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Lesson at a glance:

Students will be able to define recycling, identify items that can be recycled, determine if their family recycles, and use recyclable materials to build a toy vehicle.

Skills:

Observing, Matching, Sorting, Communicating, Creating, Art

Grades:

3-5

Materials:

For Part One - Introduction to Recycling

- Empty plastic containers
- Empty cardboard boxes
- Milk or juice cartons
- Aluminum and/or tin cans
- Styrofoam egg cartons or food containers
- Plastic or metal caps or lids
- Wood products
- Other “garbage”



For Part Two - Creating a Toy Vehicle from Recyclables

- A variety of recyclable containers such as aluminum/tin cans, plastic bottles, milk/juice cartons and egg cartons (not styrofoam).
- A variety of materials that cannot be recycled easily such as styrofoam products, wood products, metallic gift wrap, etc.
- Plastic or metal caps and lids of various diameters to be used as wheels. (With younger students, you may want to drill holes in the centers of the caps/lids in advance to accommodate the axles.)
- Wooden dowels, bamboo skewers, stiff straws or wire to serve as axles
- Scissors
- Tape
- Glue
- Crayons/markers
- Pliers
- Screws and screwdriver or a drill (for use by older students)
- Construction paper
- Stickers
- Pencils
- Ruler
- (For extension) foam board or corrugated cardboard ramp and books



Background Information:

Landfills across the country are full of items that could have been reused or recycled instead of being thrown away. Recycling and reusing products uses less energy and natural resources than manufacturing items from scratch and saves landfill space. The market for the recycling industry, however, is based on the demand for recycled products. The recycling loop includes collecting recyclable products, manufacturing recycled items from the used materials, and, finally, purchasing items made from recycled materials.

Recycling saves large amounts of energy. Recycling one glass jar saves enough energy to light a 100-watt light bulb for four hours. When products are recycled, fewer raw materials are used. On average, Americans throw away enough aluminum to build an entire air fleet four times over.

Activity:

Part One - Introduction to Recycling:

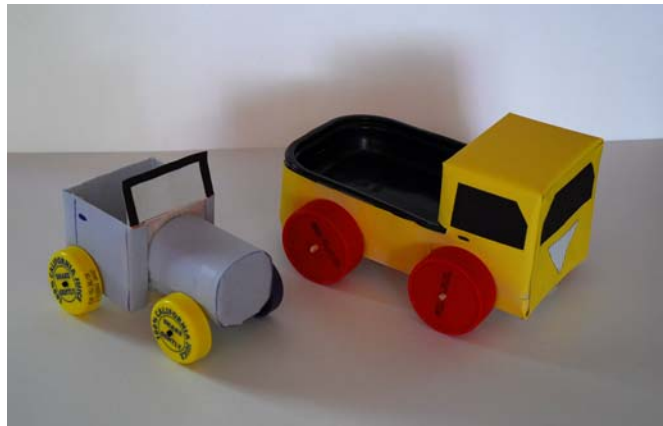
1. To introduce the concept of recycling, place a large amount of “garbage” on a table. Have the students spend time looking at the objects and sorting them into groups that they believe are recyclable. Ask your students how they determine whether or not an object is recyclable. Show them the **What’s What** chart included in this lesson plan and have the students use the chart to sort the plastics. Make sure the children understand that this labeling system was designed to identify what type of plastic resin was used in the production of the product and does not indicate the plastic’s recyclability.
2. Introduce the notion of reuse by displaying a variety of household items which are frequently thrown into the garbage but could be used for other purposes. Ask students to describe uses for each of these household products. Survey the class by holding up each item and asking for a show of hands if the item could probably be found in their garbage at home.
3. Tell the class that, in order to reduce the amount of garbage we produce, some of the items may be used again and some may be recycled or made into new products which we can purchase at the store to complete the recycling loop.
4. Explain to the students that when we use an item more than once (for the same or different use) we call it re-using. Recycling is when we take the material in an existing item and use it to make a new product. Ask your students whether they and their families recycle any of these items. Then ask them to list some of the objects that are made from these items (recycled paper products are used to make paper bags, confetti, toilet paper, etc.; recycled plastic bottles are used to make fiberfill for jackets, sleeping bags, carpeting, outdoor decking material, etc.)
5. Students will take home a set of questions (the **Reduce, Reuse, Recycle or Dump Survey** to be answered in conjunction with at least one family member.
Follow-Up to Survey: Discuss the following questions:
 - What items were found in the garbage in most of our households?



