Setting Up a Worm Bin

OBJECTIVES:

Students will:
1. set up and maintain a worm compost bin in the classroom.
2. learn about the importance of worms as decomposers and identify other compost critters in the bin.

STANDARDS: Science

SKILLS: Analysis, classification, description, problem solving

SETTING: Classroom

TIME: Setting up bin: 30 minutes
Ongoing: 5 minutes daily to once a week, maintaining bin by adding food
Worm bin observation: 30 minutes (2–3 weeks after setup)

VOCABULARY:
Bedding
Compost
Decomposition
Food scraps
Organic
Red worms
Worm bin
Worm castings
Vermicompost

Introduction

Overview:
In this lesson, students will set up a worm compost bin in the classroom, maintain the bin and observe how the contents change over time.

Teacher Background:

Worm composting is a fun, low-maintenance way of recycling food scraps and other organic material. Red worms or composting worms eat vegetative food scraps and turn them into a high-quality fertilizer known as "worm castings." Worms can thrive in a composting bin as long as they have moisture, air, bedding, and food. Worm composting can be done inside or outside, requires no turning, is odorless if done correctly and can be done in small spaces. Worm composting is most appropriate for food scraps (no meat or dairy).

Worms like to eat decomposable matter that we throw away such as apple cores, melon rinds, and soggy bread, breaking organics materials down into a rich, dark brown, earthy-smelling material called "worm castings." Castings are a nitrogen-rich fertilizer that is good for lawns, gardens and houseplants.

Materials:

Student:
- ❑ Newspaper
- ❑ Handful of soil
- ❑ Popsicle sticks or cotton swabs
- ❑ Water
- ❑ Food scraps
- ❑ "Worms at School" worksheet

Teacher:
- ❑ One pound of red worms
- ❑ Worm bin
- ❑ Rubric overhead
- ❑ Rubrics (one per student)

Preparation:

For infomation on obtaining a school worm compost bin for teachers in Alameda County call 1-877-786-7927. Get worm composting advice by calling 510-444-SOIL. You can also visit **www.StopWaste.Org**.

Assemble compost bin before the lesson. See information in the "Teachers Resources" on building a worm bin.

Optional: Assign students to bring in vegetable or fruit scraps collected from home.

ACTIVITY

Discussion

1. Introduce worm composting by discussing the importance of worms as a waste reduction strategy. Worms help reduce waste by turning food scraps and other organic materials into a rich soil amendment.

2. Describe how worms turn vegetable and fruit scraps into compost. For example, red worms eat vegetable food scraps, digest the scraps and produce rich vermicompost that can be used as soil ammendment.

3. Ask the students what conditions worms need in order to live in a worm bin (darkness, moisture, moderate temperatures, bedding and food).

4. Tell the students that they will be setting up a worm bin in the classroom that will help reduce organic waste. The students should try to save fruit and vegetable scraps from their lunches to feed the worms instead of throwing them away.

5. Show an overhead of the lesson rubic, and review the expectations for this lesson.

Procedure

1. Give each student the "Worms at School" worksheet.

2. Explain how to prepare the worm bin bedding by modeling how to tear newspaper into 1/2" to 1" wide strips. Tear about ten sheets of newspaper lengthwise with the grain. Dunk the newspaper strips in water (the paper should be wet as a wrung-out sponge), and add to the bin. Add a handful of soil, and fluff the "bedding" like a big salad.

3. Add worms and food: purchase or obtain about one pound of red worms (about 500 to 1,000 worms). See the "Teachers Resources" section for worm sources. Gently place the worms on top of the moist bedding near the bottom of the bin. Put about a handful of food waste near the worms and cover the worms and food well with the moist newspaper bedding. Add more dry, shredded newspaper to fill the bin to the top. This will keep fruit flies out of the worm bin.

4. Let the worm bin rest by not adding any additional food for one to two weeks. This allows the worms a chance to get used to their new environment and for the food to begin to decompose.

5. For ongoing maintenance, feed the worms from one to several days a week, always burying the food under paper. Do not overfeed. Bad odors or large amounts of uneaten food indicate overfeeding. Add more paper as needed to cover food. Make sure to never include meat or dairy.

6. After several weeks, the students may do an exploration of the worm bin. Hand out piles of material from the worm bin on newspaper and provide the students with popsicle sticks or cotton swabs. Organize the students into groups of four or six. Have them list all of the things they see in the compost and answer these questions: Can you see pieces of food? What kinds? What kind of compost critters are present? Are the worms active? Describe.

