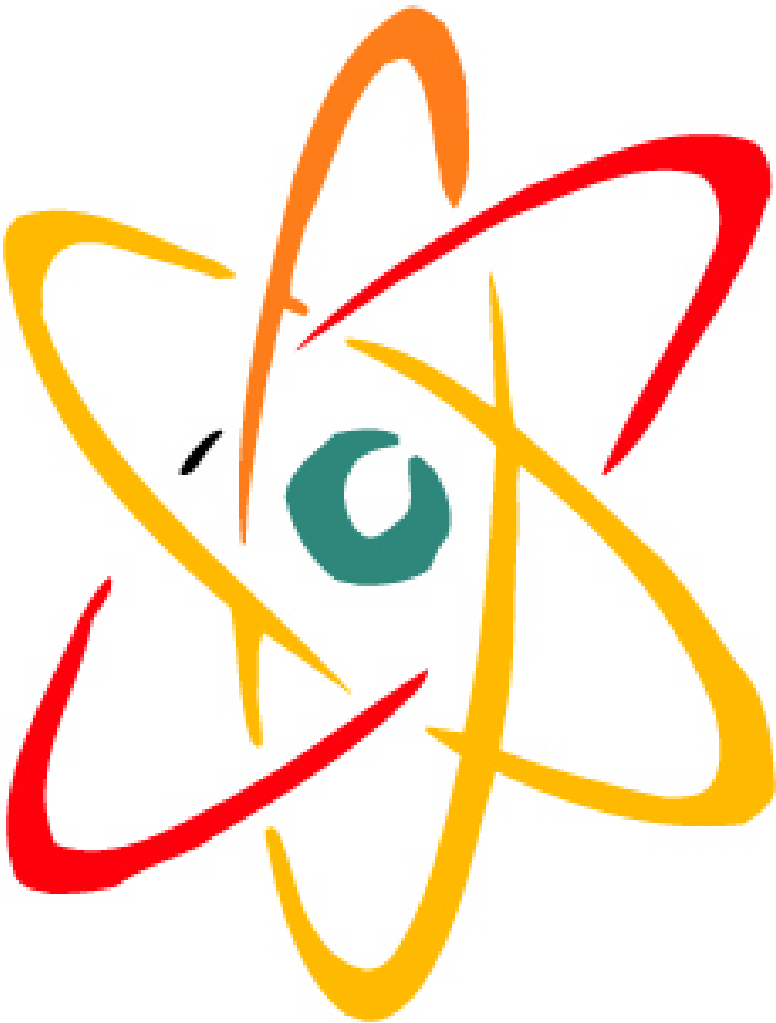
Name: _____ Date: _____

2005



Energy Fair Journal

Lemon Power

1. Ask students to predict whether the lemons can light up the light in the film canister.
2. Explain that “Lemons have chemicals inside them that serve as stored energy.”
3. Roll 3 lemons till they become squishy, this releases the juice inside the lemon.
4. Insert a copper spike and screw into one lemon about ½ way through the lemon. The copper spike and screw should be about 1 inch apart, be sure they do not touch.
5. Connect the copper spike to the positive lead and the screw to the negative lead in the film canister using the wire with alligator clips.
6. Does the light illuminate? (no)
7. Explain, “A single lemon does not have enough power to light the bulb.”
8. Touch the positive lead to the copper spike and the negative lead to the screw and measure the amount of power generated by one lemon.
9. Explain, “We can light the bulb by setting the lemons up in a series we can generate more power and light the bulb.”

10. Place a copper spike, and a screw in two more lemons following the directions in step 4.
11. Connect the three lemons together in a series as follows:
    a. Lemon 1, copper spike to the screw in lemon 2
    b. Lemon 2, copper spike to the screw in lemon 3
    c. Lemon 3, copper spike to the positive lead on the film canister.
    d. Lemon 1, screw to the negative lead on the film canister.
12. Show the students the lighted bulb. Explain, “The power of three lemons is strong enough to light the bulb.”
13. Touch the positive lead to the copper spike on lemon 3, and the negative lead to the screw on lemon 1, and measure the amount of power generated by the three lemons.
14. Ask the students what would happen if they were to connect more lemons to the bulb. (the bulb would be brighter)

Name: _____ Date: _____

Lemon Power

1. Can a lemon power a light bulb?

2. How many volts does one lemon produce?

3. Can lemons power a light bulb? If so how?

4. How many volts do three lemons in a series produce?

5. Predict what would happen if you added more lemons to the series?

Pinwheels

Students:

1. Have the students cut out their paper square.
2. Have the student color designs onto the paper square, on both sides.
3. Have the students cut along the diagonal to begin to assemble the pinwheel.

