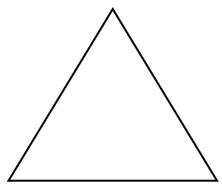
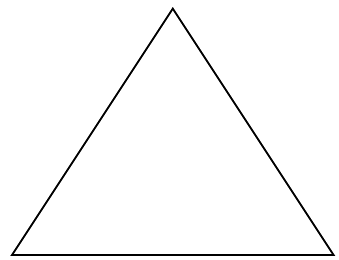
Postulate 15: If the three angles of one triangle are congruent to the three angles of a second triangle, then the triangles are similar (AAA).

Corollary 5.3.1: If two angles of one triangle are congruent to the two angles of another triangle, then the triangle are similar (AA).

(AA):
If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.

Example 1:
Given: $\angle A \cong \angle P$,
$\angle C \cong \angle R$



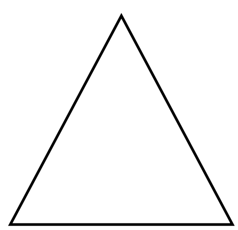


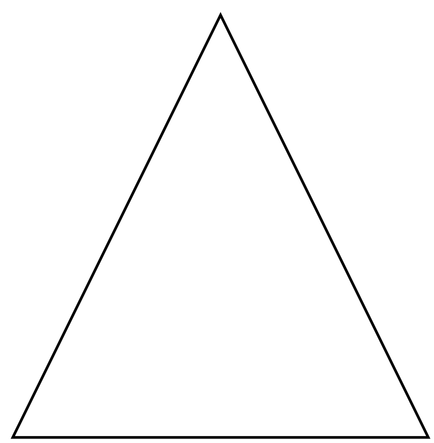
Conclusion:

(SSS):
If each side of one triangle and the corresponding side of another triangle are proportional, then the triangles are similar.

Example 2:

Given $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$



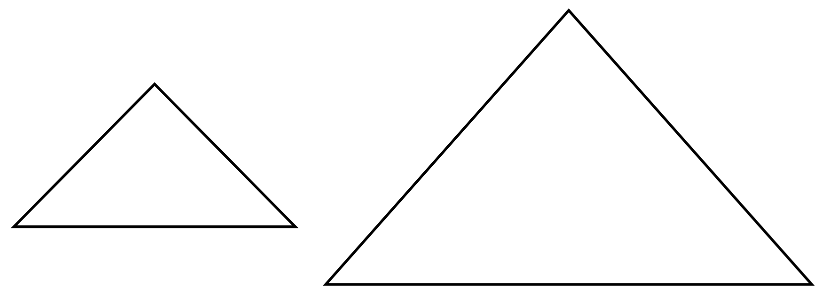


Conclusion:

(SAS):
If the measures of two sides of one triangle are proportional to the corresponding sides of another triangle AND the included angles are congruent, then the triangles are similar.

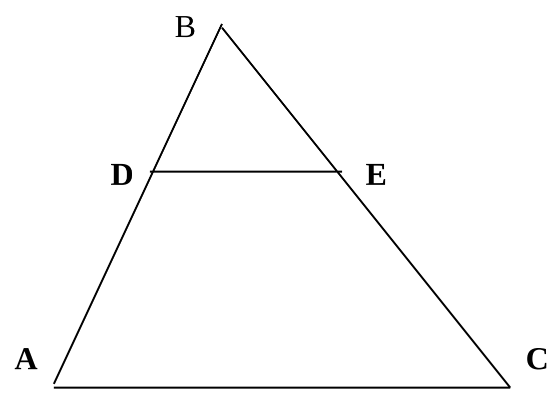
Example 3:

Given: $\frac{AB}{PQ} = \frac{BC}{QR}$ and $\angle B \cong \angle Q$



Conclusion:

Example 4: In the figure below, $AB \parallel DE$, $DA = 2$, $CA = 8$, and $CE = 3$. Find CB.



