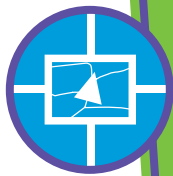
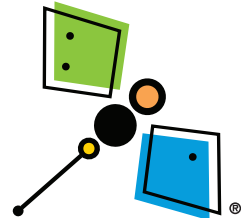


DragonflyTV: GPS Activity 11

Talkin' Trash



Southern Environmental Center
Birmingham, AL
www.myecoscapes.org



Garbology

We're Joshua and Shawn, and we live in Birmingham, Alabama. We know that three ways to eliminate pollution are to Reduce, Reuse, and Recycle. Our teachers are always encouraging us to recycle used paper, but we wanted to investigate more about the other two Rs, reduce and reuse. We got some great ideas from the Southern Environmental Center in Birmingham. We decided to do a study of our own right here at school. Our question: What kind of waste is our school producing, and how can we reduce it?

We decided to collect trash from 10 classrooms for a single day, just to demonstrate how much waste at our school could be recycled instead of thrown into the garbage bin. We weighed the trash and then sorted it into piles of metal, paper, glass, plastic, and true trash (which can't be recycled). We weighed each category individually to figure out the percentage of each kind of material. We also talked about ways we could reduce the amount of trash we were making.





Icebreaker

Recycle your own paper—really!



1 hour, plus drying time, over 2 days

DragonflyTV Skill: Observing

Guide your kids as they

- 1) Receive instruction on how to make basic paper. Begin with used office paper, or used newspaper.
- 2) Set up several batches of pulp: newspaper only without starch; newspaper only with laundry starch; newspaper only with cornstarch; office paper without starch, etc.
- 3) Prepare sheets of homemade paper from each of the pulp batches, and allow them to dry fully.
- 4) Conduct an experiment to observe how marker ink spreads in the fibers of each kind of paper. Use blank office paper, a paper towel, and each type of homemade paper.
- 5) Using the ruler as a guide, make a 5 cm line on each paper sample. Allow the marker ink to spread on its own, if it has a tendency to do so.
- 6) Measure the thickness of the line on the office paper. This is a reference measurement. Make the same measurement on the other samples, where spreading is more likely.
- 7) Discuss why the ink spreads little in some types of paper and more in others. Speculate about what ingredients may prevent inks from spreading.

▶ You'll need:

- papermaking equipment (mold and deckle, blender, tub, sponge, felt)
- used paper, either office paper or newspaper
- blank office paper
- kitchen paper towel, or other paper towel
- liquid laundry starch
- cornstarch
- marker pens, various brands, wide tip
- rulers

DFTV Science Helper

If you are unfamiliar with homemade papermaking, you can find plenty of resources on the Internet. This activity focuses on some experiments you can try once you have the basic technique worked out.



For more simple activities like this one, surf to pbskidsgo.org/dragonflytv/superdoit/index.html



Investigation Reusable Rockets



1-2 hours, plus time to launch rockets

Turn a used, unwanted soda bottle into a model rocket!

Guide your kids as they

- 1) Build a bottle rocket, including a parachute, following the basic design. No metal parts or attachments are allowed.
- 2) Design a study which seeks out the relationship between the amount of water carried by the bottle and the total flight time. Suggested volumes of water to load into the bottle are between 200 mL and 1800 mL, in increments of 200 mL.
- 3) Load the bottle with the first amount of water. Set the bottle on the launch pad, and prepare to launch. The launch pad should be operated outdoors (of course!) by an adult, with all spectators a minimum of 25 feet away from the launcher.
- 4) Use a stopwatch to time the duration of flight, from the moment of launch to the time the rocket lands on the ground. The flight time will serve as a rough analogy for height achieved.
- 5) Repeat with other water amounts. As time permits, it is acceptable, even advisable, to conduct multiple flights for each water increment to get an average flight time.
- 6) **NOTE:** The value of this exercise is diminished if the kids simply discard their rockets as trash once the flight investigation is over. Insist that if kids are going to dispose of their rockets, they disassemble them fully, keep items which can be re-used by future rocket classes, sort materials that can be collected for recycling, and sort the rest as true trash.

▶ You'll need:

- 2 2-Liter soda bottles per rocket
- stiff cardboard for fins
- duct tape
- a small orange sports cone, 1 per rocket
- clay
- string
- a garbage bag
- a metric water volume measuring device
- a stop watch
- a rocket Launch pad (available from www.nerdsinc.com)
- goggles, 1 pair per person

DFTV Science Helper

For guidance on building the basic water rocket, see Pat Hayhurst's web page at www.lnhs.org/hayhurst/rockets/. This activity focuses on experimentation your kids can safely do with the basic rocket assembly. **SPECIAL NOTE:** The primary safety guideline to follow is to put stable fins of adequate size and proper alignment on each rocket. **DO NOT** launch any rockets with improper fins.



DFTV Kids Synthesize Data and Analysis

Record the average flight times for each water amount into a table, and make the appropriate graph. An example table and graph format are below:

Water Bottle Test

Amount of water	Average flight time
200 mL	5.2 sec.
600 mL	7.8 sec.
800 mL	12.5 sec.
1200 mL	12.7 sec.
1800 mL	4.8 sec.

DFTV Adult Tip

This investigation provides wonderful opportunities to discuss topics such as design optimization, point of diminishing return, and the challenges of space flight. Use the "Goldilocks" principle to help kids identify why flight times are diminished with either too little or too much water in the bottle.



Keep Exploring!

Explore ways in which the water rocket's altitude could actually be determined. Teach kids how to use an altimeter device, one that works by determining angle of elevation, then use the device at the next rocket launch. As an extra challenge, invite them to construct their own altimeter device using items reclaimed from trash or recycling bins.