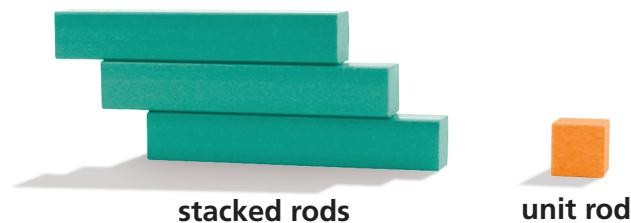# Unit Project

Finding the Surface Area of Rod Stacks

In this Unit Project, you will find different ways to find the surface area of colored rod stacks.

Part 1: Staircase Stacks

1. Choose a rod length to use to make a staircase stack. Use one of the unit rods to determine the dimensions of your chosen rod.

2. Stack several rods of this length as shown. Each rod is one unit high and one unit wide and is staggered one unit.

stacked rods   **unit rod**

Find the surface area of one rod, a stack of two rods, a stack of three rods, and so on. Describe a pattern that you see in the surface areas of the stacks you made.
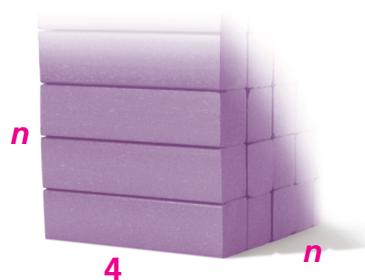
3. Write an equation that shows the relationship between the surface area A and the number of rods n in the stack. Explain.

4. Repeat Exercises 1–3 for two other rod lengths.

5. Find a student who used rods of the same length for Exercises 1–3 and whose expression for area from Exercise 3 looks different from yours. Are your expressions equivalent? Explain.

6. **a.** Make a table with columns for rod length and surface area equation. Complete the table for rod lengths 2 through 10. You will need to find students who used rods that you did not use.

   b. Do the equations in your table represent linear, quadratic, or exponential relationships? Explain.

   c. Write an equation for the surface area A of any stack of n rods of length ℓ.

   d. Use your equation from part (c) to find the surface area of a stack of 50 rods of length 10.

Part 2: Finding the Surface Area of a Rectangular Prism

Suppose rods of length 4 are stacked to form a rectangular prism as shown below right.

7. What are the dimensions of the prism?

8. Find an equation for the surface area of the prism.

9. Suppose the prism is 10 rods high and 10 rods wide. What is the surface area of the prism?

n

4   *n*

10. How would the equation change if the rod length were a length other than 4?

11. Is the relationship between the surface area and the number of rods in a prism stack linear, quadratic, exponential, or none of these? Explain.

Write a report about the results you found for rod stacks and rod prisms. Explain how you found the equations for surface area in each case. Use diagrams to show what you did and what you found.