

DAY 1: WHAT HAPPENS TO DEAD ORGANIC MATTER?



MINI-LESSON

Teacher introduces the “Inquiry Toolbox” and “Team Roles” anchor charts.

SCIENCE INQUIRY CIRCLES

Teams explore and rank their interest in four food-disposal methods to be investigated throughout the unit.



GUIDED SCIENCE INVESTIGATIONS

The phenomenon of decomposition is introduced with videos of decomposing fruits, vegetables, leaf litter.



ABBREVIATED STANDARDS

- ELA and Reading TEKS: 5.13(A)
- CCSS: SL.5(1)(b)
- NGSS: 5-LS2.A, LS2.B
- TEKS: 5.1(A)(D)(E), 5.5(F), 5.12(A)(B)

Day 1: What Happens to Dead Organic Matter?

Literacy Focus: Food waste is a big problem for schools, but many schools have found solutions to reduce food waste.

Science Concept: When organisms die, their properties change, and organic matter is broken down slowly by natural processes.

Science and Literacy Connection: Food waste is organic matter, and natural processes can be harnessed to help break down food waste.

LAUNCHING THE INQUIRY PROJECT: THE PROBLEM OF FOOD WASTE

To launch this inquiry project, you (the teacher) will present to learners **page 2 only** (“Where Does Food Waste Go?”) from the [“What Happens to Discarded Food?”](#) report:

It might be helpful to isolate (e.g., project) page 2 so that learners are not confused about which parts of the report will be read.

Introduce the report to learners as a read-aloud or invite them to read page 2 in small groups. You might facilitate a discussion around these questions:

- At school, anything thrown in the trash cans will go to a landfill. How often do you see food being thrown away in trash cans at our school? In your home? In our community?
- Besides being thrown in garbage/trash cans, where else have you seen food placed?
- What do you think the authors mean when they say that food waste can be “broken down completely” and “recycled back into nature”?

Introduce the Unit

To introduce this unit, you might say something like this:

Over the next few weeks, you will become experts on the cycling of matter and energy through living systems. Your expertise will help you design a solution to reduce the food waste at our school.

During this unit, we will read about schools around the U.S. that are reducing their food waste. In your teams, you will investigate one method for transferring food scraps from the school to somewhere else so that other living things can use the energy stored in the food scraps. You will also participate in science investigations to understand the role of microorganisms in matter cycling and energy transfer. At the end of our unit, you will write a report describing what you learned about your method of disposing of food scraps and your ideas for reducing food waste at our school. Then, as a class, we will combine our knowledge about existing solutions to food waste and make a recommendation about reducing food waste in our school; we'll send the recommendation to our principal (or other appropriate school official).*

***NOTE:** In this unit we use the phrase “food disposal method” or simply the word “method” to refer to the different ways schools dispose of food scraps. This use of the word “method” should not be confused with “research methods” or different ways of conducting research (e.g., observation, investigation). This use of the word “method” will become important as learners begin exploring and writing scientific reports. You might need to explain this difference to learners.

Mini-Lesson (15 minutes)

OVERVIEW

Throughout the unit, teacher instructions are provided for each day’s reading strategy mini-lesson. These instructions consist of **declarative knowledge** (statement of what children will do or learn), **conditional knowledge** (context or background related to what children will learn), and **procedural knowledge** (explicit instruction and practice). These strategy-based mini-lessons will begin tomorrow.

Today’s mini-lesson will simply explain what the children will be doing throughout the unit. **You will need to print out and post the “Inquiry Toolbox” and “Team Roles” anchor charts to use in the discussion.** Alternatively, these could be created on chart paper.

NOTE: You will need to assign children to teams before they begin their work in inquiry circles. You will either create teams by grouping learners with similar preferences or assign a topic to each existing team. Review the options for creating teams in the “Unit Overview for the Teacher” (“Before the Unit Begins” section).

MATERIALS

Teacher needs:

- “Inquiry Toolbox” anchor chart
- “Team Roles” anchor chart with job cards

PROCEDURE

The *italicized statements* below offer suggested wording the teacher may choose to use in the lesson.

