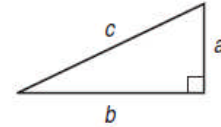


12-2 Study Guide and Intervention

The Pythagorean Theorem

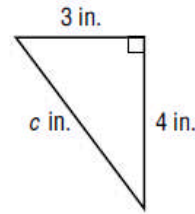
The sides of a right triangle have special names. The sides adjacent to the right angle are the **legs**. The side opposite the right angle is the **hypotenuse**. The **Pythagorean Theorem** describes the relationship between the length of the hypotenuse and the lengths of the legs. In a right triangle, the square of the length of the hypotenuse equals the sum of the squares of the lengths of the legs.

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



Example 1 Find the missing measure of a right triangle if $a = 4$ inches and $b = 3$ inches.

- | | |
|--------------------------|---|
| $c^2 = a^2 + b^2$ | Pythagorean Theorem |
| $c^2 = 4^2 + 3^2$ | Replace a with 4 and b with 3. |
| $c^2 = 16 + 9$ | Evaluate 4^2 and 3^2 . |
| $c^2 = 25$ | Add. |
| $\sqrt{c^2} = \sqrt{25}$ | Take the positive square root of each side. |
| $c = 5$ | Simplify. |



The length of the hypotenuse is 5 inches.

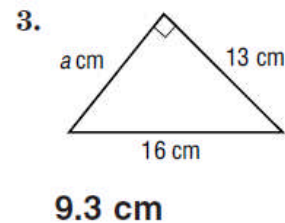
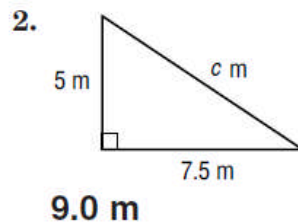
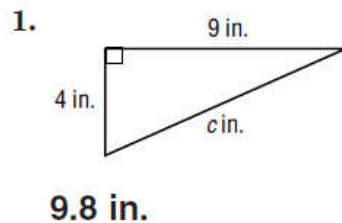
Example 2 Determine whether a triangle with side lengths of 6 meters, 9 meters, and 12 meters is a right triangle.

- | | |
|----------------------------------|--|
| $c^2 = a^2 + b^2$ | Pythagorean Theorem |
| $12^2 \stackrel{?}{=} 6^2 + 9^2$ | Replace a with 6, b with 9, and c with 12. |
| $144 \stackrel{?}{=} 36 + 81$ | Simplify. |
| $144 \neq 117$ | Add. |

The triangle is *not* a right triangle.

Exercises

Find the missing measure of each right triangle. Round to the nearest tenth if necessary.



Determine whether each triangle with the given side lengths is a right triangle. Write *yes* or *no*.

4. 15 ft, 8 ft, 17 ft **yes** 5. 5 in., 13 in., 17 in. **no** 6. 9 yd, 40 yd, 41 yd **yes**