

The Pythagorean Theorem

Pythagorean Theorem: A method used to solve for a missing length of a right triangle.

Legs: The two shorter sides of a right triangle

Hypotenuse: The longest side of a right triangle, located across from the _____ angle.

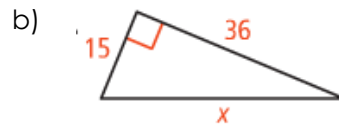
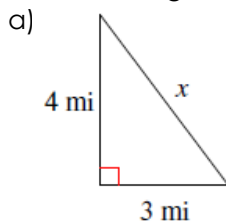
The Pythagorean Theorem

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

Where "a" and "b" are the legs of a triangle, and "c" is the hypotenuse.

Solving for a Hypotenuse

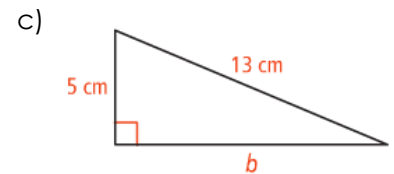
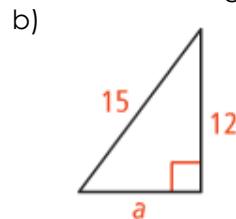
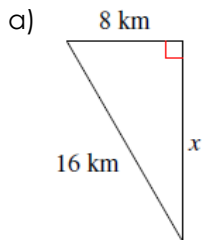
Solve for the length of the hypotenuse in each of the following:



- c) A square tile has side lengths of 6 inches. What is the length of the tiles hypotenuse if it is cut along one of its diagonals?

Solving for a Missing Leg Length

Solve for the length of the missing leg in each of the following:



Determining if a Triangle is Right

Determine if each of the following are right triangles by using the Pythagorean Theorem.

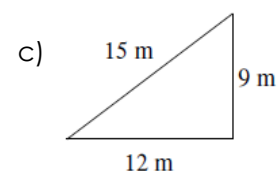
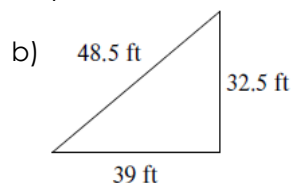
Step 1: Determine what your longest side is and set that equal to "c"

Step 2: Set up the Pythagorean Theorem with the two shorter sides as "a" and "b"

Step 3: Determine if the two sides of the equation are equal

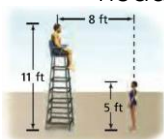
- If they are equal, then you have a right triangle
- If they are not equal, then you do not have a right triangle

- a) 20cm, 47cm, 52cm



The Pythagorean Theorem – Word Problems!!

1. The hypotenuse of a right triangle is 45cm, and one of its legs is 36cm. Find its perimeter.
2. A fifteen-foot ladder reaches the top of a 13-ft wall. How far is the base of the ladder from the base of the wall?
3. If you drive 3 miles west, then 5 miles south, and finally 15 miles east, how far will you end up from where you started?
4. An isosceles triangle has two congruent 11-inch sides, and an 18-inch base. What is its approximate area?
5. Addison is standing in the middle of a large field throwing baseballs. He throws the first ball 20 yards straight out. He turns 90 degrees to the right and throws a second ball 23 yards straight out. He turns 90 degrees to the right again and throws a third ball 45 yards straight out. What is the shortest distance he can walk to retrieve all three balls (he does not need to return to his original spot). Round to the nearest tenth.
6. A jogger goes half a mile north and then turns west. If the jogger finishes 1.3 mi from the starting point, how far west did the jogger go?
7. A construction worker is cutting along the diagonal of a rectangular board 15 ft. long and 8 ft. wide. What will be the length of the cut?
8. A swimmer asks a question to a lifeguard sitting on a tall chair, as shown in the diagram. The swimmer needs to be close to the lifeguard to hear the answer. What is the distance between the swimmer's head and the lifeguard's head?



Challenge: A rectangle is nine inches longer than it is wide, and its diagonal is 10 inches longer than its width. What is the width of the quadrilateral? (Round answer to the nearest hundredth).