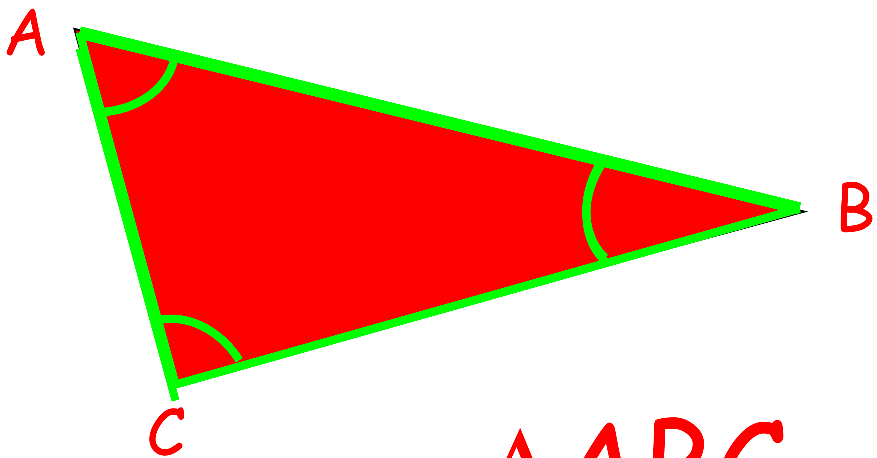
# Warm Up

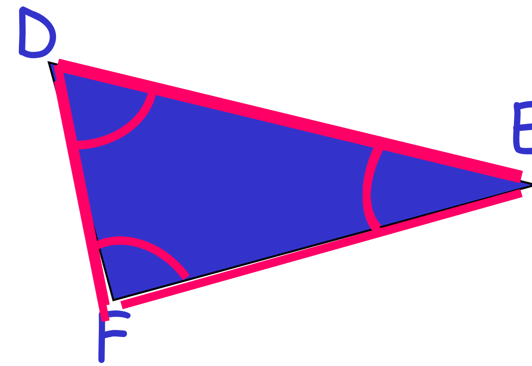
**Pick up and complete the handout on the front table.**

*Make sure that your homework is ready to be checked.

# SIMILAR TRIANGLES

**Similar triangles** are triangles that have the same shape but not necessarily the same size.




$$\Delta ABC \sim \Delta DEF$$

When we say that triangles are similar there are several repercussions that come from it. **(The corresponding angles must be congruent and the corresponding sides must be proportional)**

$$\angle A \cong \angle D$$

$$\angle B \cong \angle E$$

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

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

On the previous slide we saw six statements that were true as a result of the similarity of the two triangles.

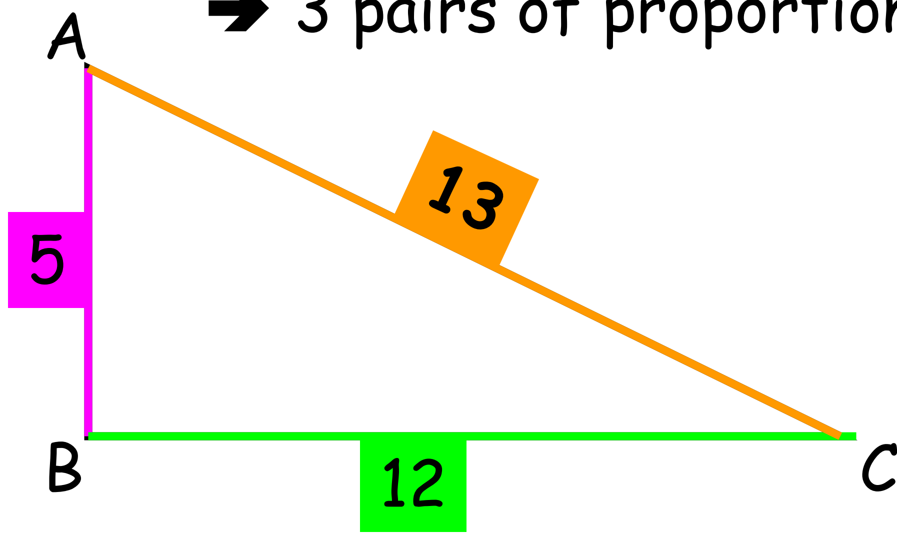
However we do not need all six statements to prove that two triangles are similar.

