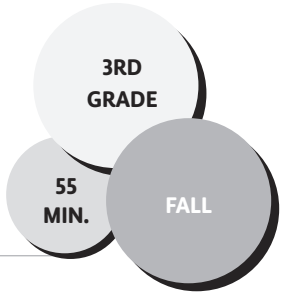
Worm Bin Wonders

THEME: GROWING AND ACCESSING HEALTHY FOOD



ESSENTIAL QUESTION

How do decomposers play an important role in growing food?

LEARNING OBJECTIVES

✓ Students will be able to construct a worm bin.

CONCEPTS

decomposition fertilizer vermicomposting worm castings recycling

Engaging the Classroom Teacher

- Ask teachers want beforehand whether they want a worm bin established for their class.
- Ask whether students are responsible enough to drill or whether you should pre-drill the holes.
- During Action Steps 3 and 4, suggest that the teacher support students who are exploring worms & designing their worm bin while you help students set up the worm bin.

LESSON DESCRIPTION

In this lesson, students learn about the decomposition of food waste by observing worms and working collaboratively to build a worm bin.

MATERIALS

- ☐ 10-gallon opaque plastic storage bin
- ☐ Old newspaper
- ☐ Spray bottle filled with water
- ☐ 1 pound of Red Wiggler worms (if you have a friend with a worm bin, ask for some starter worms. If not, you can often purchase Red Wigglers in garden centers or even buy them online.)
- ☐ Quart container of garden soil
- ☐ Food scraps
- ☐ Cordless power drill with drill bit
- ☐ Paper towel for each student
- ☐ Permanent marker
- ☐ Colored pencils
- ☐ Garden journals (if available) or plain paper for stations
- ☐ Chart paper (optional)
- ☐ Magnifying glasses (optional)
- ☐ Coffee stirrers for moving worms (optional)

PREPARATION

› If you are new to worm composting, research how to build and maintain a worm bin prior to teaching this lesson.

› Collect approximately one quart of raw fruit or vegetable food scraps, perhaps from lunch or snack.

› Use a permanent marker to mark and space out dots to drill holes along your bin's lid and the top third of the sides. Make sure there are enough dots so that each student can drill one hole.

- Dampen paper towels to hand out to groups observing worms.
- Students will work in stations for this lesson, prepare the spaces accordingly: observing & sketching worms, designing a worm bin, & setting up the worm bin. Plan the time for each section so that all students move through all three activities. This can also be broken into sessions, as needed.
- Draw a KWL chart on the board or chart paper (see example). You can photocopy or display the KWL chart. If you have access to a laminating machine, laminate copies for students to use as they're observing worms.

Why are worms important for soil?

WHAT WE . . .		
Know	**Want to Know**	**Learned**

WORM FACTS

- Worms are able to recycle food scraps and organic materials (like newspaper) into compost rich in nutrients
- The process of worms breaking down scraps of food and organic materials is called decomposition.
- When worms decompose scraps of food and organic materials, they are vermicomposting.
- Worms' waste is called castings. Castings are full of nutrients and help make plants grow. Worm castings are nature's fertilizer for the soil and also helps soil absorb water to stay moist.
- Red Wigglers are the BEST worms to use when creating a worm bin because they have HUGE appetites and can survive in different conditions.
- Worms secrete a liquid that makes burrowing tunnels underground easier and keeps them moist. When they burrow tunnels they create necessary air pockets that break up compacted soil, allow greater nutrient uptake from plants, and help other life e.g. microorganisms in the soil survive.
- Worms have tiny hairs called setae on each body segment that help them move through the soil. Their movement aerates the soil, meaning they burrow tunnels that allow oxygen to enter and water to drain better for healthy plant root growth.

ACTION STEPS

1. Connecting to Prior Knowledge: Ask, *What do you typically do with food scraps?* Discuss whether students throw them in the trash, or whether they use compost bins. Ask, *Do you know that worms are excellent at recycling?* See if students can explain how. Ask students to share with a partner what they know and what they want to know about worms. Display a KWL chart on the board, and as students share with the class, fill in the "Know" and "Want to know" columns of the chart, taking the opportunity to dispel any myths and/or flag any questions that arise for later research. You don't need to be a worm expert! ***(5 min.)***

2. Explain Worm Bin Setup: Explain that today you'll be building a worm bin that the class can use to process its food waste into excellent

compost for the garden. Show the class the materials you'll use for creating the worm habitat. Explain, *Shredded newspaper is the worms' bedding, but they eat it too! We use the spray bottle to keep the newspaper nice and moist, like a wrung-out sponge. They can't have it too wet or too dry because worms breathe through their skin and can actually drown! We add soil from the garden because it helps their digestion. We'll also add food scraps, making sure that we bury it under the bedding so that we don't also attract fruit flies and other pests. Worms aren't crazy about food like onions and citrus. Do you know that worms can eat half their weight in food in a day?* ***(5 min.)***

