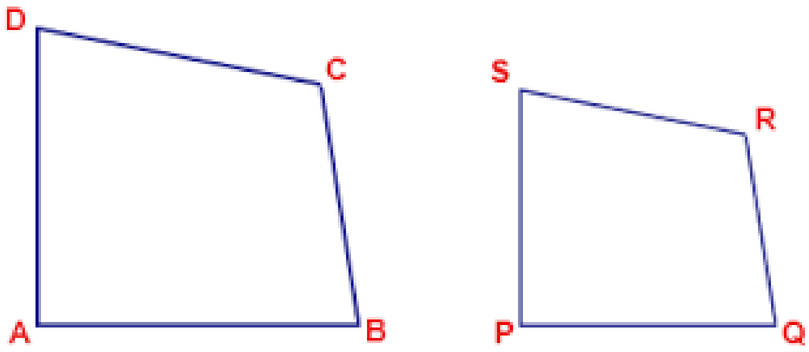
Chapter 6
Similarity

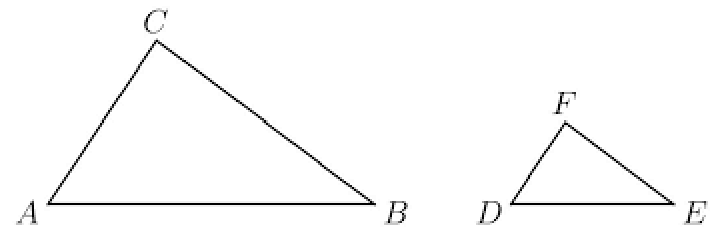
6.1
Use Similar Polygons

Similar Polygons

- Polygons are similar if:
  - Corresponding ____________________ are ___________________
  - AND
  - Corresponding _________________ are _____________________
  - Similar Symbol: ______________



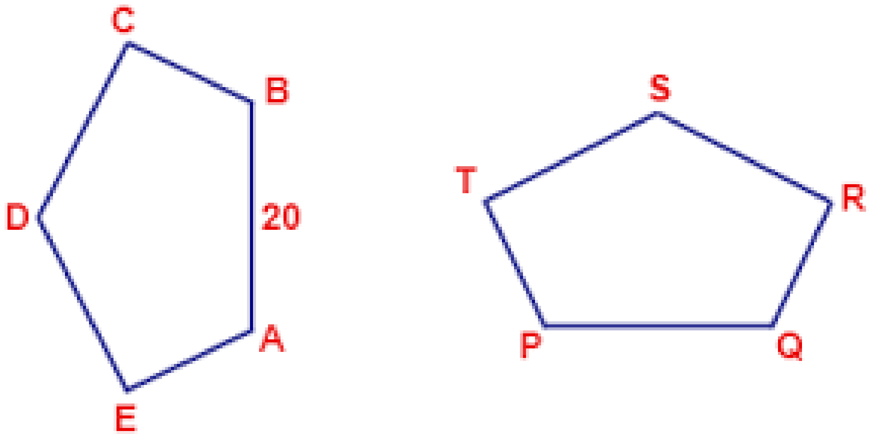
EX: The two triangles are similar.



- List all pairs of congruent angles.
- Write the ratios of the corresponding sides in a statement of proportionality.

EX: EDCBA ~ TSRQP

- List all pairs of congruent angles.



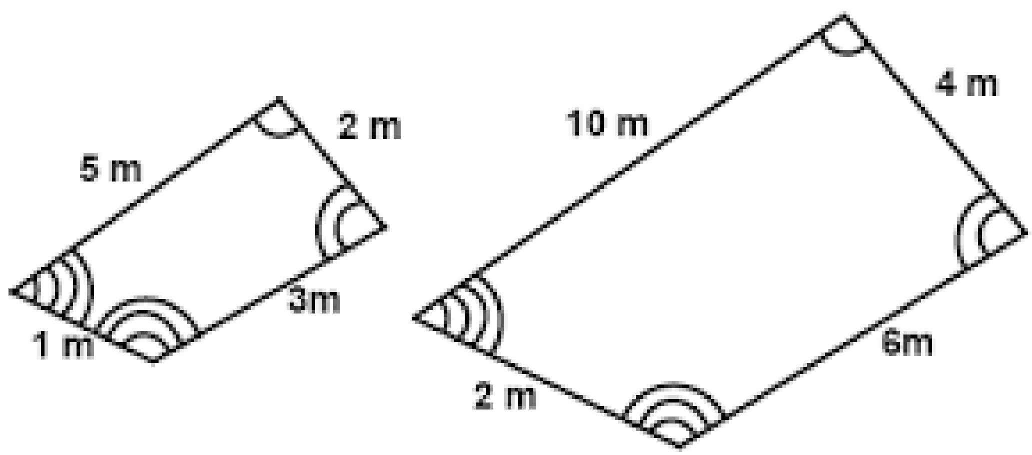
- Write the ratios of the corresponding sides in a statement of proportionality.

EX:

1. Given $\Delta\, JKL \sim \Delta\, PQR$, list all pairs of congruent angles. Write the ratios of the corresponding side lengths in a statement of proportionality.

Scale Factor

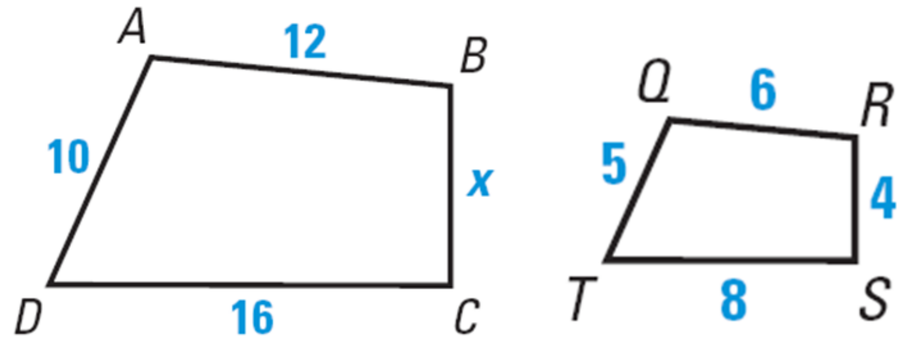
- If two polygons are ___________________________, the _____________ of the ___________________________ of two _________________________________ is called the _________________________.



EX: Find the scale factor for each.