Introduce inquiry circles

1. *Today, you will learn about what happens when dead plants and animals rot or decay. Throughout this unit you will also learn about what happens to the matter and energy stored in a plant or animal when that plant or animal dies and is consumed by other organisms. Scientists can learn a lot by observing actual plants and animals, but they can also learn from texts written by other scientists.*
2. *You will work together as a team in an inquiry circle to investigate one way that schools dispose of food scraps (dead plant and animal material). This will help you understand more about how the matter and energy stored in food scraps can be used by other living things.*
3. *In your inquiry circles, you will explore texts and media to learn more about your chosen food disposal method. During inquiry circles, you can ask questions, discuss the information you collect while reading, and think about other questions you might have about how food breaks down. The text-based inquiry involves asking questions and gathering information to answer these questions. In some ways, this is like the inquiry you engage in during a science*

investigation. We have an inquiry toolbox that will help you in your work. (Point to the “Inquiry Toolbox” anchor chart and read aloud to the class.)

Discuss Roles as Scientists

1. *When we investigate food disposal methods, we will practice our roles as scientists. We will do this because scientists use different ways to observe the world, including reading scientific texts, writing reports, and conducting investigations. You will take on the role of a scientist conducting inquiry by speaking like a scientist (using new science language), reading like a scientist (using strategies to find information), and writing like a scientist (using journals to organize important information and observations). There is no better way to learn about science than to practice the work of a scientist!*
2. *While in your inquiry circles, you will take on different science roles with duties within your team. Typically, science teams have a leader, called the Lead Scientist, and various other positions, such as Lab Director, Data Scientist, and Equipment Director. Each of these roles is important to the overall success of the team. (Point out and read each of the roles on the “Team Roles” anchor chart. **At this point you (the teacher) can assign roles or allow children to choose their roles,** letting them know that they will have the opportunity to assume different roles later.)*

Post the “Team Roles” and “Inquiry Toolbox” anchor charts in your classroom where they can be referred to and encourage your learners to use them while in their inquiry circles.

Science Inquiry Circles (30 minutes)

OVERVIEW

During the first day of inquiry circles, teams will explore (and rank their interest in) four food-disposal methods to be investigated throughout this unit:

- composting food scraps
- feeding food scraps to worms (vermicomposting)
- feeding food scraps to pigs
- sharing or donating leftover food

Teams will first explore news articles about four schools’ approaches to relocating food scraps and reducing food waste. These articles are meant to grab the attention of learners and get them interested in the topic. Refer to the “Food Waste Resources” spreadsheet (in the “Before the Unit Begins” section), which includes suggested texts and media for exploring and selecting inquiry topics. Today, you may use the recommended text for each food disposal method. Make sure to decide how you will share the links to the articles with your students ahead of time.

If you feel your learners may have difficulty interacting with these texts independently, you may choose to read the texts aloud prior to starting this unit. This option still allows the opportunity for learners to become interested when deciding which food disposal method to investigate.

MATERIALS

Each team needs:

- sticky notes
- pencils
- access to four recommended texts for initial exploration (see “Food Waste Resources” spreadsheet):
 - **Composting Food Scraps:** *Discovery Middle School takes on exciting new food waste diversion project* at Discovery Middle School in Vancouver, Washington
 - **Feeding Food Scraps to Worms (Vermicomposting):** *Fighting Food Waste with Worms* at Prairie Winds Elementary School in Monument, Colorado
 - **Feeding Food Scraps to Pigs:** *Food Waste from Classroom to Farm* at Anne Wien Elementary School in Fairbanks, Alaska
 - **Sharing or Donating Leftover Food:** *Fighting Food Waste* at Lincoln Elementary School in Frederick, Maryland

PROCEDURE

The *italicized statements* below offer suggested wording the teacher may choose to use in the lesson.

