



Science

# Worms at Work



## Objective

To teach students that food scraps and yard trimmings can be made into compost instead of being thrown away.



## Activity Description

Students will create a compost bin using worms and food scraps and monitor changes in the bin over time.



## Materials Needed

- Large plastic bin (about 8 to 16 inches deep) with holes in the bottom for aeration
- Tray for underneath the bin
- Two bricks or other large sturdy objects
- 9 to 14 pounds of newspaper
- One bag of potting soil
- 1 pound of red worms
- Food scraps (such as bread, vegetables, fruits, eggshells, grains, coffee grounds, tea bags) Do NOT include meat, bones, mayonnaise, fish, peanut butter, candy, or nonfood items
- Tarp or drop cloth
- Bucket or other carrying container
- Household gloves (optional)
- Copy of *Vermicomposting Data Sheet* for each student



## Key Vocabulary Words

Compost  
Vermicomposting  
Castings  
Decompose  
Bedding  
Organic



## Duration

Setup: 1 hour  
Follow-up: 15 minutes to 1 hour on an occasional basis



## Skills Used

Computation  
Observation/classification  
Motor skills



## Activity

**Step 1:** Explain to the class what compost is and how it is made (refer to the Teacher Fact Sheet titled *Composting* on page 109). Discuss the use of worms, the need for and use of organic waste, and other vocabulary words. During the course of this lesson, inform students of good and bad foods to use in composting, as well as the reason why it is better to compost than to throw food scraps away.

**Step 2:** Place bin on top of two bricks and put tray under bin.

**Step 3:** Have the students tear each sheet of newspaper lengthwise into strips that are 1 to 3 inches wide and place half of the pile in the bin.

**Step 4:** Have the students multiply the number of pounds of newspaper by 3 to determine the total amount of water needed (a pint of water weighs a pound, and a gallon of water



## Journal Activity

Have students write a poem, such as a limerick, that describes what compost looks like and how it feels when touched.

weighs 8 pounds). Then add half of the water to the bin with newspapers.

**Step 5:** Sprinkle two handfuls of soil and the rest of the newspaper and water. Have the students mix the contents well and distribute evenly in the bin.

**Step 6:** Gently place the worms on top of the bedding, spreading them evenly. Keep the bin uncovered so the students will see the worms moving down into the bedding to avoid light.

**Step 7:** Use the attached data sheet to record all activities surrounding the worm bin, including the date the bin was set up, the number of worms (or pounds of worms) added to the bin, and the number of people contributing food scraps (number of people in the class). For the remainder of steps for this activity, have students record the date and day food is added, includ-

ing the type of food and its weight, as well as the amount of water added. The compost bin should always remain moist.

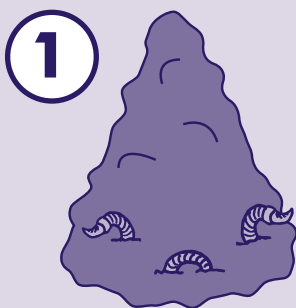
**Step 8:** Use food scraps that you brought from home or that you asked students to bring from home or save from school lunch, and have students add them to the bin. Food can be added daily, weekly, or monthly. Do not overload the system; bury food relatively evenly amongst the different "plots." On the data sheet, instruct students to keep track of how much food they are providing the worms and where it is placed (see diagram on data sheet).

**Step 9:** Place a sheet of newspaper over the top of the bin to prevent flies from circulating near the area. Store the bin in a cool place out of direct sunlight, and keep the lid tightly shut.

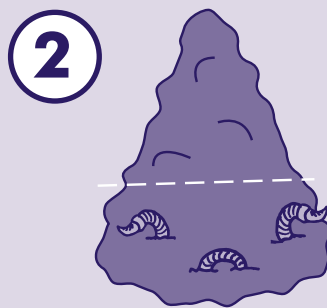
**Step 10:** Have students check the bin frequently as they add food scraps to see the changes that occur. After a period of 3 to 6 months, depending on the size of the container, most of the food and bedding will be transformed into worm castings, the nutrient-rich waste materials that worms excrete.