- ABCD to QRST

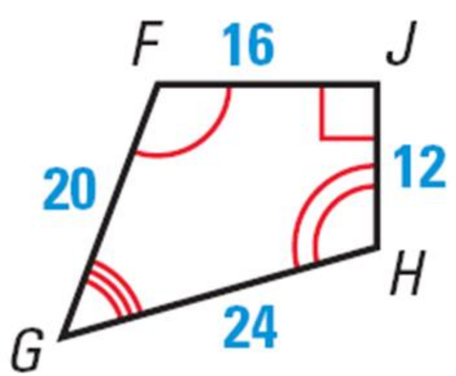
In the diagram, $ABCD \sim QRST$.

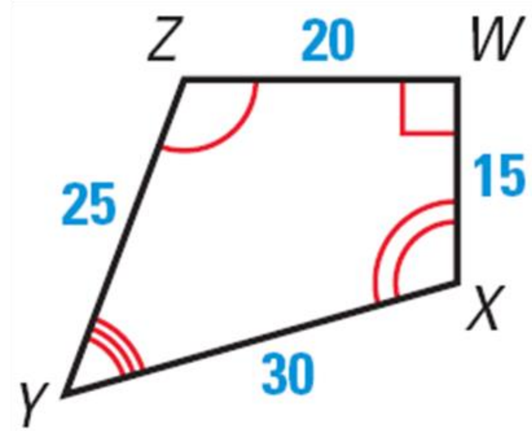


- QRST to ABCD

EX:

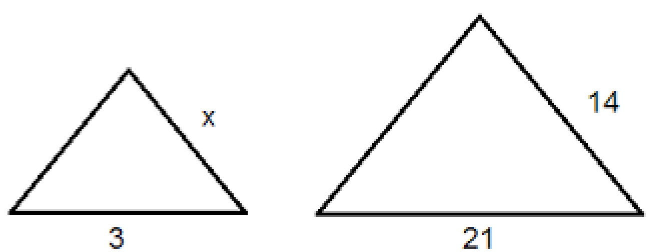
Determine whether the polygons are similar. If they are, write a similarity statement and find the scale factor of *ZYXW* to *FGHJ*.



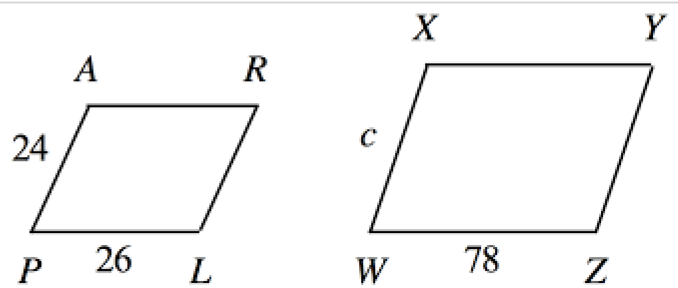


Finding Missing Side Lengths in Similar Polygons

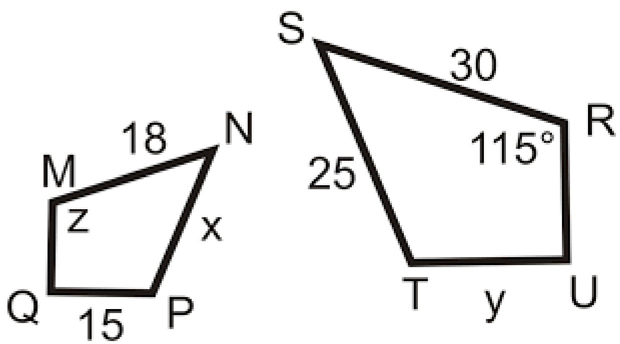
- Since similar polygons have sides that are ______________________________, you can use a ____________________________ to solve for a ______________________________.
- To ______________________________________, use ______________________________________.



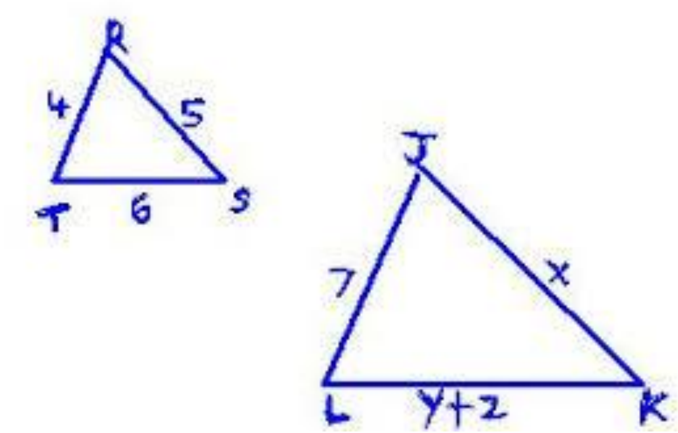
EX: Solve for c.



EX: Solve for x, y, and z.

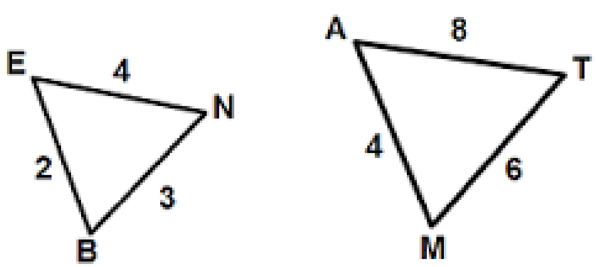


EX: Solve for x and y.



Perimeters

- All sides ________________________ up.
- If two polygons are ______________________, the ___________________ of their ____________________________ is equal to the ____________________ of _________________
- Both are also ___________________ to the ____________________________ of the polygons.

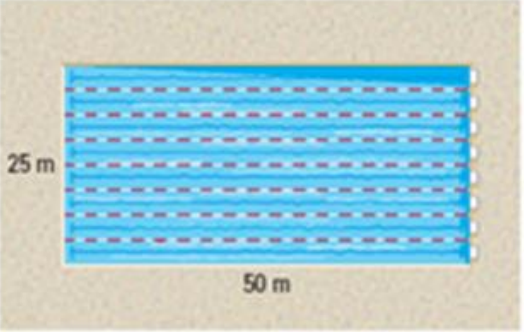


EX:

EXAMPLE 4 Find perimeters of similar figures

Swimming

A town is building a new swimming pool. An Olympic pool is rectangular with length 50 meters and width 25 meters. The new pool will be similar in shape, but only 40 meters long.



a. Find the scale factor of the new pool to an Olympic pool.

EXAMPLE 4 Find perimeters of similar figures

b. Find the perimeter of an Olympic pool and the new pool.