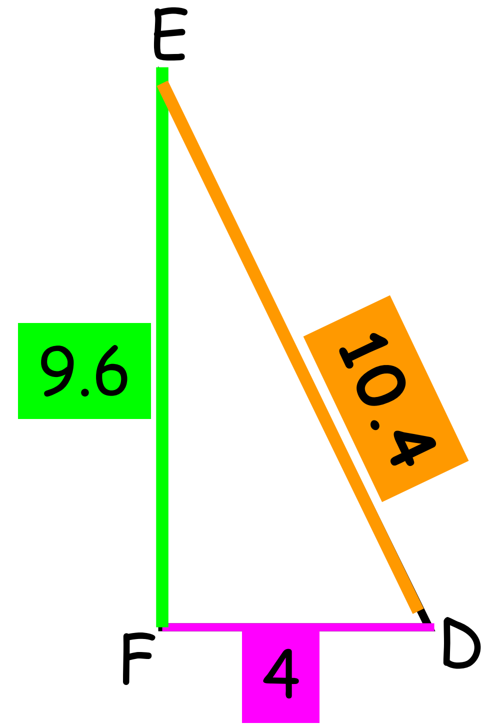
**There are three special combinations that we can use to prove similarity of triangles.**

1. SSS Similarity Theorem
   ➔ 3 pairs of proportional sides
2. SAS Similarity Theorem
   ➔ 2 pairs of proportional sides and congruent angles between them
3. AA Similarity Theorem
   ➔ 2 pairs of congruent angles

## 1. SSS Similarity Theorem

➔ 3 pairs of proportional sides




$$\frac{m\overline{AB}}{m\overline{DF}} = \frac{5}{4} = 1.25$$

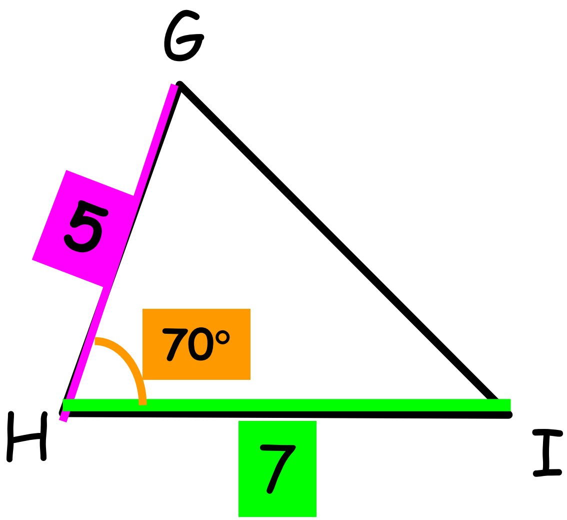
$$\frac{m\overline{BC}}{m\overline{FE}} = \frac{12}{9.6} = 1.25$$

