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NCTCOG
North Central Texas Council of Governments

Prepared in cooperation with the North Central Texas Council of Governments through funding from the Texas Commission on Environmental Quality.

Where is Away?

Purpose: To invite students to consider their responsibility for what they throw away and the impact their waste has on the environment.

Activity:

1. Place your classroom trash can in front of the students on a desk or table with a large copy of the following label attached:



2. Divide the class into three groups. Provide each group with chart paper and instruct them to write, “Thrown Away” on the top. Brainstorm a list of ten items commonly thrown away. Record on chart paper.

3. Return to large group and share the work of the three groups.

Discuss:

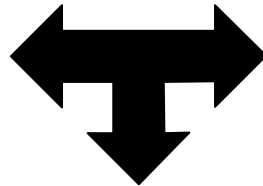
- Where is the “away” we all talk about?
 - Can it be found on a map? Here is a list of the landfills in the North Central Texas region <http://www.nctcog.org/envir/SEELT/disposal/facilities/landfills.asp>
 - Could we go there?
 - Who is in charge of “away”?
 - What happens to stuff that goes “away”?
 - How long will it stay in “away”?
 - Where did the stuff come from to start with?
 - Who is responsible for the stuff?
4. Provide each student with a copy of the “Ecological Ethics” concept organizer and work through as a class.
1. Begin with the following questions:
 - a. What does ecological mean? Elicit student definitions and record on board or overhead. (concerned with the protection and preservation of the natural environment)
 - b. What does the word ethics mean? Elicit student definitions. (the study of moral standards and how they affect conduct) (moral: relating to issues of right and wrong and how individuals should behave)
 2. Following discussion of concepts have students fill in the top two boxes with their individual thoughts. Group share.
 3. After group share have students synthesize what they’ve thought about and heard from others to write their own definition of the concept in the middle box.
 4. Pair/Share with another student. Refine if desired.
 5. Work with Pair/Share partner to complete the two bottom boxes.

Concept:

Ecological Ethics

Characteristics of ecological ethics:

Things I probably would not see in examples of this concept:



My definition of the ecological ethics:

Examples of ecological ethics in action:

Words that connect to this concept:

Dissection of a Trash Can

Have students identify and calculate the amounts and types of trash typically thrown away in their school each day.

Materials:

Trash Can 1 = Class trash

Trash Can 2 = Principal's trash can

Trash Can 3 = Class trash from another room (art, music, gym, etc.)

1 Recycle Bin

Trash Bags

Scale

Gloves

Obtain cooperation of colleagues for this project several days in advance and make a plan for retrieval and storage.

What to do:

Collect and save the trash generated in the above three trash cans for 3 days.

1. Have students estimate the amount of trash in pounds they think each collection site would throw away each day. Record estimates on the board.
2. Using plastic gloves as protection spread newspapers on the floor and dump the trash, one bag at a time.
3. Sort the items into piles according to the type of material of which they are made.
4. Count the number of different items of each type (paper, pencils, cans, bottles, plastics, etc.)
5. Place the trash types in separate bags. Or put recyclables in one bag and trash in one bag and weigh them both. Calculate to determine how much trash would be diverted from the landfill if all classrooms recycled that much.
6. Repeat for the other two bags collected.
7. Estimate the weight of each bag of sorted trash.
8. Weigh each bag using a bathroom scale by having one volunteer stand on the scale without the bag to get their weight, and then holding the bag.
9. Find the difference for each one.
10. Calculate the volume of trash in each bag by measuring the width, length, and depth.
11. Analyze the data and draw bar graphs to illustrate what you have learned.
12. Use the knowledge gained to have students work in groups of three to develop "Top-Ten" lists of tips for school waste reduction. Create eye-catching posters with these tips and post around the building.
13. Discuss how it might be different if one of the trashcans came from the cafeteria. What kind of materials might be in it? What might be recyclable?

Extension possibilities

- Calculate the average amount of each type of trash generated per day by dividing by 3 (for the 3 days of collection.)
- Determine the total amount of trash generated for the whole building for one day.

- Determine the average amount each individual student throws out in one day, week, month, and year.
- Determine how much space it would take to hold one week's worth of trash from the school. One month . . . One year . . .

Discuss:

- If no trash were removed from the classroom how long would it take to fill the classroom?
- Do you think more trash might be generated on certain days of the week or month? Why? What could collectively be done to reduce school waste?

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A Weighty Question

Materials: scale, textbook, bottle of water, shoe(use a volunteer)

Everyday each American produces nearly 4.5 pounds* of trash both in and away from home.

What does 4.5 pounds feel like?

How many equivalents in . . . textbooks?
 . . . bottles of water?
 . . . shoes?
 . . . the average sized student in your grade?

How many pounds would this be for the entire class per day?

Per week?

Per month?

If every person in our class threw away one less pound of trash per day how much less would that be in:

 One week?
 One month?
 One year?

In groups of three list 5 ways generating even one pound less per person per day would make a positive difference in the world.

Share group lists with the class.

Tally similar responses and create a class list of the top 5 positive outcomes. Post for the remainder of the unit.

*Data source: U.S. Environmental Protection Agency

That's a Wrap!

Purpose: To have students investigate the purpose of packaging and identify eco-friendly and wasteful packaging.

Materials:

- One type of food packaged in several different ways (example: jar of peanuts, can of peanuts, bag of shelled peanuts, peanuts in the shell, peanut butter)

Procedure:

1. Display each sample of the food item and discuss:
 - What are the components of packaging for this item?
 - Why is this product packaged this way? (Protect the product, protect health, prevent theft, provide convenience, promote purchasing, make it look appealing, provide advertising, etc.)
 - Is the packaging essential or wasteful? Why or why not?
 - What influence do you think the packaging for each item has on persuading potential customers to buy the product?

2. Divide students into groups of three to become food-packaging investigators.

Task: Choose a fresh food item to investigate (potato, tomato, corn, apple, etc.)

Visit a local grocery store (or grocery store website) to calculate and record the price per pound of the fresh product as well as 5 -10 processed forms of the product. (Ex: fresh potatoes, frozen French fries, canned potato salad, potato chips, potato buds, etc.)

Complete the following chart for the product chosen.

Product	Package size	Price	Price per pound	Packaging components

(lengthen chart to match # of products found)

What form of your food item is most expensive per pound? Why?

What relationships are there between cost and amount of processing and packaging for your food item?

What evidence is there that the manufacturer of the product was concerned about disposal of the packaging?

