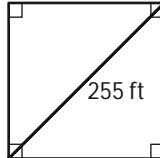


Middle School Math COURSE 3
Chapter 9, Lesson 5, More Examples

Extra Example 1
for use after Example 1

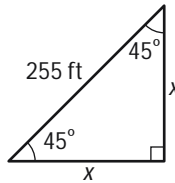
Using a 45°-45°-90° Triangle

The courtyard of a building is a perfect square. The path from one corner of the courtyard to the opposite corner is approximately 255 feet. Find the length of each side of the courtyard.



Solution

Because the courtyard is a square, you know that all the angles measure 90°. The path from one corner to the opposite corner cuts the square in half and cuts two of the angles in half.



The length of the path from one corner of the courtyard to the opposite corner is the hypotenuse of the 45°-45°-90° triangle shown above. The length of one side of the courtyard is a leg of the triangle. Use the relationship between the hypotenuse and leg of a 45°-45°-90° triangle to find the length of the side of the courtyard.

$$\text{hypotenuse} = \text{leg} \cdot \sqrt{2}$$

$$255 = x \cdot \sqrt{2}$$

$$255 \approx x(1.414)$$

$$\frac{255}{1.414} \approx \frac{1.414x}{1.414}$$

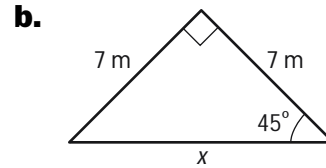
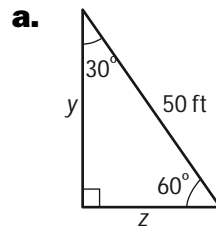
$$180 \approx x$$

ANSWER The length of each side of the courtyard is about 180 feet.

Extra Example 2
for use after Example 2

**Using a 45°-45°-90° Triangle and
a 30°-60°-90° Triangle**

Find the value of each variable. Give exact answers.



Solution

a. The triangle is a 30°-60°-90° triangle.

hypotenuse = 2 • shorter leg

$$50 = 2z$$

$$25 = z$$

longer leg = shorter leg • $\sqrt{3}$

$$y = 25\sqrt{3}$$

ANSWER The length of y is $25\sqrt{3}$ ft and the length of z is 25 ft.

b. The measure of the third angle is $180^\circ - 90^\circ - 45^\circ$, or 45° . The triangle is a 45°-45°-90° triangle.

hypotenuse = leg • $\sqrt{2}$

$$x = 7\sqrt{2}$$

ANSWER The length of x is $7\sqrt{2}$ m.