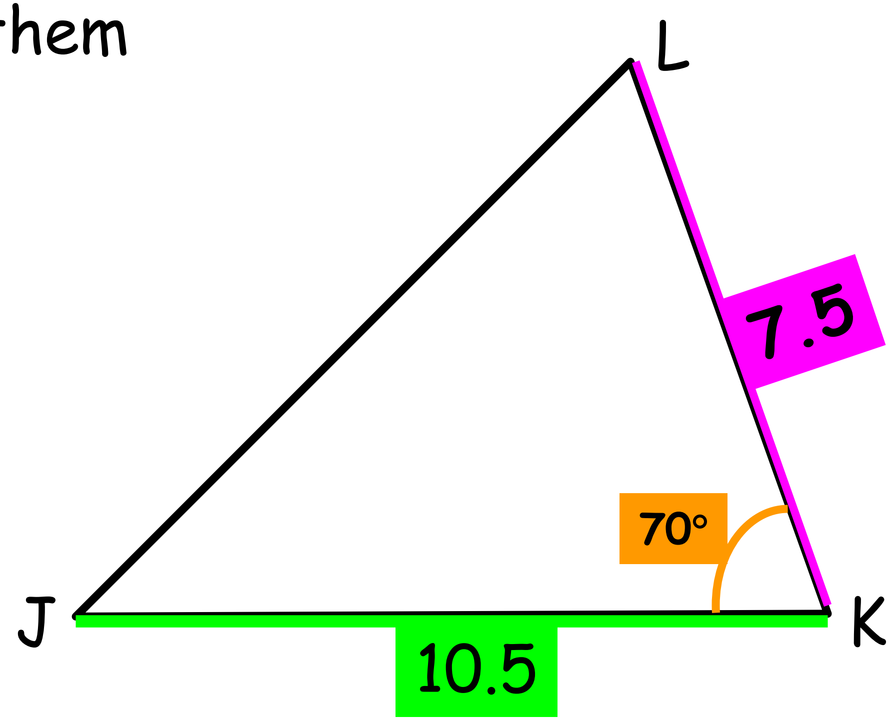
$$\frac{m\overline{AC}}{m\overline{DE}} = \frac{13}{10.4} = 1.25$$

