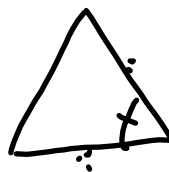


Section 7.4 Similar Triangles: SSS and SAS Similarity

Theorem 7.3

SAS Similarity Theorem: If an angle of one triangle is congruent to an angle of another triangle, and the sides including the two angles are proportional, then the triangles are similar.

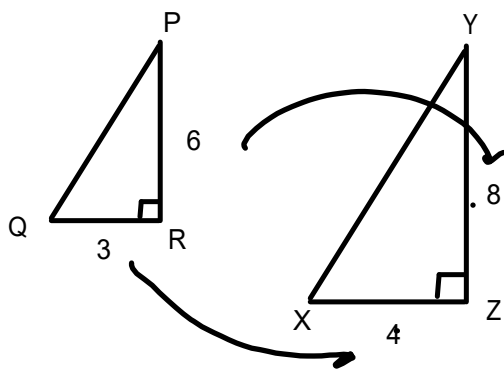


Theorem 7.4

SSS Similarity Theorem: If the corresponding sides of two triangles are proportional, then the triangles are similar.

Example:

Explain why the triangles are similar, then write a similar statement.

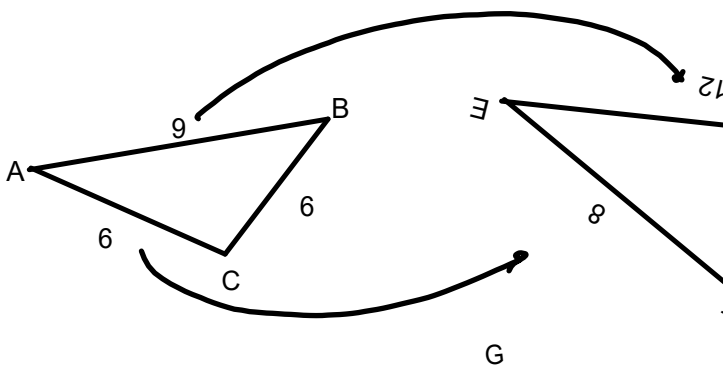


$$\frac{3}{4} = \frac{6}{8}$$

$$24 = 24$$

SAS ~

$\Delta PQR \sim \Delta XYZ$



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

$$72 = 72$$

SSS ~

$\Delta CAB \sim \Delta FEG$

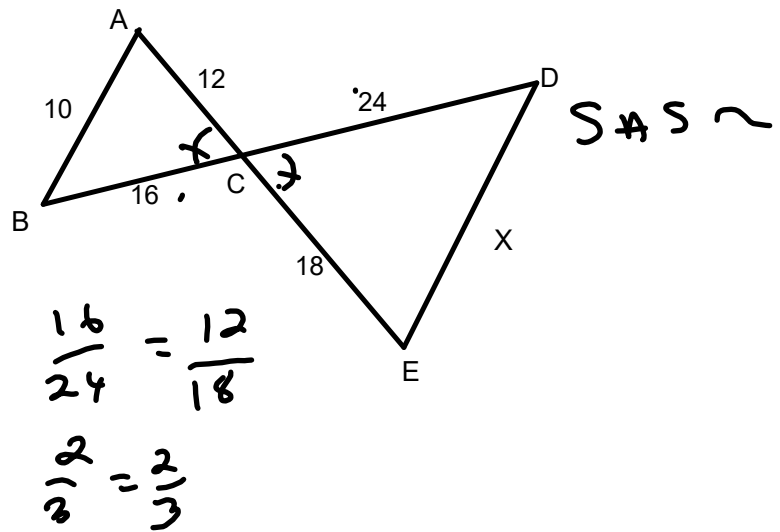
Applying the similarity theorems and postulate. Find the length of the missing sides.

