

Reduce, Reuse, Recycle Module

I. Introduction: Over & Over

Background: Natural resources are materials such as coal, oil, natural gas, trees, and other minerals that come from the Earth. These resources are used as raw materials to produce common commodities such as paper, plastic, and cans. Earth's natural resources are divided into renewable resources and nonrenewable resources. Nonrenewable resources exist in finite amounts and once depleted can not be replaced. Renewable resources are replaced by natural processes and can be used forever, provided they are not overexploited in a short period of time. Any resource that is used for the first time is considered to be a virgin resource. The extraction and processing of virgin resources often requires more energy than using recycled resources.

Resource recovery, as practiced in the reduce, reuse, and recycle concept, conserves natural resources by extracting used materials from the waste stream and reprocessing them for future use. This saves virgin resources as well as a large percentage of the energy needed for processing.

Natural Resource Consumption Facts

- The United States uses one million gallons of oil every 2 minutes.
- Every American uses about 47,000 lbs of newly mined materials each year.
- A television requires 35 different minerals, and approximately 30 minerals are used to make a computer.
- Over the past 40 years, global consumption of wood has risen by nearly 80%. North America accounts for about 40% of both production and consumption of wood as industrial wood products.
- In 2001, each person in the United States threw away an average of 4.5 lbs of waste each day.

(Sources: Natural Resources Defense Council, 1996; National Mining Association, 2000; World Resources Institute, 2000; EPA, 2003)

For more information on natural resource recovery visit the following websites:

- www.epa.gov/epaoswer/education/quest/index.htm
- www.wri.org
- www.nrel.gov

Subject Area: Practical Living, Science, Social Studies, Math, Writing

Kentucky Connections:

- Learner Goal: #2
- Academic Expectations: 2.29, 2.30, 1.11, 2.2, 2.3, 2.18
- Core Content: PL-EP-3.1.04, PL-04-3.3.04, , PL-05-3.3.04, SC-EP-1.1.1, SC-EP-4.6.1, SC-05-1.1.1, SS-EP-3.1.1, SS-04-3.1.1, , WR-E-1.1.00, WR-04-1.1.03, WR-05-1.1. 3, WR-E-1.2. 0, WR-04-1.2.3, WR-05-1.2.3, WR-E-2.3.0, WR-04-2.3.3, WR-05-2.3.3, WR-E-2.4.0, WR-04-2.4.3, WR-05-2.4.3, WR-E-3.5.0, WR-04-3.5.3, WR-05-3.5.3, WR-E-3.6.0

Activity Description/Goals:

- Students will learn to sort items that can be recycled and reused.
- Students will learn how they can reduce the amount of trash they produce.

Materials:

- Plastic milk jug
- Large trash bags
- Gloves

Length of Lesson: Each activity can be completed in 30-60 minutes.

Vocabulary Words:

- Reduce: To decrease the amount of waste, either by using wiser purchasing habits or by reusing or recycling more items.
- Reuse: A type of source reduction activity involving the repeated use of a product or container for the same purpose or a different purpose.
- Recycle: To collect, sort, process, and convert materials that would have been thrown away into raw materials used to make the same or new products.
- Municipal Solid Waste: Waste collected from homes, institutions (e.g., schools or hospitals), commercial establishments (e.g., businesses and restaurants) and some industries, and taken to sanitary landfills. Also known as garbage, trash, refuse or debris.
- Sanitary Landfill: A specially engineered site for disposing of solid waste on land, constructed so that it will reduce hazard to public health and safety.
- Decompose: To separate into components or basic elements; to rot.

- Compost: A mixture of decaying organic matter used to improve soil structure and provide nutrients.
- Source Reduction: Any change in the design, manufacturing, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they become municipal solid waste. Source reduction also refers to the reuse of products or materials.
- Disposable: Products or materials that can be or are usually thrown away after one use or a limited amount of time.
- TMMK: Toyota Motor Manufacturing, Kentucky, Inc.

Essential Question: How does solid waste affect the environment?

Guiding Questions/Outcomes:

- Students will describe ways to reduce, reuse, and recycle solid waste.
- Students will explain the best way to dispose solid waste.

Skills Used:

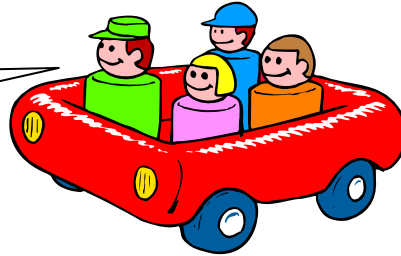
- Categorizing
- Problem Solving

Activity 1: Recycle, Reduce, and Reuse

- Have each student bring one clean dry milk jug from home. Cut out the top leaving the handle. Have the student use the jug to collect all the trash produced in one day. Be sure to stress the importance of placing only “dry” or “clean” trash in the jug. Any cans collected should be rinsed, dried and crushed. (To illustrate the concept of reusing, the jugs can be saved for other classes to use when conducting this activity.)
- On the second day, give each student a large plastic trash bag. Have each student dump their trash onto the trash bag. (After the activity, the trash bags can be wiped clean and reused.)
- Ask students to count the number of items they threw away. Sort the items by category: “Paper”, “Plastic”, “Glass”, and “Metal”. Count the number of each. Any item that does not fit into one of these four categories should be placed in a separate “Trash” category. Count the trash items.
- After each category has been counted, have students remove the items that could be reused (e.g., paper that has writing on one side only). Have each student select one item from their reuse container and explain to the class how the item could be reused.
- Ask students where the trash goes after it leaves the school. Describe to the students a sanitary landfill. Using the data

collected by the students, ask what fraction of their trash should go to the landfill, what fraction should be recycled, and what fraction should be reused.

Toyota vehicles are 85% recyclable.



Activity 2: Composting

- Describe composting.
- Have each student save their trash after lunch.
- Divide the students into groups of 4.
- Assign one member of each group to be the reporter.
- Have each group make a list of all the items being discarded.
- Ask the students what happens to these items if they are placed in the trash?
- Ask students which items could be placed in a compost bin? Which items could be replaced with reusable items?

Decomposition Facts*

Apple – 3 to 4 weeks
Sheet of paper – 1 month
Cotton glove – 5 months
Leather boot – 40 to 50 years
Tin can – 50 to 80 years
Aluminum can – 200 to 500 years
Plastic six pack ring: 450 years
Plastic jug – 1 million years
Styrofoam cup: forever
Piece of steel - forever

***Decomposition facts were gathered from sources such as the Bureau of Land Management and the Oregon Department of Environmental Quality.**

Assessment:

- Have the students construct a pie chart to illustrate their percentages of waste by category.
- As a class, prepare a chart showing the results of lunch waste.
- Ask the students to describe ways of using compost.
- After students have completed the activities, have them develop a personal waste reduction plan. The plan should include how they plan to reduce, reuse, and recycle.

Extension:

- Have students make posters showing how to have a waste free lunch. Display the posters in the cafeteria.

TMMK Connections

Large waste bins called “waste segregation” containers are provided throughout TMMK. These allow team members to easily sort their trash into five main waste streams- aluminum cans, plastic bottles, paper, compostable waste (anything biodegradable) and non-compostable waste (Styrofoam, plastic utensils, etc). This waste segregation process helps TMMK send little or no waste to a landfill each year. Instead, over one ton of waste is made into usable compost each day, helping supplement TMMK’s landscaping and gardening needs. Here are a few more details about the recycling program at TMMK:

- Everyone at TMMK is encouraged to recycle- even children at the on-site childcare facility! As a result, recycling exceeds 100,000 tons per year.
- All profit generated from selling recyclables, such as aluminum cans and plastic bottles, is donated to a unique program called the “Team Member Benevolent Fund”. This fund is set aside to help support team members during periods of financial hardship.
- Toyota vehicles are 85 percent recyclable.
- 99 percent of all scrap steel generated is recycled.
- Plastic wrap, paint solvents, used oil, packaging materials and cardboard are all recycled, as well as, nearly every other material used in the production process.
- The recycling of engine block modules annually keeps 500,000 pounds of material from ending up in a landfill.
- Over 45,000 light bulbs are recycled each year.
- Over 90 percent of the North American parts used in production at TMMK are currently received in returnable packaging.



TMMK Field Trip Observations **Name** _____

While visiting the Toyota plant, you will learn what it means to be an environmental leader in the automotive industry. Look closely at the processes it takes to build each vehicle, and be sure to use all of your senses while touring the facility. Answer these questions following your trip. (Hint: You may need to refer to the “Toyota Connections” section to help you find some of the answers.)

List 6 things that TMMK recycles.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

What does TMMK do with leftover pieces of steel?

How much paper and food waste does TMMK compost each day?

How many tons would that be in a week? _____

What are 2 ways TMMK uses compost?

1. _____
2. _____

Describe compost. (If you did not visit the compost site on the nature trail, use the Internet to help with these observations.)

1. How does it look? _____
2. How does it smell? _____
3. What is it made from? _____

Composting is important to the community because it reduces the amount of _____ going to _____.



II. Conclusion: Over and Over

(Adapted from, "Source Reduction Roundup", from The Quest for Less, published by EPA.)

Background: Source reduction, also known as waste prevention, is the practice of designing, manufacturing, purchasing, or using materials in ways that reduce the amount or toxicity of waste. Source reduction represents the "reduce" in Reduce, Reuse, and Recycle.

Consumer Source Reduction Challenge:

- Choose products that do not use excess packaging.
- Buy recycled or used items.
- Buy items in bulk rather than multiple, smaller packages to decrease the amount of packaging waste created.
- Maintain and repair durable items.
- Reuse bags, containers, and other similar items.
- "Grasscycle" – Mulch grass clippings, leaves, and yard waste and leave them on the lawn or use them to compost.
- Donate instead of discard.

