

Buried Treasure Lesson 2A: Sorting It Out-Metals

Lesson Overview:

In this lesson, students explore how physical properties are used to sort recyclable materials efficiently. After describing the physical properties of co-mingled materials in a recycling bin, students use knowledge of physical properties to solve a problem. Magnetism is used to identify steel from a mixture of different metals. A video visit to a recycling center helps students visualize steps in a sorting process.

Objectives:

Students will describe physical properties of objects.

Students will sort items using magnetic properties.

Students will describe ways that recyclable materials can be sorted.

Essential questions:

What are some efficient ways to sort recyclable objects?

Materials:

- Recyclable and non-recyclable objects:

<u>Recyclable</u>	<u>Non-recyclable</u>
empty aluminum soda can	disposable diaper
newspaper	piece of cloth
empty cereal box	cereal box liner
empty glass jar	paint can
empty milk jug	
empty soup can	
empty plastic water bottle	
- Magnets
- Balance for measuring mass
- Metal objects (e.g. empty aluminum soda can, aluminum pie tin, clean aluminum foil, steel vegetable or soup can, steel coffee can, staples, steel screw, bottle caps, or jar lids)

- Student Pages:
 - Observing Properties
 - Magnetic Properties
 - Writing Response
- ThinkGreen.com website:
 - <http://www.thinkgreen.com/recyclables>
- Recycling Process diagram
 - Follow the Waste Stream found on www.ThinkGreen.com/classroom

Time Frame: 1-2 sessions

Instructional Activities (may include formative assessment within the lesson):

1. Find out what students already know about recycling. Ask them what recycling is and why we recycle.
2. Discuss some of the benefits of recycling. For example:
 - An aluminum can in a landfill takes about 10 years to decompose, but if it is recycled, it can be back on the shelf in about 90 days.
 - Recycling one aluminum can saves the energy it takes to run a television for three hours.
 - The US throws away enough iron and steel to continuously supply all the nation's automakers, but this could be changed with increased recycling.
 - One person's trash is another person's treasure. Manufacturers can reuse materials from recycling centers to make new products. Recycling centers separate recyclable materials in search of this buried treasure!
3. Show and discuss the Recycling Process diagram.
4. As a class, separate a group of objects as recyclable or non-recyclable. See the materials list above for examples. Discuss items like the cloth or the cereal liner. While these items may not be collected by a local recycling facility, students can brainstorm some additional ways that the items might be reused instead of being thrown in the garbage. Items such as paint cans are not collected by recycling facilities since they are considered hazardous waste. Students should always check with their local community to determine the proper way to dispose of hazardous materials.
5. Tell students that today they will explore efficient ways to describe and sort recyclable materials. Provide groups of students with samples of the recyclable items. Ask students to discuss/describe the physical properties of the objects (e.g. color, mass, flexibility, magnetism) and record their thinking individually on Student Page 1: Observing Properties.
6. Ask groups of students to discuss the recycling problem on Student Page 2: Magnetic Properties and share their solutions with the class.
7. Visit the website www.thinkgreen.com/recyclables. Watch the video "Second Life" to see how Waste Management technologies separate materials at a recycling center. (Note: The Waste Stream diagram located at www.thinkgreen.com/classroom is an additional teacher resource for

summarizing the sorting process. Use the diagram based on the needs of your students. Discuss how the magnetic properties of certain metals are useful in the sorting process. (For example, magnets can be used to separate steel from aluminum.) If time permits, students may learn more about recycling metals from the ThinkGreen.com website section entitled "A Day in the Life of a Recycled Can."

<http://www.thinkgreen.com/recycle-what-detail?sec=metals&prod=aluminum-cans>

8. Provide students with magnets and a variety of recyclable metal objects. Students should sort the metals by determining which metals are attracted to the magnet and which metals are not. Include items such as an empty aluminum soda can, aluminum pie tin, clean aluminum foil, steel vegetable or soup can, steel coffee can, staples, steel screw, bottle caps, or jar lids.

9. Discuss how sorting out useful materials from a pile of waste is like searching for buried treasure!

Lesson Assessment:

- Observe the student's ability to use vocabulary (e.g. transparent /clear, magnetic, flexible, etc.) to describe physical properties. Provide struggling students with vocabulary on an index card.
- Students respond in writing to the following prompt: Describe the recycling process. Include at least four steps. Use words and/or pictures.

Reflection:

Ask students, How does knowing about physical properties such as an object's mass, magnetism, color, etc. help recycling centers separate materials? Students share their response with a partner. Ask partner groups to share responses with the whole class.

Standards Correlation:

This lesson may be used to address the National Science Education Standards listed below.

NSES 4BPS1.1: Observable properties

NSES 4BPS1.2: Materials and their properties

NSES 4FSPSP3.3: The supply of many resources is limited