

Lesson 1: The 4 R's - Reduce, Reuse, Recycle and Recover

Duration: 3 - 4 class periods

Lesson Overview:

The purpose of this lesson is to engage students in thinking about solid waste and what we do with it. It serves as an introduction to the concepts and the 4 R's, and as a means for finding out what is currently going on in their community. Most will not have any idea of what happens to solid waste when it leaves their school or their home.

In this lesson students complete a pre-assessment concept mapping activity involving their knowledge of the solid waste concepts. They discuss and agree on definitions for the 4 R's (reduce, reuse, recycle and recover) as it relates to issues of solid waste management at their school and in their community. In small teams they then investigate how their school and community handle solid waste and problems associated with managing our wastes.

In subsequent lessons, students will learn some connections that they are not yet making among the concepts. You may wish to have them keep the charts available to add to their connections later on.

Objectives:

- Students will understand concepts of solid waste.
- Students will describe how solid wastes are produced and moved in the environment.
- Students will investigate their impact on the natural environment.
- Students will become more familiar with how their own local waste management system operates.

Essential Questions:

What is our impact on the environment from our production of solid wastes?

Materials:

- A copy of the handout "Solid Waste Concept Map" for each student.
- Sticky notes, small (approx. 2 inch size) for each group
- Black or dark marker for each group
- A poster sheet or whiteboard for each of the teams of 3 or 4.
- Optional: computers or dictionaries for finding the definitions of concept terms
- For each member of one of the five teams, copies of
- The Solid Waste and Climate Change worksheet
- The Cafeteria Staff Interview worksheet
- The Building Services Staff Interview worksheet
- The City or County Landfill worksheet
- The Recycling Solid Waste worksheet
- Overhead projector or other projection device
- Access to computers connected to the Internet, one per two students in teams 3, 4, 5
- An overhead of the "4 R's Defined"

Preparation:

Contact the school cafeteria and building services staff and discuss with them what the students are going to be doing. Be sure to get their approval as well as any other necessary administrative approvals.

Use the city or county website to locate your local solid waste disposal agency. Note the website if they have one and provide it for that student group. If web information is not available, contact the local agency and arrange for someone who can respond to the students' questions.

Instructional Activity (session 1):

1. Group students into groups of 3 or 4.
2. Distribute the concept map sheets, sticky notes, and markers to each group.
3. Remind them that this is the start of your study, so they should not expect to know a lot about the concepts they will be working with today. It's a time for exploration, thinking about connections, and learning.
4. You may wish to go over the terms before you begin to be sure students are familiar with their basic meaning. Another option is to have dictionaries or computers available with internet access for looking up the terms.
5. Demonstrate how to write a term on one sticky note and another on another sticky note and add them to the poster paper or whiteboard. Demonstrate that another term may also be connected to one or both of these terms.
6. Explain that the connections must make sense.
7. Each valid connection among the terms receives 2 points. Valid means that it is accurate and true. You are the final judge of whether or not this is so.
8. They should be prepared to defend their connections.
9. Allow students to begin. Because of the competitive nature of some students, they will not want others to see their connections. You may need to isolate the groups in different corners of the classroom.
10. Walk around and check to see if they understand the task and that they are making valid connections.
11. Use this time to discuss some of the concepts with them and gauge how well they understand the concepts and the connections.
12. Help students score their connections.

Session 2 (1 – 2 days):

1. Write the 4 R's on the chalkboard or overhead and ask each student to individually to write a definition of each of the 4 R's – reduce, reuse, recycle or recover – particularly in reference to how people produce solid waste at school or at home.
2. When students are finished group them in pairs and ask each pair to come to agreement on each definition. When pairs are finished have the class compare their definitions to those on the handout.

3. Group your class into five teams and distribute the appropriate handout to each team member. Review with the class what each of the teams will be doing. Discuss appropriate behavior and send students to complete their worksheets. Remind students to use the 4 R's as a focus for their discussions and investigations but that they should also generate questions of their own.

Team 1 – Meets with cafeteria staff.

Team 2 – Meets custodial staff.

Team 3 – Goes online to find information regarding where and how students city/county handles trash and recycling.

Team 4 – Goes online to the Waste Management ThinkGreen.com website to update their information about recycling. (www.thinkgreen.com/recycling)

Team 5 – Students review data and information from the US Environmental Protection Agency website on solid waste, methane, and climate change (www.epa.gov/methane/index.html) to learn about one particular landfill issue.

In addition, students should review:

<http://www.thinkgreen.com/landfill-gas-to-energy>

<http://www.thinkgreen.com/waste-to-energy>

<http://www.thinkgreen.com/beneficial-land-reuse>

4. Teams should summarize their findings and be prepared to present their findings to the other teams. Each team should include examples of how the 4 R's are or are not being implemented at school or in their homes.
5. Each report should specify things that are currently working well with waste management and those things that are issues. Students could use poster paper to post their findings in succinct sentences or phrases under two columns: What's Working and What Needs to be Done.
6. For the presentation, consider a "wisdom walk." In this process, instead of stand and deliver reports, posters are placed around the room at stations. One student from each team stays with the poster to explain it to visitors. The rest of the students rotate from station to station taking notes.
7. Complete the exercise with a composite chart of the things that are working and the things that need to be improved about the solid waste process in the school and the community.

Standards Correlation

National Science Education Standard 12FSPSP4.1 Natural ecosystems provide an array of basic processes that affect humans. Those processes include maintenance of the quality of the atmosphere, generation of soils, control of the hydrologic cycle, disposal of wastes, and recycling of nutrients. Humans are changing many of these basic processes, and the changes may be detrimental to humans.

National Science Education Standard 12FSPSP3.2 The earth does not have infinite resources; increasing human consumption places severe stress on the natural processes that renew some resources, and it depletes those resources that cannot be renewed.

Excellence for Environmental Learning _Strand 2.4C Identify ways in which various resources can be recycled and reused.