$$\Delta ABC \sim \Delta DFE$$

## 2. SAS Similarity Theorem

➔ 2 pairs of proportional sides and congruent angles **between** them



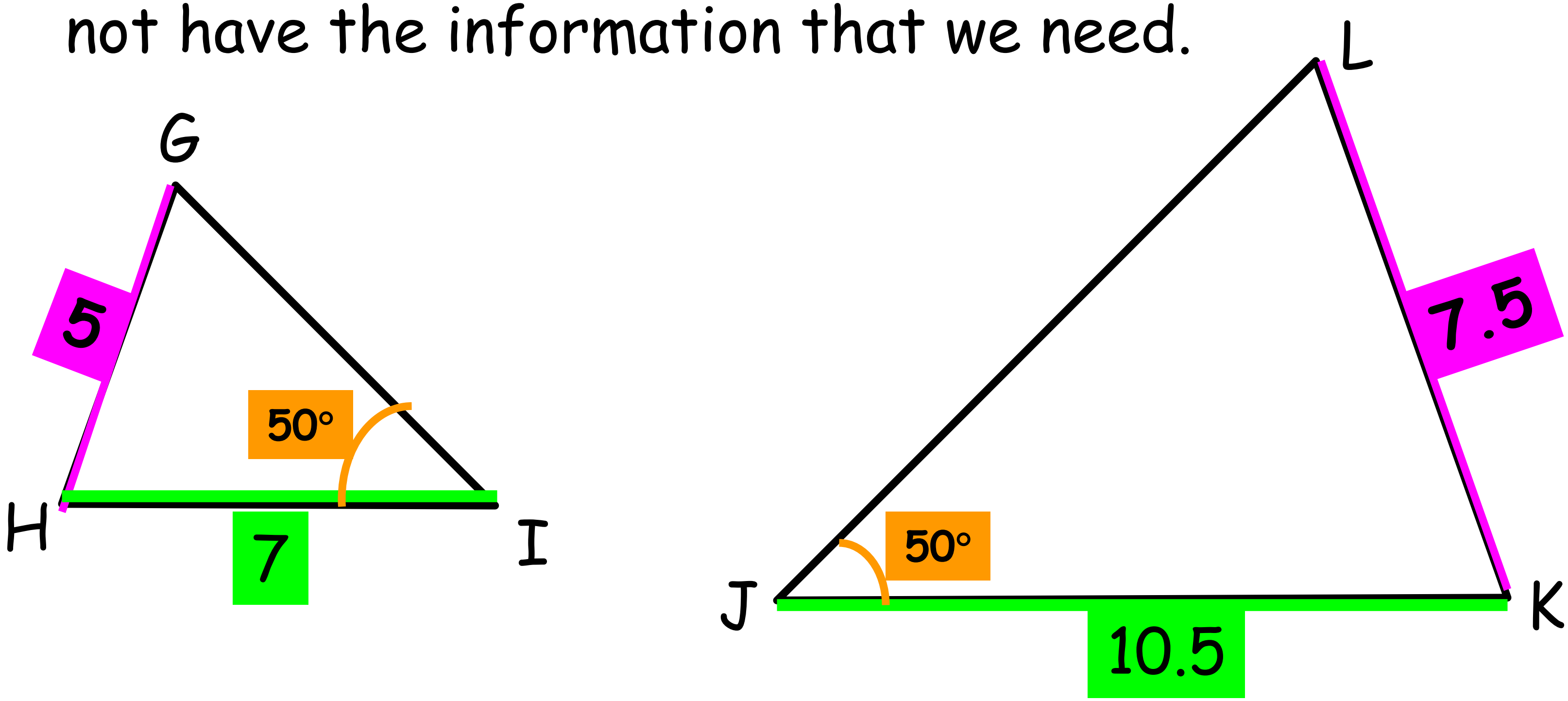

$$\frac{m\overline{GH}}{m\overline{LK}} = \frac{5}{7.5} = 0.\overline{66}$$

$$m\angle H = m\angle K$$

$$\frac{m\overline{HI}}{m\overline{KJ}} = \frac{7}{10.5} = 0.\overline{66}$$

$$\Delta GHI \sim \Delta LKJ$$

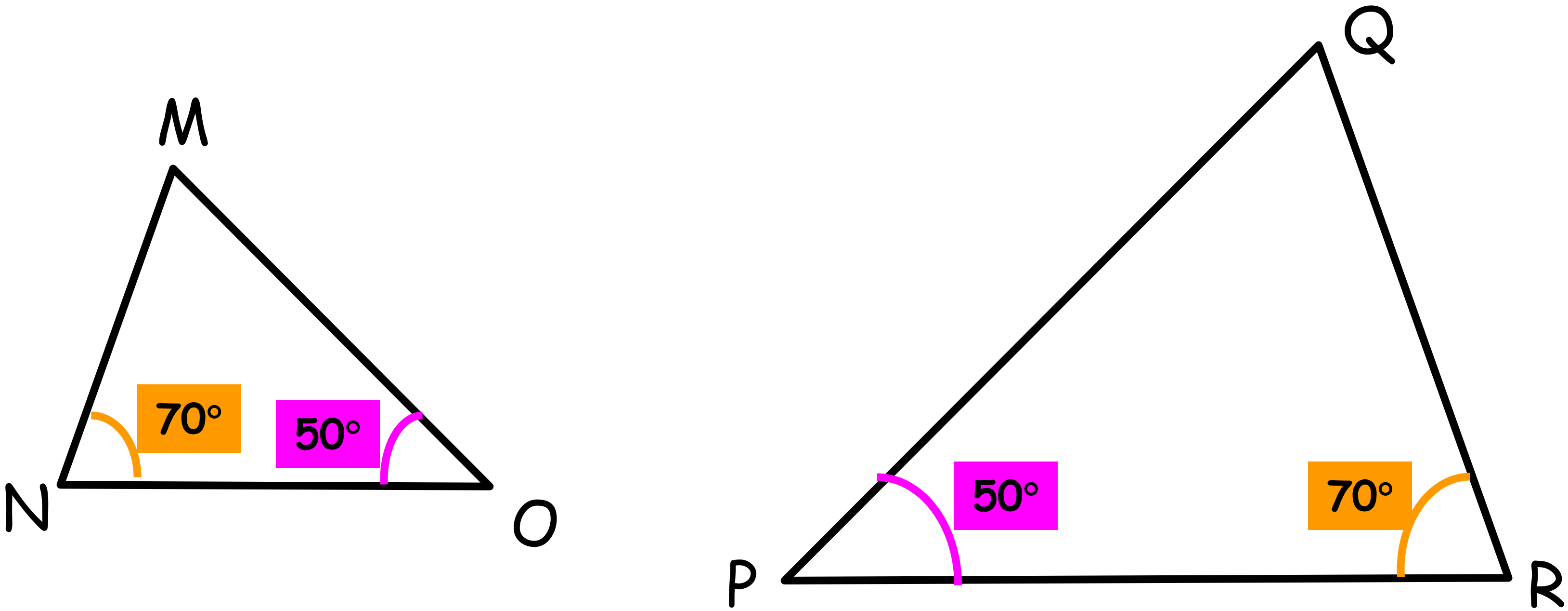
**The SAS Similarity Theorem does not work unless the congruent angles fall between the proportional sides.** For example, if we have the situation that is shown in the diagram below, we cannot state that the triangles are similar. We do not have the information that we need.




