Science Heroes

Theme- ENERGY: Chemical, Hydro, and Wind

http://www.sciencebuddies.org/science-fair-projects/project_ideas/Aero_p040.shtml#procedure
http://www.sciencebuddies.org/science-fair-projects/project_ideas/Energy_p021.shtml#materials
http://www.sciencebuddies.org/science-fair-projects/project_ideas/Energy_p010.shtml#materials

Day 1:
15 min introduction on how all projects work- presentation on Powerpoint
5 min splitting into 3 groups of 4
40 min: explaining individually to each group their materials and how and why they will be used

Day 2:
Hydropower:
Start preparing experiments

- Cut out aluminum plates
- Draw design template on aluminum plates
- Create the waterwheel for the experiment using the drawn template
- Glue nylon spacer on the wheel
- (Bucket and water wheel drilled before the experiments)

Wind:
Start preparing

- Cut the 1 L water bottle to create the tower and foundation for wind turbine
- Fill the water bottle with something heavy (ex. marbles) so the turbine stays in place
- Assemble the tower and the nacelle (holes on the water bottle will be drilled at home before the experiments)

Chemical: 25 min: Start preparing

- Begin assembling potatoes and electrodes
- Set up data tables for experiments

Day 3:

- Finish all experiments (as per the instructions on the website)
- Begin planning for presentation

Day 4:

- 15 min to plan and practice
- 30 min for all presentations
- 30 min for small cookie party

Materials:

Wind-

- Tall 1-L water bottle
- Short 500-mL water bottle, with its cap
- Scissors
- Marbles (about 50)
- Printer paper (several sheets), cut into 8-cm x 10-cm pieces
- Ruler
- Scissors
- Tape
- Non-bendable straws (about 30-40)
- Permanent marker
- Several large paper clips (about 20)
- String or thread
- Small washers (3), see Figures 5, 6, and 7 in the Procedure tab for examples
- General purpose glue like Elmer's® Glue-All
- Needle-nose pliers
- Small fan, one that you would set on a table is a good size
- Drill with a ¼-inch drill bit
- Lab notebook

Water-

- Aluminum pie plate, 9 inches; available at all grocery stores
- Scissors
- Permanent marker
- Ruler
- Drill with 3/8-inch drill bit or other bit size slightly larger than the dowel width; available at hardware stores
    - Optional (if you don't use a drill): hammer and 5/16-inch width nail; available at hardware stores
- Nylon spacer, 3/8-inch inner diameter and 3/8 inch thick. The spacer must fit in the center of the waterwheel. These are available at hardware stores. See Figure 7, below, to see what a nylon spacer looks like.
- Epoxy glue; available at hardware stores
- Scotch® tape
- Wood dowel, 5/16 inch wide and 2 feet long; available at craft stores
- Plastic bucket with removable handle, 14 quarts
- Cotton string, 30-inch-long piece

- Metal nut or other small metal object that string can be tied to
- Measuring cup, 2-cup is best
- Stopwatch
- Lab notebook

Chemical-

- Veggie Power kit (1). Includes:
    - Copper electrodes (3)
    - Zinc electrodes (3)
    - Alligator clip leads (6); each lead has alligator clips on *both* ends. Color does not affect function and may vary.
    - Digital multimeter with test leads
    - Piezoelectric buzzer
    - Red light-emitting diode (LED); a super bright, high-efficiency red LED is needed. Avoid using "diffuse" LEDs for this science project, as they will be too dim.

You will also need to gather these items:

- Potatoes (3), any large type like a russet. Make sure your potatoes are fresh. Old, dried out potatoes will not provide enough electricity.
- Paper towels for cleanup as you prepare the potatoes
- Lab notebook