Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Filling and Wrapping***

**1.4**

***Problems B,C,D***

Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour \_\_\_\_

The Science Club wants to promote environmental awareness in the community. It organizes a campaign to have families build and use compost containers called 1-2-3 boxes.

A 1-2-3 is a rectangular wooden box that is 1 foot high, 2 feet wide, and 3 feet long. Each box will compost 1 pound of garbage per day.

**B.** What changes in the dimensions of the basic design would produce a box that could compose 2 pounds of garbage each day?

4 pounds of garbage?

10 pounds of garbage?

**C.** The Science Club wants to scale up the basic 1-2-3 design to a larger box that is similar in shape.

1. Complete the following table that shows the cost and capacity of several larger boxes.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Open Box**  **(*h-w-l)*** | **Scale Factor** | **Surface Area**  **(ft2)** | **Volume**  **(ft3)** | **Amount of Garbage Decomposed in a Day (lb)** |
| 1-2-3 |  |  |  |  |
| 2-4-8 |  |  |  |  |
| 3-6-9 |  |  |  |  |
| 4-8-12 |  |  |  |  |
|  |  |  |  |  |
|  |  | 1,024 |  |  |
|  |  |  |  |  |
|  |  |  | 6,000 |  |

2. What growth patterns do you see in the volume and surface area?

**D.** Suppose a large compost box is similar to a 1-2-3 box with a scale factor of *f*.

1. How is the surface area of the large box related to that of the 1-2-3 box?
2. How is the volume of the 4-8-12 box related to that of the 1-2-3 box?
3. How is the amount of decomposed garbage related to the volume of the 1-2-3 box?

**Summary:**

How does the volume of a prism change if you increase all three dimensions by a scale factor?

How does the surface area of a prism change if you increase all three dimensions by a scale factor?