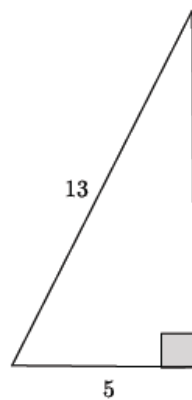# Lesson 16: Applications of the Pythagorean Theorem

Classwork

Example 1

Given a right triangle with a hypotenuse with length 13 units and a leg with length 5 units, as shown, determine the length of the other leg.
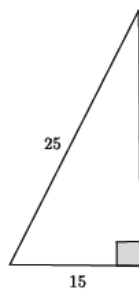

$$5^2 + b^2 = 13^2$$
$$5^2 - 5^2 + b^2 = 13^2 - 5^2$$
$$b^2 = 13^2 - 5^2$$
$$b^2 = 169 - 25$$
$$b^2 = 144$$
$$b = 12$$

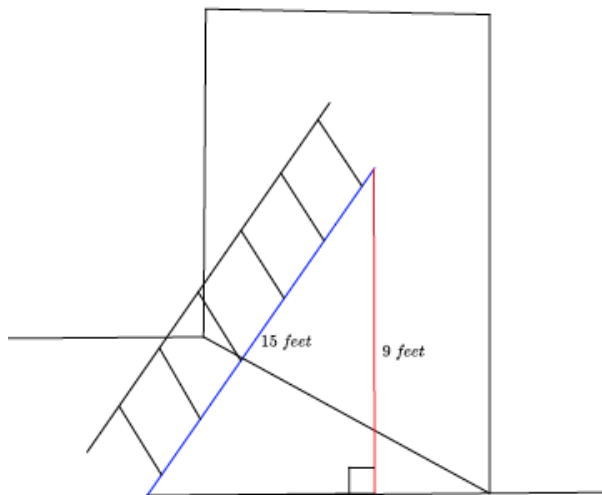The length of the leg is 12 units.

Exercises

1. Use the Pythagorean theorem to find the missing length of the leg in the right triangle.
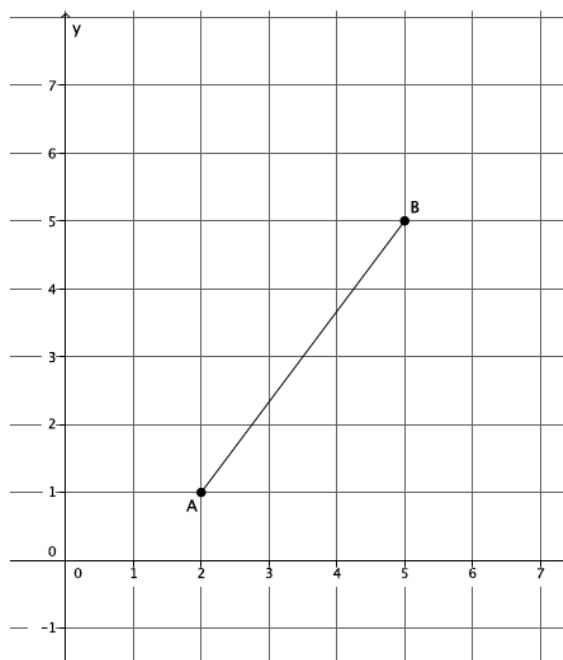

[Type here]

2. You have a 15-foot ladder and need to reach exactly 9 feet up the wall. How far away from the wall should you place the ladder so that you can reach your desired location?
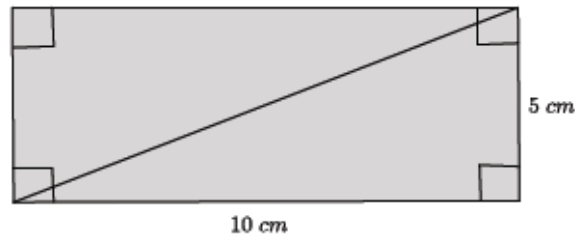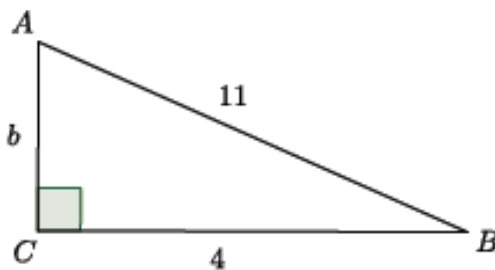

3. Find the length of the segment AB.

[Type here]

