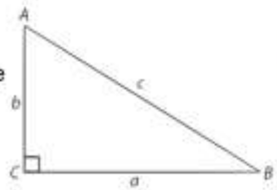
UNIT 4 LESSON 8

USING PYTHAGOREAN TO PROVE SIMILAR TRIANGLES

**Theorem**

**Pythagorean Theorem**
The sum of the squares of the lengths of the legs (*a* and *b*) of a right triangle is equal to the square of the length of the hypotenuse (*c*).




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

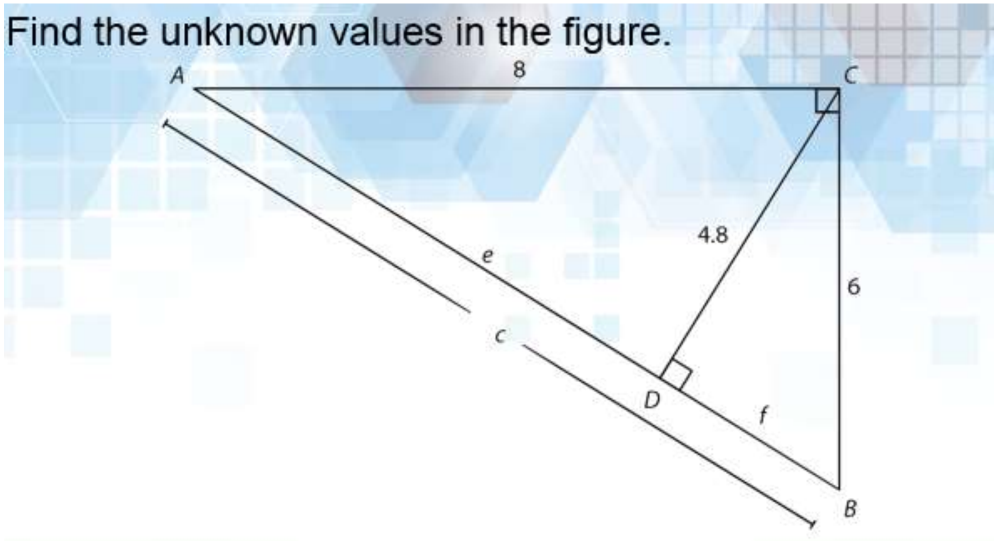
$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ Distance formula

The converse of the Pythagorean Theorem: if the sum of the squares of the measures of two sides of a triangle equals the square of the measure of the longest side, then the triangle is a right triangle.

To prove the Pythagorean Theorem using similar triangles, you must first identify the similar triangles.

The altitude of a triangle will create two smaller right triangles.

Example 1)




Looking at the diagram, we can use Pythagorean Theorem to solve for all variables.

Larger triangle: $8^2 + 6^2 = c^2$ Smaller triangle: $4.8^2 + f^2 = 6^2$

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$100 = c^2$

$10 = c$

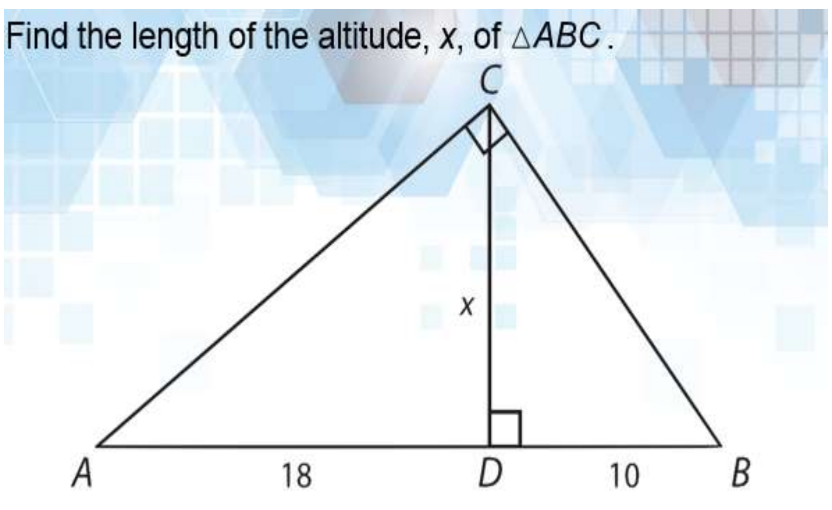
Smaller Triangle: $4.8^2 + f^2 = 6^2$

$f^2 = 12.96$

$f = 3.6$

Length "e" = 10 – 3.6 = 6.4

Example 2)




ΔABC is a right triangle. The altitude of ΔABC is drawn from right angle ACB to the opposite side, creating two smaller similar triangles.

$\triangle ABC \sim \triangle ACD \sim \triangle CBD$

Use corresponding sides to write a proportion containing x.

$$\frac{\text{shorter leg of } \triangle ACD}{\text{shorter leg of } \triangle CBD} = \frac{\text{longer leg of } \triangle ACD}{\text{longer leg of } \triangle CBD}$$

$$\frac{x}{10} = \frac{18}{x}$$

$x^2 = 180$

$x = 6\sqrt{5} = 13.4$