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# Composting: Don’t Waste Your Waste!

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## Description

This lesson will explore and research composting and the effects it has on the life cycle of soil and vegetation.

## Objectives

* Students will research composting.
* Students will observe and document characteristics of compost.
* Students will observe and document characteristics of worms.
* Students will understand science concepts and principles.
* Students will identify different insects

## North Dakota State Standards

9-10.1.1 Explain how models can be used to illustrate scientific principles

9-10.2.3. Identify questions and concepts that guide scientific investigations

9-10.2.6. Design and conduct a guided investigation

11-12.1.1 Explain how scientists create and use models to address scientific knowledge

## Schedule

9:00 – 9:30 Brief introduction/Cultural introduction

9:30 – 9:45 Activity 1: Calculating Your Carbon Footprint

9:45 – 10:00 PowerPoint

10:00 – 11:00 Activity 2: Online Compost Research and Discussion

11:00 – 12:00 Activity 3: Jeopardy

12:00 – 1:00 Lunch

1:00 – 1:30 Activity 4: Online Worm Composting Research and Discussion

1:30 – 1:45 Activity 5: Create an Online Compost Pile

1:45 – 3:00 Activity 6: Compost in a bottle

## Activity 1: Calculating Your Carbon Footprint

In this activity students will calculate their carbon footprint using the Handout provided along with the lesson plan.

## Activity 2: Online Compost Research and Discussion

In this activity you will visit the website: <http://www.recycleworks.org/compost/>

Use this website to complete the questions on the handout for activity one. Once the questions are completed we will discuss the questions as a group.

## Activity 3: Compost Jeopardy

In this activity we will review what you have just discovered and discussed. We will do this by playing our own version of the popular game show Jeopardy. Each student will work individually during the game. Students should all answer every question by writing there answer on a piece of paper or a small whiteboard. Students could also type there answers on the computer. Instructors and/or student mentors should walk around and tally the scores of each student as game play progresses.

**Activity 4: Online Worm Compost Research and Discussion**

In this activity you will visit the website: <http://www.recycleworks.org/compost/>

Use this website to complete the questions on the handout for activity three. Once the questions are completed we will discuss the questions as a group.

**Activity 5: Create an Online Compost Pile**

In this activity we are going to use an online simulator to create a compost pile.

Here are the rules:

1. <https://www.aerobin400.com/aerobin400-usa/compostsimulator.aspx>
2. You must use 5 different materials in your pile
3. The total weight of your pile must be 150 pounds
4. You will keep adjusting the contents of your pile until the moisture, density, and Carbon to Nitrogen ratio are all in the green area of the gauge
5. You will record your materials and results in the table in the back of this lesson

**Activity 6: Compost in a bottle**

 Equipment: Plastic bottles Craft knife Tape Peat-free compost

Compost activator Gloves Fruit scraps Vegetable scraps

Dry leaves or grass Newspaper Permanent marker

To make composters from bottles, ask each child to bring a clear, 2 liter plastic bottle (which has been thoroughly washed) to the meeting.

The bottles need to be cut around the top to allow items to be placed inside – cut a seam around the top of the bottle, using a craft knife, leaving a closed section (roughly 1-2 cm) to act as a hinge for the top – this will be re-sealed once the bottles have been filled.

Ensure all tables have been covered in newspaper to aid clearing up after the activity.

Explain to the children that in order for the compostable materials to be recycled there must be bacteria present to eat/recycle this. The bacteria are found in soil and so they need to have soil or compost in their bottles to allow the bacteria to get in (this is why compost bins need to have an open base and be located on top of soil in order to produce good compost).

Distribute the bottles to the children (either in pairs or one each) along with gloves, trowels and a small amount of compost (in trays) and compostable materials (fruit and vegetables, garden waste, newspaper etc.).

The children should all put on gloves (these should remain on for the duration of the activity to protect against cuts from sharp edges on bottles and also from contact with soil and waste materials) and trowels should be used to place compost or soil in bottles.

