

Geometry Lesson 29

Objective: TSW use the Pythagorean Theorem.

Date: _____

Period: _____

Pythagorean _____ - A Pythagorean triple is a set of three nonzero whole numbers a , b , and c such that:

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

Two of the most well-known sets of Pythagorean triples are (__, __, __) and (__, __, __). An easy way to find Pythagorean triples is to multiply one of these two sets by a whole number.

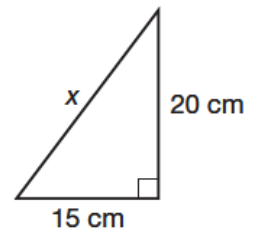
Example 1 Finding Pythagorean Triples

Find the unknown length in the triangle. Do the side lengths form a Pythagorean triple?

SOLUTION

Math Reasoning

Justify When solving $x^2 = 625$, remember that $x = 25$ or $x = -25$. However in this type of problem, the negative value of the square root is ignored. Why?

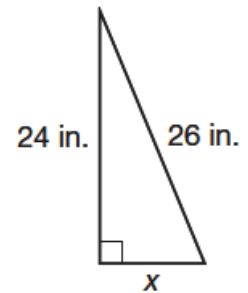


Example 2 Using Pythagorean Triples To Find the Legs

Find the unknown length in the triangle.

Do the side lengths form a Pythagorean triple?

SOLUTION

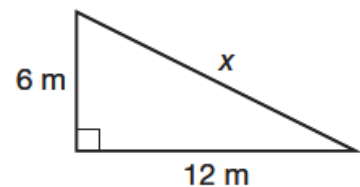


However, not all right triangles are composed of side lengths that are nonzero whole numbers. In such cases, one or more side lengths may be written as a radical expression.

_____ Expression - Any expression that contains a root. Typically, a radical expression should be reduced to simplified radical form.

Example 3 Simplifying Radicals

a. Find the value of x . Give your answer in simplified radical form.



SOLUTION

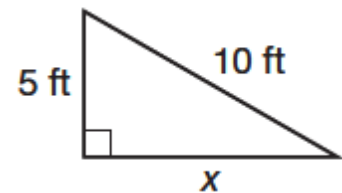
Math Reasoning

Analyze List the first ten perfect squares. These are examples of factors that you look for to express a radical in simplified form.

To write the answer in simplified radical form, you must factor out all perfect square factors of the number under the radical sign. The largest perfect square that is a factor of ___ is ___, so ___ is factored out as ___ × ___.

b. Find the value of x . Give your answer in simplified radical form.

SOLUTION



Example 4 Application: TV Aspect Ratios

The aspect ratio of a TV screen is the ratio of the width to the height of the image. Find the height and the width of a 42-inch TV screen with an aspect ratio of 4:3 to the nearest tenth of an inch. The length 42 inches refers to the diagonal distance across the screen.

SOLUTION

Hint

Taking the square root of a fraction is equivalent to taking the square root of both the denominator and the numerator separately. In other words:

$$\sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}}$$

$$\text{Width: } = 4x$$

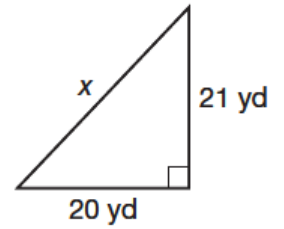
$$\text{Height: } = 3x$$

Check

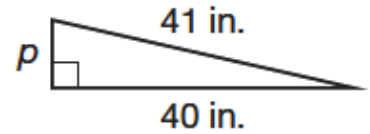
$$a^2 + b^2 = c^2$$

You Try!!!!

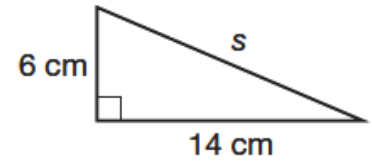
a. Find the hypotenuse of the triangle. Do the side lengths form a Pythagorean triple?



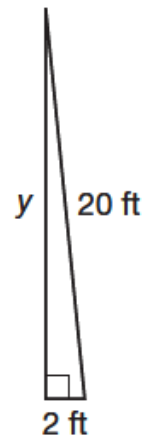
b. Find the value of p in the triangle at right. Do the side lengths form a Pythagorean triple?



c. Find the value of s in the triangle at right. Give your answer in simplified radical form.



d. Find the value of y in the triangle at right. Give your answer in simplified radical form.



e. A ratio of a TV's width to its height is 16:9. If its width is 32 inches, what is the length of its diagonal?