Title: Reduce Your Trash
Time 30-40 minutes per day for one week
Subjects: Science, Math, Language Arts

Objectives

- Explain the need to reduce the amount of trash they generate, and describe ways in which they can make changes in their actions to support waste reduction.
- Measure and compare the weight of common objects using non-standard units of measure.
- Collect, record, organize, and interpret data using a variety of graphic representations.
- Analyze collected data and draw logical conclusions.
- Use written and graphic representations to communicate their ideas and inform their audience about their actions to reduce waste.

Standards
Technology Standard 3: Understand the relationship among science, technology, society and the individual.

- Benchmark # 3: Know that man-made materials, products and systems can affect the environment adversely, yet there are things that can be done to circumvent this process (e.g., disposing of waste properly, reusing objects, recycling, reducing the amount of trash created, composting, shopping green, buying in bulk).

Science Standard 12: Understand the nature of scientific inquiry.

- Benchmark # 1: Know learning can come from careful observation and simple experiments.
- Benchmark # 2: Know that tools (e.g., scales) can be used to gather information and extend the senses.

Mathematics Standard 2: Understand and apply basic and advanced properties of the concepts of numbers.

- Benchmark # 3: Understand symbolic, concrete, and pictorial representations of numbers.
- Benchmark # 4: Understand basic whole number relationships (e.g., 4 is less than ten).

Mathematics Standard 3: Uses basic and advanced procedures while performing the processes of computation.

- Benchmark # 1: Adds and subtracts whole numbers.
- Benchmark # 2: Solve real world problems involving addition and subtraction of whole numbers.

Mathematics Standard 6: Understand and apply the basic and advanced concepts of statistics and data analysis.

- Benchmark # 1: Collect and represent information about objects or events in simple graphs (e.g., tally charts, pictographs).

Language Arts Standard 1: Use the general skills and strategies of the writing process.

- Benchmark # 7: Write in a variety of forms and genres (e.g., journals).
- Benchmark # 8: Write for different purposes (to inform, communicate ideas).

Language Arts Standard 8: Use listening and speaking strategies for different purposes.

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- Benchmark # 1: Make contributions in class and group discussions.
- Benchmark # 2: Ask and respond to questions.
- Benchmark # 5: Use grade level appropriate vocabulary in speech (e.g., terms related to waste reduction and recycling).

Materials

- Large, clear plastic trash bags
- Balance scale, large enough to accommodate the full trash bag
- A pile of books that weighs the same as the heaviest bag of trash
- Two recycling bins-one for paper, one for other recyclables
- Chart paper
- Poster markers
- Paper, pencils and crayons
- Copy of the book "Why Should I Recycle?" by Jen Green
- Copies of the Letter to Parents provided

Overview

The average US citizen generates approximately one ton of trash annually, but seldom gives it any thought once they throw it away. So what happens to it all? Well, it goes into the waste stream where it is collected and hopefully, disposed of in a manner that least impacts the environment. This process is known as solid waste management.

The Environmental Protection Agency has designed a plan for this process, which they refer to as "integrated solid waste management", and has identified five ways to properly handle waste materials: a) source reduction and reusing, b) recycling, c) composting, d) converting to energy, and e) burying it in a sanitary, engineered site. The EPA emphasizes that there is no definitive approach to waste management and encourages communities to combine these five methods to effectively address the issue.

In most communities across the country waste materials end up in at least one of three locations: a) a materials recovery facility, b) a waste-to-energy facility, or c) a landfill. A materials recovery center is where recycled materials are sent. Once at an MRF glass, metal, plastic and paper are sorted, separated, and baled. Then they are transported to manufacturers, processed, transformed into useful items and placed back on the shelves for consumers to purchase once again. A waste-to-energy facility burns the waste material and converts it to energy. The trash is used as fuel to produce heat energy, turning water into steam. The steam is channeled to turbine generators, which in turn produce electrical power. A landfill is a long-term disposal solution that buries trash in as safe and sanitary manner as possible. In a landfill trash is deposited and compacted overtime, burying layer upon layer of waste material and leaving it to decompose. The EPA recommends land filling as a last resort, after all other methods have been exhausted; however many communities find the other options too costly or impractical, and use a landfill solution as one of their primary methods of disposal.

While the technologies driving these methods have greatly improved in recent years, they still present a number of environmental problems; so the most desirable methods for reducing waste are composting and source reduction/reuse. According to reports from the EPA almost 70% of solid waste consists of organic materials, such as paper, food and yard waste. These materials can be composted by individuals or on the community level, using municipal solid waste composters. Either way, the result is a product that can be added to enrich and improve the quality of soil. Compost is a valuable agricultural resource.