Scale Factor = $\frac{2}{3}$

$$\frac{2}{3} = \frac{10}{x}$$

$$2x = 30$$

$$x = 15$$

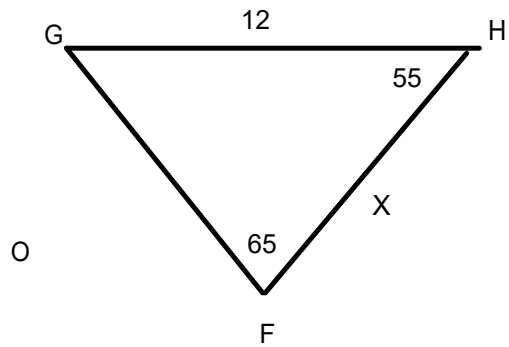
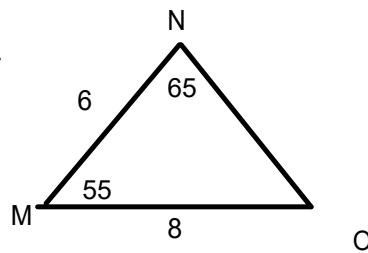


AA ~
Scale Factor = $\frac{2}{3}$

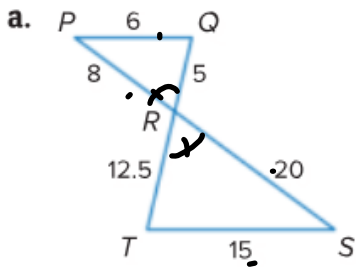
$$\frac{6}{x} = \frac{2}{3}$$

$$2x = 18$$

$$x = 9$$



Determine whether the triangles are similar. If so, write a similarity statement. Explain your reasoning.

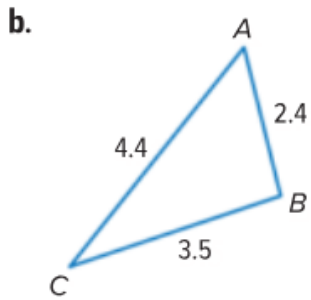


SAS ~

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

$$100 = 100$$

$\triangle PQR \sim \triangle STR$

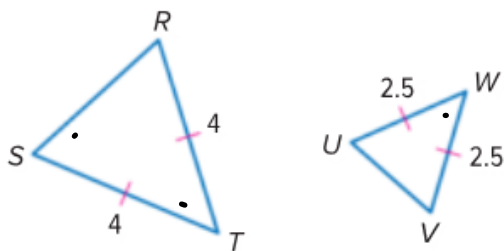


$$\frac{1.8}{2.4} = \frac{2.7}{3.5} = \frac{3.6}{4.4}$$

$$.75 \neq .77$$

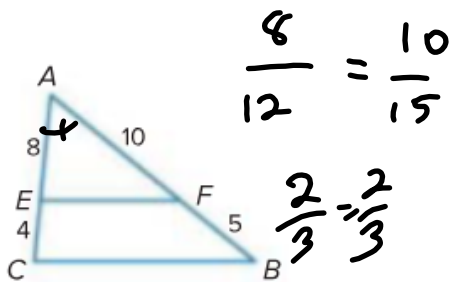
Determine whether the triangles are similar. If so, write a similarity statement. Explain your reasoning.

a.



NOT similar

b.



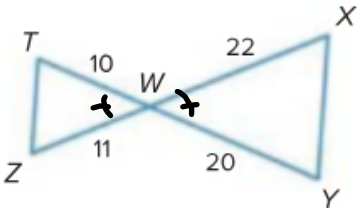
$$\frac{8}{12} = \frac{10}{15}$$

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

SAS ~

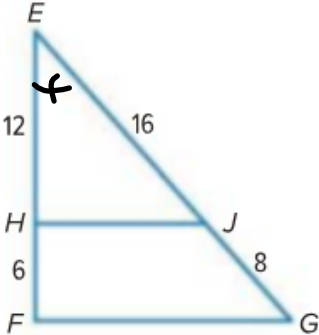
$\triangle DEF \sim \triangle CAB$

3A.



