

1.4 Compost Containers

Scaling Up Prisms

Finding enough landfill space for garbage is becoming a problem for many communities. Some communities are considering composting as a way to recycle garbage into productive soil. Composting is a method for turning organic waste into rich soil. Today, many people have compost boxes that break down kitchen waste quickly and with little odor. The secret is in the worms!



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.



Recipe for a 1-2-3 Compost Box

- Start with an open rectangular wood box that is 1 foot high, 2 feet wide, and 3 feet long. This is a 1-2-3 box.
- Mix 10 pounds of shredded newspaper with 15 quarts of water. Put the mixture in the 1-2-3 box.
- Add a few handfuls of soil.
- Add about 1,000 redworms (about 1 pound).

Every day, mix collected kitchen waste with the soil in the box. The worms will do the rest of the work, turning the waste into new soil. A 1-2-3 box will decompose about 0.5 pound of garbage a day.



- If you want to double the amount of garbage you can compost, what would be the dimensions of the new box?
- How many worms would you need?

**Problem 1.4**

- A** Use grid paper to make a scale model of the 1-2-3 box that will decompose 0.5 pound of garbage each day.
- B** Assume that the number of worms used increases to match the increase in box volume. What changes in the dimensions of the basic design would produce a box that could compost 1 pound of garbage each day? 2 pounds of garbage? 5 pounds of garbage?
- C** 1. The Science Club wants to scale up the basic 1-2-3 design to a larger box that is similar in shape. Copy and complete the following table that shows the cost and capacity of several larger boxes.

Compost Box Project

Open Box ($h-w-l$)	Scale Factor	Surface Area (ft^2)	Volume (ft^3)	Amount of Garbage Decomposed in a Day (lb)	Worms Needed
1-2-3	■	■	■	■	■
2-4-6	■	■	■	■	■
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 scale factor f .
- How is the surface area of the large box related to that of the 1-2-3 box?
 - If both boxes had tops, would the relationship of surface areas change? Explain.
 - How is the volume of the 4-8-12 box related to that of the 1-2-3 box?
 - How is the amount of decomposed garbage related to the volume of the 1-2-3 box?

A C E Homework starts on page 15.