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Pythagorean Theorem

C.1.2.1

Example

Which of the following sets of measures forms a right triangle? Use the Pythagorean theorem to help you decide.

- A 6 cm, 9 cm, 12 cm
- B 5 cm, 8 cm, 10 cm
- C 9 cm, 12 cm, 15 cm
- D 7 cm, 9 cm, 11 cm

Example

A rectangular swimming pool is 48 feet long and 20 feet wide. Mr. Rollins wants to buy a hose that will stretch from the southwestern corner to the northeastern corner of the pool. What size hose should he buy?

- A 52 ft
- B 58 ft
- C 62 ft
- D 68 ft

Thinking It Through

Solve —*Test It: Eliminate Wrong Answers* Use the Pythagorean theorem to see which answer choice forms a right triangle.

$$6^2 + 9^2 = 117; \sqrt{117} \neq 12$$

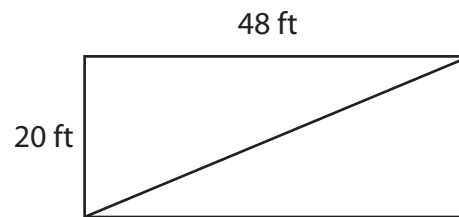
$$5^2 + 8^2 = 89; \sqrt{89} \neq 10$$

$$9^2 + 12^2 = 225; \sqrt{225} = 15$$

The answer is 9 cm, 12 cm, 15 cm, choice C.

Thinking It Through

Solve —*Draw It* Make a drawing of the pool.



Use the Pythagorean theorem to find the length of the hose.

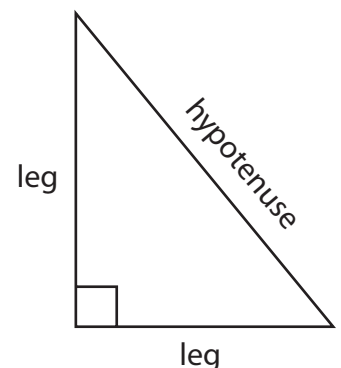
$$a^2 + b^2 = c^2$$

$$48^2 + 20^2 = c^2$$

$$2,304 + 400 = \sqrt{2,704} = 52, \text{ choice A.}$$

Review

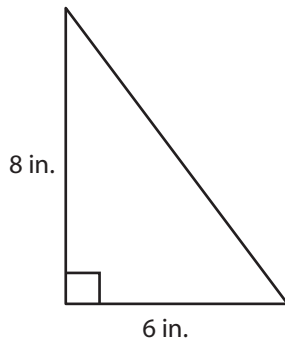
- The **Pythagorean theorem** states the sum of the squares of the legs is equal to the square of the **hypotenuse** of a **right triangle**. The hypotenuse is the side opposite the right angle. The theorem can be written algebraically as $a^2 + b^2 = c^2$, when a and b are legs and c is the hypotenuse.
- A **Pythagorean triple** is a relationship between the legs and the hypotenuse, where all three measures are whole numbers. The most common relationship is 3:4:5, such as the relationship in the first example. (9:12:15 simplifies to 3:4:5—try dividing each number by 3.) Another common Pythagorean triple is 5:12:13.



Pythagorean Theorem

DIRECTIONS Read and solve each question. Then circle the letter of the best answer.

1. What is the length of the hypotenuse of this triangle?



- A 4 in.
B 7 in.
C 10 in.
D 14 in.



The Pythagorean theorem is $a^2 + b^2 = c^2$.

2. The hypotenuse of a triangle is 20 inches. One of the legs has a measure of 16 inches. What is the measure of the other leg?

- A 5 in.
B 12 in.
C 18 in.
D 35 in.

3. A 25-foot ladder is leaning against a building. The bottom of the ladder is 15 feet from the building. How high up the building does the ladder reach?

- A 8 ft
B 10 ft
C 16 ft
D 20 ft

4. Lorraine lives 21 miles east of Cady. Cady lives 28 miles south of Paula. How far does Paula live from Lorraine?

- A 7 miles
B 35 miles
C 42 miles
D 49 miles