For more information on source reduction visit the following websites:

- www.epa.gov
- www.redo.org
- www.nrdc.org
- www.keec.ky.gov
- www.kentuckypride.com

Kentucky Connections:

- Learner Goal: #1, #2, #6
- Academic Expectations: 1.2, 1.3, 1.12, 2.18, 6.1
- Core Content: PL-EP-3.1.014, PL-04-3.1.04, PL-05-3.1.04, SC-EP-1.1.1, SC-EP-4.6.1, SC-04-4.6.1, SC-05-1.1.1

Activity Description/Goals: Students will form teams to answer questions on source reduction.

Materials:

- Clock or timer

- Flip board or poster board
- Source Reduction Question and Answer sheet

Length of Lesson: 60 minutes for the class activity. Questions should be written on the flip board (or poster board) in advance. The space under each question should be divided into two columns. Each team name will place above one of the columns. Be sure to keep questions hidden until the game begins.

Vocabulary Words:

- Reuse: A type of source reduction activity involving the use of a product or container for the same purpose or a different purpose.
- Source Reduction: Any change in the design, manufacturing, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they become municipal solid waste. Source reduction also refers to the reuse of products or materials.
- Disposable: Products or materials that can be or are usually thrown away after one use or a limited amount of time.
- Pollution: The contamination of soil, water, or the atmosphere by the discharge of harmful substances.
- Natural Resources: Raw materials or energy supplied by nature and its processes.

Essential Question: How can I create less waste?

Guiding Questions/Outcomes:

- Students will discuss the benefits of creating less waste and reusing products.
- Students will explain why source reduction is important.
- Students will compose questions pertaining to source reduction to be used in an academic game.

Skills Used:

- Communication
- Observation
- Classification

Activity:

- Discuss source reduction and reuse and how it relates to the environment. Explain what individuals can do to reduce the amount of waste that is created.
- Divide the class into two teams. One member of the team should be designated as the “Captain”.

- Assign one student to be the “Reporter” and write answers on the flip board under each question.
- Ask each team to select a team name that represents some aspect of source reduction. (e.g., Toyota Recyclers)
- Inform teams that there will be six answers for each question. Each team will be given 2 minutes before they must try and provide as many answers as possible.
- Teams will alternate questions. As each answer is given, the Reporter will list them on the flip chart under the appropriate team name.
- Present the first question to Team 1. One point will be awarded for each correct answer. If Team 1 is unable to give six answers, Team 2 gets an opportunity to guess the rest of the answers. Write Team 2’s answers in the appropriate column. If Team 1 is able to give six correct answers, Team 2 gets a chance to give additional answers.
- Discuss the answers with the class and ask if there are any additional answers for the question.
- Repeat the process, giving question #2 to Team 2. Keep track of the score and alternate which team gets to answer first.

Assessment:

- Ask students what kinds of activities are involved in source reduction.
- Have students list things each of us can do to create less waste and reuse more.
- Ask students to explain why source reduction is important.
- Have each team devise its own questions for the opposing team and play again.

**“Over and Over”
Questions & Possible Answers**

1. What are 6 commonly used items that are often thrown away but could be replaced by reusable items?

(Possible answers)

1. Styrofoam (paper) plates replaced with washable plates
2. Styrofoam (paper) cups replaced with reusable cups
3. Plastic eating utensils replaced with reusable utensils
4. Paper napkins replaced with cloth napkins
5. Paper lunch bags replaced with reusable plastic containers
6. Batteries replaced with rechargeable batteries

2. What are 6 benefits of source reduction?

(Possible answers)

1. Reduces waste
2. Conserves natural resources
3. Reduces pollution
4. Reduces disposal cost
5. Reduces size of landfill
6. Saves money

3. What are 6 ways your class can reduce waste?

(Possible answers)

1. Paper free day
2. Write on both sides of the paper
3. Scrap paper box
4. Recycle paper
5. Recycle aluminum cans
6. Recycle art projects

4. What are 6 ways you and your family can reduce waste?

(Possible answers)

1. Use a reusable bag when shopping
2. Bring your lunch to school in a reusable bag
3. Make sure you buy only what you need
4. Donate items you don't need anymore instead of throwing them away
5. Recycle paper and aluminum
6. Compost

5. What are 6 ways you can reuse a jelly jar?

(Possible answers)

1. Pencil holder
2. Storage container

3. Drinking glass
4. Vase for flowers
5. Bank
6. Store leftovers

6. What are 6 ways TMMK reduces waste?

(Possible answers)

1. Compost food waste
2. Compost paper
3. Recycle
4. Send leftover pieces of steel for reuse by suppliers.
5. Use compost for fertilizer
6. Use recycled plastic/wood lumber
7. TEACH RECYCLING