

### Example 4 Classify Triangles

Determine whether each set of numbers can be the measures of the sides of a triangle. If so, classify the triangle as *acute*, *right*, or *obtuse*. Justify your answer.

a. 7, 14, 16

**Step 1** Determine whether the measures can form a triangle using the Triangle Inequality Theorem.

$$7 + 14 > 16 \quad \checkmark \quad 14 + 16 > 7 \quad \checkmark \quad 7 + 16 > 14 \quad \checkmark$$

The side lengths 7, 14, and 16 can form a triangle.

**Step 2** Classify the triangle by comparing the square of the longest side to the sum of the squares of the other two sides.

$$c^2 \stackrel{?}{=} a^2 + b^2 \quad \text{Compare } c^2 \text{ and } a^2 + b^2.$$

$$16^2 \stackrel{?}{=} 7^2 + 14^2 \quad \text{Substitution}$$

$$256 > 245 \quad \text{Simplify and compare.}$$

Since  $c^2 > a^2 + b^2$ , the triangle is obtuse.

b. 9, 40, 41

**Step 1** Determine whether the measures can form a triangle.

$$9 + 40 > 41 \quad \checkmark \quad 40 + 41 > 9 \quad \checkmark \quad 9 + 41 > 40 \quad \checkmark$$

The side lengths 9, 40, and 41 can form a triangle.

**Step 2** Classify the triangle.

$$c^2 \stackrel{?}{=} a^2 + b^2 \quad \text{Compare } c^2 \text{ and } a^2 + b^2.$$

$$41^2 \stackrel{?}{=} 9^2 + 40^2 \quad \text{Substitution}$$

$$1681 = 1681 \quad \text{Simplify and compare.}$$

Since  $c^2 = a^2 + b^2$ , the triangle is a right triangle.

### Guided Practice

4A. 11, 60, 61

4B.  $2\sqrt{3}, 4\sqrt{2}, 3\sqrt{5}$

4C. 6.2, 13.8, 20

### Review Vocabulary

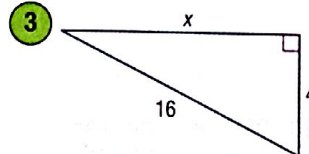
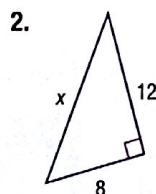
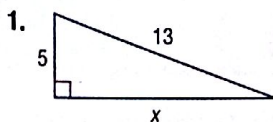
**Triangle Inequality Theorem** The sum of the lengths of any two sides of a triangle must be greater than the length of the third side. (Lesson 5-5)

### Check Your Understanding

 = Step-by-Step Solutions begin on page R20.

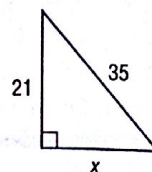


Example 1 Find  $x$ .



Example 2

4. Use a Pythagorean triple to find  $x$ . Explain your reasoning.

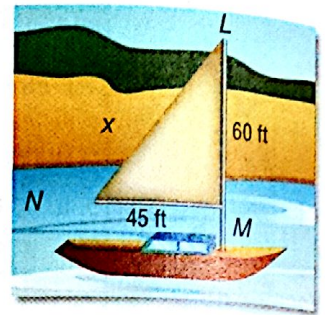




**Example 3**

**5. MULTIPLE CHOICE** The mainsail of a boat is shown. What is the length, in feet, of  $\overline{LN}$ ?

- A 52.5
- B 65
- C 72.5
- D 75



**Example 4**

Determine whether each set of numbers can be the measures of the sides of a triangle. If so, classify the triangle as *acute*, *obtuse*, or *right*. Justify your answer.

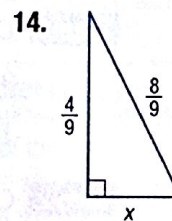
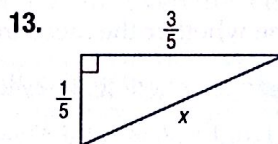
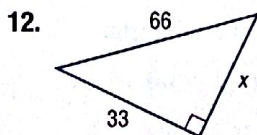
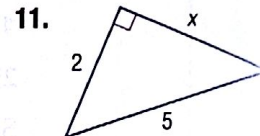
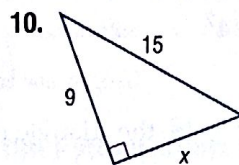
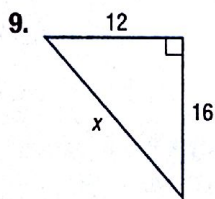
- 6. 15, 36, 39
- 7. 16, 18, 26
- 8. 15, 20, 24

**Practice and Problem Solving**

Extra Practice begins on page 969.

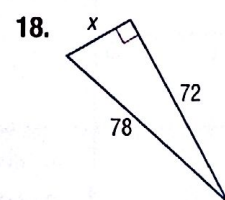
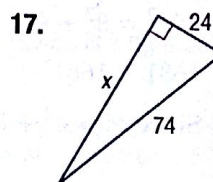
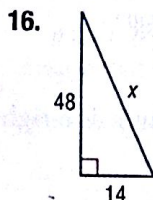
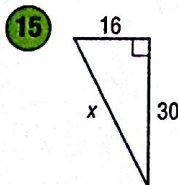
**Example 1**

Find  $x$ .