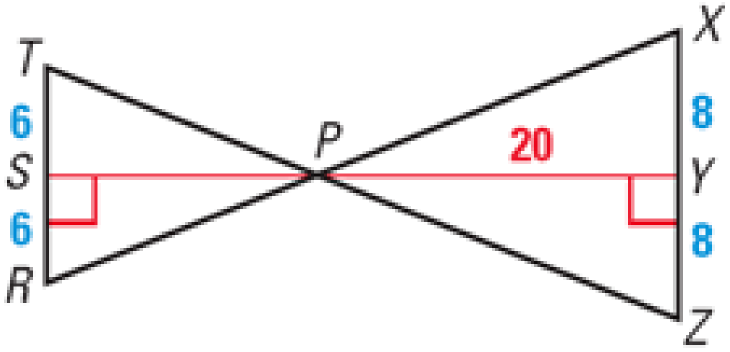
Corresponding Lengths in Similar Polygons

- If two polygons are _________________, then the _____________ of any two ___________________________ in the polygons is ____________________ to the __________________________ of the polygons.
  - Examples:

EX:

EXAMPLE 5 Use a scale factor

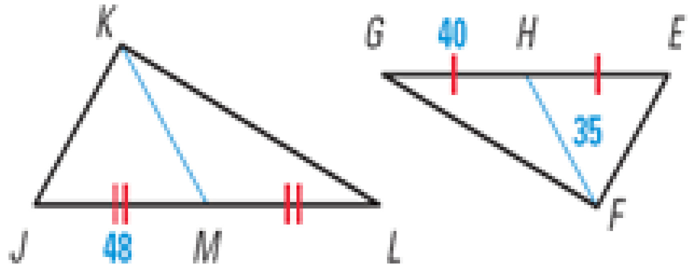
In the diagram, $\Delta TPR \sim \Delta XPZ$. Find the length of the altitude $\overline{PS}$.



EX:

GUIDED PRACTICE for Example 5

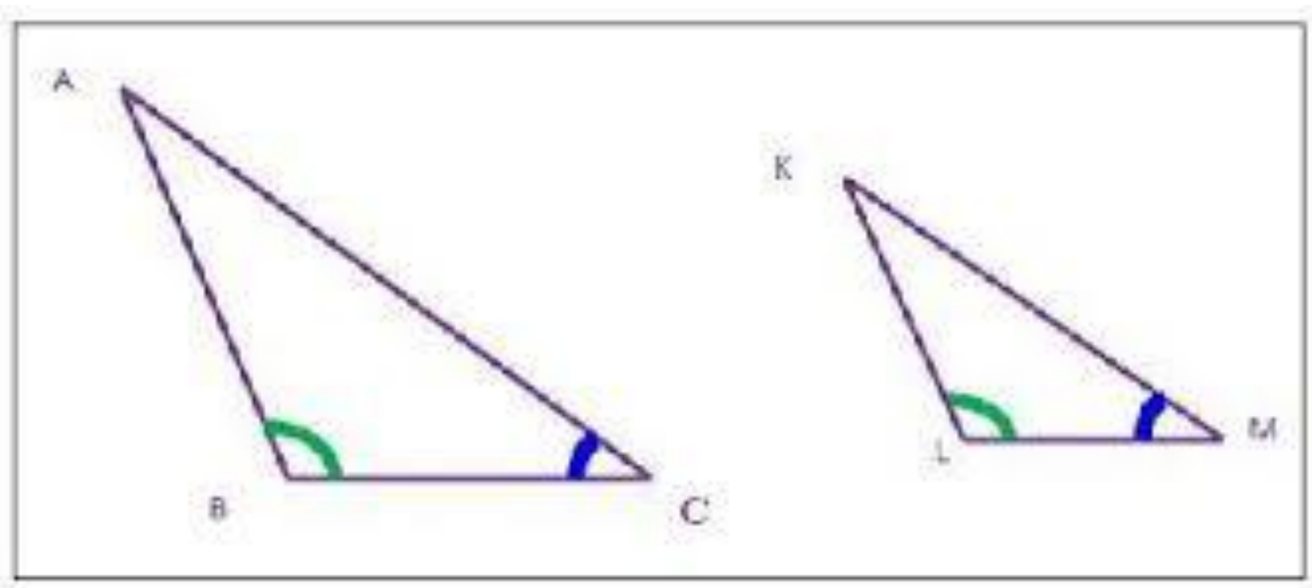
7. In the diagram, $\triangle JKL \sim \triangle EFG$. Find the length of the median $\overline{KM}$.



6.3
Prove Triangles Similar by AA

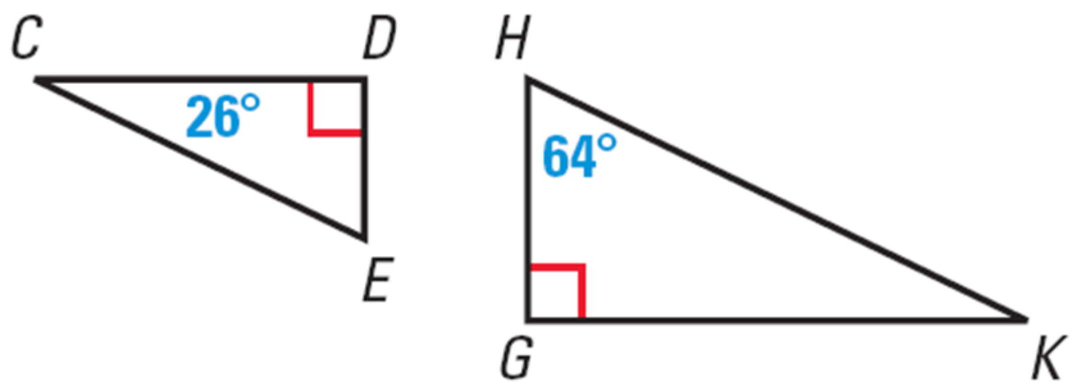
Angle-Angle Similarity Postulate (AA)

- If ____________________________ of one triangle are _____________________ to ___________________________ of another triangle, the triangles are ______________________.



EX:

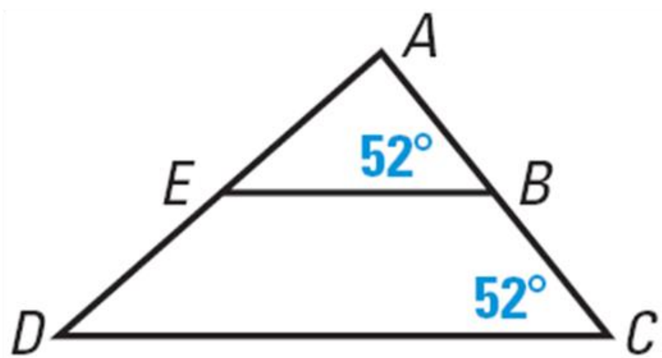
Determine whether the triangles are similar. If they are, write a similarity statement. Explain your reasoning.