SAS ~

3B.



$$\frac{12}{16} = \frac{6}{8}$$

$$\frac{3}{4} = \frac{3}{4}$$

SAS ~

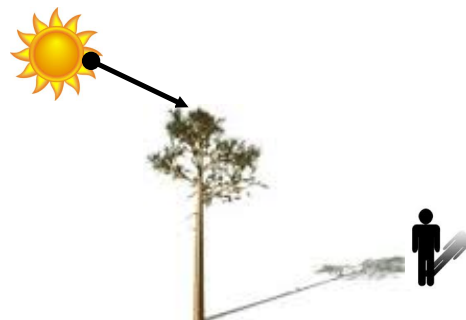
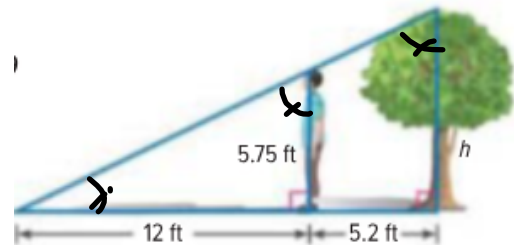
ECOLOGY A park volunteer is doing an inventory of the trees in the park, noting the species and height of each tree. He stands so that his shadow coincides with the tree's shadow. He is 5 feet 9 inches tall and his shadow is 12 feet long. If the length of the tree's shadow is 17.2 feet, how tall is the tree?

$$\frac{12}{17.2} = \frac{5.75}{x}$$

$$98.9 = 12x$$

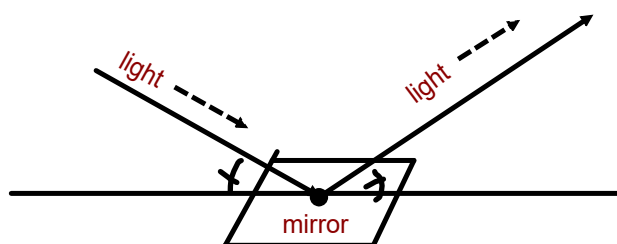
$$x = 8.24$$

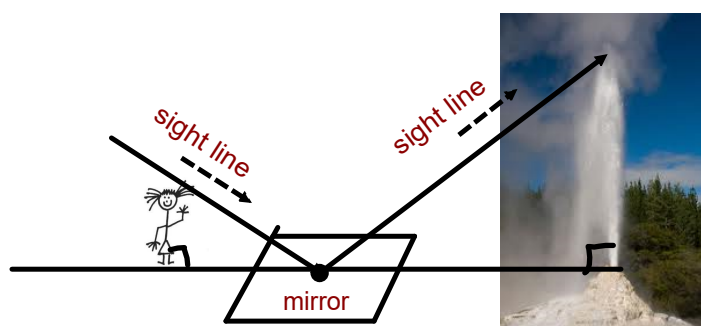
$$8' 2.88''$$



Indirect Measurements

Light reflects off a mirror at the same angle at which it hits the mirror.





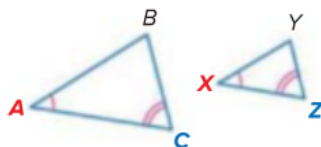
The geyser is 40.5 feet from the mirror. Betty walked away from the mirror until she can see the geyser in the middle of the mirror. She walked 7 feet. Betty is 5.5 feet tall. How tall is the geyser?

$$\frac{5.5}{x} = \frac{7}{40.5}$$

$$x = 31.82$$
$$31' 9.8''$$

Concept Summary Triangle Similarity

AA Similarity Postulate



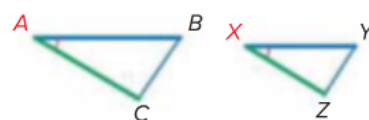
If $\angle A \cong \angle X$ and $\angle C \cong \angle Z$,
then $\triangle ABC \sim \triangle XYZ$.