<u>RULES:</u>

1) **If two triangles are similar, then the** <u>perimeters are proportional</u> **to the measures of corresponding sides.**

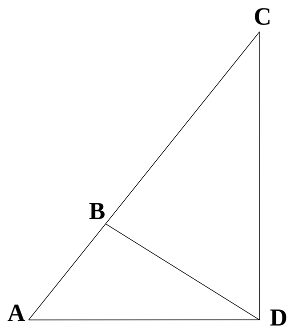
2) **If two triangles are similar, then the measures of the corresponding** <u>altitudes (form 90°) are proportional</u> **to the measures of the corresponding sides.**

3) **If two triangles are similar, then the measures of the** <u>corresponding angle bisectors</u> **of the triangles** <u>are proportional</u> **to the measures of the corresponding sides.**

4) **If two triangles are similar, then the measures of the corresponding** <u>medians are proportional</u> **to the measures of the corresponding sides.**

Example 5:

$\Delta ABD \sim \Delta ADC$. If AD=16, AC=31, and DC=23, find the perimeter of ΔABD.



CSSTP: Corresponding sides of similar triangles are proportional.

CASTC: Corresponding angles of similar triangles are congruent.

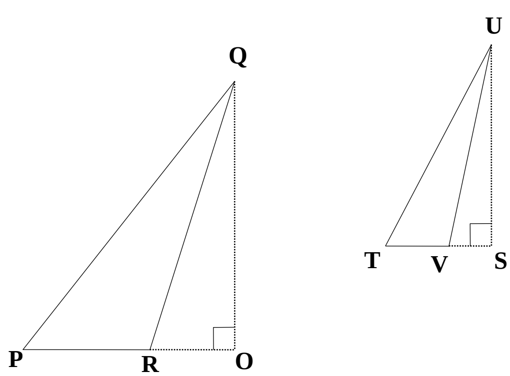
Theorem 5.3.2: The lengths of the corresponding altitudes of similar triangles have the same ratio as the lengths of any pair of corresponding sides.

Example 6:

$\Delta PQR \sim \Delta TUV$. IF QO is an altitude of ΔPQR, and US is an altitude of ΔTUV, then complete the following:

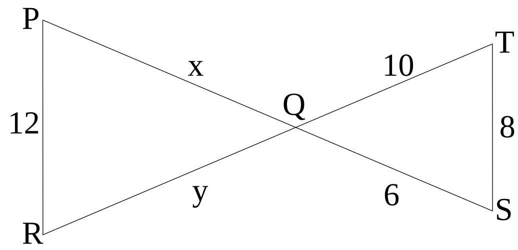
$$\frac{QO}{US} = \frac{QR}{?}$$

$$\frac{QO}{US} = \frac{?}{TU}$$

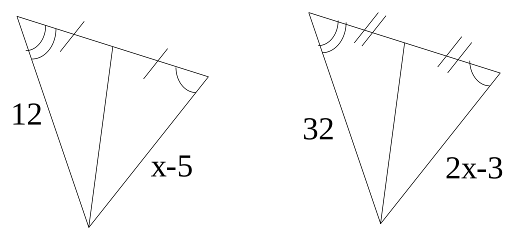


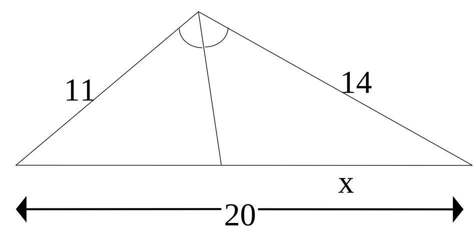
Example 7: Find the value of x and y.

ΔPQR ~ ΔSQT



Example 8:
a.
x = ________ b) x = ________





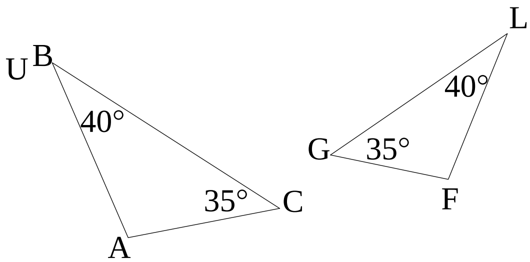
Theorem 5.3.3: (SAS ~) If an angle of one triangle is congruent to an angle of a second triangle and the pairs of sides including the angles are proportional, then the triangles are similar.

