

GEORGIA AG EXPERIENCE



FALL '24 CHALLENGE
TURNING TRASH INTO TREASURE

STEM CHALLENGE

DIGITAL TOOLKIT

Sponsored by:



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FALL '24 CHALLENGE
TURNING TRASH INTO TREASURE
STEM CHALLENGE



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NAME: _____

COMPOST PILE: UNEARTH NEW VOCABULARY!



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | C | A | R | B | O | N | R | G | Z | W | C | L | F |
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| L | Y | E | V | X | C | F | Q | P | B | Q | M | N | S |
| E | T | N | C | M | O | L | D | R | C | B | C | P | T |
| K | X | S | Q | N | A | A | P | P | L | E | R | G | X |
| N | B | O | N | I | T | R | O | G | E | N | X | B | E |

WORD BANK:

- ORGANIC
- COMPOST
- ROT
- RECYCLE
- CARBON
- MOLD
- GREENS
- BROWNS
- NITROGEN
- DECOMPOSE
- ODOR
- APPLE
- SCRAPS
- NUTRIENTS
- SOIL
- GREENS

Opening Activity:

Get the “DIRT” on Georgia’s Soil!



OBJECTIVES/PURPOSE

The student will be able to:

- Students will be able to identify and describe the different soil layers.
- Students will be able to explain the significance of soil layers and their composition in Georgia
- Students will be able to create a soil layers model that accurately represents the soil layers and their components.

CONTENT/PROCEDURE ENGAGE:

Begin a discussion with your students to evaluate their prior knowledge of soil and its importance. Ask questions like:

- What is soil made of?
- Why do you think soil is important for plants and animals?
- What would happen if we didn't have healthy soil?
- Did you know there are different layers of soil?

VOCABULARY WORDS

- Soil: the upper layer of earth in which plants grow.
- Horizon: a layer of soil.
- Organic matter: material composed of decayed plants and animals.
- Topsoil: the top layer of soil, rich in nutrients.
- Subsoil: the layer of soil beneath the topsoil. Bedrock: the solid rock layer beneath soil layers.

DID YOU KNOW?

- **Georgia’s Red Soil:** Georgia’s soil is often red because it contains a lot of iron. This iron gives the soil its bright, reddish color and helps it stay rich and healthy.
- **Georgia’s State Soil:** Tifton soil is Georgia’s official state soil. It’s perfect for farming because it drains well and is great for growing crops like peanuts, cotton, and soybeans.
- **Soil Supports Wildlife:** The soil in Georgia supports diverse plants and animals. Healthy soil is crucial for forests, gardens, and wetlands, providing a home and food for many species.
- **Protecting Soil from Erosion:** Erosion happens when rain or wind washes soil away, which can harm plant growth. Farmers use methods like planting cover crops and avoiding tilling to keep soil in place and prevent erosion.

RESOURCES

- Soil Layers Anchor Chart
- USDA Natural Resources Conservation Service Georgia: <https://gfb.ag/usdasoilresources>
- FREE Soil Booklets: <https://gfb.ag/FreeSoilBooklets>
- Soil Survey for all Georgia Counties: <https://gfb.ag/GASoilSurvey>

EXPLORE

Activity 1: Create a Paper Soil Model

1. Review Soil Layers:

- Show an anchor chart or poster of soil layers to the class. Explain each layer: **Humus:** Contains decomposed plants and leaves. **Topsoil:** Rich in nutrients and where plants grow. **Subsoil:** Contains minerals leached from the topsoil. **Parent Material:** Made up of weathered rock fragments. **Bedrock:** The solid rock layer underneath all the other layers.

2. Model Creation:

- Provide dark brown construction paper for the background. Cut grey construction paper for the Bedrock layer and glue it to the bottom of the paper. Add Weathered Rock Fragments using torn pieces of light brown paper. For Subsoil, color with crayons and add glitter for minerals. For Topsoil, use white crayons to draw roots and add green paper for grass and flowers. Discuss each layer's role as you add it.

3. Labeling:

- Provide sticky labels or markers for students to label each soil layer on their models.

