

Activity	Materials	Reasoning	Directions
Thursday			
Lemon Battery	1-3 Lemons 3-4 Galvanized Nails Copper pennies (1982 or earlier) Copper wire 2 Alligator clips Small LED bulb Paper towels Wire cutters Pliers Safety goggles (Kits are also available to perform this activity at a variety of stores such as this one here: Lemon clock kit)	<p>How does a lemon battery work? Food has energy. With a lemon battery we are capturing that energy and using it to light up a LED. To do this we need electrodes to capture the energy from our electrolyte.</p> <p>The zinc and copper plates are called electrodes, and the lemon juice is our electrolyte.</p> <p>All batteries have a "+" (known as the cathode) and a "-" (known as the anode) terminal. In our lemon battery, the copper plate is our positive cathode and the zinc plate the negative anode.</p> <p>Electric current is created by the flow of atomic particles called electrons. Conductors are materials that allow electrons (and the electrical current) to flow through them. Electrons flow from the negative to the positive terminal. So in our experiment electrons are flowing from our zinc plate, through the lemon juice to the copper plate. From there it goes into our alligator clip, along the wire, into the zinc plate on the next lemon, where it picks up more energy as it travels through that cell. It continues on, building energy with each additional cell we add. Until finally we have enough voltage to power a light bulb.</p> <p>Volts (or voltage) is a measurement of the force moving the electrons through our lemon battery. The higher the voltage the more power the battery has, but higher voltage also means greater danger. Always remember to be careful and safe around electricity. Thankfully our lemon battery is very low voltage.</p>	<ol style="list-style-type: none"> 1. The first step is to roll the lemons. Just like you would if you were about to eat or juice them. This releases the juices inside and we want our lemons as juicy as possible. 2. Start with one lemon and make a small cut through the peel on either end. It is very important that you place these far enough apart that the electrodes don't touch. 3. Insert a copper plate on one side and a zinc plate on the other side. 4. Now it is time to start adding more cells (lemons) to our battery. Repeat the above steps on a second lemon. Once you are finished use an alligator clip to connect the zinc plate on the first lemon to the copper plate on the second lemon. 5. Test your energy level with 2 cells (you will test by touching the copper plate on the first lemon and zinc on the second). Remember you are completing the circuit. 6. Now repeat the steps to add a third and fourth cell.
Food Coloring Experiment	3 Clear containers Warm water Cold water Room temperature water Food coloring	<p>Temperature is a measurement of how quickly molecules are moving. When molecules move fast, they are warm, when they move slowly, they are cold. This difference can impact how different liquids behave. You will look at how the temperature of water impacts how quickly food coloring mixes into the liquid. Do you think liquids will mix together faster or slower when they are hot?</p>	<ol style="list-style-type: none"> 1. Fill the three containers with water (warm, room temperature, cold) 2. Make a prediction about which container will have the food coloring mix in first 3. Put food coloring (2-3 drops) in each of the different containers 4. Observe the three containers to see how quickly the food coloring disperses in water at different temperatures