SSS Similarity Theorem



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

SAS Similarity Theorem



If $\angle A \cong \angle X$ and $\frac{AB}{XY} = \frac{AC}{XZ}$,
then $\triangle ABC \sim \triangle XYZ$.

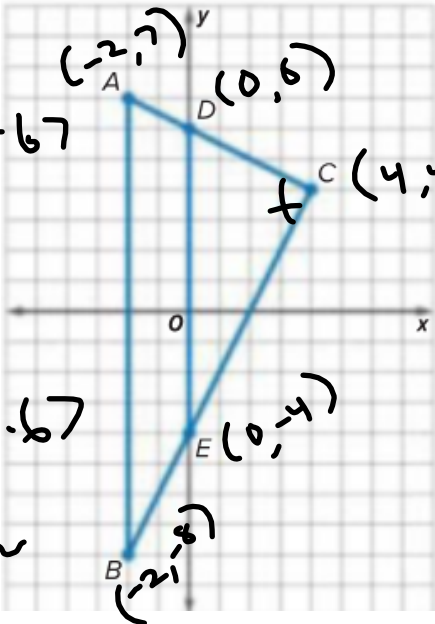
Example 4 Analyze Triangles on the Coordinate Plane

Determine whether $\triangle ABC$ with vertices $A(-2, 7)$, $B(-2, -8)$, and $C(4, 4)$ is similar to $\triangle DEC$ with vertices $D(0, 6)$, and $E(0, -4)$. Explain your reasoning.

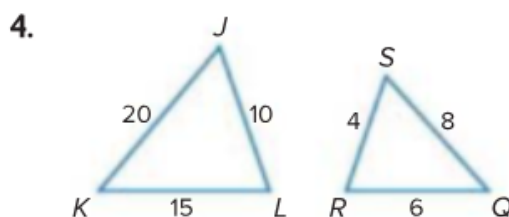
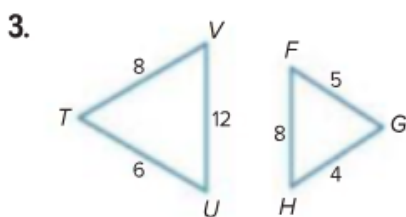
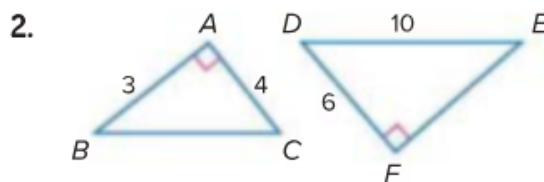
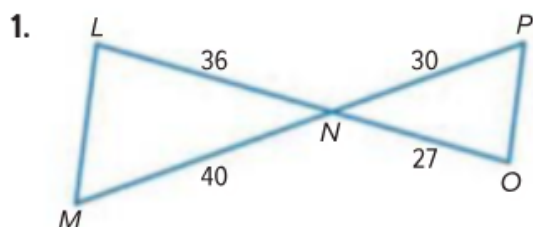
$$\frac{CD}{AC} = \frac{\sqrt{\frac{(0-4)^2}{16} + \frac{(6-4)^2}{4}}}{\sqrt{\frac{(-2-4)^2}{36} + \frac{(7-4)^2}{9}}} = \frac{\sqrt{20}}{\sqrt{45}} = \frac{2\sqrt{5}}{3\sqrt{5}} = \frac{2}{3} \approx 0.67$$

$$\frac{CE}{CB} = \frac{\sqrt{\frac{(4-0)^2}{16} + \frac{(4-4)^2}{64}}}{\sqrt{\frac{(4-2)^2}{36} + \frac{(4-8)^2}{144}}} = \frac{\sqrt{90}}{\sqrt{180}} = \frac{3\sqrt{10}}{3\sqrt{20}} = \frac{\sqrt{10}}{\sqrt{20}} = \frac{\sqrt{10}}{2\sqrt{10}} = \frac{1}{2} = 0.5$$