- Are any of the items used again (reused) in most of our households?
- If so, what are they used for?
- Does our town have a place where people can take items to be recycled?
- If so, have any of you ever been there? What kinds of things did you take to be recycled?
- What are some ways that you might reduce the amount of garbage in your home?
- Can larger items such as cars be recycled?

Part Two—Creating a Toy Vehicle from Recyclables

1. Introduce the idea that larger items such as cars are recyclable. Use the information sheet **The Afterlife of a Car** to introduce your students to the idea that cars are recyclable.
2. Now that your students understand that many products can be reused and recycled, ask each student to bring to class at least two empty plastic bottles, aluminum or tin cans, milk/juice containers or other non-breakable containers and at least four plastic or metal caps or lids that are all the same size. Tell them to be sure to wash all of the items before bringing them to class.
3. As the students bring in their materials, have them place the items in a large box.
4. Add non-recyclable materials to the inventory (e.g. styrofoam blocks or egg cartons, wire hangers, metallic gift wrap, etc.) so the students will have to research which items are/are not recyclable. (Note: If you are unsure, check the website of your city's or county's recycling office.)
5. Provide wooden dowels, hard plastic straws or bamboo skewers as axles.
6. For younger students, you may want to drill holes in the centers of the plastic or metal caps and lids in advance to accommodate the dowels/straws/skewers your students will be using as axles.
7. Assemble the other items on the Materials List. Now you are ready to conduct the activity.
8. Explain to the students that their task is to build a toy vehicle out of the materials provided and that the goal is to use as many recyclable materials as possible in the construction. Tell them to decide in advance whether their creation is meant to be a functioning toy or a piece of artwork.
9. Let them know they can use non-recyclable materials if they feel these materials will make their vehicle better in some way (e.g. faster, more sturdy, more aesthetically pleasing) but that they will have to identify which items are recyclable and non-recyclable in all cases.



10. After the students have built their vehicles, have each student present their creation to the class, explaining whether it was built to be a functioning vehicle or to be a piece of art and identifying which materials used in its construction were recyclable or non-recyclable.

Assessment:

1. Did the student correctly identify which items used were recyclable/non-recyclable?
2. If non-recyclable materials were used, did the student explain how the use of the material(s) added to his/her creation (e.g. made it faster, more sturdy, or more aesthetically pleasing)?
3. If the vehicle was meant to be a functioning vehicle, how well did it work (did it roll easily and roll straight)?

Extensions:

1. Have the students who built their cars/trucks to be functioning vehicles race their vehicles down a ramp to see which is the fastest or which rolled the furthest.
2. Have a “car show” where the students display their vehicles and produce informational signage to explain which materials used were recyclable/non-recyclable.
3. Have the students develop a recycling program for your school and present it to the principal. If a program already exists, are there ways it could be improved? Are there ways the students think they could reduce the school’s consumption of resources?



The Afterlife of a Car Information Sheet

Cars are one of the most recyclable products on the planet. In fact, up to 75 percent of the average car by weight is recyclable. The following are the steps to recycle a car:

Before the body of the car can be recycled, the operating fluids such as oil, fuel and coolants must be drained. A car holds about 19 liters of fluids that can often be reused. If they can't be reused they need to be disposed of properly to keep them from entering groundwater systems.

The next step in the process is removing the gas tank, battery and tires. If the battery is still usable, it is often resold. If not, it is sent to a recycler to be recycled—and all of the toxic materials are safely removed. The gas tank is drained and then recycled for the metals. The tires may be resold if they are still in good shape. If not, they may be sent to a facility that recycles them into new products such as playground mats, sandals, door mats and bicycle pedals.