EX: Show that the triangles are similar.

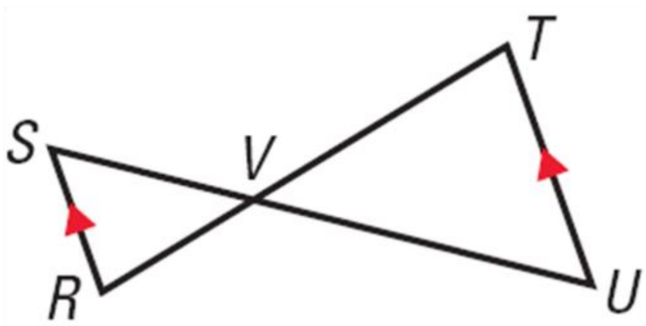
a.

ΔABE **and** ΔACD



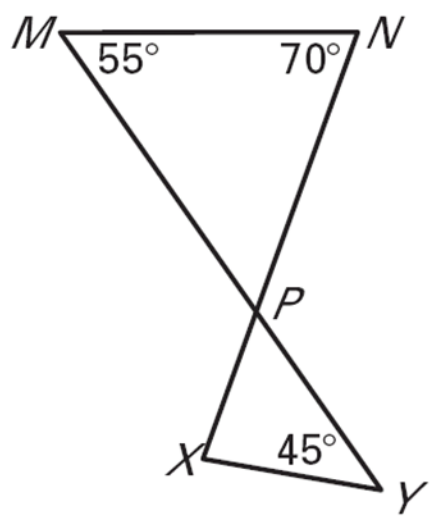
b.

ΔSVR **and** ΔUVT



EX:

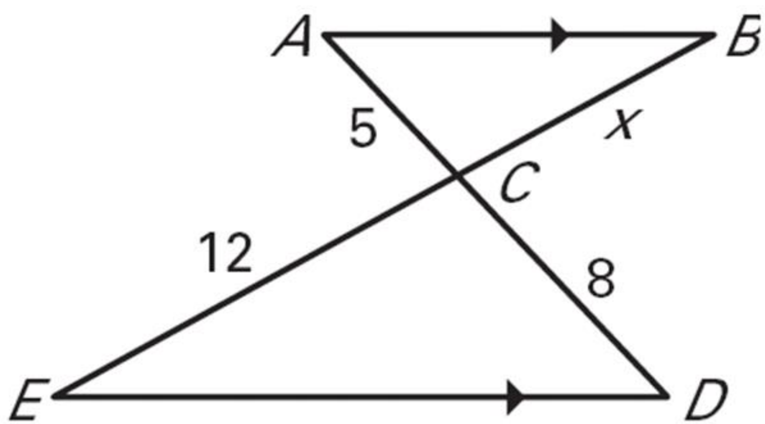
Determine if the two triangles are similar. If they are write a similarity statement.



EX:

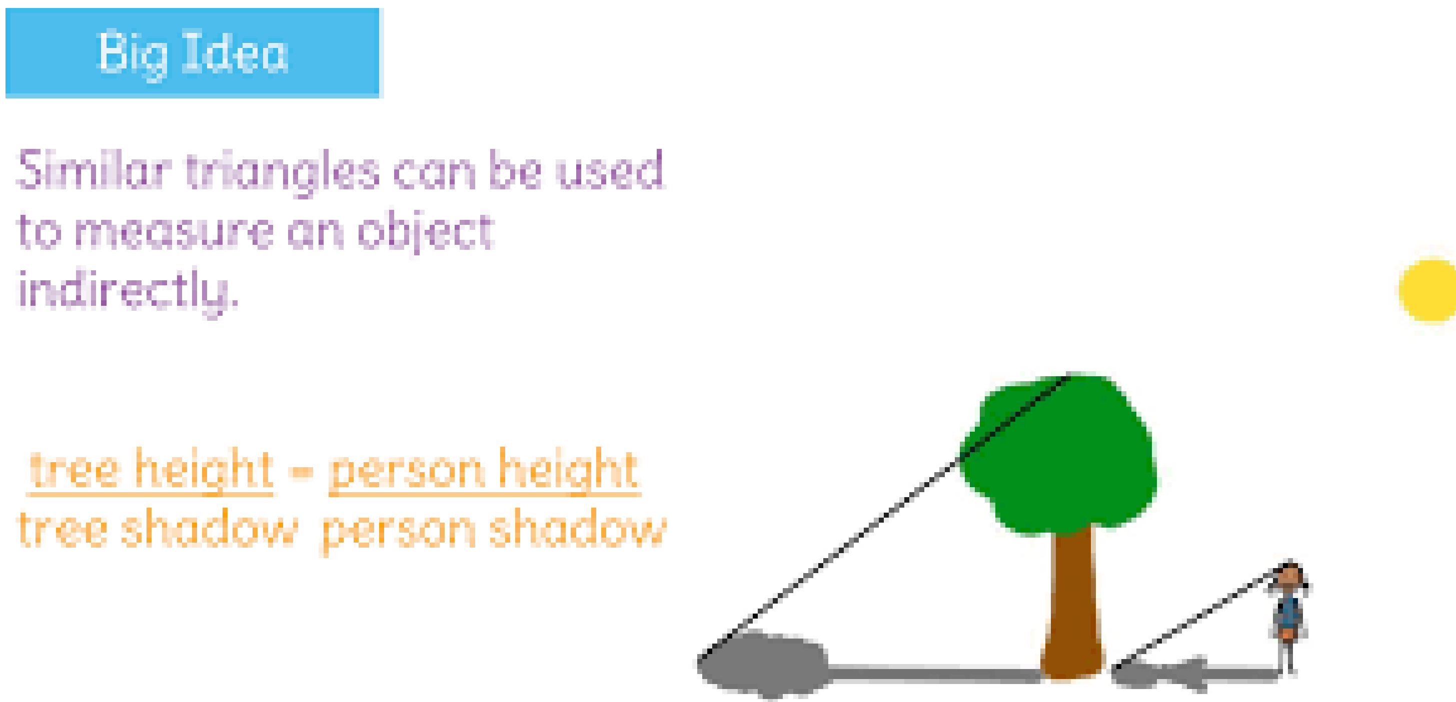
Find the length of $\overline{BC}$

3.