**Step 11:** In order to harvest the compost, or humus, for use (if you choose to), you must change the bedding and temporarily remove the worms. Spread out a tarp or drop cloth in an open area and dump out the entire contents of

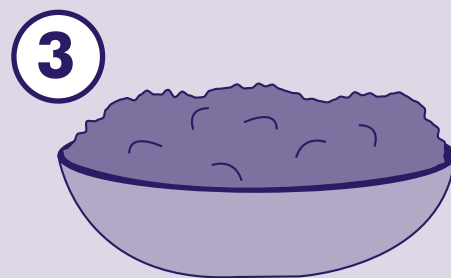
## Step 11: How To Harvest Compost



**1** Divide compost materials into several cone-shaped piles (larger on the bottom).



**2** Scoop off the material from the top of the piles.



**3** Put the castings into a container to carry out to the garden.

the bin. Have students help you divide the materials into several cone-shaped piles (larger on the bottom, so the worms will burrow into it and avoid the light). Direct students to scoop off the material from the tops of the piles, and put the castings into a container to carry out to the garden (see illustration on the previous page for help). Repeat this procedure until most of the compost is harvested.

**Step 12:** Have students put worms back in the bin, along with any uncomposted food and old bedding. Your class can start a new stock of bedding and add in any additional worms to begin the process again.

**Step 13:** Create a garden in which to use the compost as a soil amendment, or use the compost on the schools' beds or lawn.

**NOTE:** Other critters may make their way into the compost bin. Many are beneficial, including mold, bacteria, sow bugs, beetle mites, white worms, snails and slugs, flies, round worms, and millipedes. You do NOT want the following in your bin, however: flat worms, ground beetles, centipedes, ants, and pseudo scorpions. If you find any of these organisms, start over.



## Assessment

1. Ask students to define and describe decomposition.
2. Ask students why it is beneficial to compost items instead of throwing them away.



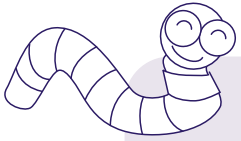
## Enrichment

Ask the students to make observations about the worm bin each week. Do smaller pieces of food tend to break down faster than larger ones? What does the compost smell like? What organisms do they notice? Are the worms multiplying?

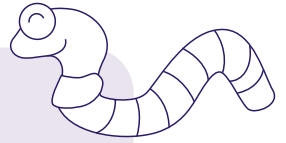
1. Have students take the temperature of the worm bin once a week to determine the variations that occur while food is composted. Use a thermometer that can measure up to 170°F. Have the students create bar graphs showing the increase or decrease in temperature over time.
2. Let students use a pH paper to test the acidity of the worm bin once a week. Does the pH change based on the foods that are added? Have the students keep a record of the foods that are added and the pH and chart a graph showing the correlation. If the soil is too acidic, the worms may try to leave the bin. Try adding a little lime.
3. Give students gloves to gently examine the critters inside the bin once a week. You might also examine a sample of the soil under a microscope (at the beginning of composting, bacteria are present that help break down the food; later larger organisms such as sow bugs and round worms play a larger role.) Obtain an identification guide to invertebrates and insects and see how many you can identify. Have students draw the different kinds of critters and discuss the differences in each (number of legs, body parts, function).

# Student Handout

Name: \_\_\_\_\_



## Vermicomposting Data Sheet



Date bin was set up: \_\_\_\_\_



Number of worms (or pounds of worms) added to bin: \_\_\_\_\_



Number of people contributing food scraps on a regular basis: \_\_\_\_\_



Date	Day	Weight of food added	Type of food added	Amount of water added	Buried in site #	Notes

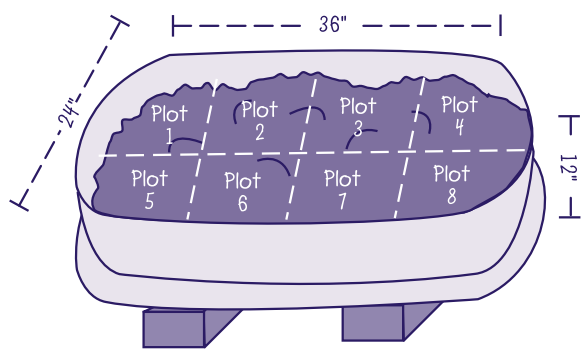


(If you run out of spaces, get an extra copy of this sheet from your teacher.)



On the back of this paper, draw the worm bin, including its dimensions, and assign plots to certain sections so you can track decomposition of food placed in each numbered area.

### Example:



Harvest date: \_\_\_\_\_

Total days: \_\_\_\_\_

Total weight of food buried: \_\_\_\_\_

Weight of uneaten food left over: \_\_\_\_\_

Average weight buried per day: \_\_\_\_\_