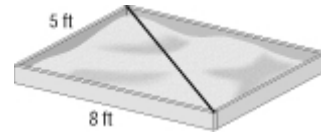**Lesson 12-2**

Example 1 Find the Length of the Hypotenuse SANDBOX Find the length of the diagonal of a sandbox which is a rectangle having length measuring 8 feet and width measuring 5 feet. Round to the nearest tenth if necessary.

To solve, find the length of the hypotenuse c.

$$c^2 = a^2 + b^2 \qquad \text{Pythagorean Theorem}$$
$$c^2 = 8^2 + 5^2 \qquad \text{Replace } a \text{ with 8 and } b \text{ with 5.}$$
$$c^2 = 64 + 25 \qquad \text{Evaluate } 8^2 \text{ and } 5^2.$$
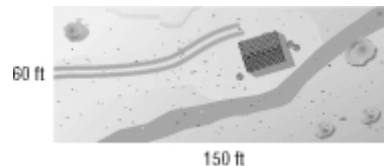$$c^2 = 89 \qquad \text{Add.}$$
$$\sqrt{c^2} = \sqrt{89} \qquad \text{Take the square root of each side.}$$
$$c \approx 9.4 \qquad \text{Simplify.}$$

The length of the diagonal of the sandbox is about 9.4 feet.

Example 2 Solve a Real-Life Problem CONSTRUCTION A survey of a plot of land is being done in preparation for a new house being built on it. The plot is rectangular in shape with a length of 150 feet and a width of 60 feet. Find the measure of the diagonal of the plot.

The diagonal of the rectangle is the hypotenuse of a right triangle.

$$c^2 = a^2 + b^2 \qquad \text{Pythagorean Theorem}$$
$$c^2 = 60^2 + 150^2 \qquad \text{Replace } a \text{ with 60 and } b \text{ with 150.}$$
$$c^2 = 3{,}600 + 22{,}500 \qquad \text{Evaluate } 60^2 \text{ and } 150^2.$$
$$c^2 = 26{,}100 \qquad \text{Simplify.}$$
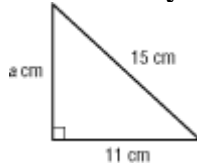$$\sqrt{c^2} = \sqrt{26{,}100} \qquad \text{Take the square root of each side.}$$
$$c \approx 161.6 \qquad \text{Simplify.}$$

The length of the diagonal of the plot is about 161.6 feet.

Example 3 Find the Length of a Leg Find the missing measure of the right triangle at the right. Round to the nearest tenth if necessary.

15 cm

a cm

11 cm

The missing measure is a leg of the triangle.

$c^2 = a^2 + b^2$	Pythagorean Theorem
$15^2 = a^2 + 11^2$	Replace b with 11 and c with 15.
$225 = a^2 + 121$	Evaluate 15^2 and 11^2.
$225 - 121 = a^2 + 121 - 121$	Subtract 121 from each side.
$104 = a^2$	Simplify.
$\sqrt{104} = \sqrt{a^2}$	Take the square root of each side.
$10.2 \approx a$	Simplify.

The length of the leg is about 10.2 centimeters.

Example 4 Standardized Test Practice

QUILTING Mrs. Jones is creating a quilt out of fabric squares that measure 12 inches on a side. Which is the closest to the length of the diagonal of the fabric square?

A 12 in.   **B** 13 in.   **C** 15 in.   **D** 17 in.

Read the Test Item

You need to use the Pythagorean Theorem to find the diagonal length.

Solve the Test Item

$$c^2 = a^2 + b^2$$ Pythagorean Theorem
$$c^2 = 12^2 + 12^2$$ Replace *a* with 12 and *b* with 12.
$$c^2 = 144 + 144$$ Evaluate 12^2.
$$c^2 = 288$$ Simplify.
$$\sqrt{c^2} = \sqrt{288}$$ Take the square root of each side.
$$c \approx 16.97$$ Simplify.

So, the answer is D.