Indirect Measurement

- Calculating the ____________________ of an object, without _____________________________________.



EX:

A flagpole casts a shadow that is 50 feet long. At the same time, a woman standing nearby who is five feet four inches tall casts a shadow that is 40 inches long. How tall is the flagpole to the nearest foot?

(A) 12 feet (B) 40 feet

(C) 80 feet (D) 140 feet

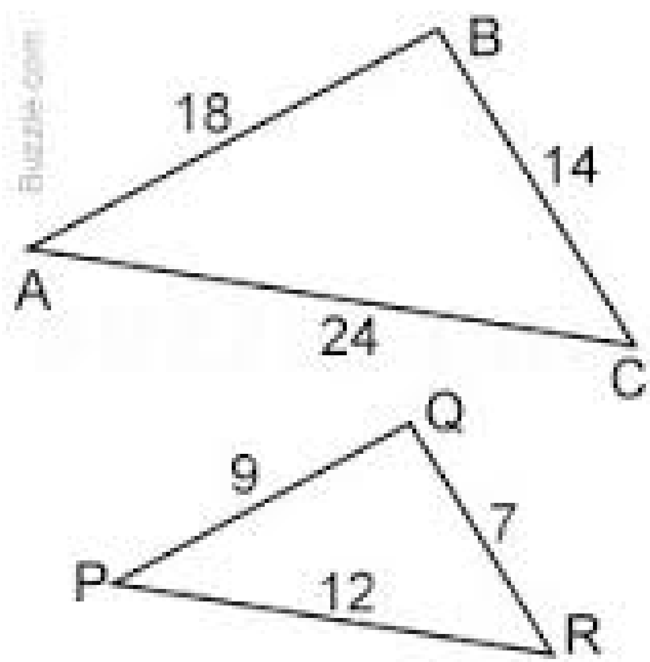
EX:

- A tree casts a shadow that is 30 feet long. At the same time a person is standing nearby, who is 5 feet tall, casts a shadow that is 4 feet long. How tall is the tree?

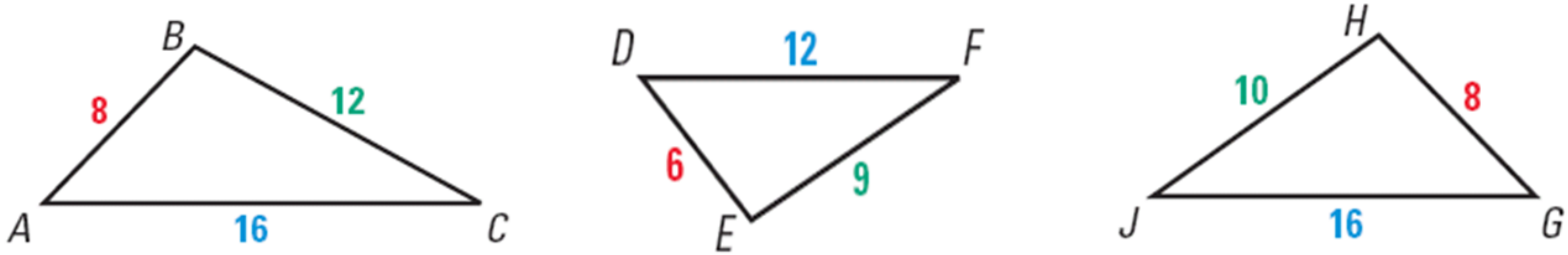
6.4
Prove Triangles Similar by SSS and SAS

Side-Side-Side (SSS) Similarity Postulate

- If the ______________________________ of two triangles are ______________________, then the triangles are _____________________.



EX: **Is either $\triangle DEF$ or $\triangle GHJ$ similar to $\triangle ABC$?**



EX:

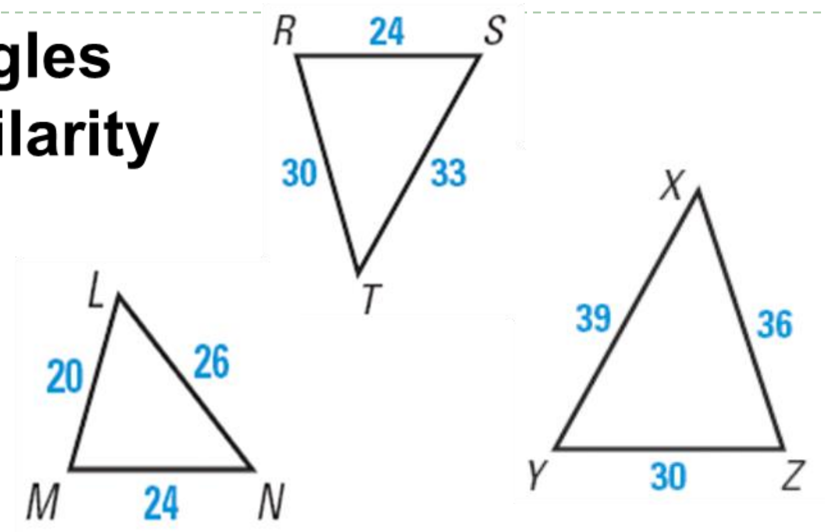
1. **Verify that $\triangle ABC \sim \triangle DEF$ for the given information.**

$\triangle\ ABC : AC = 6, AB = 9, BC = 12;$

$\triangle\ DEF : DF = 2, DE = 3, EF = 4$

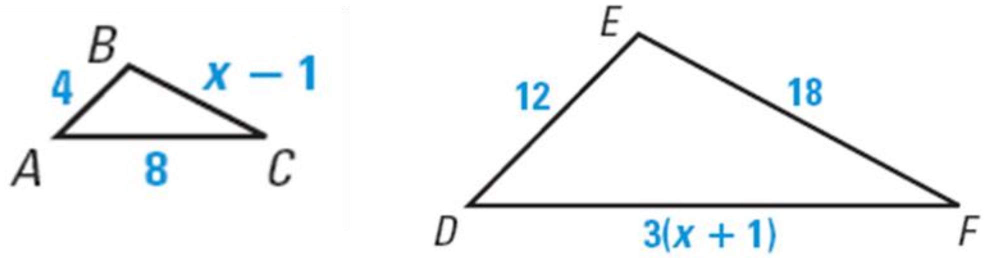
EX:

1. **Which of the three triangles are similar? Write a similarity statement.**



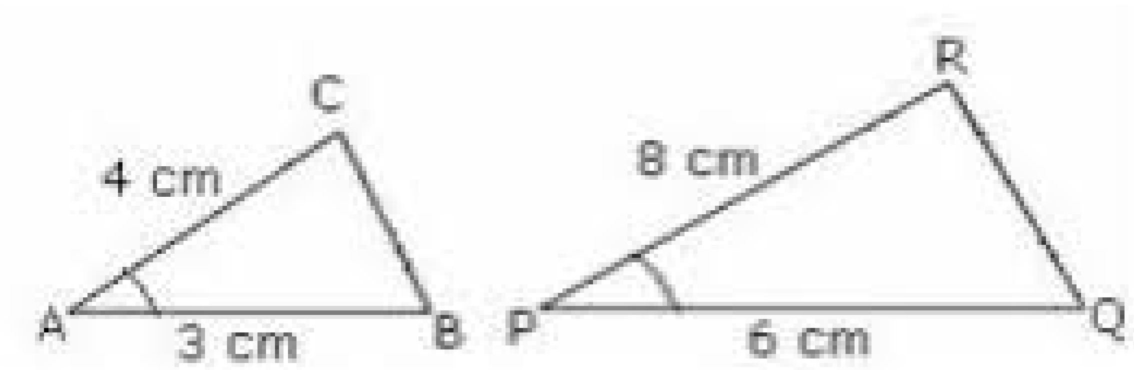
Find the value of x that makes $\triangle ABC \sim \triangle DEF$.

EX:



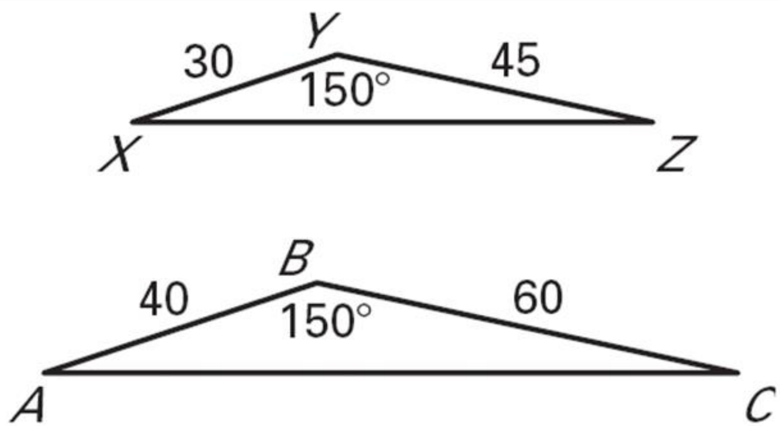
Side-Angle-Side (SAS) Similarity Postulate

- If an ____________________ of one triangle is ____________________ an _______________of another triangle and the ________________ including this ___________________ are _____________________________, then the triangles are ___________________.



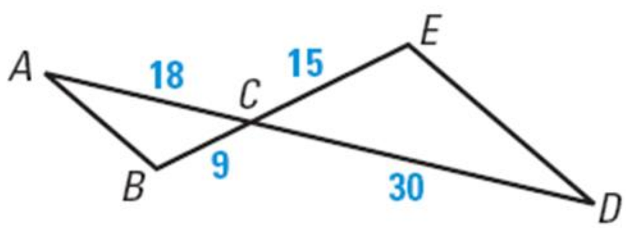
EX:

2. **Show that the triangles are similar and write a similarity statement. Explain your reasoning.**



EX:

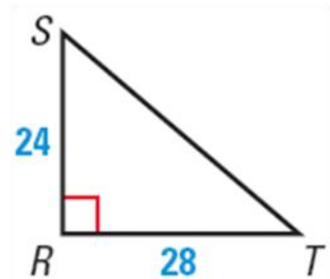
Tell what method you would use to show that the triangles are similar.

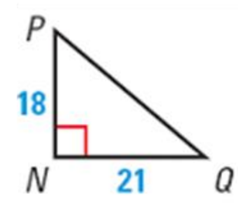


EX:

Explain **how to show that the indicated triangles are similar.**

3. $\triangle SRT \sim \triangle PNQ$

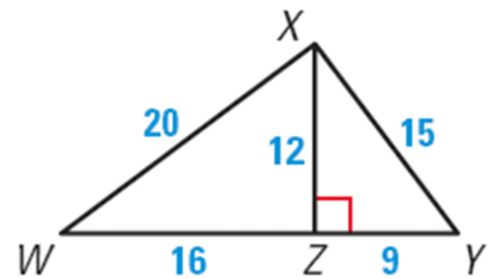




EX:

Explain **how to show that the indicated triangles are similar.**

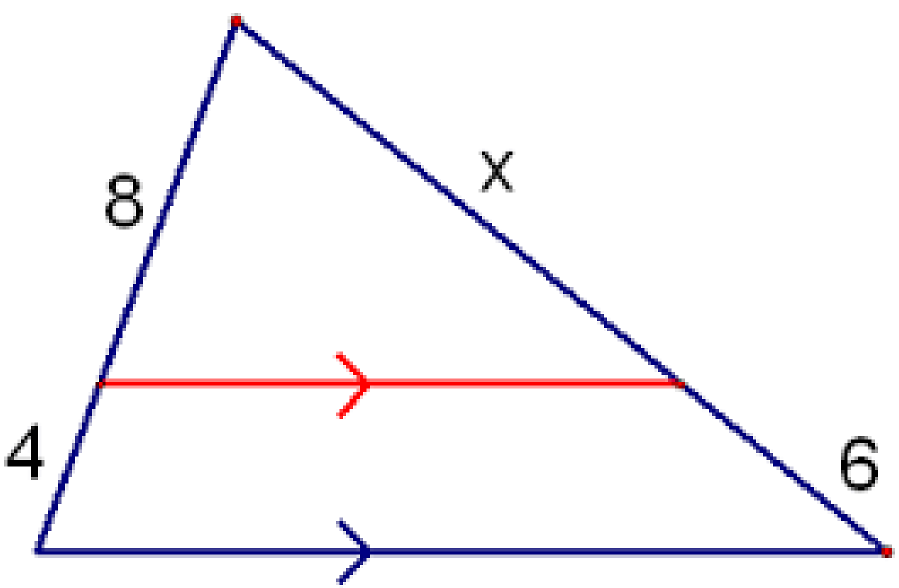
4. $\triangle XZW \sim \triangle YZX$



6.5
Use Proportionality Theorems

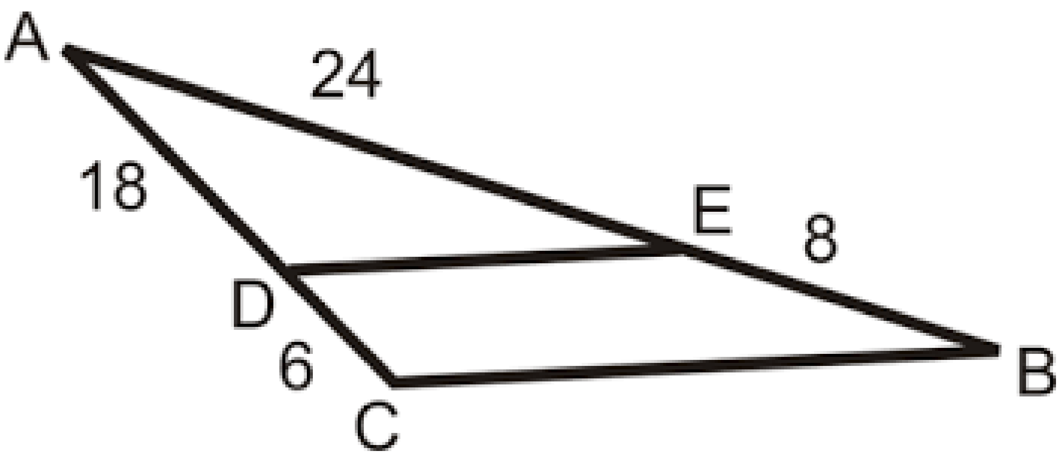
Triangle Proportionality Theorem

- If a line __________________________ to one ____________ of a _________________________ intersects the other _________________________, then it divides the ____.

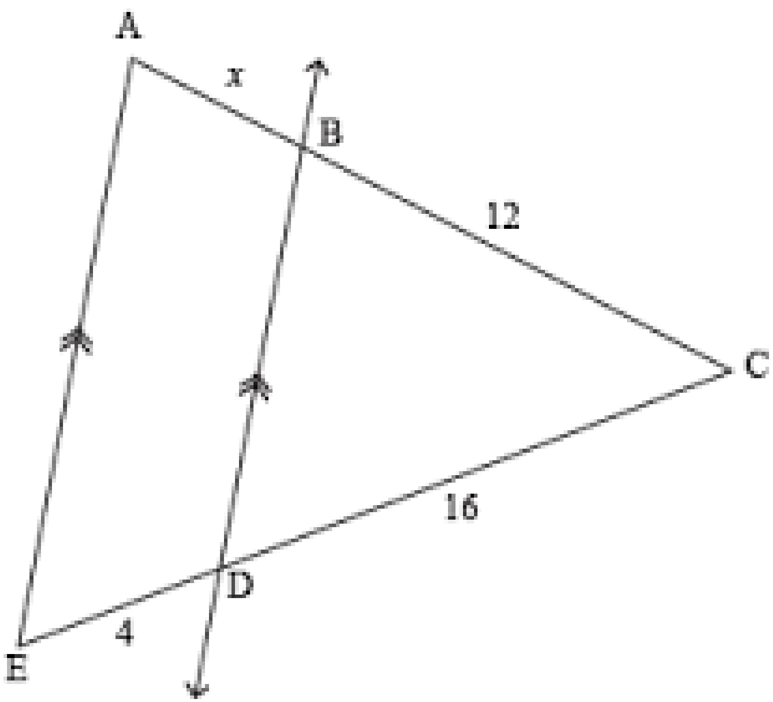


Converse of the Triangle Proportionality Theorem

- If a __________ divides _________________________ of a triangle _________________________________, then it is _______________________ to the _______________________.

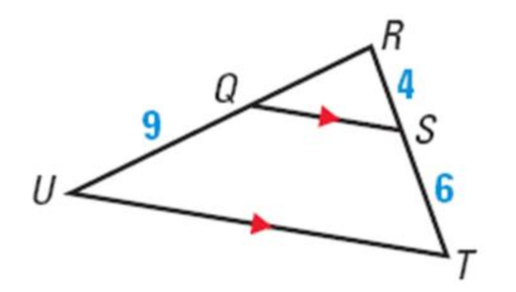


EX: Find x.



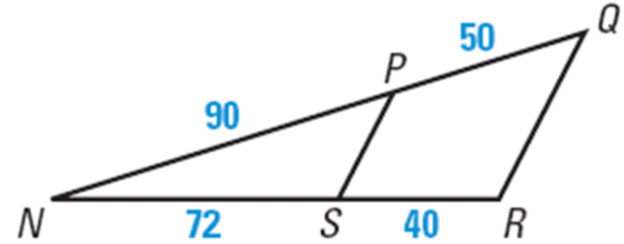
EX:

In the diagram, $\overline{QS} \parallel \overline{UT}$, $RS = 4$, $ST = 6$, and $QU = 9$. What is the length of $\overline{RQ}$?



EX:

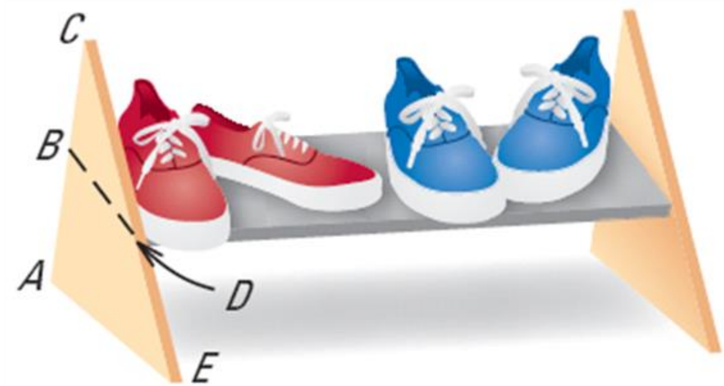
2. Determine whether $\overline{PS} \parallel \overline{QR}$.