3. Follow-up class processing:

Share group findings for chosen products and discuss the following questions:

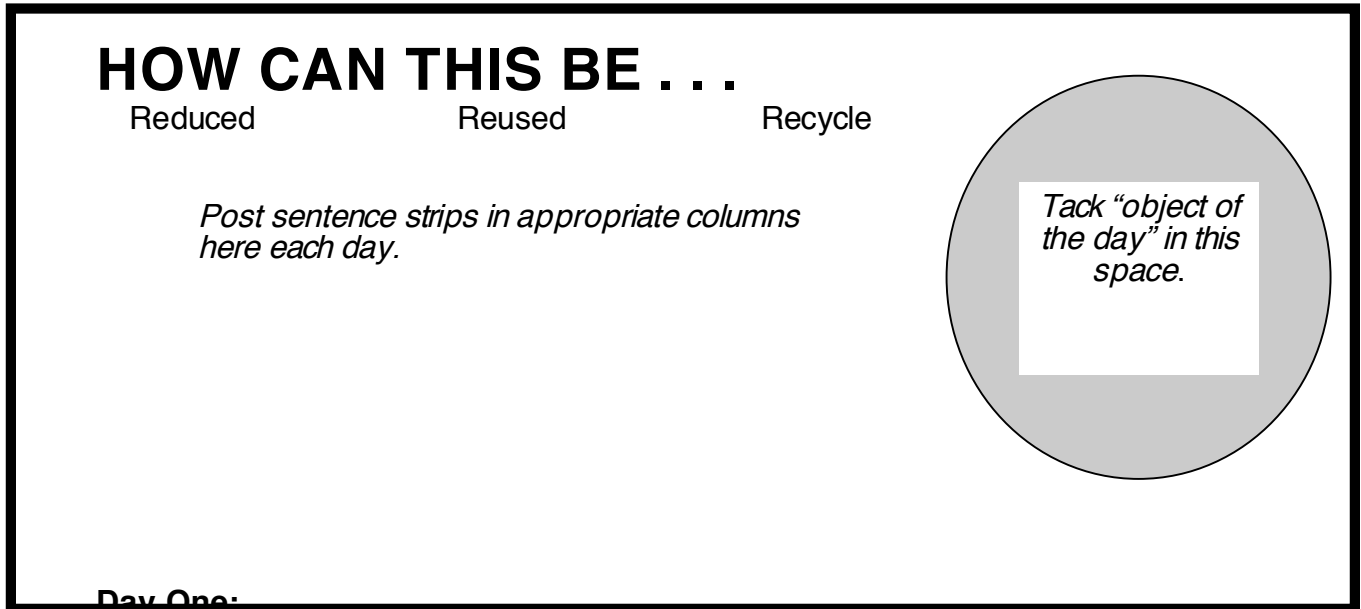
- What conclusions can you make about the relationships between cost, processing and packaging?
- What products did you find that truly need packaging?
- Which packaging did you find to be least wasteful of resources and energy?
- Which packaging takes up the least space in a landfill?
- Which packaging decomposes?
- Which packaging is recyclable?
- Which packaging could be reused?
- Which packaging is most appealing?
- Which forms of products would you try to purchase if you were interested in reducing solid waste?

- What packaging is used on your favorite food items? How does this impact the waste stream? Which of these favorites could be purchased without packaging?
- How often do you think the manufacturers consider the impacts of packaging on the environment?
- Who should pay for the disposal costs of packaging that isn't recyclable or reusable?
- Is it more important to package the item to sell or to package it to have low environmental impact?
- Are these two concepts mutually exclusive?
- How will this knowledge affect your purchasing choices?

3 R's Every Day is a Choice Board

Purpose: To consider environmentally informed and mindful choices with regard to daily waste.

Prepare a bulletin board with 3 columns as shown below.
To one side place a large colored circle for the “object” of the day.



Day One:
Choose an object commonly thrown away, or wasted, in the classroom. Tack it into the circle. Pair students and give them 5 minutes to brainstorm their ideas and write statement on strips of paper to be posted under the 3 headings (reduced, reused, recycled).

Post and discuss.

Days Two and Three:

Follow the same procedures, tacking a different object into the circle each day.

Day Four:

Use the ideas generated in the preceding days to create “bumper stickers” with slogans and mottos reminding fellow students to avoid unnecessary wastefulness. Post in the halls and classroom.

Sayings and Slogans

In the “old” days:

“A stitch in time saves nine.”

“Waste not, want not.”

“An ounce of prevention is worth a pound of cure.”

“Built to last a lifetime.”

“Use it up, wear it out, make it do, or do without.”

In these times:

“Quick and easy to use.”

“No mess, no bother.”

“Completely disposable.”

“Individually wrapped for your convenience.”

“They sure don’t make ‘em like they used to.”

What are these sayings telling us about how our lifestyles have changed?

Which messages emphasize product quality? Which emphasize convenience?

Are products today made to be durable, convenient to use, both? Why? How do you feel about this?

Why are we attracted to items that are “new and improved”?

Imagine yourself as a reporter investigating how times have changed since your parents or grandparents were young. Interview someone from a previous generation to find out what products they used in their everyday lives for toys, clothing, wrappings, trash disposal, etc. What differences do they notice regarding waste and disposal? Did they recycle?

Discuss interview results in class.

Smart Choices Bingo Game

Play a bingo game by focusing on wise use of natural resources. Provide students with a blank bingo board to fill in randomly with the following earth friendly habits people may practice:

- Recycles aluminum
- Recycles newspaper
- Recycles junk mail and office paper
- Recycles glass
- Recycles plastic
- Recycles used batteries
- Installed water saver showerhead
- Has one car
- Utilizes public transportation regularly
- Bikes for transportation
- Buys hybrid car
- Walks regularly for transportation\
- Carpools regularly
- Utilizes rechargeable batteries
- Turns off water while brushing teeth
- Installed water saver toilet tanks
- Uses cloth towels for spills instead of paper towels
- Checks faucets regularly – no leaky faucets
- Composts regularly
- Walks to work or school
- Installed solar panels
- Uses energy saver light bulbs
- Has automatic energy saver thermostat
- Takes 2 minute showers
- Uses wind energy
- Consistently makes “smart shopping” choices regarding packaging of products
- Installed a ‘water’ (xeriscape) garden
- Purchases recycled computer paper
- Recycles computer printer cartridges
- Other – student choice/suggestions

A bingo caller shouts out the wise use choices selected at random from a container. (Prepare slips ahead of time by copying and cutting into strips **and** randomly attaching an equal distribution of S,M,A,R or T with each action.)