Activity #2: Make Edible Soil Layers

1. Materials:

- Clear plastic cups
- Gummy worms
- Chocolate pudding
- Crushed graham crackers
- Crushed chocolate chip cookies

2. Instructions:

- Humus: Add a layer of crushed graham crackers to represent the organic matter.
- Topsoil: Add a layer of chocolate pudding for the nutrient-rich layer.
- Subsoil: Add a layer of crushed chocolate cookies to represent the minerals.
- Parent Material: Add another layer of chocolate pudding for the weathered rock fragments. Bedrock: Add a layer of larger cookie chunks for the solid rock layer.
- Top Decoration: Place gummy worms on top to represent soil organisms.

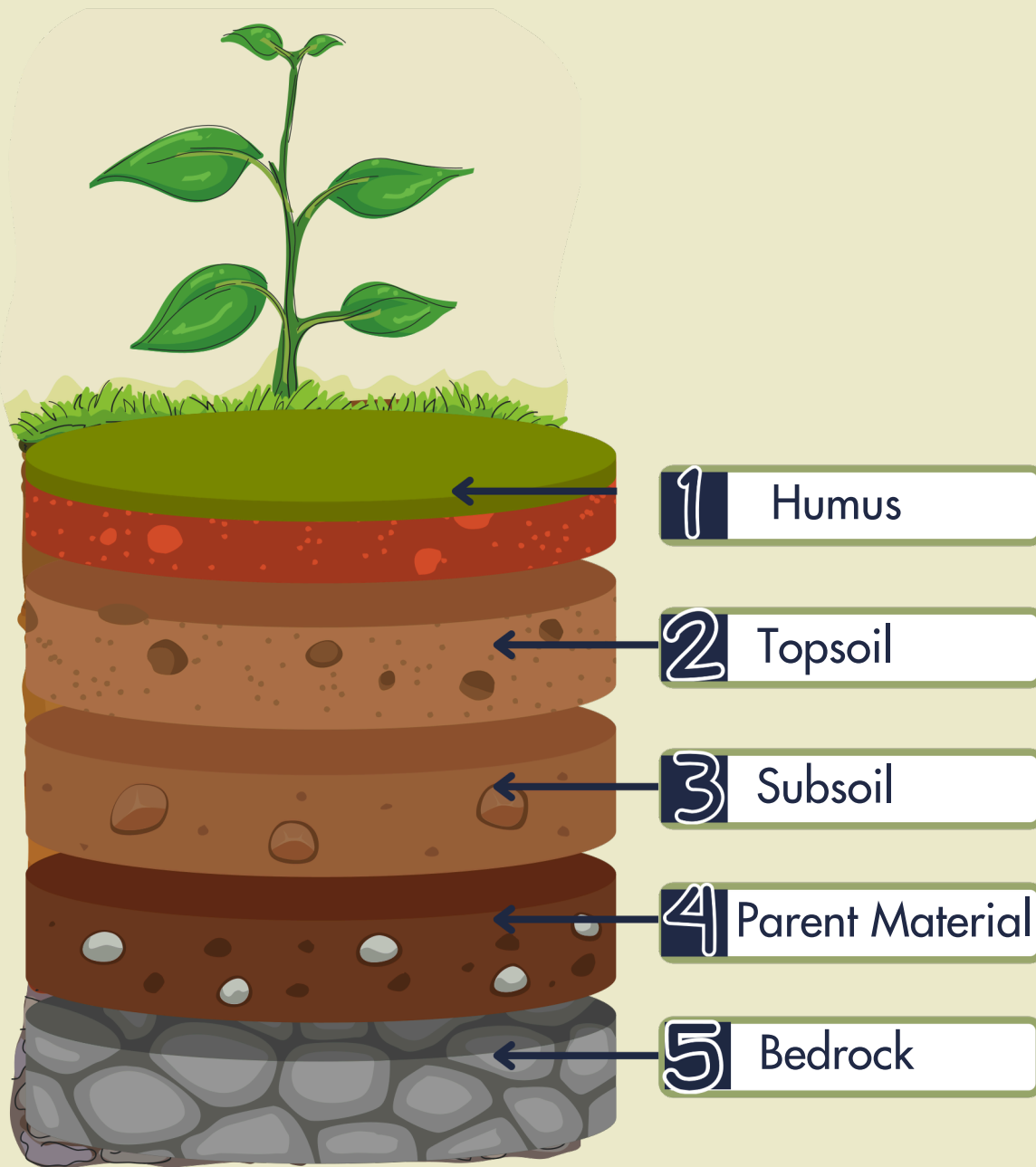
3. Discussion:

- Explain how each layer of the dessert corresponds to a layer of soil as you build it. Discuss why each layer is important for plant growth and soil health.

