

4.4 Painted Cubes

Leon invents a puzzle. He makes a large cube from 1,000 centimeter cubes. He paints the faces of the large cube. When the paint dries, he separates the puzzle into the original centimeter cubes. The object of Leon's puzzle is to reassemble the cubes so that no unpainted faces are showing.

When Leon examines the centimeter cubes, he notices that some are painted on only one face, some on two faces, and some on three faces. Many aren't painted at all.



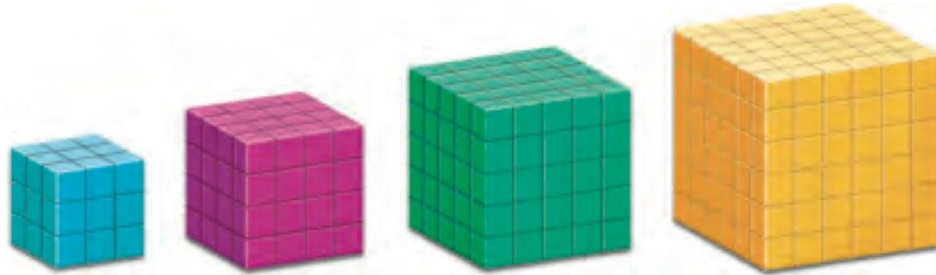
Problem 4.4 Looking at Several Functions

In this problem, you will investigate smaller versions of Leon's puzzle.

- A. 1.** The cube at the right is made of centimeter cubes. The faces of this cube are painted. Suppose you broke the cube into centimeter cubes. How many centimeter cubes would be painted on
- a.** three faces?
 - b.** two faces?
 - c.** one face?
 - d.** no faces?



2. Answer the questions from part (1) for cubes with edges with lengths of 3, 4, 5, and 6 centimeters.



Organize your data in a table like the one below.

Edge Length of Large Cube	Number of Centimeter Cubes	Number of Centimeter Cubes Painted On			
		3 faces	2 faces	1 face	0 faces
2					
3					
4					
5					
6					

- B.** Study the patterns in the table.
- Describe the relationship between the edge length of the large cube and the total number of centimeter cubes.
 - Describe the relationship between the edge length of the large cube and the number of centimeter cubes painted on
 - three faces
 - two faces
 - one face
 - zero faces
 - Decide whether each relationship in parts (1) and (2) is linear, quadratic, exponential, or none of these.
- C.**
- Write an equation for each relationship in parts (1) and (2) of Question B. Tell what the variables and numbers in each equation mean.
 - Sketch the graph of each equation. What shapes could you have predicted? Explain.