If the choice called matches a number on the player's card, the player marks it off. Players try to form vertical, horizontal, diagonal lines, or four corners on their card to win.

S M A R T

Earth “Charge” Card

Purpose: To provide students with a “reminder” to live lightly on their Earth.

Materials:

- Cardstock – 3.25 x 2 inches
- Art supplies
- Laminating machine

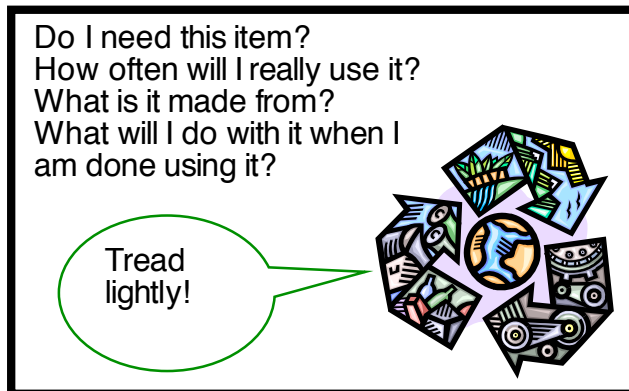
Procedure:

Provide students with the following questions and time to design a personal wallet card to keep with their money reminding them to consider the “cost” to their world each time they make a purchase.

- Do I need this item?
- How often will I really use it?
- What is it made from?
- What will I do with it when I am done using it?

Laminate for longevity.

Example:



What to do:

1. Read the poem below.
2. Reread the poem and write your response to John Caddy's words and phrases on the right hand side.
3. On the back of this sheet do a written response to this question: How does this poem relate to you and what you've learned about your ecological impact?

Poem

My response
(feelings, thoughts, questions)

The Way

Go out into Earth.
Roll in moss, lick a pebble,
dance a circle round a tree, catch
a falling feather on your palm,
watch a turtle head thumb up
from pond to measure you-
smile greeting,
for this going out is going in,
in to your root nature,
for you are Earth, and if you are
to know yourself, you must know
the rest of Earth, and know too
that each atom of your flesh has been
since Earth has been,
and always has been shared
with all alive, and know as well,
how in each live cell the spirals dance,
as spiraled stardust coalesced
into the sun and Earth
and eventually you,
for going out is going in.

John Muir said once in a letter that "going out, I found, was really going in." Now, a century and a half later, we explore this truth as ecopsychology.

John Caddy, "The Way," in MORNING EARTH: FIELD NOTES IN POETRY (Minneapolis: Milkweed Editions, 2003). Copyright (c) 2003 by John Caddy. Reprinted with permission from the author and Milkweed Editions (www.milkweed.org). For more on John Caddy's work with ecological literacy through the arts, go to: <http://www.morning-earth.org/>

Teacher overview

The Eco-Shopping Game: Making the connection between people, consumption, and our local and global environment.

We all use resources to survive, but many people are concerned that our growing population, and changing lifestyles are straining the Earth's ability to provide fairly for all of its inhabitants. As population grows, consumption grows even faster, especially in the industrialized countries of North America and Western Europe. Along with consumption comes trash and habitat change. Why are we making all this trash, and where does it end up, what can we do to think proactively about our everyday impact on the Earth?

You are encouraged to use the information and activities in this unit with your students across all subject areas. By informing students, finding out their thoughts and opinions, and providing them with opportunities for action, you can help them connect new concepts regarding their responsibilities to the Earth with what they already know for meaningful learning and conscious decision-making. Possible action learning projects are included with the final module; however, one or more could be instituted at any time during the course of study based on student excitement and interest.

Smart Shopping:

This module introduces the idea of reducing waste and preserving natural resources through smart shopping practices (conscious thought about the goods, services, and activities bought or supported) in our everyday lives.

Everyone produces some waste, but we can choose not to be "Superconsumer". Many of the goods that we consume everyday are made on one continent, fabricated on another, and consumed on a third. Without realizing it, by buying a new pair of sneakers we can affect the distribution of wealth, labor practices, and natural environment in areas that are just locations on a map to most of us. We rarely think about what goes into the products we use everyday, or what happens to them once they are thrown away, but our choices do make a difference, both positive and negative on a global scale.

In the book, *How Much is Enough?* Ecologist Alan Durning writes, "Here is the typical American adult consumer. We dine on meat and processed, packaged goods; imbibe soft drinks and other beverages from disposable containers; spend most of our time in climate-controlled buildings equipped with refrigerators, clothes washers and dryers, abundant hot water, dishwashers, microwave ovens and a plethora of other electric powered gadgets." We know that children learn

consumption habits by observing grown-ups. Polls also tell us that teenagers are an important target demographic for advertisers. Statistics say that the average American spends almost an hour either reading, watching, or listening to advertisements each day. It is critical that we educate our children about the growing commercialization of our lives and the effect it is having on our environment and our world.

Pre and post consumer paper products will be featured in this module. Knowing the difference before viewing will help students make their choice.

Post-consumer waste paper products are items made from paper waste that has reached the intended end use and then has been placed in a recycling bin and sent to a waste collection facility. At the collection facility, the waste paper is sorted by type and sent to reclamation sites. For paper, post-consumer fiber is sent to a pulp mill to be made into post-consumer pulp. The pulp is then used in the paper making process. This is the most desirable ecological choice.

Pre-consumer waste paper products are made from paper waste that has *not* reached its end use. It can best be described with an example. A large (or parent size) sheet of paper is used when making paper envelopes. However, the pattern for the envelope is cut out of the parent size sheet and used as an envelope. The remaining portion of the sheet is then sent back to a pulp mill to be pulped.

Recycling/Composting/Hazardous Waste:

“Garbage is not something you throw away. There is no such place as away. Disposal is a myth . . .”

Nancy Cosper
Seeds of Peace, A Catalogue of Quotations
by Jeanne Larson and Madge Micheels-Cyrus, 1986

What else can we do with the trash? This module helps users identify the importance of recycling, composting, and disposing properly of hazardous wastes as strategies for reducing one’s environmental footprint. The essential question becomes, “Where is away?” Is there such a place? Everyday we throw out everything from toothpaste tubes to broken VCR’s, plastic soft drink bottles to grass clippings, school lunch wrappings to milk cartons. The average amount of daily trash attributed to each American is approximately 4.5 pounds. When multiplied by 365 days per year and approximately 296,000,000 American citizens the results are staggering! Consequently, when each person becomes aware of and consciously responsible for their ‘drop in the bucket’, and if each drop becomes smaller, the problem will be reduced accordingly.