3. Explain Worm Observation: Explain that you're going to pass out worms for students to observe at their tables, while other students begin work on the worm bin. Then groups will switch tasks. Ask, *How should we treat the worms?* Discuss being gentle. Say, *Let's remember to be observers. So we're mostly using our eyes to observe different parts of the worms. See how many body parts you can recognize.* To give students a purpose while they are observing the worms, have them sketch the worm and anything else they observe about worm movements, texture, etc.. Tell students that as they're observing, they should also think of new questions they have for the KWL chart. Pass out a small handful of worms on dampened paper towels to half your students to observe. ***(5 min.)***

4. Setting Up Worm Bin: While half your students are observing worms, this group of students will practice designing a worm bin and prepare the worm bin. Start by asking them, *How do we keep our worms thriving so they can vermicompost?* Collect student responses and then explain, *Our worms need a balance* (1:3 ratio) of green and brown materials. Green materials (nitrogen-rich) are fruit and vegetable scraps along with things like grass clippings. Brown materials (carbon-rich) are twigs, dried leaves, shredded newspapers, and straw.

Break students into two groups or into stations 2 & 3. Students draw what an ideal worm bin should look like. Give them crayons to color. Provide them a pencil so they can label what they draw. Students should use as many of their new vocabulary words as possible like castings, decomposition, fertilizer, etc. The third group of students will shred newspapers and prepare the worm bin. Call them up one at a time to drill a hole into the bin (with help from an adult!), add their shredded newspaper, and spray with water. Be sure that each student only sprays a couple times. Remind students that we don't want our worms to drown! Lastly, remind students that they will need to turn the soil regularly so that it stays moist.

If you already have an established worm bin, this rotation can be about students maintaining the worm bin with fresh bedding, food, and hydration. ***(15 min.)***

5. Finishing Worm Bin: Once groups have moved through all three stations: observe worms, drawing a worm bin, and helped establish the worm bin, have the class watch as one student adds the worms beneath the bedding, another student sprinkles the container of soil, and another buries the food scraps under the bedding. If the teacher has popsicle sticks or another method to randomly generate student volunteers, use them! Have all students wash their hands, clean the workspace, and return to their seats. ***(10 min.)***

6. Why Are Worms Important KWL: Today, as gardeners, you have started a worm bin. Have students return to their KWL charts. Ask students what they learned about "Why are worms important to soil?" Students can turn and talk to a neighbor in a whisper voice to share what they learned. Then the food educator can ask a few students to share aloud with the whole class. Ask students to turn to a neighbor and share three things you need to construct a worm bin. Food educators can invite students to share with the whole group and collect some responses on the chart. ***(10 min.)***

7. Reviewing Responsibilities: If this class is keeping the worm bin in their room, explain to students that they'll be responsible for keeping their worms healthy, happy, and fed each week. Explain the role of the Worm Lifeguard who rotates each week. Say, *You'll want to check your worms' bedding and spray water if it's too dry, or add more newspaper if it's too wet. Start by feeding them once a week, but be sure to observe how much they've eaten since you last fed them, and adjust the amount accordingly.* ***(5 min.)***

REFLECTION

Have students discuss the following questions in small groups, then share with the class: ***(5 min.)***

Social and emotional learning

- *What worked well in making our worm bin as a class? What could we have done better?*
- *Ask yourself: Did I take turns and help my classmates during the activity?*
- *What's one way you helped a classmate today?*

Check for understanding

- *What's one new thing you learned about worms today? (Add responses to L column of KWL)*
- *How do decomposers play an important role in growing food?*
- *How do worms help us grow our food?!*
- *How will you be taking care of your worms each week?*
- *What do you think we will see when we observe the worm bin in one week?*

ADAPTATIONS

Literacy Extensions: Have students create a how-to brochure of how to care for the worm bin. Students can also keep a weekly log in which they take notes on what they observe.

Song: Teach students the song "Gusano (I am a Worm)" by the Bungee Jumpin' Cows.

Thought Experiment: Explain to students that there are over 1 million worms in the size of a football field. Ask them to imagine what our earth would be like without earthworms tunneling in the soil and decomposing organic matter into rich worm castings. Have students draw a picture of what our world would be like without worms.

ACADEMIC CONNECTIONS

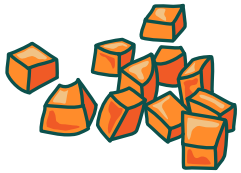
Next Generation Science Standards, Life Science Disciplinary Core Idea

NGSS LS.4.D

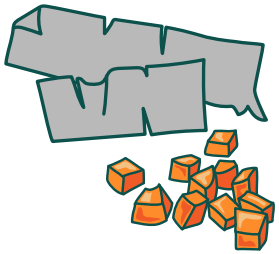
Populations live in a variety of habitats, and change in those habitats affects the organisms living there.

WORM LIFEGUARD CHORE CHART

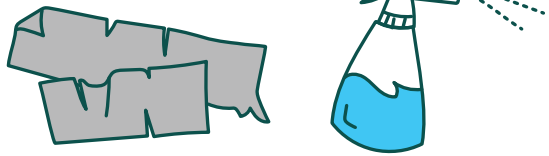
STEP 1: **Feed worms about a cup of food**
- **Raw fruit and veg**
- **Small pieces decompose quickly**



STEP 2: **Cover food with bedding**



STEP 3: **Check the moisture of the bedding**
- **If very dry, spray lightly**
- **If wet, add more bedding**



WEEK	NAME(S)