Assignment: Factor a Sum of Cubes

Follow the directions to find the missing information in each problem. Be sure to show all work leading to your answers and simplify your answers whenever possible.

1. A shipping company offers various sized shipping boxes to its customers. Some of these boxes are cube-shaped, with equal height, width, and depth. As part of an upcoming sales promotion, the company will offer two cube-shaped boxes for the price of one.

    a. Write an expression to represent the total volume of two different sized boxes as a sum of cubes if one of the boxes has sides with a length of 1 foot and the other has sides with a length of x feet.

    b. Factor the sum of cubes.

    c. Calculate the total volume of the two boxes if $x = 3$ feet.

2. A toy manufacturer is preparing to manufacture a puzzle cube in two different sizes. One of the puzzle cubes will have a side length of 4 centimeters, and the size of the other is yet to be determined.

    a. Write an expression to represent the total volume of two different sized puzzle cubes as a sum of cubes, using m centimeters as the side lengths of the second puzzle.

    b. Factor the sum of cubes.

    c. Calculate the total volume of the two puzzle cubes if $m = 5$ centimeters.

3. A pet supply store is planning to offer cube-shaped fish tanks. The store manager decides to order one tank with a 12-inch side length but has not yet decided on the size of the other.

   a. Write an expression to represent the total volume of two different sized tanks as a sum of cubes, using $2t$ centimeters as the length of the sides in the second tank.

   b. Factor the sum of cubes.

   c. Calculate the total volume of the two fish tanks if $t = 7$ inches.

4. Think of another real-world situation involving two different sized cube-shaped items.

   a. Write a sentence to describe what the cubes represent and then write an expression to represent the total volume of the two items as a sum of cubes, using $2a$ to represent the side lengths in one cube and $3b$ to represent the side lengths in the other cube.

   b. Factor the sum of cubes.

   c. Choose two different values for a and b and use these values to calculate a specific total volume for the two items.