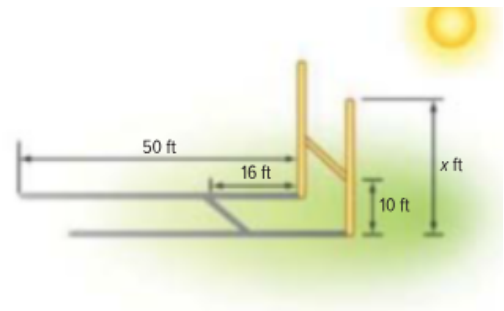
SAS \sim



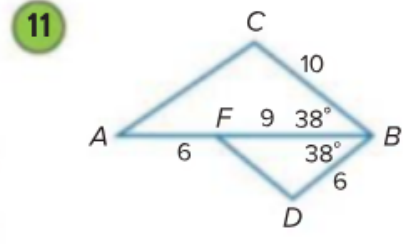
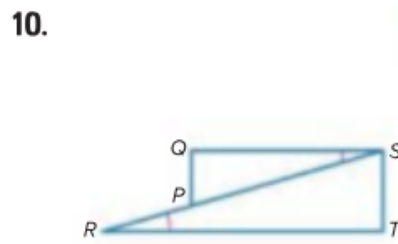
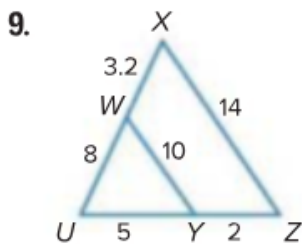
Determine whether the triangles are similar. If so, write a similarity statement. Explain your reasoning.



8. **SPORTS** The goalpost at the North High School football field casts a shadow 50 feet long. The distance from the post to the shadow of the crossbar is 16 feet. If the crossbar is 10 feet above the ground, how tall is the goalpost?

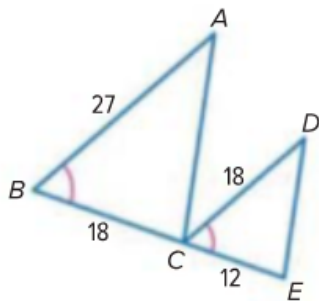


Determine whether the triangles are similar. If so, write a similarity statement. If not, what would be sufficient to prove the triangles similar? Explain your reasoning.

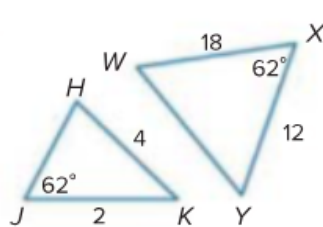


Determine whether the triangles are similar. If so, write a similarity statement. If not, what would be sufficient to prove the triangles similar? Explain your reasoning.

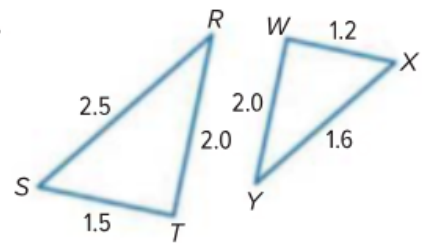
12.



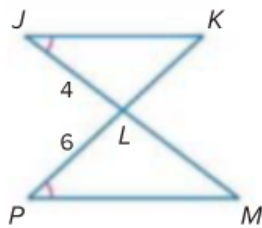
13.



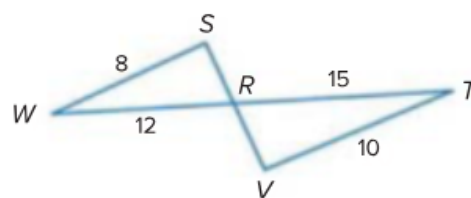
14.



15.



16.



17.

