MRF in Action Lesson Plan

5E Format

Subject / grade level: Science/ Grade 4

Materials:
MRF kits (one per group), poster of landfill, visual aids

NC SCOS Essential Standards and Clarifying Objectives
4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them.
4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion.
4.P.2.1 Compare the physical properties of samples of matter (strength, hardness, flexibility, ability to conduct heat, ability to conduct electricity, ability to be attracted by magnets, reactions to water and fire).
4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g. recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).
4.G.1.2 Explain the impact that human activity has on the availability of natural resources in North Carolina.
4.G.1.3 Exemplify the interactions of various peoples, places, and cultures in terms of adaptation and modification of the environment.
4.G.1.4 Explain the impact of technology (communication, transportation and inventions) on North Carolina's citizens, past and present.

Lesson objective(s):
1) Students will understand basics of solid waste management and remember the 3Rs in order.
2) Students will understand physical properties of recyclables.
3) Students will understand the basics of the recycling sorting process.

ENGAGEMENT (10 min)
Students have a discussion about recycling as they watch the video series "Life of a Plastic Bottle."

- While watching these videos, let's think about a few things. What is recycling? Why do we do it? What are the 3Rs and what do they mean?
- Watch Life of a Plastic Bottle Part 1(1:56): http://youtu.be/SUGw6V_Jp4s
  1) What happens to our recycling after we put it in our recycling bins? (sorted at a recycling center or Material Recovery Facility[MRF])
- Watch Life of a Plastic Bottle Part 2 (2:21) http://youtu.be/fNFarO81lQM
  1) What happens to plastic bottles after they are sorted out at the recycling center? (goes to a manufacturer and is shredded)
- Watch Life of a Plastic Bottle Part 3 (2:28)http://youtu.be/dWK6RrYcIUA
  1) After the plastic bottles are shredded, where do they go next? (manufacturer melts the flakes, molds it into something new)

EXPLORATION (15 min) Build a Mini-MRF

- Refer back to the first episode of "Life of a Plastic Bottle." The recycling center shown in the video is called a MRF, or Material Recovery Facility. Students will work in groups to build their own mini-MRF using tools and materials they receive in the MRF kit.

- Guiding Questions: What tools can you use to sort the recyclables? Why did you choose those tools for those materials? What can you tell me about the materials that need to be recycled – shape, feel, weight, hardness, etc?
- Have students write down their observations if it helps them decide what tools to use.

EXPLANATION (20 min)

- Each group presents their MRF to the class, demonstrating and explaining how they would sort the recyclable materials (2-3 min per group)
- Record sorting methods on the board for each type of recyclable.

ELABORATION

- Walk students through the sorting process. Refer to the groups' ideas when explaining the MRF.
  1) Cardboard, plastic bags, and trash sorted manually.
  2) Paper is lightweight and goes up a conveyor belt, and the heavier materials drop to another conveyor belt.
  3) Plastics are sorted with an optical sensor – a laser beam that sorts the plastics by density.
  4) Magnets separate out steel cans. Eddy currents (reverse magnet) repel aluminum cans.
  5) Glass drops down because of its weight.
- Show video "How a MRF Works" (2:50) http://youtu.be/7CFE5tD1CCI to clarify further.

EVALUATION

- **Wrap Up Discussion -** What are the 3Rs? What tools can we use to sort out recyclables, and why?
- Students can do the Post Activity Worksheet "Sort It Out" in class or for homework.