Current population figure reported from Population Connection (formerly Zero Population Growth)

http://www.populationconnection.org/Reports_Publications/Reports/report209.html

The Past and Future Lives of Stuff:

“Why buy new when slightly used will do?”

“One man’s trash is another man’s treasure.”

A lot of “stuff” goes into the waste stream, is this really necessary? Reuse can literally keep tons of materials “busy” and out of the trash - saving citizens and governments money and become a major weapon in the war on trash by reducing the size of our ecological footprints. This module helps users to understand how objects considered everyday garbage can be used creatively in new ways and as new things.

Lesson Design:

The model for lesson design in this curriculum is the “Backward Mapping Process” by Wiggins & McTighe, *Understanding by Design*, © 1998. Each module has a complete series of learning experiences corresponding to the concepts presented on the **Eco-Shopping Game** CD. An “overview” document for each module is included to assist teacher planning.

The first step in the lesson design process is identification of the desired results for students – knowledge of TEKS, “Big Ideas”/*Enduring Understandings*, and concepts.

Next, *Essential Questions* are identified to stimulate student interest, energize instruction and provide a focus for the unit. The questions are open ended, have the potential for in-depth investigation, and connect to real-world issues.

Lastly, the *Constructing Meaning* (learning experiences and instruction) portion of the unit is created. Instruction follows a natural learning cycle for students.

The **Learning Cycle** guides students through four phases of learning.

Focus: This stage is characterized by activities designed to access prior knowledge, clarify prior understandings of the topic, and focus the students for the investigations to come.

Explore: During this stage students will be guided by a question or problem and engaged in experiences aimed at keeping wonderment of the topic alive. These experiences bring new understanding of the concepts through deeper questioning, collaborative work, group discussions and individual processing.

Reflect: The reflection stage provides activities for students to strengthen their personal understanding through cognitive processing. These activities assist students in organizing new learning into generalizations and concepts that can be connected to prior knowledge.

Apply: These experiences allow the students to transfer and demonstrate their new level of understanding into real life and novel situations. Often a culminating task is warranted which requires students to present and/or use what they have learned. This task should embody the TEKS and relate directly back to the “Big Ideas”/*Enduring Understandings* and *Essential Questions* identified for the unit. There is also opportunity to collect new questions for further investigation.

Example: Students will plan, organize and carry out a community Solid Waste Awareness Day. Activities for the day will focus on issues of solid waste creation and disposal in the community. Activities will answer the essential question, "How are the quantity and composition of solid waste in our community affected by citizen behaviors?"

Student engagement in large-scale project-based activities (centered on addressing the Enduring Understandings) is essential. Collaboratively identifying and planning the real-world activities of greatest interest and importance to them is key.

Note: Graphic organizers are frequently suggested as a strategy for helping students to "see" and process their thinking. In order to model responsible consumption of paper resources, please consider demonstrating how to construct the suggested organizer on the board or overhead and ask students to make their own on the flip side of previously used paper instead of making multiple copies on fresh paper.

Eco-Shopping Game Glossary:

Alternative: the possibility of choosing between two different things or courses of action

Biodegradable: the property of a substance that permits it to be broken down by microorganisms into simple stable compounds such as carbon dioxide and water

Compost: to change organic wastes like food scraps and grass clippings into enriching
soil (verb)
:a mixture of decayed plants and other organic matter (noun)

Conserve: to protect from loss or depletion

Conservation: the wise use of natural resources to minimize loss and waste

Decompose: to break down into component parts or basic elements

Degrade: to cause damage or destruction to part of the environment as a result of human activity

Degradable: able to undergo biological or chemical decomposition

Disposal: the process of throwing away or getting rid of something

Disposable: designed to be thrown away after use

Ecology: the study of the relationships and interactions between living organisms and their natural or developed environment

Ecological: concerned with the protection and preservation of the natural environment

Generate: to produce or originate

Hazardous waste: waste that causes special problems for living organisms or the environment because it is poisonous, explosive, burns or dissolves flesh or metal, ignites easily with or without a flame or carries disease

Landfill: a site for the controlled burial of solid waste – a sanitary landfill is specially engineered and constructed to reduce hazards to health and safety\

Nonrenewable resources: a natural resource that, because of its scarcity, the great length of time it takes to form, or its rapid depletion, is considered finite in amount (e.g., coal, copper, petroleum)

Pre-consumer recycled paper: made from waste paper that remains unused when a product is being manufactured. Example: a large sheet of paper is used when making envelopes. A pattern for the envelope is cut out of the large sheet and made into the envelope. The scraps from the original sheet are sent back to a pulp mill to be made into something else.

Post consumer recycled paper: made from paper materials that once had other lives as letters, junk mail, reports, etc.

Recycle: the collection and reprocessing of manufactured materials for reuse either in the same form or as part of a different product

Renewable resources: a natural resource derived from an endless cyclical source (e.g., sun, wind, water, wood)

Sustain: to keep something going

Sustainable: making use of natural resources without destroying the ecological balance of a particular habitat

Sustainability: development maintained within acceptable levels of global resource depletion and environmental pollution

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Activity:

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Discuss:

- Where is the “away” we all talk about?
- Can it be found on a map? Here is a list of the landfills in the North Central Texas region <http://www.nctcog.org/envir/SEELT/disposal/facilities/landfills.asp>
- Could we go there?
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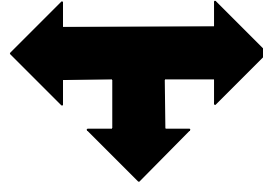
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7. Estimate the weight of each bag of sorted trash.
8. Weigh each bag using a bathroom scale by having one volunteer stand on the scale without the bag to get their weight, and then holding the bag.
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10. Calculate the volume of trash in each bag by measuring the width, length, and depth.
11. Analyze the data and draw bar graphs to illustrate what you have learned.
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Extension possibilities

- Calculate the average amount of each type of trash generated per day by dividing by 3 (for the 3 days of collection.)
- Determine the total amount of trash generated for the whole building for one day.
- Determine the average amount each individual student throws out in one day, week, month, and year.
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Discuss:

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How many pounds would this be for the entire class per day?

Per week?

Per month?

If every person in our class threw away one less pound of trash per day how much less would that be in:

One week?

One month?

One year?