Before Inquiry Circles (5 minutes)

1. *In your inquiry circles, you will become experts on one method for disposing of food scraps (dead plant and animal material). Since it is not always possible to observe plants and animals firsthand, scientists must turn to text and media resources to expand their knowledge. As scientists, you will also explore texts and media (e.g., articles and videos) to answer your questions about what happens to food scraps and build your expertise.*
2. *To begin, you will explore four different methods used by schools to dispose of food scraps. You can choose any of these four methods to explore with your team.*
3. *No matter which school you choose, you will investigate how the schools relocate and use food to keep it out of landfills. Before you decide which school to investigate, you will have the opportunity to read an article about each school to see what may interest you the most. (Make sure to decide how you will share the links to the articles with your students ahead of time. You might choose to provide all four articles to each team or have teams explore the articles one at a time.)*

During Inquiry Circles (20 minutes)

1. *Now that each team has a text to explore, you need to decide how to read it together. You may want to take turns reading using chunking (reading paragraph by paragraph or the entire page), but decide before you start. (You may want your learners to read the text closely or browse the text and read only certain sections. Encourage learners to look at the texts to spark conversations about what they discover. What questions do they have?)*
2. *While you are reading, I will be walking around to assist you as needed. (You may want to set a timer and let learners know when it is time to switch to the next article.)*
3. *When all inquiry circles are finished reading the articles, you will work together to discuss what interested you and decide which food disposal method you want to investigate. Rank the options from favorite (1) to least favorite (4). (Learners can rank the options individually OR in teams, depending on which option for creating teams you have chosen. **You will either create teams by***

grouping learners with similar preferences or assign a topic to each existing team.) Make note of anything you found interesting while you were reading. You'll share this with the class later.

After Inquiry Circles (10 minutes)

1. *The Data Scientist from each inquiry circle will now share the team's top school choices, as well as anything interesting the team noted about the schools they read about. What grabbed the team's attention? (Be sure all members of the team assist the Data Scientist so that they are prepared to speak. Allow time for all inquiry circle teams to share.)*
2. *I will assign all topics for investigation tomorrow.*

Guided Science Investigation (30–45 minutes)

OVERVIEW

The phenomenon of decomposition is introduced with videos of decomposing fruits and vegetables, and leaf litter.

GUIDING QUESTIONS

What does it mean for something to rot or decay? What happens when dead organisms such as plants seem to “disappear”?

BACKGROUND INFORMATION FOR THE TEACHER

In this introductory lesson, learners will observe the process of food decomposing in a container and then watch how leaf litter on a forest floor undergoes decomposition in a natural setting. The idea is to get learners thinking about what is happening as these organisms change and seemingly disappear.

Our focus throughout this unit will be on the **process** of decomposition: how matter is cycled and energy is transferred as the properties of organisms change. Using a soil ecosystem as a model, learners will study how matter and energy are cycled in natural environments. Then they will apply new knowledge to finding better solutions for reducing food waste. Food (dead plants and animals) makes up a lot of the trash produced in school cafeterias. How can we make food waste “disappear” to promote a healthier, more sustainable ecosystem/environment?

We've included an Investigation Journal with this unit for learners to record their science- investigation observations. Written in a “See, Think, Wonder” format, this formative assessment tool can provide valuable insight into the progression of learner thinking, writing, and conceptual understanding. We encourage the teacher to review the journals regularly.

DAILY OBSERVATIONS

Daily observations will begin on Day 2.

SAFETY

There are no safety issues today.

MATERIALS

Each team member needs:

- Investigation Journal
- pencil

Each team needs:

- access to videos/graphics:
 - [Fruits & Vegetables](#)
 - [Leaves](#)

Teacher needs:

- “Animal Carcass” image
- Investigation Journal
- access to videos/graphics:
 - [Fruits & Vegetables](#)
 - [Leaves](#)

SETUP

- Make copies of the Investigation Journal (1 per team member).
- On the whiteboard, make a T-chart labeled “Fruit” on one side and “Leaves” on the other; the teacher will use this to record observations shared by learners.
- Prepare to project or share the videos and the “Animal Carcass” image for observations. Cue the first video ([Fruits & Vegetables](#)) to **0.06 seconds** so that it’s ready to project (the background music can be muted to avoid distractions).