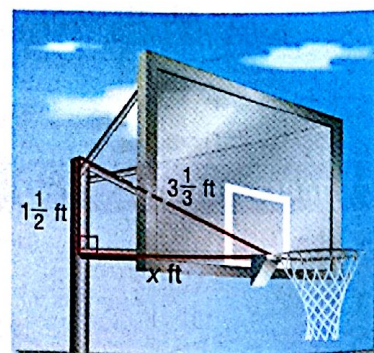
**Example 2**

Use a Pythagorean Triple to find  $x$ .

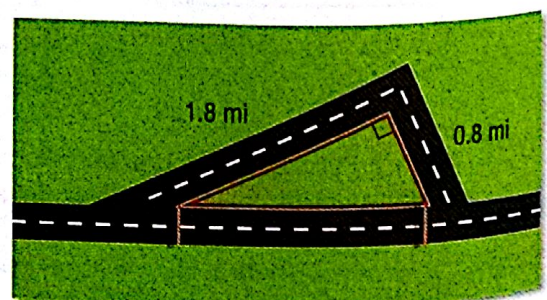


**Example 3**

**19. BASKETBALL** The support for a basketball goal forms a right triangle as shown. What is the length  $x$  of the horizontal portion of the support?



**20. DRIVING** The street that Khaliah usually uses to get to school is under construction. She has been taking the detour shown. If the construction starts at the point where Khaliah leaves her normal route and ends at the point where she re-enters her normal route, about how long is the stretch of road under construction?





Determine whether each set of numbers can be the measures of the sides of a triangle. If so, classify the triangle as *acute*, *obtuse*, or *right*. Justify your answer.

21. 7, 15, 21

22. 10, 12, 23

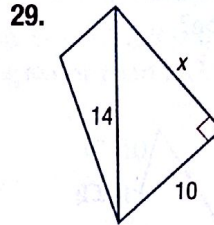
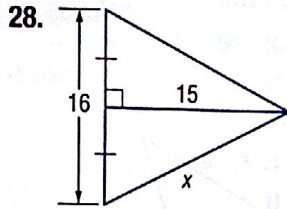
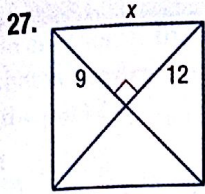
23. 4.5, 20, 20.5

24. 44, 46, 91

25. 4.2, 6.4, 7.6

26. 4, 12, 14

Find  $x$ .



**COORDINATE GEOMETRY** Determine whether  $\triangle XYZ$  is an *acute*, *right*, or *obtuse* triangle for the given vertices. Explain.

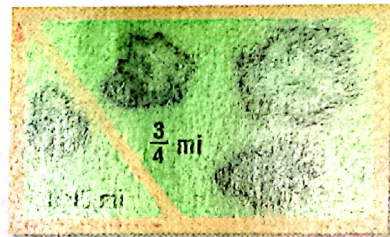
30.  $X(-3, -2), Y(-1, 0), Z(0, -1)$

31.  $X(-7, -3), Y(-2, -5), Z(-4, -1)$

32.  $X(1, 2), Y(4, 6), Z(6, 6)$

33.  $X(3, 1), Y(3, 7), Z(11, 1)$

34. **JOGGING** Brett jogs in the park three times a week. Usually, he takes a  $\frac{3}{4}$ -mile path that cuts through the park. Today, the path is closed, so he is taking the orange route shown. How much farther will he jog on his alternate route than he would have if he had followed his normal path?



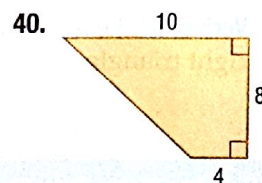
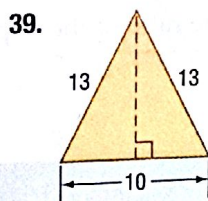
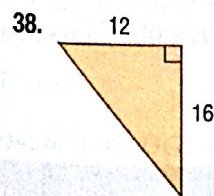
35. **PROOF** Write a paragraph proof of Theorem 8.5.

**PROOF** Write a two-column proof for each theorem.

36. Theorem 8.6

37. Theorem 8.7

Find the perimeter and area of each figure.



41. **ALGEBRA** The sides of a triangle have lengths  $x$ ,  $x + 5$ , and 25. If the length of the longest side is 25, what value of  $x$  makes the triangle a right triangle?

42. **ALGEBRA** The sides of a triangle have lengths  $2x$ , 8, and 12. If the length of the longest side is  $2x$ , what values of  $x$  make the triangle acute?

43. **TELEVISION** The screen aspect ratio, or the ratio of the width to the length, of a high-definition television is 16:9. The size of a television is given by the diagonal distance across the screen. If an HDTV is 41 inches wide, what is its screen size?

