Mathematics 10D

7.1 Congruence & Similarity in Δs

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Our Goal: Investigate the relationship between corresponding sides and angles in pairs of congruent and similar Δs

Definitions:

Congruent Δs: Same 3 sides and angles (=)

Similar Δs: Same shape but can be different sizes. (~) They have the same 3 angles and the sides are proportional.

For example, $\Delta ABC \sim \Delta A'B'C'$ if

$$\angle A = \angle A', \angle B = \angle B', \angle C = \angle C' \text{ and } \frac{AB}{A'B'} = \frac{CB}{B'C'} = \frac{CA}{C'A'}$$

Proportions

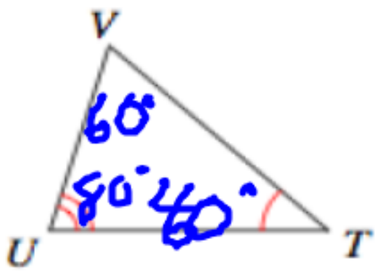
Tests:

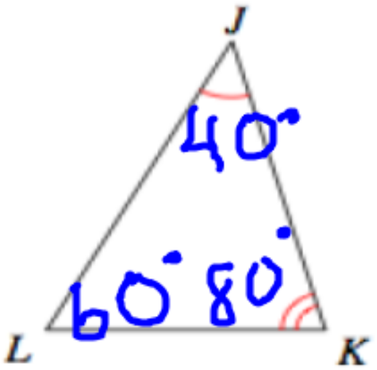
AAA

SSS

SAS

Determine if the two triangles are similar and/or congruent.





$\angle T = \angle J$

$\angle U = \angle K$

$\angle V = \angle L$

} AAA

$\therefore \triangle TUV \sim \triangle JKL$

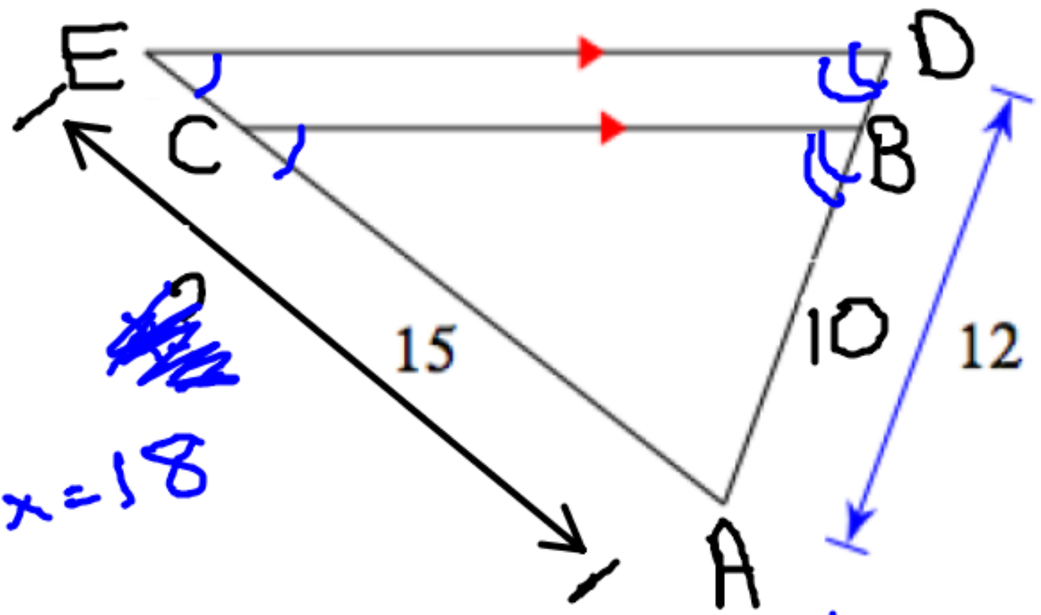
$180^\circ = \angle J + \angle K + \angle L$

$180^\circ = 40^\circ + 80^\circ + \angle L$

$180^\circ - 120^\circ = \angle L$

$60^\circ = \angle L$

pay attention!



