Name _____ Date _____

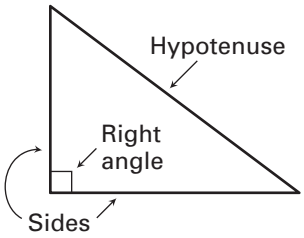
LESSON 8.3

Interdisciplinary Application

For use with the lesson "Find Special Products of Polynomials"

Pythagoras

Geometry Little is known of Pythagoras' early life, but scholars believe that he was born on the island of Samos. In about 529 B.C., he settled in Crotona, Italy. There he founded a school (brotherhood) among the aristocrats of the city. Pythagoras was a Greek philosopher and mathematician. He became famous for formulating the *Pythagorean theorem*, even though its principles were known earlier. For example, the ancient Egyptians had used these principles to create fields with square corners.



The theorem states that the square of the length of the hypotenuse of a right triangle is equal to the sum of the squares of the lengths other two sides. The Pythagorean theorem written as a formula is $c^2 = a^2 + b^2$. In this formula, c is the length of the hypotenuse, and a and b are the lengths of the other two sides. If you know the lengths of any two sides of a right triangle, you can find the length of the third side.

1. The hypotenuse of a right triangle has a length of $t + 11$. The lengths of the other two sides are $t + 10$ and $t - 7$. Draw a diagram to model this right triangle.
2. Substitute the expressions into the Pythagorean theorem. Simplify your equation.
3. Using your simplified equation from Exercise 2, check the values of $t = 14$ and $t = 2$.
4. Using the value(s) of t that make the equation true in Exercise 3, find the lengths of the three sides of the right triangle. *Explain* your results.

In Exercises 5–8, use the following information.

A pine tree casts a shadow. The height of the tree (in feet) is $t - 30$. You stand at the end of the tree's shadow. The distance between the ground where you are standing and the top of the tree (in feet) is $t + 20$. The length of the shadow (in feet) is $t + 19$.

5. Draw a diagram of the pine tree with its shadow. Label the lengths of your diagram.
6. Substitute the expressions in the Pythagorean theorem. Simplify your equation.
7. Using your simplified equation from Exercise 6, check the values of $t = 21$ and $t = 41$.
8. Using the value(s) of t that make the equation true in Exercise 7, find the length of the tree's shadow, the height of the pine tree, and the distance between the ground where you are standing and the top of the tree. *Explain* your results.