Depending on the condition of the body, parts and components, the car is then dismantled and the pieces salvaged—including body panels, fenders and bumpers, lights, hoods, windows and windshields. These parts are often refurbished and then resold to people looking for them to improve their cars.

Once all of the fluids have been drained and all of the re-usable parts removed, the car is then crushed and pulverized. The valuable metals are removed magnetically, and with a complex floatation system. The parts that are not valuable are sent to the landfill. These parts are referred to as Auto Shredder Residue (ASR) and are made up of cloth, foam, plastics, rubber and glass. Scientists are currently working to develop ways to use the ASR to produce new products and reduce the amount ASR that is sent to landfills.



AMERICA'S CAR MUSEUM®

What's What

The Society for the Plastics Industry came up with a labeling system for plastics a number of years ago. This system, which uses the numbers from 1 to 7 (7 is used for anything that doesn't fall into the 6 common categories) surrounded by recycling arrows, was designed to identify what type of plastic resin was used in the production of the product. The use of the recycling arrows in this system is misleading for, contrary to popular belief, it does not indicate whether this plastic product is recyclable or not. Plastics numbered 1 and 2 are commonly accepted at recycling centers. Plastics with the number 7 have the lowest rate of recyclability. Whether plastics numbered 3 through 6 are accepted for recycling varies widely from one municipality to another. If you are unsure whether a product is recyclable or not, you should contact your city or county recycling center or visit its website to determine what is recycled in your area.



PETE

Polyethylene terephthalate: Soda bottles, water bottles, vinegar bottles, medicine containers, backing for photography film.



HDPE

High-density Polyethylene: Containers for: laundry/dish detergent, fabric softeners, bleach, milk, shampoo, conditioner, motor oil, newer bullet proof vests, various toys.



V

Polyvinyl chloride: Pipes, shower curtains, meat wraps, cooking oil bottles, baby bottle nipples, shrink wrap, clear medical tubing, vinyl dashboards and seat covers, coffee containers.



LDPE

Low-density Polyethylene: Wrapping films, grocery bags, sandwich bags.



PP

Polypropylene: Plastic storage containers, syrup bottles, yogurt tubs, diapers, outdoor carpet.



PS

Polystyrene: Coffee cups, disposable cutlery and cups (clear and colored), bakery shells, meat trays, "cheap" hubcaps, packing peanuts, styrofoam insulation.



OTHER

Products labeled as "**other**" are made of any combination of 1-6 or another, less commonly used plastic.



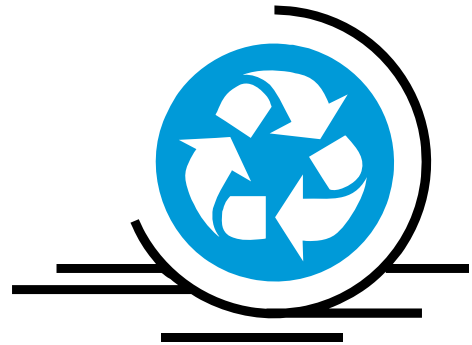
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Name: _____

Reduce, Reuse, Recycle or Dump Survey

1. Put G's by the items that go into your garbage and R's next to the things that your family recycles.

- ___ cans (aluminum and/or tin)
- ___ glass bottles
- ___ paper
- ___ aluminum foil
- ___ styrofoam (containers or packaging materials)
- ___ cardboard
- ___ disposable diapers
- ___ plastic containers
- ___ newspapers
- ___ grocery bags (paper or plastic)
- ___ egg cartons
- ___ batteries
- ___ clothing
- ___ catalogues and magazines



2. Which items (of those listed above) that you put in the garbage could be recycled - by you or someone else?



3. Where does your garbage go once it leaves your house? (Draw a picture.)

4. What are the benefits and drawbacks of recycling?

- **Benefits:**

- **Drawbacks:**

5. How does reusing or recycling things help the environment?

