

Building a Compost Pile



OBJECTIVES:

Students will:

1. build an outdoor compost pile in a compost bin.
2. describe what compost is, how it is used and why it is important.
3. sort organic materials into greens (nitrogen) and browns (carbon).



STANDARDS: Science



SKILLS: Analysis, classification, description, problem solving



SETTING: Classroom and outdoors



TIME: 45 minutes
Ongoing: 5–10 minutes, once a week



VOCABULARY:

Big Four
Biodegradable materials
Compost

Introduction

Overview:

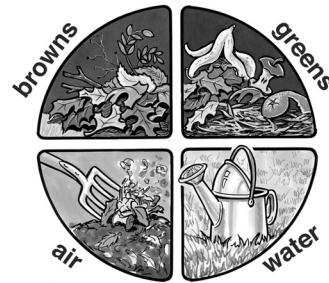
In this lesson, students will learn about the process of decomposition by setting up a compost bin at school. They will collect biodegradable materials to place in the bin, learn about how compost is made and why it is important.

Teacher Background:

Compost returns valuable nutrients to the soil. Composting is an excellent way to demonstrate the cycle of life, which includes life, death, decomposition and rebirth.

The essential ingredients of a compost pile include the BIG FOUR: browns (carbon), greens (nitrogen), air, and water. Browns are dry and woody plant trimmings, such as wood chips, dried leaves, and straw. Browns are rich in carbon. Greens are moist vegetable and fruit scraps, green leaves and fresh herbivore manure. Greens are rich in nitrogen. A good compost pile will have approximately half brown materials and half green materials by volume. Decomposer organisms need air and water to break down organic matter. Turning and watering the compost pile provides it with the air and moisture necessary for the microorganisms to thrive. The pile should be as moist as a wrung-out sponge.

The compost bin needs to be located close to a source of water and resistant to rodents. A rodent-resistant bin has a top and a bottom, and all openings are smaller than a quarter-inch.



The pile should be located outdoors and preferably on top of soil.

Materials:

Students:

- Pitchfork or spading fork
- Green and brown plant trimmings such as woody or dry plant trimmings and green leaves, etc.
- Yard clippers
- Water
- Compost bin
- Flat-edged shovel
- “Brown and Greens” homework
- “Building a Compost Pile” worksheet

Teacher:

- Brown and green materials for the compost bin
- Rubric overhead
- Rubrics (one per student)

Preparation:

For information on how to obtain a school compost bin or composting advice for teachers in Alameda County call 1-877-786-7927 or 510-444-SOIL. You can also visit www.StopWaste.Org.

Optional: Assign students to bring in organic materials collected from home to help build the compost pile.

Assemble compost bin before the lesson.



ACTIVITY

Discussion

1. Explain the cycle and concept of decomposition. A compost pile is a home for decomposers. Bacteria, earthworms and other creatures actually eat organic materials placed in the compost bin, breaking them down into food that plants can use. The end product is a rich, dark-brown, earthy-smelling material called “compost.”
2. Ask students to describe materials from home or school that might decompose in a compost bin. Explain that composting is nature’s way of recycling these materials through the decomposition process.
3. Show an overhead of the lesson rubric, and review the expectations for this lesson.

Procedure

1. For homework: Ask students to bring in organic materials collected from home or school to help build the compost pile. Explain that organic materials are biodegradable and include things like banana peels, dried leaves, etc.
2. Pass out the “Browns and Greens” homework sheet to each student.
3. Have students list the items they brought from home on the top half of their homework sheet.
4. Explain the basics of composting and that it is essential to have the proper mixture of the BIG FOUR: browns, greens, air and water.
5. Explain the three main steps to building a compost pile:
 - a. Chop materials to six inches or less.
 - b. Mix browns and greens (half of each by volume).
 - c. Maintain moisture by keeping the pile as wet as a wrung-out sponge.
6. Review the steps and write on the board.
7. Show some examples of organic materials that are classified as “Greens” and “Browns” (see teacher background for examples). Ask students to group and categorize their organic materials as “Greens” or “Browns” and record their findings on their homework sheet.
8. Assign students to the following tasks:
 - a. Chop materials
 - b. Layer greens and browns
 - c. Mix layers
 - d. Water layers
9. Follow the steps below to build a compost pile and describe ongoing maintenance and how to harvest the finished compost.