Angles I and J do not fall in between sides GH and HI and sides LK and KJ respectively.

## 3. AA Similarity Theorem

➔ 2 pairs of congruent angles

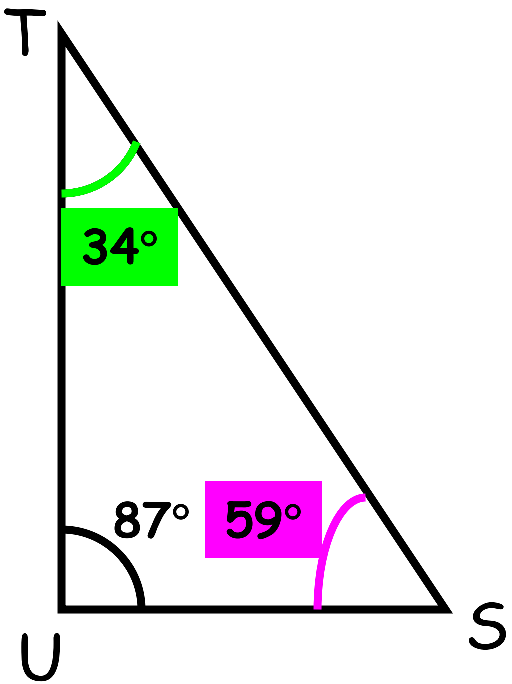


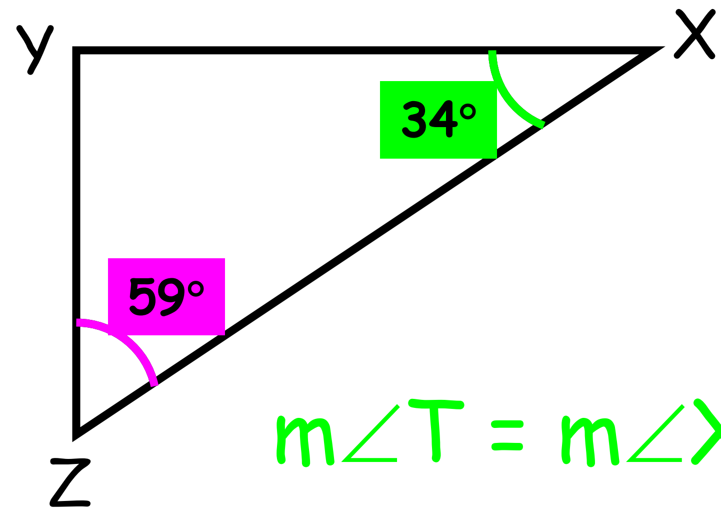

$m\angle N = m\angle R$

$m\angle O = m\angle P$

$\Delta MNO \sim \Delta QRP$

It is possible for two triangles to be similar when they have 2 pairs of angles given but only one of those given pairs are congruent.