Closing:

- Review the five layers of soil: Humus, Topsoil, Subsoil, Parent Material, and Bedrock. Explain that soil formation is a slow process, with each layer taking hundreds to thousands of years to develop. The order of the layers remains consistent, similar to how you cannot bake a cake without following the proper sequence of steps. Discuss the importance of each layer in supporting plant growth and maintaining soil health. Relate the layers to the edible dessert model, highlighting how each component of the dessert represented a specific soil layer.

LAYERS OF THE SOIL



- 1 Humus:** Contains decomposed plants and leaves.
- 2. Topsoil:** Rich in nutrients and where plants grow.
- 3. Subsoil:** Contains minerals leached from the topsoil.
- 4. Parent Material:** Made up of weathered rock fragments.
- 5. Bedrock:** The solid rock layer underneath all the other layers.



Lesson Plan - Digital Toolkit

| | |
|---|---|
| <p><u>Title:</u> "Turning Trash Into Treasure"</p> | <p><u>Grade Level:</u> 3rd -5th Grade</p> |
| <p><u>Challenge Question:</u> Why is composting important, and how do brown and green materials break down differently?</p> | |
| <p><u>Engage:</u> Students will explore the process of composting by creating their own compost bins and observing the transformation of organic waste into nutrient-rich soil. They can document their observations in a journal highlighting the changes they see and the benefits of composting.</p> | |
| <p><u>Explore:</u> A journal has been provided for the entire challenge and can be easily adapted to fit your schedule, whether you choose to complete in the activities on a weekly or daily basis. This journal is ready to use and can be tailored to best support your students and classroom throughout the composting process.</p> | |
| <p><u>Challenge Timeframe:</u> September 4, 2024- November 22, 2024. The challenge will take you roughly <u>8 weeks</u> to complete. Averaging 20-30 minutes of required work each week. You can choose anytime in the Challenge Timeframe to start and finish your project!</p> | |
| <p><u>Materials Needed:</u></p> <ul style="list-style-type: none"> • Compost container (Tupperware, old trashcan, 5-gallon bucket, etc.) • Green materials (fruits and veggies, coffee grounds, eggshells, tea bags) • Brown materials (shredded paper, dried leaves, cardboard, wood chips) • Trowel or shovel to turn compost over • Thermometer • Labels • Compost Tracking Journal • Watering container • Gloves | |

Next Steps:

Creating the Compost Bin:

1. Container Selection:

- Provide students with options for composting containers, such as Tupperware containers, storage bins, old trash cans, or 5-gallon buckets. Use what you have easily available and what works best for your class.
- Each group or student can choose their preferred type of container for their compost. This can be a whole class or individual project.

2. Preparing the Compost Bin:

- Fill the Container with Soil:
 - Start by filling the chosen container with soil, which can come directly from outside the school.
 - The container should be 2/3 full, allowing room for the items from the next activity to be added and occasionally turned over.

Hosting the Decay Buffet:

1. Introduce the Concept:

- Explain that composting is a way to turn organic waste into nutrient-rich soil.
- Introduce the "Decay Buffet," a fun activity similar to the *viral* "Candy Salad Challenge."

2. Materials to Bring:

- Ask students to bring organic materials from home. Provide them with a list of examples, such as:
 - Fruit and vegetable scraps (apple cores, banana peels, carrot tops)
 - Coffee grounds and tea bags
 - Eggshells
 - Paper and cardboard (shredded paper, paper towel rolls)
 - Grass clippings and leaves
- Emphasize that they should avoid bringing meat, dairy, fatty foods, and which can attract bugs and cause odor problems.

Adding the Ingredients:

1. On collection day, have students explain why they brought each item and identify whether it is a green or brown compost material.
2. In their journal, have them write down each item and whether it was a green or brown compost item.

Layering in the Bin:

1. Begin layering the collected materials into the compost bin, alternating between green and brown materials.
2. Have students assist in adding their materials to the bin, explaining the importance of each type of material in the composting process.
3. Have students document the initial state of the compost bin in their Compost Journals, noting the types of materials and their arrangement.
4. Discuss how different materials might break down at different rates and the role of microorganisms in this process.