Determine the scale factor. and x

A) $\Delta ABC \sim \Delta ADE$ ✓

AAA $\angle B = \angle D$

$\angle C = \angle E$

B) AE, AC, AB, AD.

i) $\frac{AE}{AC} = \frac{AD}{AB} \Rightarrow \frac{x}{15} = \frac{12}{10}$

$\frac{10x}{10} = \frac{180}{10}$

$x = 18$

ii) $\frac{AC}{AE} = \frac{AB}{AD}$

$12x\left(\frac{15}{x}\right) = \left(\frac{10}{12}\right)12x \Rightarrow 180 = 10x$

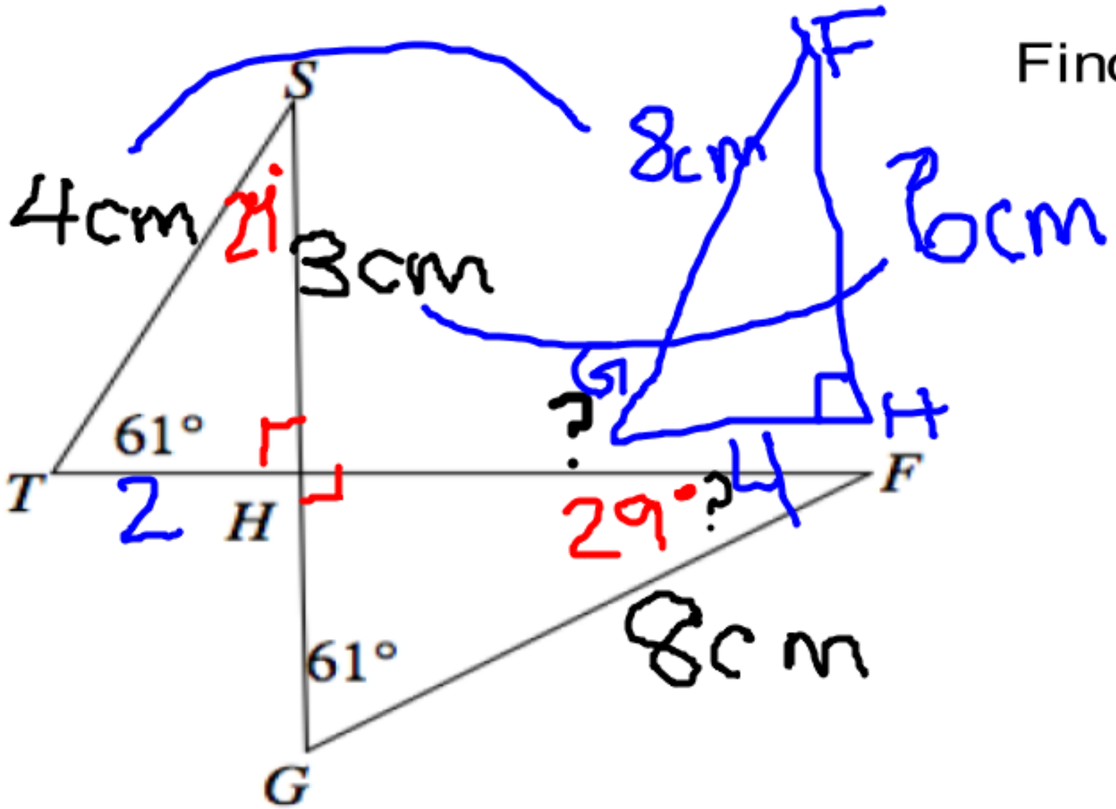
$x = 18$

C) i) $\frac{AE}{AC} = \frac{18}{15} = \frac{6}{5}$

$15 \times \frac{6}{5} = 18$.

ii) $\frac{15}{18} = \frac{5}{6}$

$18 \times \frac{5}{6} = 15$



Find the missing angle and side.

$\angle F$ HF

$180° = 61° + 90° + \angle F$

$180° - 151° = \angle F$

$\boxed{29° = \angle F}$

$\therefore \triangle FHG \sim \triangle SHT$

HF, FG, HS, ST

$\frac{HF}{HS} = \frac{FG}{ST} \Rightarrow \frac{4}{3}\left(\frac{x}{3}\right) = \left(\frac{8}{4}\right)^3$

$\frac{4x}{4} = \frac{24}{4}$

$x = 6$

$\therefore HF = 6cm$

Scale factor:

$\frac{8}{4} = 2$