EX:

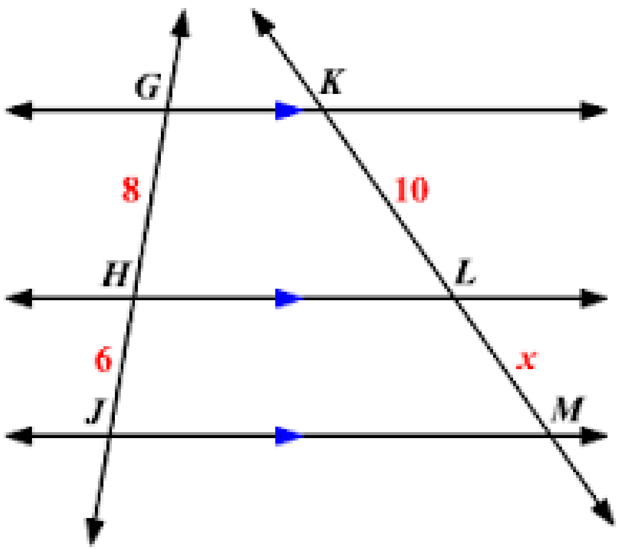
Shoerack

On the shoerack shown,
$AB = 33$ **cm,** $BC = 27$ **cm,**
$CD = 44$ **cm,and** $DE = 25$ **cm,**
Explain **why the gray shelf is not parallel to the floor.**



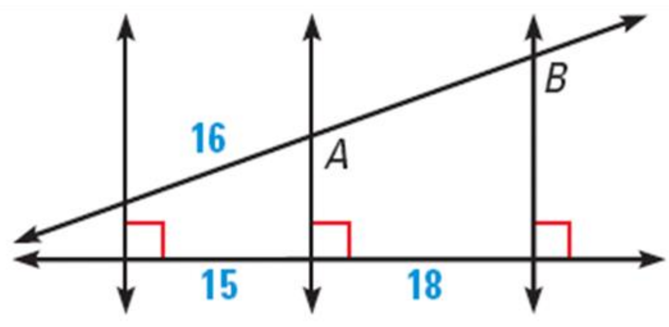
Parallel Lines Theorem

- If ______________________________ intersect ________________________, then they _________________ the ____.



EX: Find the length of AB.

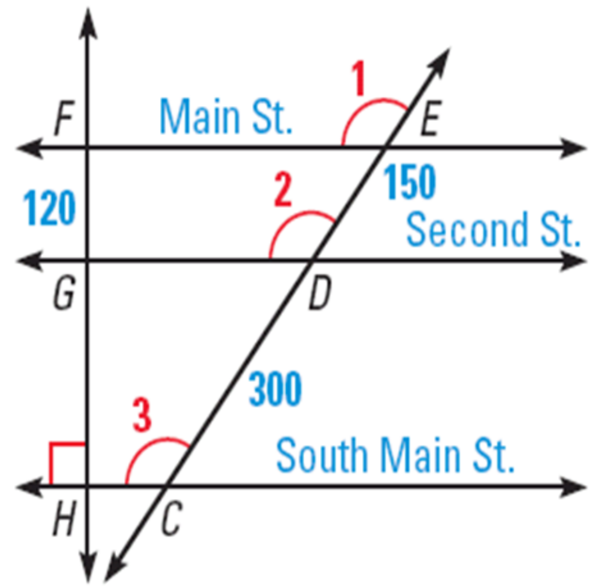
3.



EX:

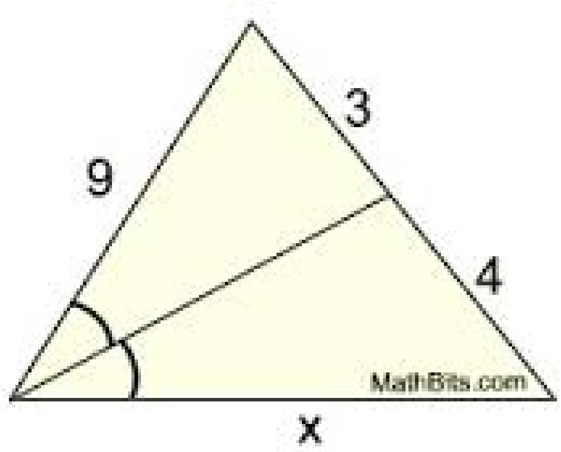
City Travel

In the diagram, $\angle 1, \angle 2$, **and** $\angle 3$ **are all congruent and** $GF = 120$ **yards,** $DE = 150$ **yards, and** $CD = 300$ **yards. Find the distance** HF **between Main Street and South Main Street.**

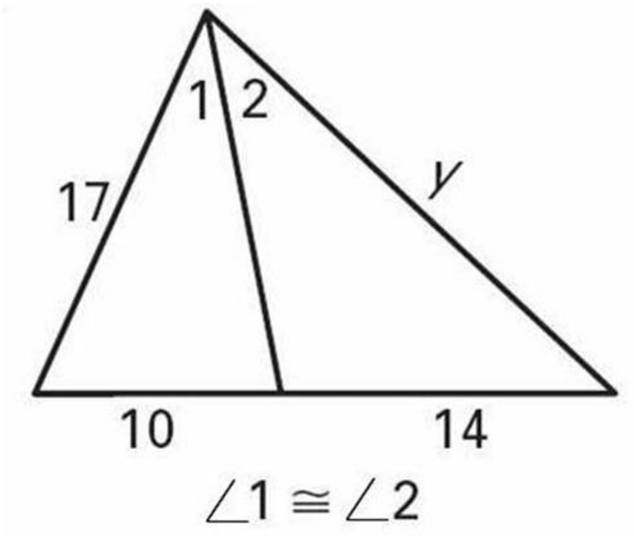


Angle Bisector Theorem

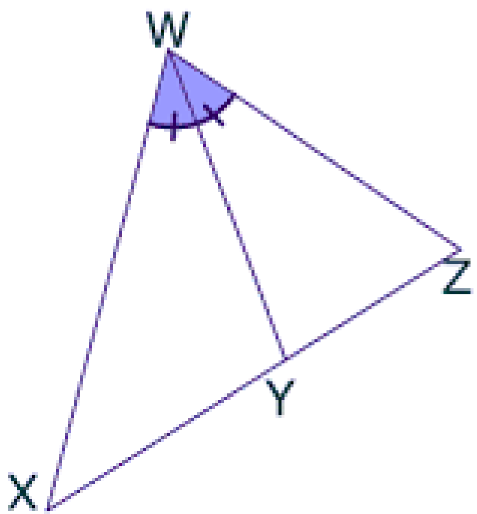
- If a ______________________________ an angle of a triangle, then it ________________________ the ______________________ into ___________________________ whose lengths are _______________________________ to the lengths of the ____.



EX: Find the value of the variable.



EX:



$\overline{WZ} = 24$

$\overline{ZY} = 12$

$\overline{WX} = 30$

$\overline{XY} = ?$

EX:

In the diagram, $\angle QPR \cong \angle RPS$. **Use the given side lengths to find the length of** $\overline{RS}$ **.**