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However, even with all these other options source reduction is, by far, the most preferred method of solid waste management. It uses fewer resources, less energy and is essentially free. Unfortunately, it is also the most difficult concept to communicate to consumers. For manufacturers, source reduction means looking at and reducing the waste they generate during production, and the materials they use in packaging products. For individuals, it means reevaluating current practices, learning to do more with less, using what already exists responsibly, and recognizing the difference between needs, wants and what is ultimately best for the environment and the future of mankind.

Kid's Speak: People make a lot of trash. Every day they throw trash away without even thinking about where it will go or what will happen to it. People make so much trash that they need to have a plan to take care of it so it won't just pile up.

Not all trash needs to go in the garbage. There are other things that can be done. Some of it can be reused it in a different way, some of it can be recycled so it can be made into something else, and some of it, like scraps of food, leaves and grass clippings, can be composted and added to the garden. But there are also things that people can do so there isn't as much trash. They can use fewer items that make trash. Instead of using plastic sandwich bags to put snacks in, they can use a reusable container. Instead of a drink box, they can use a reusable water bottle. Instead of paper napkins and plastic utensils, they can use cloth napkins and washable forks and spoons. There are lots of things that people can do to make less trash. They just have to think about the choices they have and try to make the best ones for the environment. You can do these things too, and you can start right way.

Eco-Fact: For every ton of paper that is recycled, rather than thrown in the trash, seventeen trees are saved.

Procedures:
Before National Green Week:

- Sometime during the week of January 25, 2010 school appointed green keepers will collect one day's snack trash from each participating class. (Note: This day will be determined on an individual school basis. Please check with your school administrators for the date and time of your school's collection.) This trash will be combined with trash from all participating classrooms school wide and weighed in total to determine the pre-weight of snack trash for your school. In order to achieve an accurate weight please include in the trash collection only the waste that was generated at snack time for the given day. Before giving the trash to the green keepers please remove any organic waste (e.g., fresh fruit, fruit cores and peels), but do not empty out any drink containers that still contain liquids.

- Explain National Green Week to students. Talk to students about what they can do to help reduce trash in the classroom. Explain to students that if they use reusable water bottles, reusable snack containers, cloth napkins, washable silverware (not plastic ware), and snacks without wrappers (e.g., apples, bananas, grapes,…) they can make a big difference in the amount of trash that will enter the waste stream. Request that they use reusable lunch sacks instead of paper or plastic bags.

- Send the Parent Letter provided below home with the students. Ask students to talk to their parents about National Green Week and how they can all help reduce the trash that gets thrown away. Request parents send environmentally friendly snacks and lunches to school. (Note: If needed, change the dates in the parent letter to reflect the designated green week in your school.)

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To support the Waste-Free Snack Challenge in the classroom the following lessons are recommended.

Before Conducting the Reduce Your Trash Lesson:

- On **Monday** morning of **National Green Week** introduce the lesson using a think aloud. While holding a recyclable item, such as a can or plastic bottle, wonder aloud, "What should I do with this?" Then answer your own question. "I could throw it in the trash basket, or maybe I could recycle it. What would be the best thing to do?" Answer your own question, giving a few reasons why people should recycle: it reduces waste, saves energy, uses less space in the landfill, reduces pollution, its good for the environment, etc. After talking it out for a minute or two suddenly remember the perfect book to help with this issue. Introduce "Why Should I Recycle?" by Jen Green.

- Read the story aloud to the class. After the reading pose the following questions:

    - What would happen if everyone threw away all of their trash? What kind of problems could this cause?
    - What type of items can we reuse? How can we reuse them?
    - What type of items can we recycle? How do we recycle them?
    - What type of items can't we reuse or recycle at school? Why?

- Discuss the importance of the 3 R's: reduce, reuse, and recycle. Share the Eco-Fact with students. Ask them to think about how many pieces of paper they put in the trash every day and explain to them how they can help to reduce trash and recycle starting right away.

- After students leave for the day, collect the trash that has accumulated over the course of the day and save it in a clear plastic trash bag. (Snack trash will have been collected by the green keepers.) Label the bag Day 1. Weigh the bag of trash. Then make a pile of books that weighs the same amount as the bag of trash. The books should be approximately the same dimensions in order to make a nice stackable pile. Bring both the bag of trash and pile of books to class on Tuesday. (Note: If a balance scale, large enough to accommodate the trash bag and pile of books, is not available, use the nurse's scale or another scale suitable for the project. Talk the students through the process of weighing both the bag and the books using the think aloud method as in the beginning segment.)

Reduce Your Trash Lesson:

1. **On Tuesday** morning, begin the class by drawing students' attention to the bag of trash saved from Day 1. Show the students the bag of trash and explain to them that it contains all the trash that they threw away the day before. Put the trash bag on the balance scale. (If the bag of trash is too cumbersome to place on the balance scale, you can simulate the bag of trash with another bag of similar weight, but better size.)Begin to add books to the other side of the scale. Explain to students that books will continue to be added to the pile until it is in balance and weighs as much as the bag of trash. Ask them to predict how many books they think will be in the pile. Make the pile of books equal to the weight of the trash bag. Count aloud with the students the number of books in the pile. Discuss with them how close their predictions were?