4. Given a rectangle with dimensions 5 cm and 10 cm, as shown, find the length of the diagonal.

5 cm

10 cm

5. A right triangle has a hypotenuse of length 13 in and a leg with length 4 in. What is the length of the other leg?

6. Find the length of b in the right triangle below.

A

11

b

C

4

B

[Type here]

> **Lesson Summary**
>
> The Pythagorean theorem can be used to find the unknown length of a leg of a right triangle.
>
> An application of the Pythagorean theorem allows you to calculate the length of a diagonal of a rectangle, the distance between two points on the coordinate plane and the height that a ladder can reach as it leans against a wall.
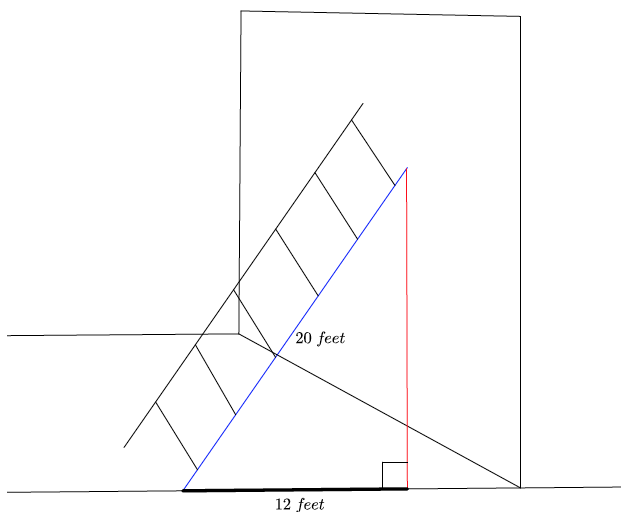
Problem Set

1. Find the length of the segment AB shown below.
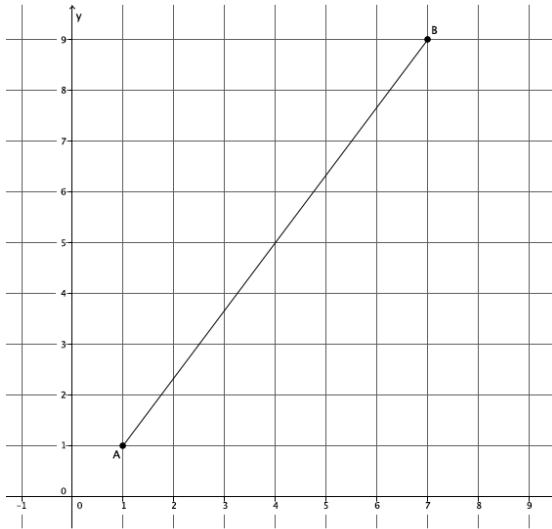
2. A 20-foot ladder is placed 12 feet from the wall, as shown. How high up the wall will the ladder reach?
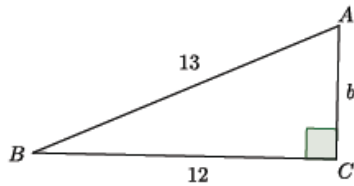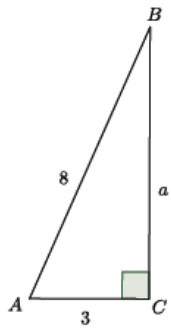
[Type here]

3. A rectangle has dimensions 6 in by 12 in. What is the length of the diagonal of the rectangle?

Use the Pythagorean theorem to find the missing side lengths for the triangles shown in Problems 4–8.
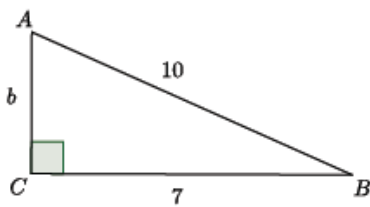
4. Determine the length of the missing side.

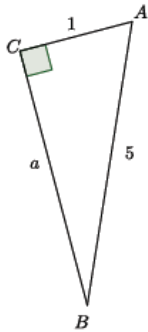5. Determine the length of the missing side.

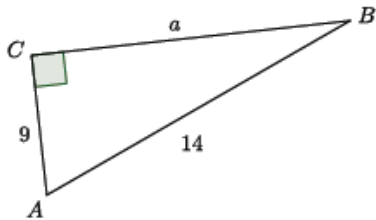6. Determine the length of the missing side.

[Type here]

7. Determine the length of the missing side.

8. Determine the length of the missing side.

[Type here]