In groups of three list 5 ways generating even one pound less per person per day would make a positive difference in the world.

Share group lists with the class.

Tally similar responses and create a class list of the top 5 positive outcomes. Post for the remainder of the unit.

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- Is the packaging essential or wasteful? Why or why not?
- What influence do you think the packaging for each item has on persuading potential customers to buy the product?

2. Divide students into groups of three to become food-packaging investigators.

Task: Choose a fresh food item to investigate (potato, tomato, corn, apple, etc.)

Visit a local grocery store (or grocery store website) to calculate and record the price per pound of the fresh product as well as 5 -10 processed forms of the product. (Ex: fresh potatoes, frozen French fries, canned potato salad, potato chips, potato buds, etc.)

Complete the following chart for the product chosen.

Product	Package size	Price	Price per pound	Packaging components

(lengthen chart to match # of products found)

What form of your food item is most expensive per pound? Why?

What relationships are there between cost and amount of processing and packaging for your food item?

What evidence is there that the manufacturer of the product was concerned about disposal of the packaging?

3. Follow-up class processing:

Share group findings for chosen products and discuss the following questions:

- What conclusions can you make about the relationships between cost, processing and packaging?
- What products did you find that truly need packaging?
- Which packaging did you find to be least wasteful of resources and energy?
- Which packaging takes up the least space in a landfill?
- Which packaging decomposes?
- Which packaging is recyclable?
- Which packaging could be reused?
- Which packaging is most appealing?

- Which forms of products would you try to purchase if you were interested in reducing solid waste?
- What packaging is used on your favorite food items? How does this impact the waste stream? Which of these favorites could be purchased without packaging?
- How often do you think the manufacturers consider the impacts of packaging on the environment?
- Who should pay for the disposal costs of packaging that isn't recyclable or reusable?
- Is it more important to package the item to sell or to package it to have low environmental impact?
- Are these two concepts mutually exclusive?
- How will this knowledge affect your purchasing choices?

Recycling/Composting/ Hazardous Waste

“Big Idea”/ Enduring Understandings:

Recycling, composting and proper disposal of hazardous waste is critical to the natural environment.

(Everything is connected and interdependent.)

Essential Questions:

- Where is “away”?
- What is “responsible disposal”?
- What practices qualify as responsible disposal?
- How does our community support responsible disposal practices? Could more be done?
- What are additional measures, on a personal level, can I take to dispose of my waste responsibly?

Concepts:

- Much recyclable waste ends up in landfills, increasing our footprint.
- Recycling and composting reduce stress on landfills.
 - Curbside recycling is an easy way to reduce one’s ecological impact
 - Composting makes good use of vegetable food wastes
 - Hazardous waste must be recycled at special collection centers

Constructing Meaning:

- Educational Objective: To identify importance of recycling, composting, and disposing properly of hazardous household wastes as strategies for reducing one’s ecological impact.

Focus:

1. “Responsible Disposal” phrase/definition chart
 - Initially done by individual students. Review and refine as large group.
2. List and discuss virtues and vices of everyday items we use/purchase as “disposables.”

Explore:

1. View CD – Recycling Module
2. Article readings with Fact/Response T Chart
 - Recycling* <http://www.eules.org/recycling/FAQs.htm>
 - Municipal Waste Stream* http://www.eules.org/recycling/waste_stream.htm
 - Recycling Fun Facts* <http://www.startribune.com/static/recycling/facts.html>
3. POP it into the Compost Pile Activity
<http://www.earth911.org/master.asp?s=lib&a=organics/organics.asp>
4. Decomposition Game

Reflect:

1. Recycling Article Readings with Jigsaw Sheet Activities
 - <http://www.eules.org/recycling/aluminum.htm>
 - <http://www.earth911.org/master.asp?s=lib&a=aluminum/default.asp>
 - <http://www.eules.org/recycling/paper.htm>
 - <http://www.eules.org/recycling/plastic.htm>
 - <http://www.eules.org/recycling/glass.htm>

Apply:

1. Use Star Tribune "Sorting" link to view steps in the four recycling processes (glass, aluminum, plastic and paper) <http://www.startribune.com/static/recycling/index.html> OR <http://www.recycleitnow.net/reincarnation.asp?menu=1>
2. Create Venn diagrams to compare and contrast these processes.
3. Writing assignment: What if nothing ever decomposed?
4. Personal Top Ten List: Top Ten Ways I Will Practice Responsible Disposal

Academic Vocabulary:

recycle
 soil
 compost*
 dispose
 hazardous waste disposal
 landfill*
 responsible
 habitat
 responsible disposal
 alternative*
 sustain*
 pollution
 hazardous

Resources

Recycling Plastic Beverage Jugs

PlasticsResource.com, website of the American Plastics Council- Recycled Plastic Lumber
http://www.plasticsresource.com/s_plasticsresource/sec.asp?TRACKID=&CID=128&DID=230
 Recycling: Where Do Those Bottles Go?
 On the National Resources Defense Council website, from an article in the Christian Science Monitor
<http://www.nrdc.org/news/newsDetails.asp?nID=1832>

Recycling Paper

PaperRecycles.org, the website of the American Forest & Paper Association
http://www.paperrecycles.org/tools_for_teachers/index.html (click on [Paper Recycling - From Curb to Consumer](#))

Aluminum Can Recycling- The Benefits of Aluminum Can Recycling

<http://www.aluminum.org/>
 From the website Earth911, presented by the Aluminum Association
<http://minnesota.earth911.org/master.asp?s=lib&a=aluminum/benefits.asp>
 From the website of Bring Recycling, in Eugene, OR—Recycling Facts And Figures By Material Type
<http://www.bringrecycling.org/benefits.html>

Glass Recycling

From the Newton's Apple website: Glass Recycling
<http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/newton/GlssRecycl.html>
 From the website of the World Wildlife Fund:
http://www.panda.org/news_facts/education/middle_school/homework_help/projectidea.cfm?pid=7

This is from the Green Home Environmental Store, an online resource based in California.
http://www.greenhome.com/info/articles/reduce_reuse_recycle

TEKS:

(About TEKS- Though TEKS benchmarks are separated into content strands and each strand articulates concepts and skills relevant to that content area, these components are intended to be integrated for instructional purposes. With that in mind, only the *content strands* relevant to the Recycle Game have been identified in the following matrix. The critical thinking, interpersonal, analytical and communications skills of the sciences and social sciences are embedded in and essential to each of the activities.)