Instruct the group to fill their bottles as shown in the diagram (attached) using soil/compost layers alternate to waste layers. Ensure that each layer is visible as a distinct layer to make recording easier.

Once completed, the contents should be covered in a final layer of compost activator and then the bottles can be sealed around the cut seam using tape. The uppermost limit of the bottle contents should be marked on the bottle with permanent marker so that changes can be observed and bottles can also be marked with names or initials for identification.

Bottles should be kept on a windowsill or outside and monitored each week until changes are visible (lids should be removed occasionally to allow oxygen into the bottle to aid the rotting process). Ultimately the level inside the bottles should decrease as the materials rot, and the changes in the visible materials can be monitored – some materials will rot faster than others and this can be recorded. The group may also like to make predictions that can then be tested over time as the experiment continues.

Top Layer Compost Activator 

Soil

 Vegetable Scraps

 Compost Activator

 Soil

 Newspaper

 Compost Activator

 Soil

 Vegetable Scraps

 Compost Activator

 Soil

 Dry Leaves

 Compost Activator

 Vegetable Scraps

 Soil

**\*\*Remember to start from the bottom layer and work your way up\*\***

Activity 2 Questions

1. What is composting? *Natural process of recycling decomposed organic materials into a rich soil called compost*
2. One advantage of composting is that it \_\_\_\_\_\_\_\_\_\_\_\_\_ the natural process. *Accelerates*
3. Describe what finished compost will look like. *Dark brown, crumbly, smells like forest floor*
4. Compost piles need oxygen so that \_\_\_\_\_\_\_\_\_\_ are able to break down the material. *microbes*
5. What can you do to accelerate the composting process by adding air? *Turn the pile*
6. Why is it important to make sure your pile doesn’t get too wet? *if too wet it will compact and restrict air flow*
7. What happens if too little nitrogen is present in your pile? Too much? *Not enough heat, It will smell*
8. What is the optimal temperature of a compost pile? *90 – 135 F*
9. What is one advantage of having a higher pile temperature? *Keep away unwanted pests*
10. Why is it important to make sure that food scraps are buried? *Keep away unwanted visitors*
11. What is the ideal “brown” to “green” ratio? *30:1*
12. Why does a compost pile need water? *Microbes need water to survive*
13. How does turning your compost pile kill unwanted organisms? *Increases the heat*
14. What do “green” ingredients add to your pile? *Nitrogen*
15. What do “brown” ingredients add to your pile? *Carbon*
16. Why don’t we use diseased plants in a compost pile? *Disease can spread if temp is low*

**For questions 17 – 20 list one advantage and disadvantage for each method of composting**

1. Hot Composting *Fastest method, lots of work*
2. Slow Composting *not much effort needed, will take a year and weeds may not die*
3. Dig-a-hole Composting *no maintenance, very small amount of compost*
4. Tumbler Composting *No odor and tidy, small amount of compost*

Activity 4 Questions

1. The best type of worm for a worm bin is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_? *Red Wriggler*
2. Why is this type of worm better than night crawlers? *Like shallow ground*
3. Give 3 advantages of using red wrigglers: *process large amounts of organic material, reproduce quickly, and survive a variety of temperatures*
4. Why do worm bins need to have holes in them? *airflow*
5. Why is it important that your bin have a cover? *Keep light out and moisture in*
6. What is one reason that a plastic bin will last longer than a wooden bin? *Wood will rot*
7. What is needed to prepare a wooden or plastic bin? *Dirt and shredded paper*
8. Why is it important that the worms have access to food as well as dirt? *Use the dirt as grit to help digest food*
9. Why must you keep shredded newspaper over the food at all times? *Keeps it dark and moist and keeps fruit flies away*
10. Why is it important to not overfeed the worms during the first few weeks? *Let them get acclimated*

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