

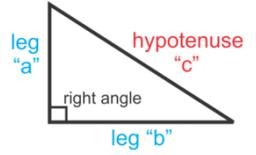
Lesson 2: Pythagorean Theorem and its Converse

Standard: MCC9-12.G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Essential Question: How do you use the Pythagorean Theorem to solve right triangles?

In this lesson you will discover, prove and apply the Pythagorean Theorem to solve for unknown sides in right triangles and prove triangles are right triangles.

The **Pythagorean Theorem** refers to the relationship between the lengths of the three sides in a right triangle. It states that if a and b are the legs of the right triangle and c is the hypotenuse, then $a^2 + b^2 = c^2$. For example, the lengths 3, 4, and 5 are the sides of a right triangle because $3^2 + 4^2 = 5^2$ ($9 + 16 = 25$). Keep in mind that c is always the longest side. The converse of this statement is also true. If, in a triangle, c is the length of the longest side and the shorter sides have lengths a and b , and $a^2 + b^2 = c^2$, then the triangle is a right triangle.



Mr. Paul wants to fence off half of his rectangular garden plot to keep the deer out. He will run the fencing around the outside of the garden and diagonally down the center to form a right triangle. The garden measures 5 yards by 8 yards.

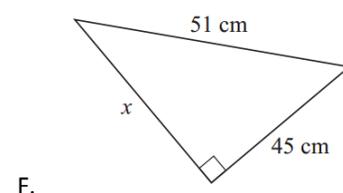
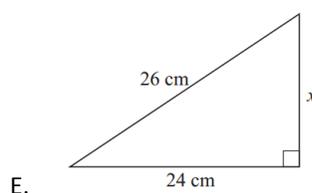
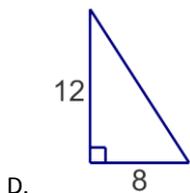
- Draw a diagram to represent the situation.
- What does Mr. Paul need to find in order to determine the amount of fence off his garden?
- How many full yards of fencing does Mr. Paul need?

Practice:

For the given two sides, determine the length of the third side if the triangle is a right triangle

- $a = 7$ and $c = 25$
- $a = 10$ and $b = 5$
- $a = 5$ and $c = 13$

Find the length of the third side of the triangle below. Leave your answer in reduced radical form.

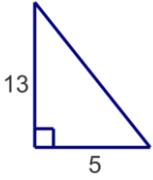


Use the Pythagorean Theorem to determine if a right triangle is formed by the given lengths.

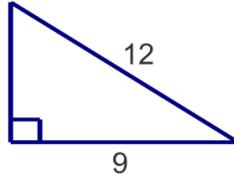
- G. 21, 28, 35 H. 16, 30, 34 I. 9, 40, 42 J. 2, 2, 4

Homework

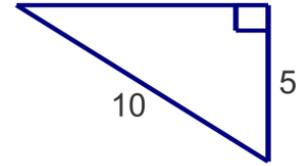
Find the unknown side length for each right triangle below.



1.



2.



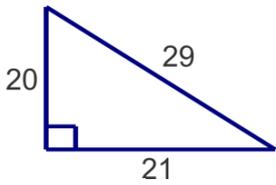
3.

4. $a = 6; b = 8$

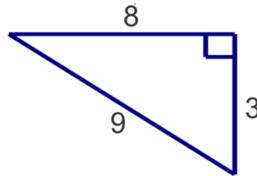
5. $b = 6; c = 14$

6. $a = 12; c = 18$

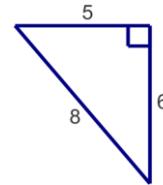
Use the Pythagorean Theorem to determine if a right triangle is formed by the given lengths.



7.



8.



9.

10. 3, 4, 5

11. 6, 6, 11

12. 11, 13, 17

Complete all the problems. Make sure to draw pictures to help you solve the problems.

13. A 50 meter tall tree casts a shadow that is 60 meters long. Find the distance between the top of the tree and the shadow.

14. Fred bought an LCD TV 12 inches long. The diagonal of the LCD TV measures 20 inches. Find the width of the LCD TV.

15. The President is hoisting the flag, but the line has gotten stuck. Agent Hardy wants to fix it. He used a 15m ladder and placed it 9m away from base of flag pole. Find the height of flag.