Grade level 4	TEKS Content Area	TEKS Standard
	(4.9) Geography -The student understands how people adapt to and modify their environment	The student is expected to: (A) Describe ways people have adapted to and modified their environment in Texas, past and present; (B) Identify reasons why people have adapted to and modified their environment in Texas, past and present, such as the use of natural resources to meet basic needs; and (C) Analyze the consequences of human modification of the environment in Texas, past and present.
	(4.5) Science concepts -The student knows that complex systems may not work if some parts are removed.	The student is expected to: (A) Identify and describe the roles of some organisms in living systems such as plants in a schoolyard, and parts in nonliving systems such as a light bulb in a circuit; and (B) Predict and draw conclusions about what happens when part of a system is removed
Grade level 5		
	(5.9) Geography . The student understands how people adapt to and modify their environment.	The student is expected to: (A) Describe ways people have adapted to and modified their environment in the United States, past and present; (B) Identify reasons why people have adapted to and modified their environment in the United States, past and present, such as the use of human resources to meet basic needs; and (C) Analyze the consequences of human modification of the environment in the United States, past and present.
	(5.5) Science concepts -The student knows that a system is a collection of cycles, structures, and processes that interact.	The student is expected to: (A) Describe some cycles, structures, and processes that are found in a simple system; and (B) Describe some interactions that occur in a simple system.

Grade level 6	(6.6) Geography. The student understands the impact of physical processes on patterns in the environment.	The student is expected to: (C) Analyze the effects of physical processes and the physical environment on humans.
	(6.7) Geography. The student understands the impact of interactions between people and the physical environment on the development of places and regions.	The student is expected to: (C) Describe ways in which technology influences human capacity to modify the physical environment.
	(6.14) Citizenship. The student understands the relationship among individual rights, responsibilities, and freedoms in democratic societies.	The student is expected to: (A) Identify and explain the importance of voluntary civic participation in democratic societies; and (B) Explain relationships among rights and responsibilities in democratic societies.
	(6.20) Science, technology, and society. The student understands the relationships among science and technology and political, economic, and social issues and events	. The student is expected to: (B) Explain how resources, belief systems, economic factors, and political decisions have affected the use of technology from place to place, culture to culture, and society to society; and (C) Make predictions about future social, economic, and environmental consequences that may result from future scientific discoveries and technological innovations.
	(6.8) Science concepts. The student knows that complex interactions occur between matter and energy.	The student is expected to: (B) explain and illustrate the interactions between matter and energy in the water cycle and in the decay of biomass such as in a compost bin; and (C) Describe energy flow in living systems including food chains and food webs.
Grade level 7	(7.10) Geography. The student understands the effects of the interaction between humans and the environment in Texas during the 19th and 20th	The student is expected to: (A) Identify ways in which Texans have adapted to and modified the environment and analyze the consequences of the modifications; and (B) Explain ways in which geographic factors have affected the political, economic, and social development of Texas.

	centuries.	
	(7.17) Citizenship. The student understands the importance of the expression of different points of view in a democratic society.	The student is expected to: (C) Express and defend a point of view on an issue of historical or contemporary interest in Texas.
	(7.14) Science concepts. The student knows that natural events and human activity can alter Earth systems.	The student is expected to: (C) make inferences and draw conclusions about effects of human activity on Earth's renewable, non-renewable, and inexhaustible resources.
	(7) Personal management. The student analyzes the relationship between decision making and acceptance of responsibility.	The student is expected to: (A) Implement the decision-making process; (B) Describe the role of acceptance of responsibility in making decisions; (C) Summarize the effects of personal priorities and other influences on decisions; and (D) Predict personal, family, and societal implications of various decisions.
Grade level 8		
	(8.28) Science, technology, and society. The student understands the impact of science and technology on the economic development of the United States	The student is expected to: (C) Analyze how technological innovations changed the way goods were manufactured and marketed, nationally and internationally; and
	(8.6) Science concepts. The student knows that interdependence occurs among living systems.	The student is expected to: (C) Describe interactions within ecosystems.
	(8.14) Science concepts. The student knows that natural events and human activities can alter Earth systems.	(C) Describe how human activities have modified soil, water, and air quality.

National Science Education Standards:

Science as Inquiry, Grades 5-8

- Students should develop the ability to listen to and respect explanations proposed by other students. They should remain open to and acknowledge different ideas, be able to accept the skepticism of others, and be able to recognize and analyze alternative explanations.

Science in Personal and Social Perspectives, Grades 5-8

- Causes of environmental degradation and resource depletion vary from region to region and from country to country.

From the *Benchmarks for Science Literacy*:

4B The Earth, Grades 6-8

- Earth's resources – fresh water, air, soil, trees, etc. can be depleted by wasteful usage. Or by deliberate or inadvertent destruction. The atmosphere and the oceans have a limited capacity to absorb wastes and recycle materials naturally. Cleaning up polluted air, water, or soil, or restoring depleted soil, forests, or fishing grounds, can be very difficult and costly.

I think this phrase means:

Are there parts of the word(s) I recognize?

Focus phrase: responsible disposal

Responsible disposal is an important strategy for reducing my ecological impact.

Responsible disposal doesn't look like:

What makes this an important phrase for me to know?

When, where, and how might I find this phrase used?

How does this fit with other words and concepts I know?

Recycling Articles Jigsaw

Procedure:

Divide the class into 4 groups. Each group receives one article from the resources listed on the Recycling Articles Jigsaw Resources page. Teachers can download and print the articles in preparation for this activity, or ask students to locate and print the resource of their choice.

Regroup before reading, forming new groups of four with an A, B, C, and D reader in each group.

Read and process the article using the steps listed.

Step #1 – READING:

Everyone in your group is reading something different, but related. In order to have a good discussion, everyone will need to both share and connect. To prepare for your group discussion, please respond to the following items, during

reading and again after.

While reading: Please mark any words, lines, or sections of the text that “stick out” for you. These passages might be important, puzzling, curious, provocative, interesting - whatever strikes you.

Big Ideas: Jot down two or three of the main points, ideas, or opinions you found in your article.

Reactions/Connections: What are your feelings and responses to this article? What personal connections do you make with the text? Does it remind you of past experiences, people, or events in your life? Does it connect to anything happening in the news, around school, or in other materials you have read?

Illustration: On the back of this sheet, quickly sketch a picture related to your reading. This can be a drawing, cartoon, diagram, flow chart—whatever. You can draw a picture of something that's specifically talked about in the text or something from your own experience or feelings, something the text made you think about. Be ready to show your picture to your group and talk about it.

