8.2 Notes
Pythagorean Theorem and Its Converse

Learning Goal: I can use the Pythagorean Theorem and its converse to solve for missing side lengths on right triangles.

**Pythagorean Theorem**

**Theorem 8.4 Pythagorean Theorem**

Words: In a right triangle, the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse.

Symbols: If \( \triangle ABC \) is a right triangle with right angle \( C \), then

**Example 1**

Find the missing side length.

**Example 2**

Find the missing length on the Pythagorean Triples below.

**Pythagorean Triples**

**Pythagorean Triple:**
Real World Applications

1. A 20-foot ladder is placed against a building to reach a window that is 16 feet above the ground. How many feet away from the building is the bottom of the ladder?

2. A 10-foot ladder is placed against a building. The base of the ladder is 6 feet from the building. How high does the ladder reach on the building?

Pythagorean Theorem Converse and Inequality Theorems
Example 3

9, 12, and 15 can are the measures of the sides of a triangle. Classify the triangle as acute, right, or obtuse.

7, 8, and 14 can are the measures of the sides of a triangle. Classify the triangle as acute, right, or obtuse.

10, 11, and 13 can are the measures of the sides of a triangle. Classify the triangle as acute, right, or obtuse.
8.3 Notes
Special Right Triangles

Learning Goals:
I can use the properties of 45°-45°-90° triangles.
I can use the properties of 30°-60°-90° triangles.

45°-45°-90° Triangles

Theorem 8.8 45°-45°-90° Triangle Theorem

In a 45°-45°-90° triangle, the legs $\ell$ are congruent and the
length of the hypotenuse $h$ is $\sqrt{2}$ times the length of a leg.

Symbols
In a 45°-45°-90° triangle

Example 1 – Finding the hypotenuse
Find $x$.

Example 2 – Finding the legs
Find $a$.

Find $b$. 
**Theorem 8.9 30°-60°-90° Triangle Theorem**

In a 30°-60°-90° triangle, the length of the hypotenuse $h$ is 2 times the length of the shorter leg $s$, and the length of the longer leg $l$ is $\sqrt{3}$ times the length of the shorter leg.

**Symbols** In a 30°-60°-90° triangle,

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**Example 3**

Find $x$ and $y$.

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**Example 4**

Shaina designed 2 identical bookends according to the diagram below. Use special triangles to find the height of the bookends.