$m\angle T = m\angle X$

$m\angle S = m\angle Z$

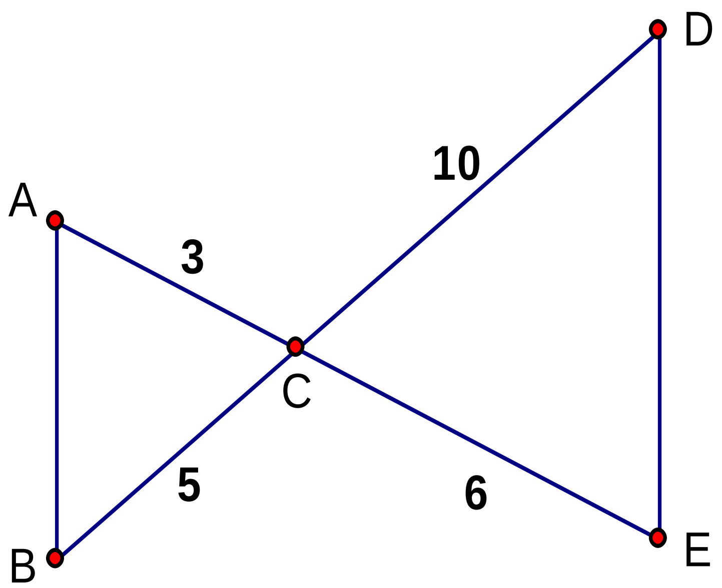
$m\angle S = 180° - (34° + 87°)$

$m\angle S = 180° - 121°$

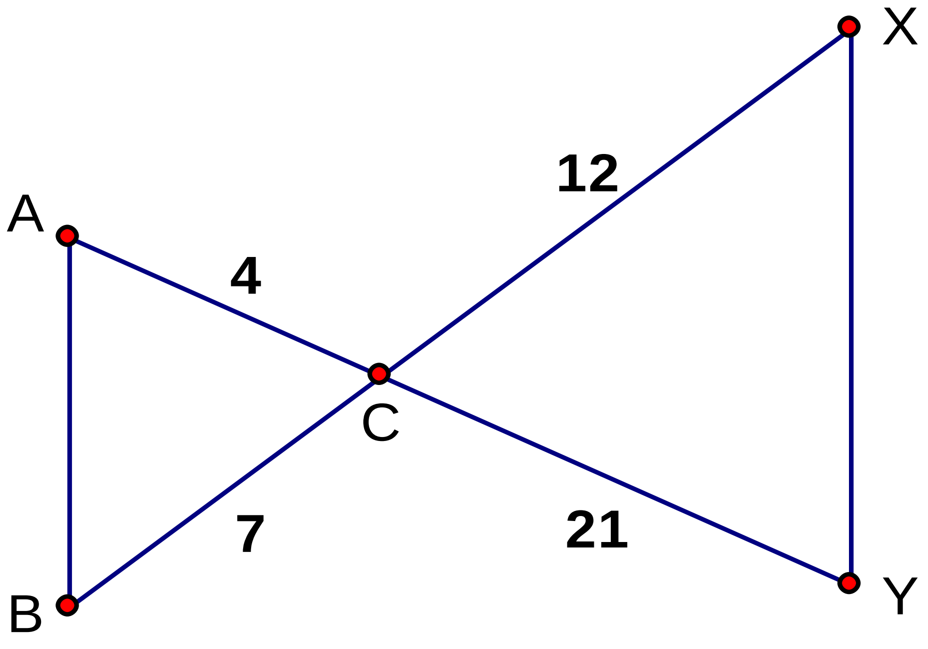
$m\angle S = 59°$

$$\Delta TSU \sim \Delta XZY$$

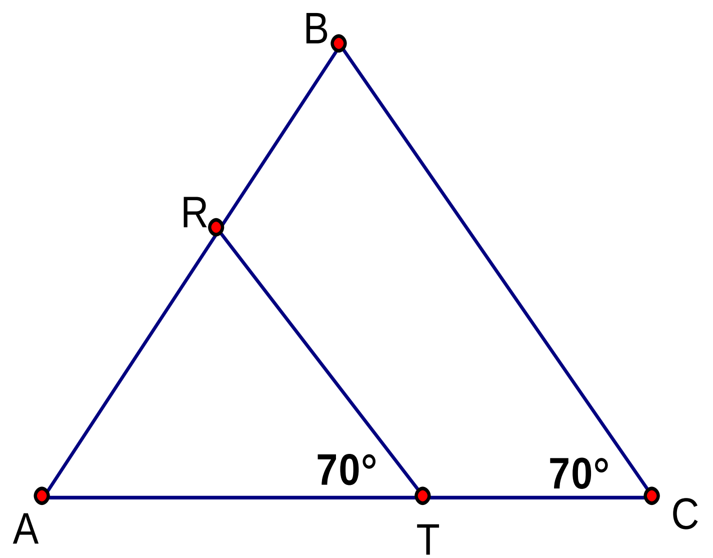
Example 1: Are the triangles similar? If so, write the similarity statement and justify.