Step # 2 – MEETING: When everyone has had time to read and respond you will meet together to chat. Your discussion will have two stages. **First**, each person should take about one minute (no more!) to give the group a brief summary and a personal reaction to their article. **Next**, everyone can join in general conversation, comparing and connecting whatever seems valuable and interesting about the readings. Share your drawings during this step.

RECYCLING ARTICLES JIGSAW: RESOURCES

For background information on the economic costs and benefits of recycling, teachers can go to the following article, from the Federal Reserve Bank of Minneapolis:

<http://minneapolisfed.org/pubs/fedgaz/05-03/recycling.cfm>

OR

<http://www.eules.org/recycling/FAQs.htm>

Including articles on recycling from other perspectives can make this activity a valuable critical literacy activity. Ask students to consider:

- Whose interests are served by this perspective, and whose are not?
- What does the author want me to think about this issue?
- What should I do with this information?

For other perspectives on these issues, go to the following links:

Recycling Plastic Beverage Jugs

PlasticsResource.com, website of the American Plastics Council

Recycled Plastic Lumber

http://www.plasticsresource.com/s_plasticsresource/sec.asp?TRACKID=&CID=128&DID=230

Recycling: Where Do Those Bottles Go?

On the National Resources Defense Council website, from an article in the Christian Science Monitor

<http://www.nrdc.org/news/newsDetails.asp?nID=1832>

Recycling Paper

PaperRecycles.org, the website of the American Forest & Paper Association

http://www.paperrecycles.org/tools_for_teachers/index.html (click on [Paper Recycling - From Curb to Consumer](#))

American Beverage Association

<http://www.ameribev.org/industry-issues/environment/recycling/index.aspx>

From the Hennepin County website—

Recycle More Paper: Paper Mills Can't Get Enough

<http://wwwa.co.hennepin.mn.us/portal/site/HCInternet/menuitem.f25c437125254e89710ece04b1466498/?vgnnextoid=0d9806640bafc010VgnVCM1000000f094689RCRD>

Paper University - TAPPI - The Leading Technical Association for the Worldwide Pulp, Paper and Converting Industry

http://www.tappi.org/paperu/all_about_paper/earth_answers/earthAnswers.htm

Aluminum Can Recycling

The Benefits of Aluminum Can Recycling

From the website Earth911, presented by the Aluminum Association

<http://minnesota.earth911.org/master.asp?s=lib&a=aluminum/benefits.asp>

From the website of Bring Recycling, in Eugene, OR-
Recycling Facts And Figures By Material Type
<http://www.bringrecycling.org/benefits.html>

Glass Recycling

From the Newton's Apple website:
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<http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/newton/GlssRecycl.html>

From the website of the World Wildlife Fund:

http://www.panda.org/news_facts/education/middle_school/homework_help/projectidea.cfm?pjid=7

This is from the Green Home Environmental Store, an online resource based in California.

http://www.greenhome.com/info/articles/reduce_reuse_recycle/113/

[The Glass Packaging Institute/Facts and FAQs](http://gpi.org/recycling/environment)

<http://gpi.org/recycling/environment>

FACT

RESPONSE

(I WONDER . . .) (I THINK . . .)

Write 5 or more facts you learned while reading here:

Jot your first response to each fact directly across from where you wrote it,

POP it into the Compost Pile!

What happens to the food and yard wastes that the majority of people throw away every day? Most likely they are thrown into the trash and taken to the landfill for burial. Once in the landfill many organic materials cannot fully decompose because they will not have enough oxygen for the process. Landfills typically seal garbage in the earth, excluding the air and moisture needed for natural decomposition. Nature's recyclers are tiny bacteria and fungi. They breakdown wastes making nutrients available for other living things in the process. Try **reusing** a plastic pop (soda) bottle to see how decomposition and composting works.

What you need:

- One clear plastic 2-liter soda bottle
- Scissors
- Nail
- Garden soil
- Organic waste (leaves, fruits, vegetables, grain products)
- Water
- Worms?!

Allow
approximately
three week for
best results.

What to do:

1. Carefully use the nail to punch 50-60 small holes all around the bottle (from about 2 inches from the bottom to approx. 2 inches from the top).
2. Use the scissors to cut off the top of the bottle so that you end with a column like container about 12 inches tall.
3. Pile the compost by alternating layers of garden soil with layers of organic waste (any plant material – but no greasy animal products). Make each layer about 2 inches deep. On top of each layer of organic waste sprinkle a little water before continuing on with the garden soil.
4. Continue layering until the pile reaches about 3 inches from the top of the container – making sure you end with garden soil on the top layer.
5. If you are brave enough, add several earthworms to the top layer of soil. They will help aerate the soil for you during this process.
6. Place the compost pile tube in an easily accessible area, but away from extreme temperatures or direct sunlight.
7. **Observe what happens for three weeks.** Check for temperature changes, odor, color and texture.
8. Test the moisture every several days and add water as needed. The compost pile should stay damp but not saturated.
9. Once a week gently turn and aerate the compost with a large spoon.

What happens to the original organic wastes added to the compost pile?

What organic materials decompose the fastest? The slowest? Why?

Did the temperature fluctuate over time? What do you think caused this?

Why is it necessary to aerate the compost?

How is composting is a useful strategy for reducing the volume of wastes sent to landfills?

The Decomposition Game

How to Play:

Match the items below with the length of time that you think it takes for that item to decompose. For example: if you think that the aluminum can breaks down in 6 months, then draw a line from the can to 6 months.

2 – 5 months

Orange Peel



6 months

Aluminum Can



5 years

Styrofoam



10 –12 years

Plastic Container



10-20 years

Milk Carton



25 –40 years

Paper



50-80 years

Filter Tip Cigarette



75 years

Tin Can



100 years

Leather Shoe



200-500 years

Plastic Bag



Never

Disposable Diaper



3 R's Every Day is a Choice Board

Purpose: To consider environmentally informed and mindful choices with regard to daily waste.

Prepare a bulletin board with 3 columns as shown below.
To one side place a large colored circle for the "object" of the day.



Day One:

Choose an object commonly thrown away, or wasted, in the classroom. Tack it into the circle. Pair students and give them 5 minutes to brainstorm their ideas and write statement on strips of paper to be posted under the 3 headings (reduced, reused, recycled).

Post and discuss.

Days Two and Three:

Follow the same procedures, tacking a different object into the circle each day.