PROCEDURE

The *italicized statements* below offer suggested wording the teacher may choose to use in the lesson.

Engage

1. Project the first video frame of the [Fruits & Vegetables](#), frozen at **0.06 seconds**.
2. Distribute the Investigation Journals to each learner. Ask them to write their names on the front then open to the Day 1 page and write the date.
3. Explain, *You will be viewing two short videos and one image. You will record your observations, thoughts, and questions for each video and for the image on this page.* Give learners a minute to read over the template, then ask if there are any questions.

Explore/Explain

1. When ready, let learners know that you will play the video twice: once all the way through, then a second time where you will pause it for a closer look. (You can pause it at any point to highlight changes.)
2. After observations are complete, randomly pick learners to share what they observed and recorded. Ask probing questions, such as, *What changes did you observe? Were all the changes the same? What do you think was happening? What questions do you have about what you observed?* Accept all responses and record them on the T- chart. Let learners know they will learn more about what is happening to the fruits and vegetables as they work through this unit and conduct investigations.

3. After discussion, tell the class that the video they saw used a time-lapse technique. In other words, it took a long time—74 days—for the changes to occur, but the video shows this at a much faster rate.
4. Moving on to the [Leaves](#) video, tell learners they will now observe and write about two different side-by-side views of leaves undergoing change in a natural environment. Let them know that midway through this time-lapse video, they will have a closer look at what is happening on each side. Once again, you will run the video twice. **Begin the video at 0.05 secs.**
4. After the video, ask, *How were the changes occurring to the leaves on each side the same? How were they different?* Record learner responses on the T-chart.
5. Use the information recorded on the T-chart to lead a discussion about how the changes in the leaves video compare to the changes in the fruits and vegetables video. Allow learners to point out the similarities and differences.

Elaborate

1. Clarify that the changes they have observed are part of the scientific process known as decomposition. *Decomposition is the breaking down of certain types of matter, including dead organisms like plants and animals.*
2. *Sometimes we use the words rot or decay to describe this same process.*
3. Next, let the class know that they will be learning more about how these changes occur in the days to come. Add that their work in their inquiry circles and the science investigation will help them understand more about decomposition

Evaluate

1. Project the “Animal Carcass” image. Ask, *What happened to the body of the animal when it died?* Instruct learners to write their thoughts in their journals on the Day 1 page.

Science Language

- **Decomposition** is the breaking down of certain types of matter, including dead organisms like plants and animals.
- A **team** is a group of people who work together to accomplish a goal.
- **Collaboration** occurs when two or more people work together, learn from each other, and communicate with each other.
- **Observing** is carefully looking at something or someone to gather information.
- **Organisms** are living things that are able to carry out the actions needed to live, grow, and survive.
- **Matter** is anything that takes up space and has weight. It can be in the form of a liquid, solid, or gas.
- **Energy** is the ability to do work or cause change and can be transferred through the interactions of organisms in an ecosystem.

Expanded Standards

English Language Arts and Reading TEKS

5.13(A) Generate and clarify questions on a topic for formal and informal inquiry.

CCSS

SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly. **(b)** Follow agreed-upon rules for discussions and carry out assigned roles.

NGSS

5-LS2.A The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. **LS2.B** Matter cycles between the air, water, and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water from the environment, and release waste matter (gas, liquid, or solid) back into the environment.

Science TEKS

5.1(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations; **(D)** use tools, including calculators, microscopes, hand lenses, metric rulers, Celsius thermometers, prisms, concave and convex lenses, laser pointers, mirrors, digital scales, balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, notebooks, timing devices, materials for building circuits, materials to support observations of habitats or organisms such as terrariums and aquariums, and materials to support digital data collection such as computers, tablets, and cameras to observe, measure, test, and analyze information; **(E)** collect observations and measurements as evidence; **5.5(F)** explain the relationship between the structure and function of objects, organisms, and systems; **5.12(A)** observe and describe how a variety of organisms survive by interacting with biotic and abiotic factors in a healthy ecosystem; **(B)** predict how changes in the ecosystem affect the cycling of matter and flow of energy in a food web.