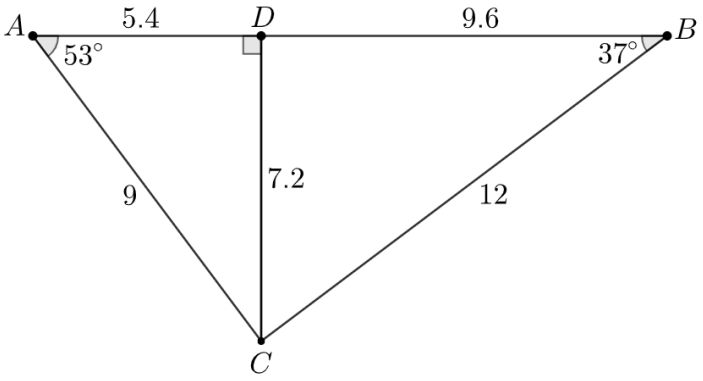
Name: _____

Lesson 3.09
Pythagorean Theorem

Geometry GT

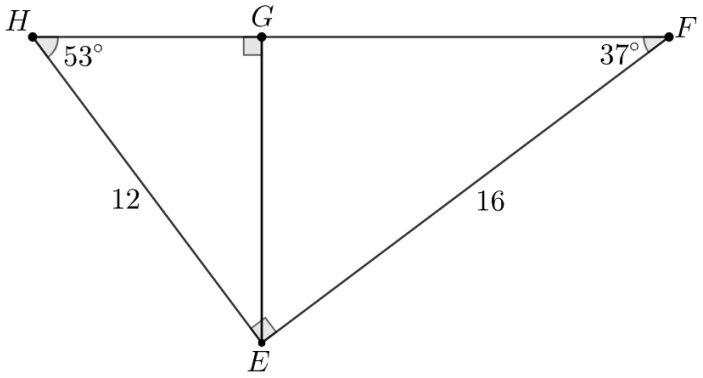
Analyze

Is $\Delta ADC \sim \Delta CDB$? Explain or show your reasoning.



Explore

Trace the two smaller triangles onto separate sheets of patty paper.

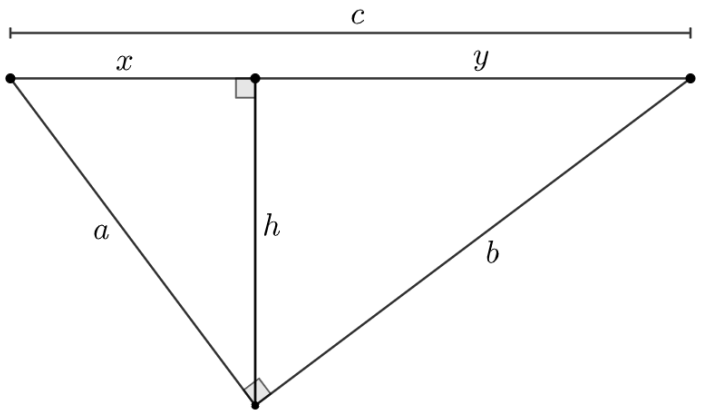


Rotate your patty paper and convince yourself that all three triangles are similar, then write three similarity statements.

Determine the scale factor for each pair of triangles.

Determine the lengths of sides $\overline{HG}$, $\overline{GF}$, $\overline{HF}$.

Discuss



Since all three triangles are similar, the following equivalent ratios can be formed: $\frac{a}{x} = \frac{c}{a}$ and $\frac{b}{y} = \frac{c}{b}$.

Use cross multiplication to simplify each equivalence.

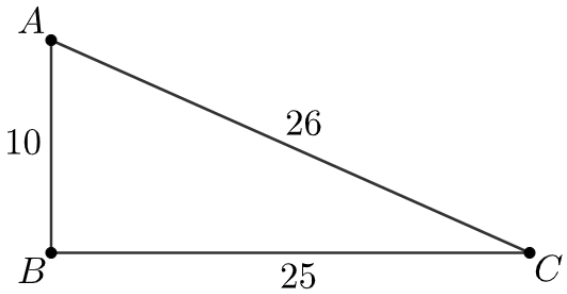
Prove that $a^2 + b^2 = c^2$ using your answers from above.

Theorem

Pythagorean Theorem: if a right triangle has legs with length a and b and hypotenuse with length c, then $a^2 + b^2 = c^2$

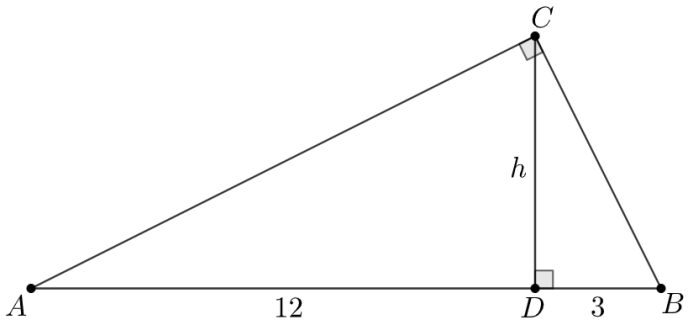
Demonstrate

Is ΔABC a right triangle? Explain.

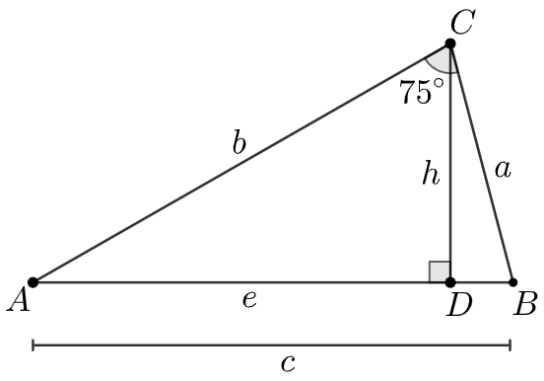


Practice

1. In right triangle ΔABC, altitude $\overline{CD}$ with length h is drawn to its hypotenuse. We also know $AD = 12$ and $DB = 3$. What is the value of h?



2. In ΔABC (*not* a right triangle), altitude $\overline{CD}$ is drawn to side $\overline{AB}$. The length of $\overline{AB}$ is c. Which of the following statements must be true?



A. $m\angle ACB = m\angle ABC$

B. $b^2 = c^2 + a^2$

C. $\Delta ADC \sim \Delta ACB$

D. The area of ΔABC is $\frac{1}{2}h \cdot c$

3. Which of the following are right triangles?

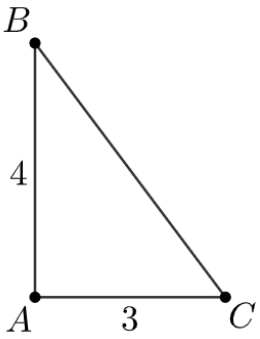
A. ΔABC with $AC = 6$, $BC = 9$, and $AB = 12$

B. ΔDEF with $DE = 8$, $EF = 10$, and $FD = 13$

C. ΔGHI with $GI = 9$, $HI = 12$, and $GH = 15$

D. ΔJKL with $JL = 10$, $KL = 13$, and $JL = 17$

4. Moura says she can find the length of the third side of ΔABC and it is 5 units. Rowan disagrees and thinks that the side length is unknown. Do you agree with either of them? Show or explain your reasoning.



5. In right triangle ΔABC, altitude $\overline{CD}$ is drawn to its hypotenuse. Find two triangles which must be similar to ΔABC.