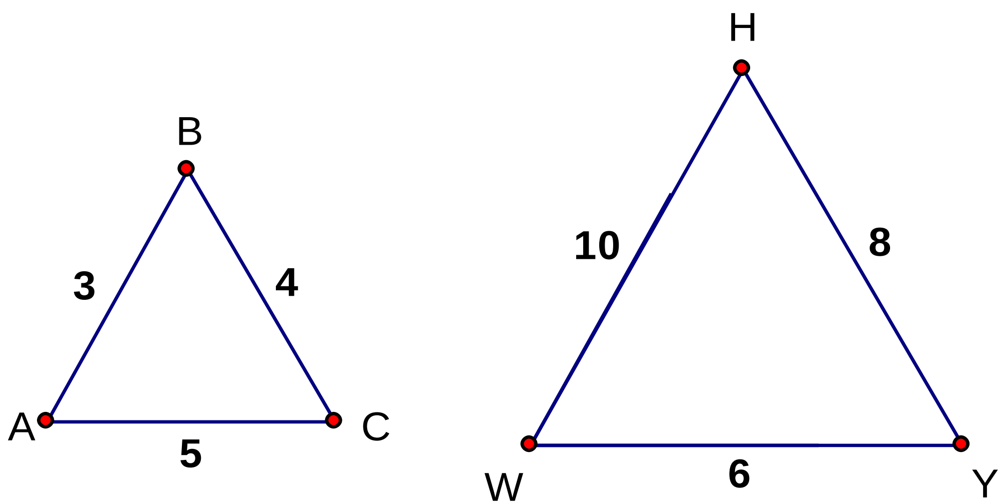
# Example 2: Are the triangles similar? If so, write the similarity statement and justify.



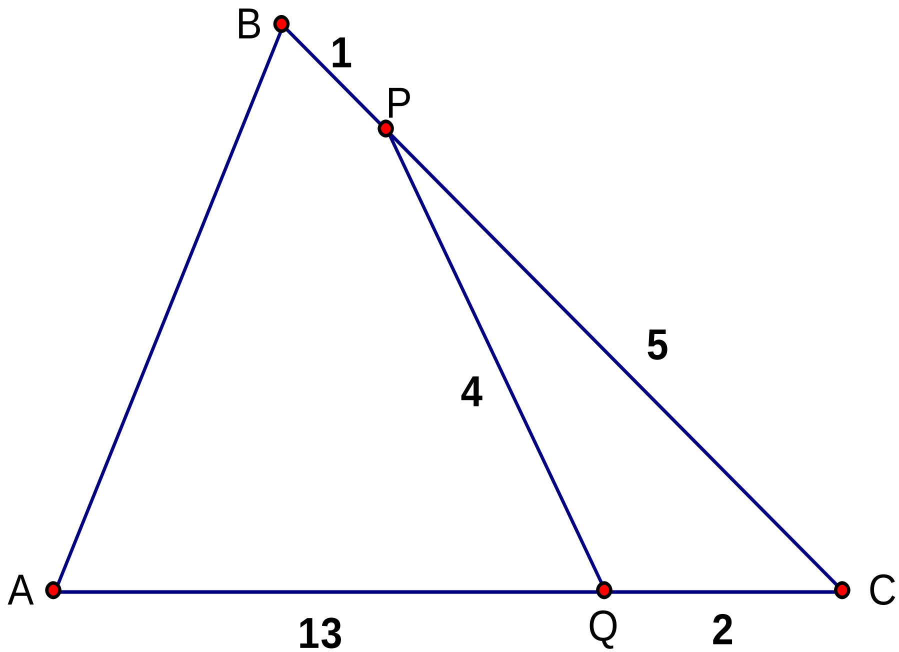
# Example 3: Are the triangles similar? If so, write the similarity statement and justify.



# Example 4: Are the triangles similar? If so, write the similarity statement and justify.



# Example 5: Are the triangles similar? If so, write the similarity statement and justify.



The end