Starting a Compost Pile:

- a. Chop greens and browns down to six inches or less in size to speed up the decomposition process.
- b. Start with a layer of browns at the bottom of the pile. Next add an equal layer of greens. Note: Fruit and vegetable trimmings should be buried and mixed into the center of the pile so it’s best to add them after mixing the layers.
- c. Keep adding equal layers of browns and greens.
- d. Add water. The pile should be about as wet as a wrung-out sponge.
- e. Stir the layers together to increase air flow in the pile.
- f. Add food scraps in the center of the pile and bury.
- g. Add a final layer of browns.

Ongoing:

1. Add equal amounts of greens and browns at least once a week.
2. Keep the pile as wet as a wrung-out sponge.
3. Turn or mix the pile about once a week, adding a final layer of browns to the top of the pile each time.

Harvest Compost:

1. After about three to eight months, harvest the finished compost by sifting out coarse, unfinished materials (these materials can be added to the new pile).
 2. Apply finished compost to amend soil prior to planting as a mulch or top dressing on planted areas or as an amendment to potting soil (make sure the compost is completely decomposed before using it).
10. Pass out a “Building a Compost Pile” worksheet to each student and have the students complete their worksheets.

Wrap-Up

1. Review the basics of composting and why it is important.
2. Create a plan for the ongoing maintenance and eventual harvesting of the compost bin.
3. Have the class design a maintenance schedule that describes how often the pile will be turned, watered, etc. Assign students to these roles.
4. Ask students to hypothesize what will happen to materials added to the compost bin over time.

Final Assessment Idea

Ask students to create a book that illustrates and describes the steps to starting a compost bin. They should discuss why they think it is important to compost materials and how composting helps reduce waste.



RESOURCES

Extensions:

Have students harvest the compost bin and use the compost to amend the soil in a school garden or take the finished compost home to use.

Teacher Materials:

California State Content Standards

The standards below represent broad academic concepts. This lesson provides connections to these academic concepts through hands-on activities and exploration. This lesson is not designed for a student to master the concepts presented in the standards. Additional lessons in the classroom that build on this lesson or the standard(s) ensure that students will have the opportunity to master these concepts.

SCIENCE	CONTENT STANDARDS
Grade 4	Life Science 2.a. Students know plants are the primary source of matter and energy entering most food chains. 2.c. Students know decomposers, including many fungi, insects and micro-organisms, recycle matter from dead plants and animals. 3.a. Students know ecosystems can be characterized by their living and nonliving components.
Grade 5	Life Science 2.g. Students know plant and animals cells break down sugar to obtain energy, a process resulting in carbon dioxide (CO ₂) and water (respiration).





Building a Compost Pile Rubric

A rubric is a scoring tool that defines the criteria by which a student's work will be evaluated. This rubric is provided to assist you in setting expectations for students and assessing their performance and engagement during the lesson based on specific tasks. Ideally, a rubric is developed with the cooperation of the students. Two blank rows have been provided for you and your class to develop and add your own assessment criteria.

CATEGORY	4	3	2	1
Builds a compost pile	Student participates in their assigned role to build the compost pile.	Student has difficulty participating in their assigned role to build the compost pile.	Student participates outside of their assigned role to build the compost pile.	Student does not participate in building the compost pile.
Describes how to use compost and why it's valuable	Student clearly describes why compost is valuable and how to use it.	Student describes how to use compost, but not how it is valuable.	Student has difficulty describing how to use compost and why it is valuable.	Student does not attempt assignment.





