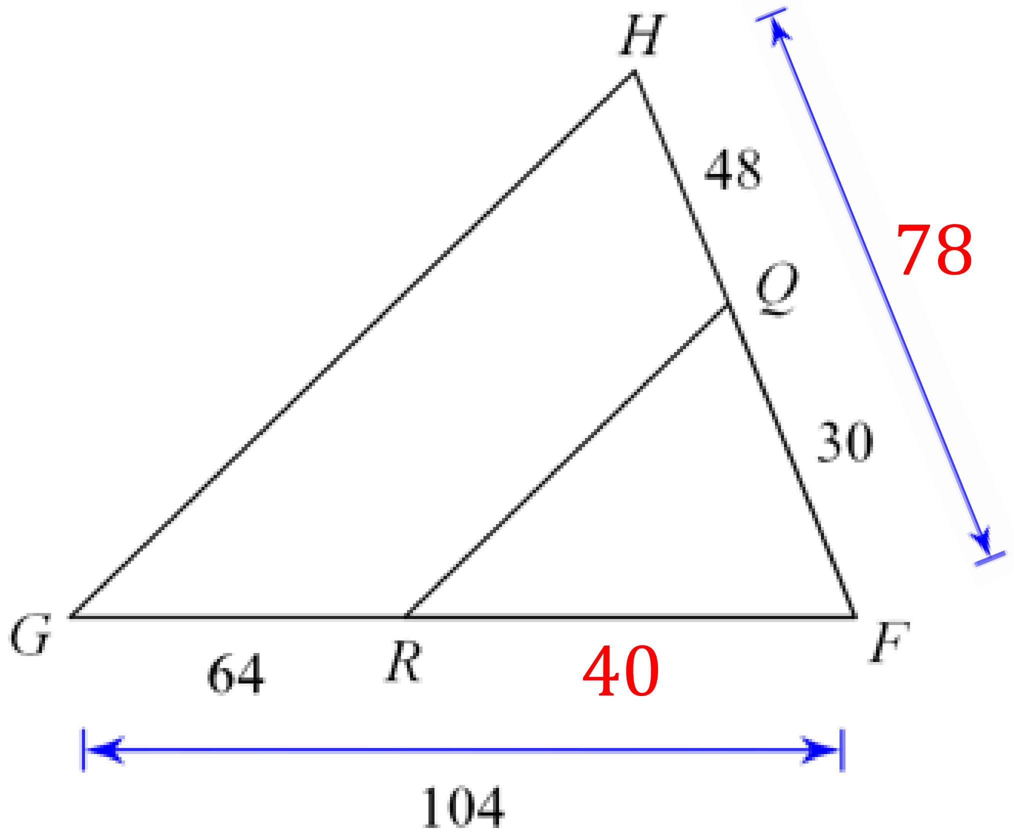
$$\text{scale factor}_{\Delta TRQ \to \Delta TUV} = 2$$

Name the two triangles. ΔFGH and ΔFRQ

Name the angle pair congruencies: $\angle F \cong \angle F$ $\angle HFG \cong \angle QFR$

List the missing side lengths:

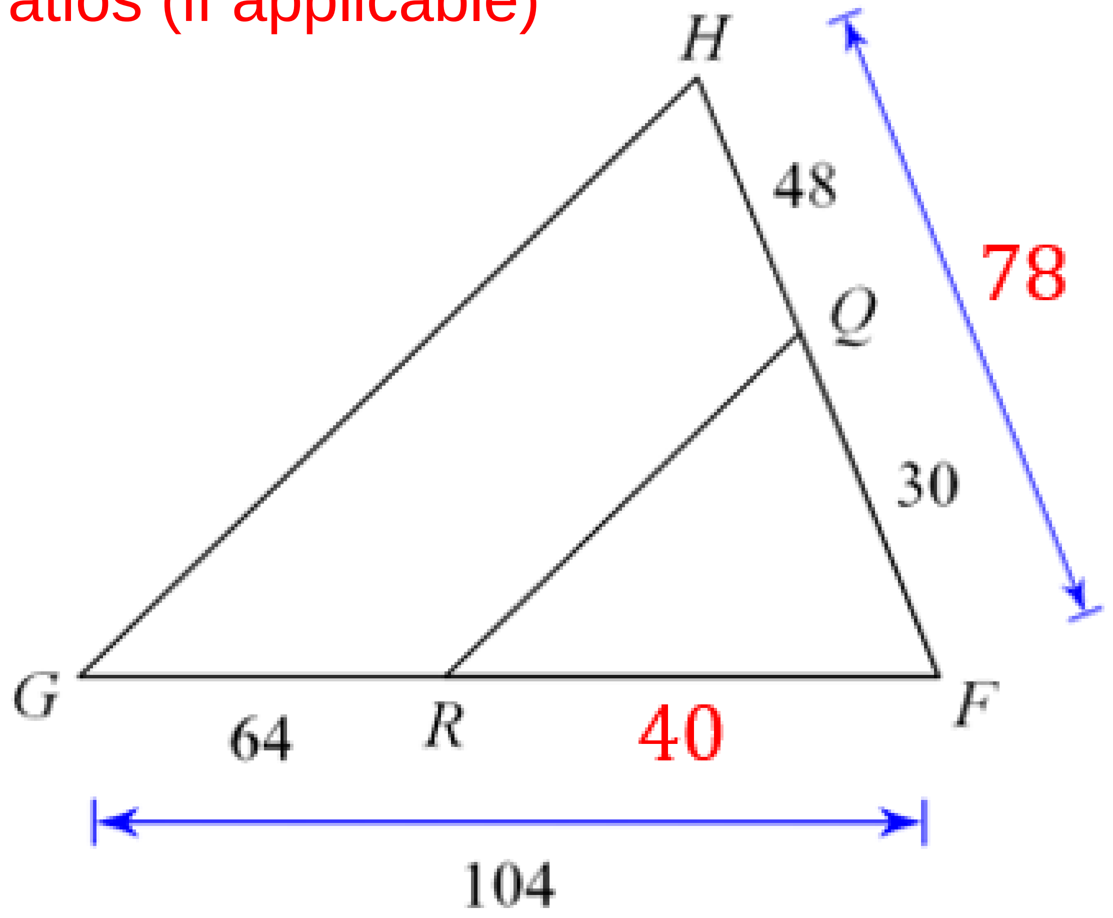




$RF =$ $104 - 64 = 40$

$HF =$ $30 + 48 = 78$

If the triangles are similar:
a) Show that the triangles are similar using ratios (if applicable)
b) give the similarity theorem
c) write the similarity statement.
d) write the scale factor (small Δ to large Δ)



$$\frac{FG}{FR} = \frac{104}{40} = 2.60 \qquad \frac{FH}{FQ} = \frac{78}{30} = 2.60$$

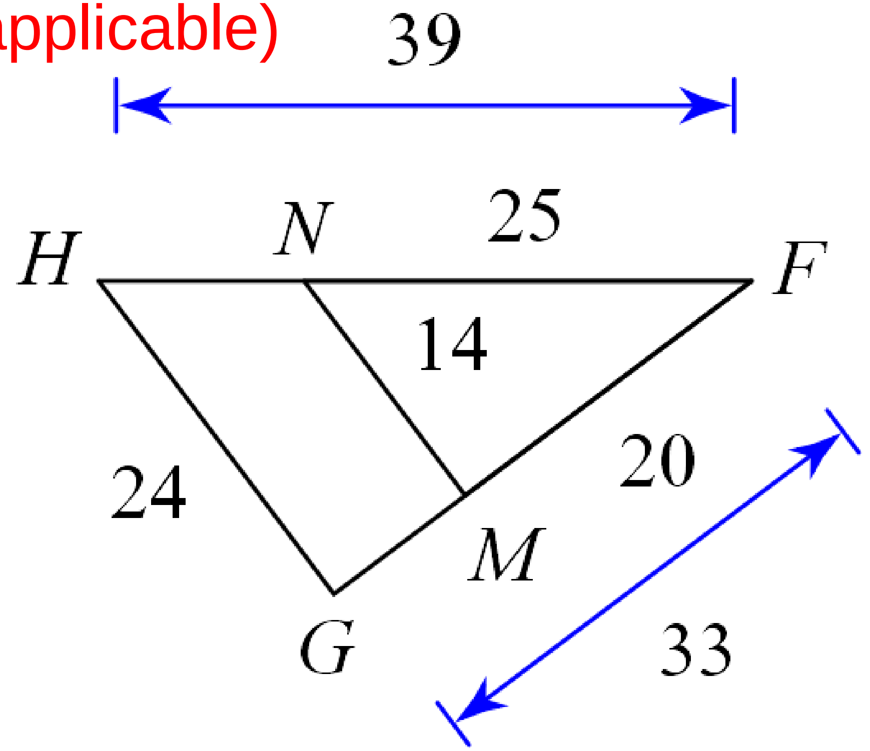
$$\angle F \cong \angle F$$

SAS Triangle Similarity

$$\Delta FGH \sim \Delta FRQ$$

$$\text{scale factor}_{\Delta FRQ \rightarrow \Delta FGH} = 2.6$$

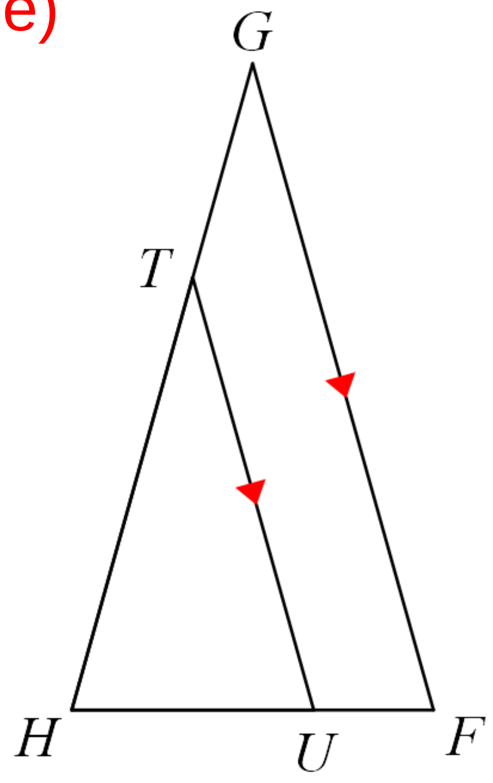
If the triangles are similar:
a) Show that the triangles are similar using ratios (if applicable)
b) give the similarity theorem
c) write the similarity statement.
d) write the scale factor (small Δ to large Δ)



$$\frac{FG}{FM} = \frac{33}{20} = 1.65$$

$$\frac{FH}{FN} = \frac{39}{25} = 1.56$$ NOT Similar

If the triangles are similar:
a) Show that the triangles are similar using ratios (if applicable)
b) give the similarity theorem
c) write the similarity statement.
d) write the scale factor (small Δ to large Δ)



$\angle HTU \cong \angle HGF$ (corresponding angles)

$\angle H \cong \angle H$

AA Triangle Similarity

$\Delta HGF \sim \Delta HTU$

$\text{scale factor} = ??$