Theorem 5.3.4:(SSS ~) If the three sides of one triangle are proportional to the three consecutive sides of one second triangle, then the triangles are similar.

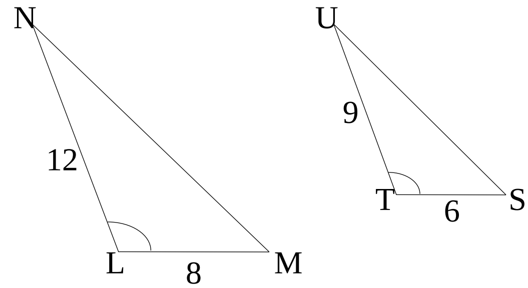
Example 9:

Determine if the triangles are similar and give a reason for your answer (AA, SSS, SAS).

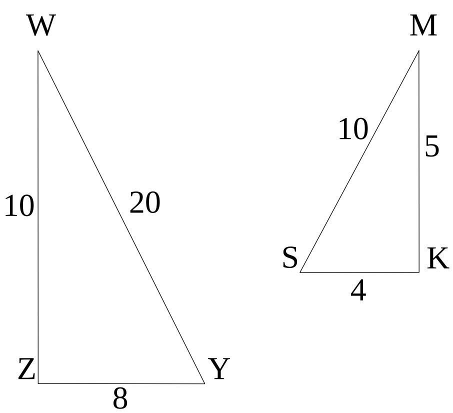
a. similar? ________
reason ________



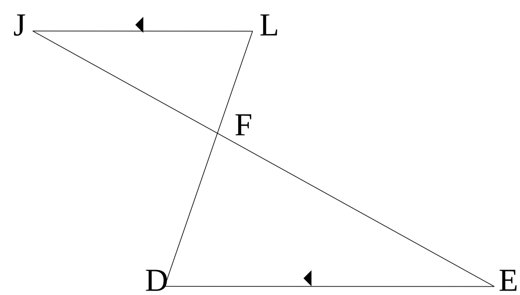
b. reason ________ similar? ________



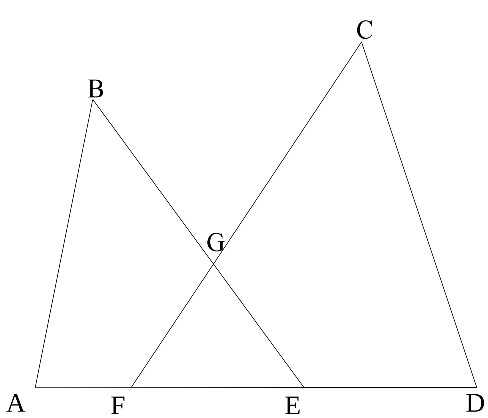
c. similar? ________
reason ________



d. similar? ________ reasson________



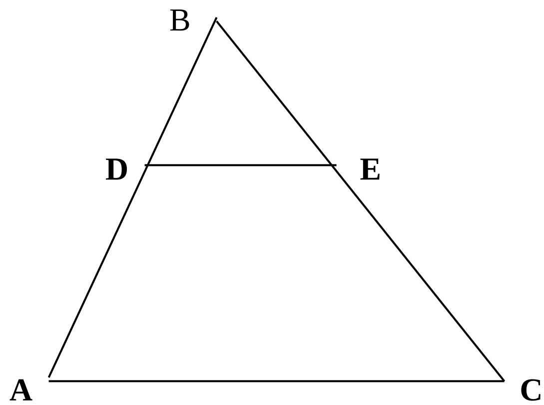
Example 10: In the figure below, $FG \cong EG$, $BE = 15$, $CF = 20$, $AE = 9$, $DF = 12$. Determine which triangles in the figure are similar.



Lemma 5.3.5: If a line segment divides two side of a triangle proportionally, then this line segment is parallel to the third side.

Example 11:
Given ΔABC ~ ΔDBE

If AC = 10 , DE = 8, AD = 4.
Find DB



Example 12:
Given ΔABC ~ ΔDBE

CB = 12, CE = 8, AD =4.

Find BD