Journaling and Monitoring:

Weekly Observations:

1. Using the provided journal, instruct students to keep a simple weekly journal where they record their observations of the compost. Make sure to note the temperature in the weekly log.
2. Pages 1 and 2 should be used when starting the challenge. Page 3 can be printed out as the weekly log for the compost pile. Page 4 should be completed as the final closing activity.
3. They should note the types of materials added, the temperature of the compost, and any changes they observe in the composting process.
4. Encourage them to describe the compost's appearance and smell.

Caring for your Compost:

1. Turn the compost occasionally to add air, which helps microorganisms break down the materials.
2. Add water as needed to keep the compost pile as damp as a sponge.

Reflection:

1. What did you notice in your journal about which materials in the compost broke down and which didn't?
2. How did the soil change over time? Did it become richer, darker, or different in texture?
3. What did you find interesting about how green (like fruit scraps) and brown (like paper) materials broke down differently?

So What?

1. Discuss why some materials broke down faster than others and how green and brown materials affect composting differently.
2. Explain how composting improves soil by adding nutrients and making it better for plants.
3. Relate these observations back to your hypothesis or driving question: Why is composting important? How does understanding how different materials decompose support your answer to this question?
4. Reflect on how this experiment helped you understand the role of composting in the environment. What new ideas do you have about how composting can help us take care of the Earth?

Georgia Standards of Excellence

- S3E1. Obtain, evaluate, and communicate information about the physical attributes of rocks and soils.
- S4L1. Obtain, evaluate, and communicate information about the roles of organisms and the flow of energy within an ecosystem.
- S5E1. Constructive and Destructive processes work together.

Georgia Elementary AFNR

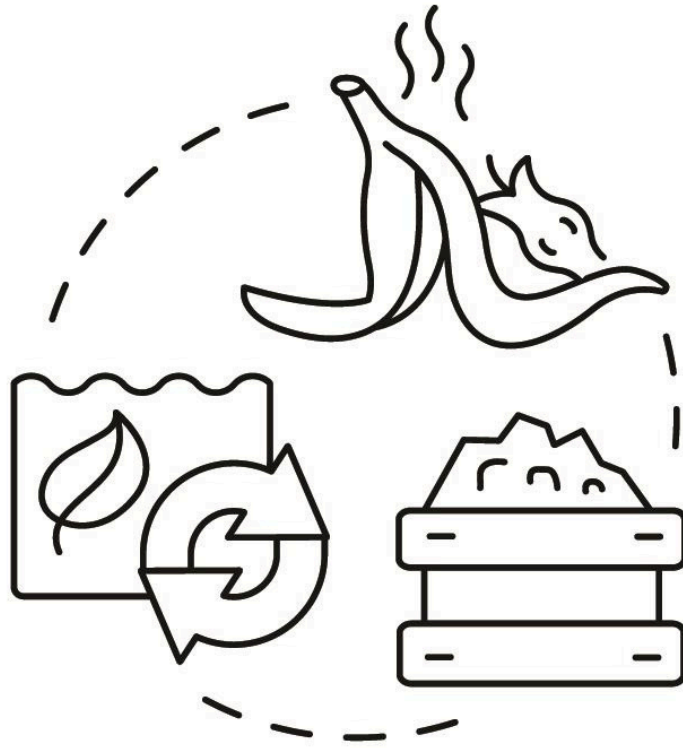
- 3NRS2. Compare the different types of soil found in Georgia.
- 3NRS3. Analyze Georgia's renewable and nonrenewable natural resources.
- 5NRS1. Research the impact of agricultural practices on forests, soils, and other natural resources.
- 5NRS2. Describe the benefits and the importance of conservation and recycling of natural resources.