2. Create a Data Table similar to the one below. Record the number of books it takes to equal the weight of the trash bag for Day 1. Explain to them that tomorrow the trash that they throw away today will be weighed and books will either be: added to the pile, taken away from the pile, or the

pile will be left alone. Explain that if more books are added it means that the class threw away more trash on Tuesday than they did on Monday. That is not good news. It means students did not remember to reuse and recycle materials. If books are taken away or subtracted from the pile it means that the class threw away less trash on Tuesday than on Monday. This is good news. It means students did remember to reuse and recycle materials. If the pile of books is the same on both days, it means the trash thrown away on both days weighed the same, and the class needs to try harder to reduce the amount of trash they throw away.

3. Ask students what they think might have been in the trash that made it so heavy, and what could have been reused or recycled so it would have weighed less? Make a simple list. Use picture clues where necessary. Explain to students that today they should be careful to recycle things that can be recycled, and to reuse whatever they can, such as using the back of any paper before recycling it. Leave the pile of books and the list in an obvious place so students will be reminded to reuse/recycle.

4. Save Tuesday's trash. Label the bag Day 2. Snack trash will have been collected by the green keepers.

5. **On Wednesday**, show students the trash bag from Day 2. Place the bag for Day 2 on one side of the balance scale. Place the pile of books from the previous day on the other side of the scale. Ask for a volunteer to help adjust the pile so it balances by putting on more or taking away the appropriate number of books. Count aloud with the class the number of books in the pile. Record the number of books on the data table. Ask students if the weight of today's trash is less than, equal to or greater (<, = , >) than the weight on Day1? What was the difference? Show students how to count to compare the two days and find the difference. Discuss with students the conclusions they can draw from this information about trash reduction? Remind students to continue to be careful about what is thrown away and what is recycled.

6. At snack time on Wednesday, have students share with their classmates the types of containers they used to carry their snacks to school. Make a tally chart to show the different kinds of environmentally friendly containers students used. Discuss with students how they have helped the environment by bringing reusable containers to school. Encourage them to continue the practice.

7. Save Wednesday's trash. Label the bag Day 3.

8. **On Thursday** morning, show students the trash bag from Day 3. Follow the procedure from the previous day. What conclusions can be drawn from this information about trash reduction? What do students notice about the change? Discuss with students what might account for the difference. Remind students to continue to be careful about what is thrown away and what is recycled.

9. At snack time, add to the tally chart to show the different kinds of environmentally friendly containers students used. Find the count for Thursday. Ask students if there were more environmentally friendly containers used on Wednesday or Thursday? What conclusions can students draw?

10. Save Thursday's trash. Label the bag Day 4.

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11. On Friday follow the same procedure as on Wednesday and Thursday. Using data from all four days, find the difference in the pile of books from Monday to Thursday. How much of a difference was there in the amount of trash generated on Monday compared to the amount generated on Thursday? Explain to students that their actions directly affected the amount of trash they made. When they recycled, they put less trash in the trash bag. When they brought reusable containers for snack, they put less trash in the trash bag. They helped reduce the trash!

After Conducting the Lesson:

- Using the data recorded on the Data Table conduct a whole group activity to transfer the information from the table to a pictograph. Use a book as the symbol to represent the numbers for the pictograph, and a key of 1, 2 or 5 to stand for the value of each symbol.
- Discuss with students what the pictograph indicates. Ask the following questions and show students how they can find the answers by reading the pictograph.
- On which day did the class have the most amount of trash? How do we know? (Number of books)
- On which day did the class have the least amount of trash? How do we know?
- What conclusions can we draw from the pictograph? Was the class successful in reducing the amount of trash they threw away each day?
- Students will reproduce the pictograph and use it as a tool to explain to their parents how successful National Green Week was in their class.

Adaptations:

- If a large enough balance scale is not available the same activity can be done by first weighing the trash and then building the pile of books to approximate the weight of the trash bag. In this case the teacher will have to talk students through the process rather than letting them see how the weight of the two balance.
- Other graphic organizers can be used (e.g., real graphs, picture graphs, tally charts).
- Trash bags can be organized by size, from greatest to least, to provide students with a visual of the decreasing amounts of waste being generated in the classroom. However, it is important for students to realize that the size of the bag is not necessarily indicative of its weight. Use the example of three bottles, all the same size. One is empty, one is half full and one is completely full. Use the balance scale to show students how the three bottles all have a different weight, yet they would take up the same amount of space inside the bag.

Extensions:

- Students can create a 3 R's journal. Students can write and illustrate daily journal entries about how the amount of trash collected in the classroom is decreasing.
- Students can add journal entries about what types of items are being recycled in their classroom.

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