

Garbology Lesson: Let's Build a Worm Bin!

Grades K-5; K-4 Standards

Lesson Summary

Students set up a worm bin and learn the important role worms play in the process of decomposition and making compost.

Overview

In this lesson, students will:

- Discuss the role of red worms in decomposition and waste reduction.
- Prepare a worm home.
- Measure worms and weigh worm food.

Time

60-90 minutes to prepare. 40-60 minutes for the lesson.

Vocabulary

- Vermicomposting
- Red Wigglers
- Castings
- Fertilizer
- Compost
- Landfill

Preparation

- Read background information on first page
- Have students read: *The Dirt on Composting* and *Composting with the FBI* fact sheets. (For younger students, introduce relevant concepts from fact sheets)
- Copy *Record Sheet* and *Worm Menu* so that each student has one. See sample at end of lesson.
- Save a small amount of leftover plant-based foods from lunch. Cut into small pieces and keep in an airtight container.
- Poke breathing holes into lid of plastic tub.

Background

Composting with worms, also called **vermicomposting**, is the process of using Red Wiggler worms to transform food scraps into a nutrient rich fertilizer known as **castings** or **compost**. Vermicomposting helps reduce the amount of waste going to the **landfill**, the amount of methane released into the atmosphere from landfills, and our dependence on chemical fertilizers.

Vermicomposting can be done inside or outside. It is odorless if done correctly and does not require a lot of labor or space. Building a worm home is simple. All that is needed is a bin, some worms, shredded newspaper for bedding, and organic material like leftover food scraps. Although worms can eat animal products like meat, cheese, and eggs, they will produce a bad smell if put in worm bins. Maintenance of the bin requires some monitoring and controlling, though not much.

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Garbology.org/teachers

Materials

- *The Dirt on Composting* and *Composting with the FBI* student fact sheets—1 per student
- Plastic storage tub and lid
- Red Wiggler worms
- 10 sheets of newspaper
- Spray bottle of water
- 1/2 cup of food scraps chopped into small pieces (to prevent smell, use only plant-based food scraps!)
- Rulers
- Scale
- Gloves (plastic or latex)



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Red Wigglers are commonly used in vermicomposting, because they are space and temperature tolerant, and they reproduce quickly. Most importantly, Red Wigglers can eat organic matter equaling half of their body weight every day.

Having a worm bin in the classroom is a fun and engaging learning experience and can reduce the amount of garbage your classroom generates. Vermicomposting is a great tool for teaching about habitats, nature's cycles, and the responsibilities associated with caring for living things.



Pre-Activity Questions

Ask students:

1. What is a landfill? (*Big hole in ground where garbage is buried*)
2. What are decomposers? (*Living things that live in the soil and break down organic matter into compost*)
3. What is compost? (*Crumbly, dark soil that helps plants grow*)
4. How does compost help plants grow? (*It provides nutrients*)
5. How does composting reduce the amount of garbage we make? (*Keeps organic matter out of the landfill*)
6. If “vermi” means “worm” in Latin, what does “vermicomposting” mean? (*Composting with worms*)
7. What do we know about worms? (*They live underground, they eat our leftover food, they can eat half their weight every day*)
8. What do worms eat? (*Plant-based foods like fruits, vegetables, bread, and meat*)
9. Name some examples of plant-based foods that you might have after lunch? (*Bread crusts, fruit peels, carrot tops*)
10. What happens to the leftover food after worms eat it? (*It gets digested and comes out of the worms' bodies as “castings”, or compost which are like vitamins for the soil*)

Classroom Activity

1. Explain that the class is going to keep worms as pets, so that students can observe decomposition.
2. Ask students what all animals and human beings need to survive? (*food, water, shelter, air*)
3. Explain how each need will be met in the worm bin:
 - Shelter – bin and newspaper bedding
 - Food – leftover food scraps (*fruits, vegetables, and bread*)
 - Water – moistened newspaper
 - Air – air holes should be punched into the bin (*storage tub and lid*)
4. Show students the bin and explain that it will be the worms' home.
5. Prepare the bedding.
 - Hand out half a sheet of newspaper to each student and have them tear into strips about ½” to 1” wide.
 - Place bedding in bin and spray with water bottle until it is about as moist as a wrung out sponge.
6. Pass out to students the *Record Sheet* and *Worm Menu* and ask students to fill out the menu. Older students can alphabetize this list. (*Worms can eat all plant-based foods like vegetables, fruit, and bread products. Although they can eat animal products like meat, cheese, and eggs, don't put those in worm bins because of the bad smell they will produce.*)