7. Worm castings will be ready to harvest from the worm bin after three to six months. Refer to Lesson 24, "Harvesting a Worm Bin," for information on how to harvest worm castings.

Wrap-Up

1. Ask students to share some reasons for using worms to compost food scraps. You may share some of the following reasons:
   a. We will reduce the amount of garbage we create.
   b. Compost improves the soil and makes it hold water better.
   c. When we use compost, we use fewer chemical fertilizers and avoid creating pollution.
   d. Composting is fun!

2. Have them explain how worms turn food scraps into compost.

3. Explain to the students that after three months, they will harvest the worm bin.

Final Assessment Idea

Have students write an expository paragraph that describes the sequence of setting up a worm bin and how the contents of the bin has changed over time based on their own observations.

RESOURCES

Extensions:

Have students measure the weight of food scraps that are added to the worm bin for one week. Have them calculate how much food they have diverted from the waste stream for one month by composting it instead of throwing it away.

Teacher Materials:

California State Content Standards

The standards below represent broad academic concepts. This lesson provides connections to these academic concepts through hands-on activities and exploration. This lesson is not designed for a student to master the concepts presented in the standards. Additional lessons in the classroom that build on this lesson or the standard(s) ensure that students will have the opportunity to master these concepts.

SCIENCE	CONTENT STANDARDS
Grade 4	**Life Science** 2.b. Students know producers and consumers (herbivores, carnivores, omnivores and decomposers) are related in food chains and food webs and may compete with each other for resources in an ecosystem. 2.c. Students know decomposers, including many fungi, insects and micro-organisms, recycle matter from dead plants and animals. 3.a. Students know ecosystems can be characterized by their living and nonliving components.
Grade 5	**Life Science** 2.g. Students know plant and animals cells break down sugar to obtain energy, a process resulting in carbon dioxide (CO_2) and water (respiration).

