

KEY CONCEPT OVERVIEW

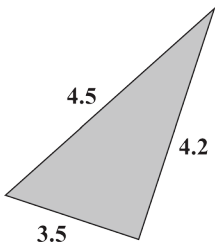
In Topic C, we return to the **Pythagorean theorem**. In this exposure to the theorem, students are presented with a proof that involves similar triangles and the angle-angle criterion. Once again, students apply the Pythagorean theorem to find the measures of unknown side lengths in right triangles.

You can expect to see homework that asks your child to do the following:

- Use the Pythagorean theorem to solve for the measure of an unknown side length in a right triangle.
- Use the properties of **perfect squares** to apply to perfect square decimals. For example, if $c^2 = 121$, then $c = 11$. Likewise, if $c^2 = 1.21$, then $c = 1.1$.
- Determine whether a triangle is a right triangle by using the **converse of the Pythagorean theorem**.

SAMPLE PROBLEM (From Lesson 14)

The numbers in the diagram below indicate the lengths of the sides of the triangle. Is the triangle shown below a right triangle? Show your work, and answer in a complete sentence.



If this were a right triangle, the side measuring 4.5 would be the longest side and would therefore be the hypotenuse. We need to check whether $3.5^2 + 4.2^2 = 4.5^2$ is a true statement. The left side of the equation is equal to 29.89. The right side of the equation is equal to 20.25. That means $3.5^2 + 4.2^2 = 4.5^2$ is not true, so the triangle shown is not a right triangle.

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at GreatMinds.org.

HOW YOU CAN HELP AT HOME

You can help at home in many ways. Here are some tips to help you get started.

- Do you have a tall tree or a flagpole in your yard? Use the shadow activity found in Lesson 12 Problem Set 1. On a sunny day, position yourself such that the end of your shadow and the end of the tree's shadow match up. Ask your child to measure the following: your distance from the tree, your height, and the length of your shadow. Ensure that the measurements are all in one unit (e.g., 3 feet 6 inches should either be 42 inches or 3.5 feet). Then, challenge your child to use that data with equivalent ratios to determine the height of the tree. Next, your child can use the Pythagorean theorem and the data gathered so far to determine the **hypotenuse** lengths of the two triangles formed by you, the tree, and your shadows.
- Right angles are all around you. Continue to point out right angles (or what appear to be right angles) in your environment. Discuss with your child ways to determine whether an angle is actually a right angle.
- Work with your child to remember the perfect squares. Your child should be able to identify the first fifteen perfect squares and know what number squared results in each perfect square (See Terms).

TERMS

Perfect square: A number that is the result of squaring an integer base. The first fifteen perfect squares are 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, and 225.

Hypotenuse of a right triangle: The side of the right triangle that is opposite the right angle. This is also the longest side of the right triangle.

Legs of a right triangle: The two sides of the right triangle that form the right angle.

Pythagorean theorem: If the triangle is a right triangle, then $leg_1^2 + leg_2^2 = hypotenuse^2$, or $a^2 + b^2 = c^2$.

Converse of the Pythagorean theorem: If $leg_1^2 + leg_2^2 = hypotenuse^2$, or $a^2 + b^2 = c^2$, then the triangle is a right triangle.