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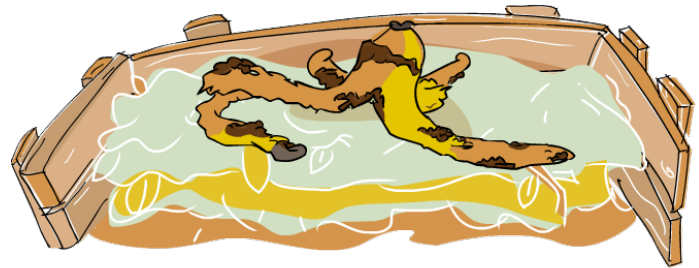
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7. Students will now fill out the *Record Sheet*. Ask them to weigh and record the total amount of worms put into the bin so that they can compare it to the total weight of food put into the bin. Ask them to observe how long it takes for this initial food to decompose. Have them check every day or couple days.
8. Now it's time to add the worms and the food to the bin:
 - Place worms in the moist bedding near the bottom of the bin. Include soil from box of worms if available. Place a handful of food near worms and cover with newspaper.
 - Add dry shredded newspaper on top.
9. Let your students get to know their worms. Hand each pair of students a worm and ask them to carefully observe, describe, and measure the worm when extended to its full length. Develop a chart with students to record and compare lengths of 20 worms.
 - Younger students can visually compare longer and shorter worms.
10. For ongoing maintenance, feed the worms every three to seven days, always burying the food under paper. Do not overfeed. Add more paper as needed to cover food and soak up excess moisture.



Discussion Questions

1. What do worms need to survive? (*shelter-bin; food-leftover lunch or snacks; moisture-dampened bedding; air-fluffed newspaper and air holes in bin*)
2. What did we learn about worms? (*They help break down leftover food into compost and reduce our garbage*).
3. How do you feel about worms now that you know more about them? Do you like them? Why or why not?
4. What is the average length of the worms? How many worms are shorter than 2 inches? How many are longer?
5. How much do the worms weigh? How much does the food weigh?
6. Make a prediction of how long it will take the worms to break down the food.

Extensions

- Have students make a collage of “worm food” cut out of magazines and newspapers. Ask students to sort foods into categories.
- Have students write a short story about “A Day in a Worm’s Life” or a conversation between two worms in the worm bin.

National Science Standards Addressed

- Grades K-4:
- Characteristics of organisms (4CLS1)
 - Organisms and environments (4CLS3)
 - Abilities of technological design (4EST1)
 - Abilities necessary to do scientific inquiry (4ASI1)
 - Understandings about scientific inquiry (4ASI2)

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A Visit to the Worm Doctor

Symptoms	Causes	Remedy
Strong, bad smell	Not enough air circulation	Fluff bedding, make sure air holes are not blocked.
	Overfeeding	Feed worms less food and/or less often
	Improper food added	Remove animal products
Fruit flies	Food exposed	Bury food completely
	Too much food	Feed worms less food and/or less often
Dead worms	Bin too moist or dry	Adjust moisture or bedding levels
	Not enough food	Add more food
Ants in bin	Too dry	Add spritz of water
		Put sticky ant trap on legs of bin
		Put legs of bin in water
Mites	Too moist in bin	Avoid adding food with a lot of moisture



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Record Sheet

Date	Weight of Food	Type of Food	Weight of Worms	Length of your Worm

Worm Menu

DO feed worms: Food from Plants	DON'T feed worms: Food from Animals
Example: Apple cores	Example: Hamburgers

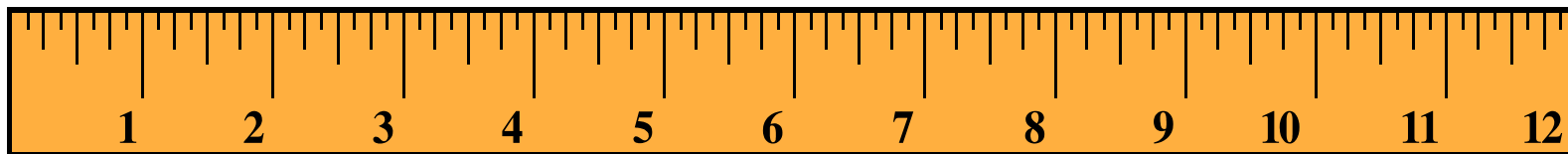


How Long are Worms?

5"																				
4"																				
3"																				
2"																				
1"																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Worm Length

Worm Number



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