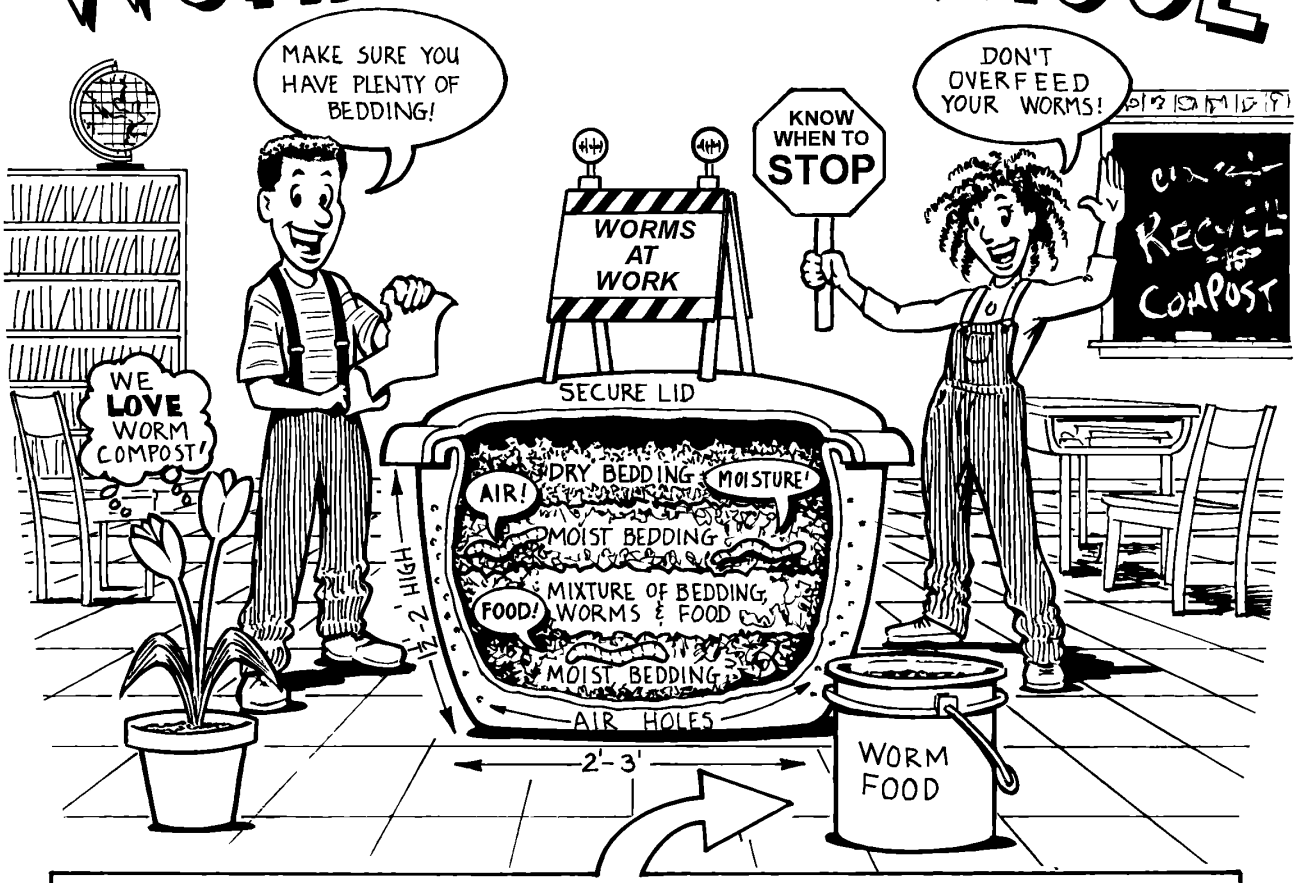
Teacher

Setting Up a Worm Bin Rubric

A rubric is a scoring tool that defines the criteria by which a student's work will be evaluated. This rubric is provided to assist you in setting expectations for students and assessing their performance and engagement during the lesson based on specific tasks. Ideally, a rubric is developed with the cooperation of the students. Two blank rows have been provided for you and your class to develop and add your own assessment criteria.

Category	4	3	2	1
Setting up the worm bin	Student helps with setting up the bin.	Student tries to help with setting up the bin.	Student does little to help with setting up the bin.	Student does not help with setting up the bin.
Maintaining the worm bin	Student helps maintain the bin.	Student sometimes helps maintain the bin.	Student does little to help maintain the bin.	Student does not help maintain the bin.
Exploring the worm bin	Student examines and identifies the contents in the bin.	Student examines and identifies some content in the bin.	Student examines very little content in the bin.	Student does not examine the content in the bin.

WORMS AT SCHOOL



HERE ARE JUST A FEW "KITCHEN SCRAP" TYPE THINGS WORMS LOVE TO EAT!

APPLE CORES | ORANGE PEELS | EGG SHELLS | SHREDDED PAPER | TORTILLA CHIPS | COFFEE GRINDS | MELON | LETTUCE | BREAD CRUST

- LIKE HUMANS, WORMS NEED _____ , _____ & _____ TO LIVE.
- SHREDDED PAPER PROVIDES THE _____ FOR WORMS TO LIVE IN.
- WORMS MAKE _____ THAT CAN BE USED ON PLANTS.

Name: _____ Date: _____

DEFINITIONS

Vocabulary

Bedding: material such as dried leaves or shredded paper used to retain moisture, create air space and cover food scraps in a worm composting system.

Compost: the process or end result of living organisms digesting and reducing organic material into a dark, rich, soil amendment.

Decomposition: the process of materials being digested and broken down into simpler substances, making nutrients more available to plants. Decomposition happens all the time in nature and in human-managed systems such as compost piles.

Food scraps: food that can be put into a compost bin, typically fruit and vegetable scraps. Meat, dairy and oils are excluded because they can attract pests.

Organic: any materials that were once living or materials produced by a living organism. such as food, leaves, plant trimmings, hair, clothing fibers, paper, etc. Organic may also be used to describe food grown using sustainable agricultural methods.

Red worms: the type of worm typically used in worm composting systems. Red worms can be found in leaf mold and manure piles and can be purchased in bait shops and some gardening stores. Their Latin (scientific) name is *Eisenia fetida*.

Worm bin: a container used to hold worms, food scraps and bedding for composting.

Worm castings: worm manure or the final product of worm composting. It is a high-quality, rich soil amendment that is used to fertilize plants.

Vermicompost: compost produced in a worm composting system. It is a mixture of partially decomposed organic waste, bedding and worm castings. When finished, it is a balanced, nutrient-rich compost for the garden.