Day Four:

Use the ideas generated in the preceding days to create "bumper stickers" with slogans and mottos reminding fellow students to avoid unnecessary wastefulness. Post in the halls and classroom.

Sayings and Slogans

In the “old” days:

“A stitch in time saves nine.”

“Waste not, want not.”

“An ounce of prevention is worth a pound of cure.”

“Built to last a lifetime.”

“Use it up, wear it out, make it do, or do without.”

In these times:

“Quick and easy to use.”

“No mess, no bother.”

“Completely disposable.”

“Individually wrapped for your convenience.”

“They sure don’t make ‘em like they used to.”

What are these sayings telling us about how our lifestyles have changed?

Which messages emphasize product quality? Which emphasize convenience?

Are products today made to be durable, convenient to use, both? Why? How do you feel about this?

Why are we attracted to items that are “new and improved”?

Imagine yourself as a reporter investigating how times have changed since your parents or grandparents were young. Interview someone from a previous generation to find out what products they used in their everyday lives for toys, clothing, wrappings, trash disposal, etc. What differences do they notice regarding waste and disposal? Did they recycle?

Discuss interview results in class.

Smart Choices Bingo Game

Play a bingo game by focusing on wise use of natural resources. Provide students with a blank bingo board to fill in randomly with the following earth friendly habits people may practice:

- Recycles aluminum
- Recycles newspaper
- Recycles junk mail and office paper
- Recycles glass
- Recycles plastic
- Recycles used batteries
- Installed water saver showerhead
- Has one car
- Utilizes public transportation regularly
- Bikes for transportation
- Buys hybrid car
- Walks regularly for transportation\
- Carpools regularly
- Utilizes rechargeable batteries
- Turns off water while brushing teeth
- Installed water saver toilet tanks
- Uses cloth towels for spills instead of paper towels
- Checks faucets regularly – no leaky faucets
- Composts regularly
- Walks to work or school
- Installed solar panels
- Uses energy saver light bulbs
- Has automatic energy saver thermostat
- Takes 2 minute showers
- Uses wind energy
- Consistently makes “smart shopping” choices regarding packaging of products
- Installed a ‘water’ (xeriscape) garden
- Purchases recycled computer paper
- Recycles computer printer cartridges
- Other – student choice/suggestions

A bingo caller shouts out the wise use choices selected at random from a container. (Prepare slips ahead of time by copying and cutting into strips **and** randomly attaching an equal distribution of S,M,A,R or T with each action.)

If the choice called matches a number on the player's card, the player marks it off. Players try to form vertical, horizontal, diagonal lines, or four corners on their card to win.

S M A R T

Earth “Charge” Card

Purpose: To provide students with a “reminder” to live lightly on their Earth.

Materials:

- Cardstock – 3.25 x 2 inches
- Art supplies
- Laminating machine

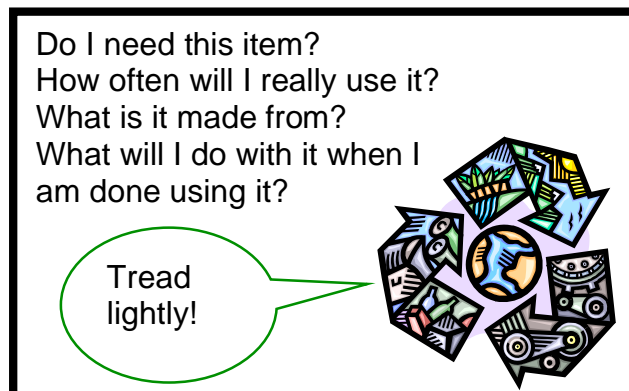
Procedure:

Provide students with the following questions and time to design a personal wallet card to keep with their money reminding them to consider the “cost” to their world each time they make a purchase.

- Do I need this item?
- How often will I really use it?
- What is it made from?
- What will I do with it when I am done using it?

Laminate for longevity.

Example:



What to do:

1. Read the poem below.
2. Reread the poem and write your response to John Caddy's words and phrases on the right hand side.
3. On the back of this sheet do a written response to this question: How does this poem relate to you and what you've learned about your ecological impact?

Poem

My response
(feelings, thoughts, questions)

The Way

Go out into Earth.
Roll in moss, lick a pebble,
dance a circle round a tree, catch
a falling feather on your palm,
watch a turtle head thumb up
from pond to measure you-
smile greeting,
for this going out is going in,
in to your root nature,
for you are Earth, and if you are
to know yourself, you must know
the rest of Earth, and know too
that each atom of your flesh has been
since Earth has been,
and always has been shared
with all alive, and know as well,
how in each live cell the spirals dance,
as spiraled stardust coalesced
into the sun and Earth
and eventually you,
for going out is going in.

John Muir said once in a letter that "going out, I found, was really going in." Now, a century and a half later, we explore this truth as ecopsychology.

John Caddy, "The Way," in MORNING EARTH: FIELD NOTES IN POETRY (Minneapolis: Milkweed Editions, 2003).
Copyright (c) 2003 by John Caddy. Reprinted with permission from the author and Milkweed Editions (www.milkweed.org).
For more on John Caddy's work with ecological literacy through the arts, go to: <http://www.morning-earth.org/>

Time for Action!

Purpose: To engage students with opportunities and responsibility for taking proactive environmental action.

Procedure: Students identify a specific concern surrounding the components of the ecological footprint, design a guiding question to address their concern, and plan and carry out action to help solve the problem.

A short list of possibilities:

- City Council Information Brochure
- Prepare and deliver local news media public service announcements – TV, radio, cable.
- Conduct a school or neighborhood litter survey and publicize results.
- Design posters for public places addressing the issues of reduce, reuse and recycle.
- Become informed about our community development plans for your neighborhood.
- Conduct a survey of local fast food restaurants and record the packaging they use and analyze for the environmental impact. Share your findings.
- Go to a fast food restaurant and ask to be served a drink in your own cup or on your own plate. What happens? What are the reasons? Could you change this?
- Visit your local solid waste disposal facility to see how it operates and what positive environmental components it integrates into daily practice.
- Organize a Reuse It Day for participants to share reuse ideas and tips.
- Plan, organize and carry out a community Solid Waste Awareness Day
- Conduct a school yard sale to reuse or trade unwanted, but useful, objects.
- Enact a recycling plan for your school (if you do not already have one in place).
- Design and publicize a “Tread Lightly” pledge for students in your school.
- Visit senior citizens to offer home assistance for reducing, reusing, and recycling.