Student

Browns and Greens

Directions: Write the names of organic materials you collected from home.

- | | |
|----------|-----------|
| 1. _____ | 6. _____ |
| 2. _____ | 7. _____ |
| 3. _____ | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

Directions: Write the names or draw a picture of green and brown materials from the list above.

Greens:

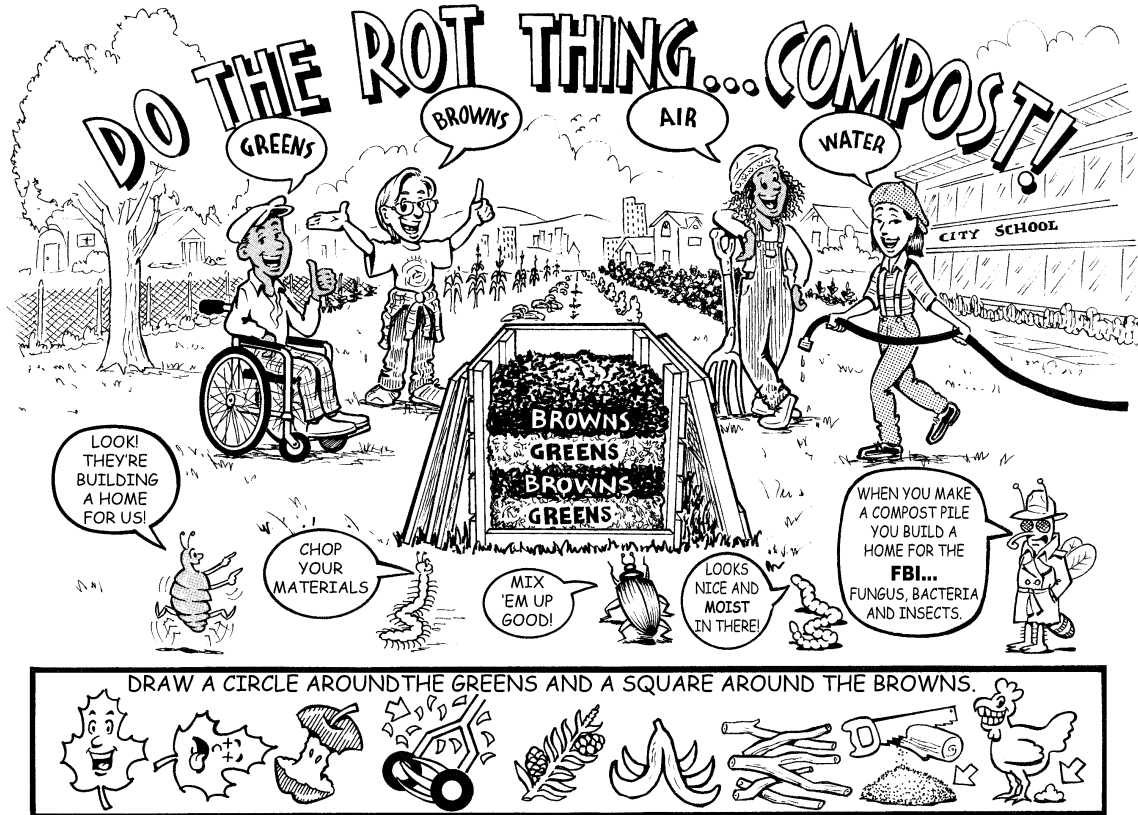
Browns:

Name: _____ Date: _____





Building a Compost Pile



1. What is compost?

2. Describe how compost is used.

3. Why is compost important?

Name: _____

Date: _____



DEFINITIONS

Vocabulary:

Big Four: the four main ingredients necessary in a composting system – air, water, greens (nitrogen) and browns (carbon).

Biodegradable: organic materials that can decompose or decay, such as wood, food scraps, paper and grass clippings.

Compost: the process or the end result of living organisms digesting and reducing organic materials into a dark, rich, soil amendment.