Additional Resources

| Videos / Activities: | Book Suggestions: |
|---|--|
| <p><u>Composting Basics</u></p> <p><u>How Compost is Made</u></p> <p><u>The Magic School Bus Meets the Rot Squad</u></p> <p><u>Compost Song</u></p> <p><u>Ranger Nick's Garbage Assignment</u></p> <p><u>AgVentures at Piney Woods Farm in LaGrange, GA.</u></p> | <p><u>The Magic School Bus Meets the Rot Squad</u></p> <p><u>The Soil In Jackie's Garden</u></p> <p><u>Compost Stew</u></p> <p><u>Science With Plants</u></p> <p><u>What's Sprouting in my Trash?</u></p> <p><u>Composting: Nature's Recyclers</u></p> |
| Community Partner Suggestions: | Agricultural Career Connections: |
| <p><u>Georgia Association of Conservation Districts</u></p> <p><u>USDA Natural Resources Conservation Services</u></p> <p><u>County Farm Bureau Office</u></p> <p><u>Georgia Master Gardeners</u></p> <p><u>Georgia Recycling Coalition</u></p> <p>Ask an Expert: <u>UGA Extension Office</u></p> | <p><u>Extension Agent</u></p> <p><u>Agricultural Teacher</u></p> <p><u>Agronomist</u></p> <p><u>Farm Manager</u></p> <p><u>Bioconversion Manager</u></p> <p><u>Vermiculturist</u></p> |

Rubric

| Category | Description | Points |
|---|--|---|
| Time Requirement | The video must be no longer than 5 minutes. | Up to 5 minutes - 5 points Over 6 minutes - 4 points Over 7 minutes - 3 points Over 8 minutes - 2 points Over 9 minutes - 1 point |
| Delivery | Student's voices and video quality were clear and at an appropriate volume. | 15 points |
| Orderly Progress | Video flows from beginning to end with a clear introduction, main points, and conclusion. | 20 points |
| Researched Information and Coverage of Subject | Video demonstrates the knowledge compost, the difference between green and brown compost, and the benefits of compost on living things. | 20 points |
| Creativity | Get creative with your video! We want to see more than just your students reading off a paper. This could include video editing, artistic elements, out of the box thinking, acting, costumes, storytelling narration, text overlays, animations, visuals, audience engagement, and showcasing curiosity. | 20 points |
| Supportive Materials | Video must include at least 5 photos or video clips of students throughout the challenge process. | 20 points |
| TOTAL | | 100 Points |
| Bonus Points | Ask an expert! Contact a community partner. If you are having trouble connecting with a community partner, please contact us for help! info@georgiaagexperience.org | 5 Bonus Points for inviting/including local partners to join in on the project. |