Parent:

4. Explain to the students, “We will be using a pin with a sharp point. The pin can be used as a weapon. If we see anyone playing with their pin or removing the pin from their pinwheel, the pinwheel will be taken away and the student or students will be punished.”
5. Take one corner of each section of the square and insert the pin through it until all four corners are pierced.
6. Now pierce the pin through the center of the paper square and into the pencil eraser.
7. Make sure the pin does not go through the other side of the eraser.

8. Adjust the pin and the paper so that there is space between the paper center and the attached “corners.”
9. Test the pinwheel by blowing on it.

Ask the students to blow into their pinwheel from four directions:

   a. Front
   b. Back
   c. Left Side
   d. Right Side

10. Have the students record what happens to the pinwheel from each of the directions.
11. Ask the students from which direction the pinwheel moves the best.
12. Explain, “Wind from blowing on the pinwheel pushes against the ‘blades’ and causes the pinwheel to move.
13. Ask the students how they could make the pinwheel move faster? (blow harder)

Name: _____ Date: _____

Pinwheel

1. How does the pinwheel work when you blow on it from the
   a. Front

   b. Back

   c. Left Side

   d. Right side

2. From which direction does the pinwheel move the best?

3. How could you make the pinwheel move faster?

Racers

1. Show the students the cars and the rubber bands and ask them, “How can this rubber band move this race car?”
2. Let the students explore how the rubber band can move the racers.
3. Demonstrate to the students how to connect the rubber bands to the racers and get them to move.
4. Set-up the rubber band and rotate the wheel around four full rotations, set it on the floor and let it go.
5. Measure how far the racer went.
6. Ask the students how you can get the racer to go further? (more rotations of the wheel)
7. Explain to the students, “The more rotations of the wheel the more power and the further the racer will go. But, there is a limit to the number of rotations before the rubber band or the racer will break.”
8. Tell them, “You are not to rotate the wheel more than ten times.” Make sure they acknowledge this.

9. In groups of 2 or 3 students let the students explore working with the racers.
10. After a few minutes and when each student has had an opportunity to explore the racers get the students ready to run trials.
11. In groups of two or three let the students race their racers. They should record the number of rotation they turned the wheel and the distance the racer traveled.
12. After a few trials have the students share their results and have them explore what the results tell them.
13. Ask the students to predict what would happen if they could spin the racer wheels 20 times, how far would their racers go?

Name: _____ Date: _____

Racers

1. How does a rubber band move the race car?

2. Racer Trials

Trial	Rotations	Distance Moved

3. What would happen if you could spin the racer wheel 20 times, how far would the racer go?

Water Turbine

1. Ask the students how water can make energy? (Water can fall on or push a wheel and cause it to turn and create mechanical energy.)
2. Show the students the water turbine and ask them to describe how it might work. (The water falls on the paddles of the water wheel and causes the axle to turn. The axle is then attached to a gear which creates mechanical energy.)
3. Demonstrate to the students how the water turbine works by pouring water through the funnel onto the paddles.
4. Ask the students to describe and record what happens when the water falls onto the paddles.
5. Ask the students to how you could make the wheel turn faster or slower? (By varying the amount of water flowing onto the paddles.)
6. Demonstrate this for the students by starting with the smallest funnel and pouring water onto the water turbine and observe the results.
7. Ask the students where we might see water being used to create energy? (rivers, streams, oceans, waterfalls)

Name: _____ Date: _____

Water Turbine

1. How can water make energy?

2. What happens when water falls onto the paddles of the water turbine?

3. How could you make the wheel turn faster, or slower?

4. Where might you see water being used to create energy?