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COMPOST JOURNAL



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Problem: _____

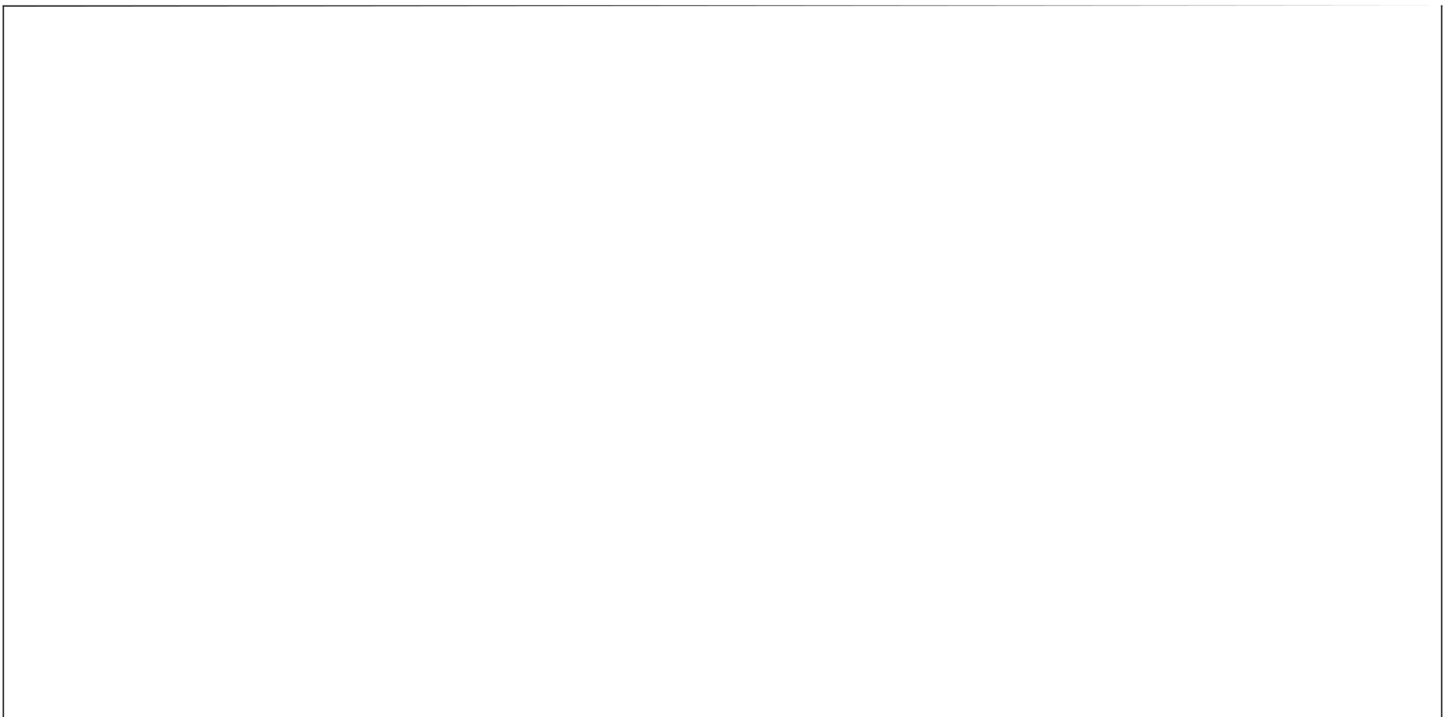
Independent Variable (t)-

Dependent Variables - _____

Hypothesis - _____

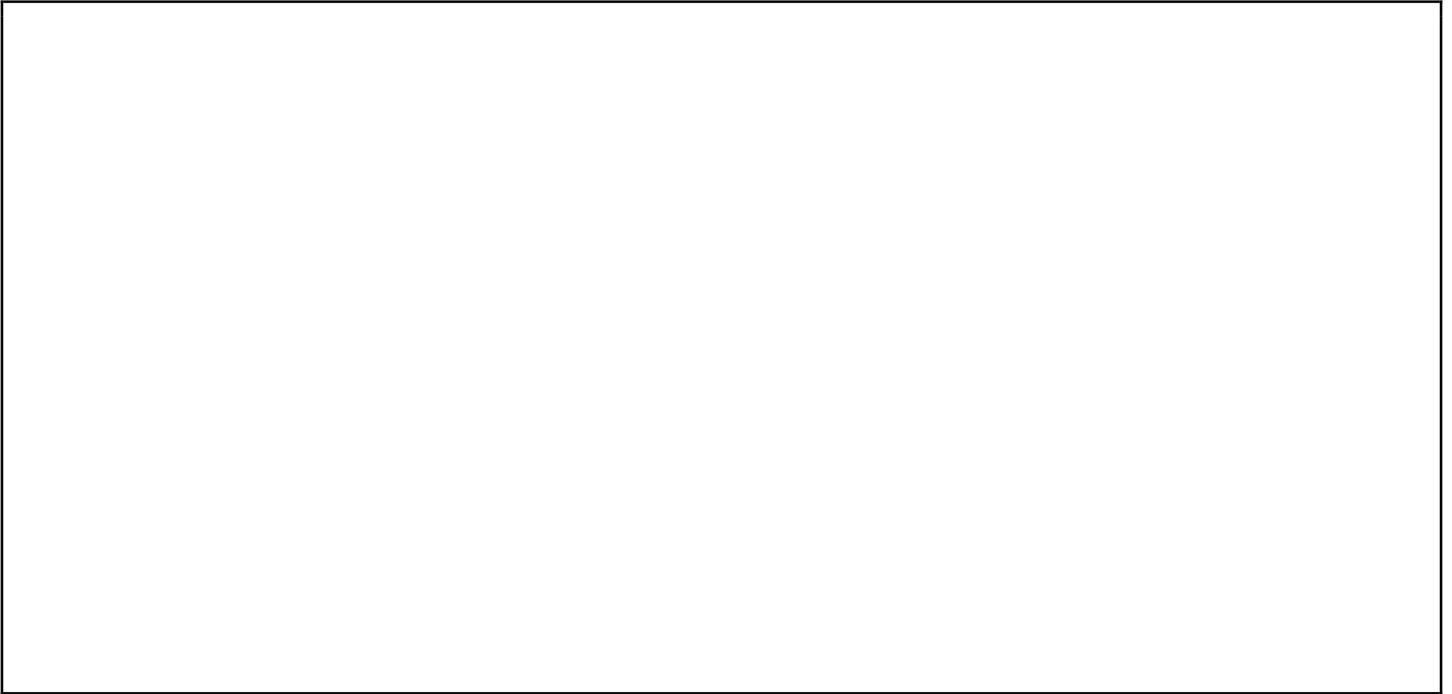
Materials Used: _____

Draw a picture of what items can be added to your compost bin:



Date: _____

Illustration of what I see:



Today, I observed _____

_____.

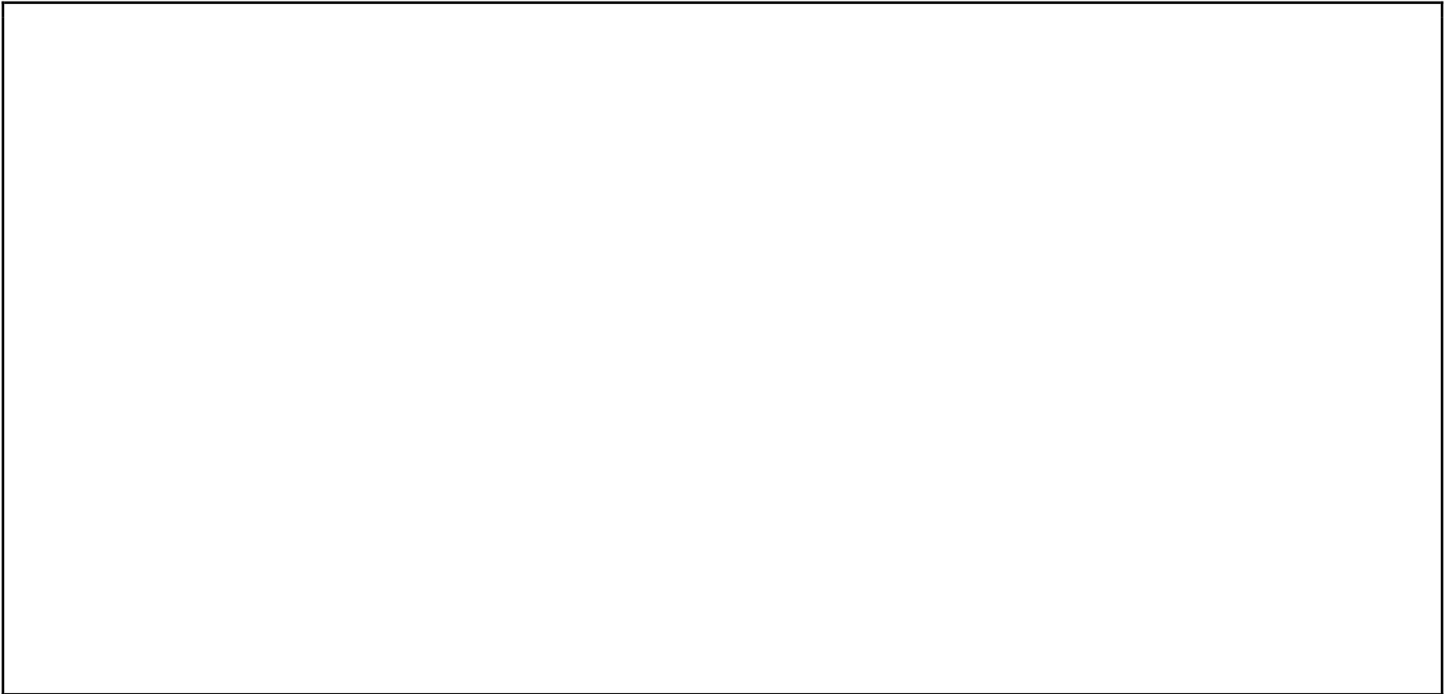
What items were added to the compost bin? _____

_____.

I think _____

_____.

Illustration of what I see:



What did you learn about composting: _____

Describe any issues you had during the STEM Compost Challenge. _____

What would you do differently next time? _____
