



SHOCKING FRUIT!

Challenge:

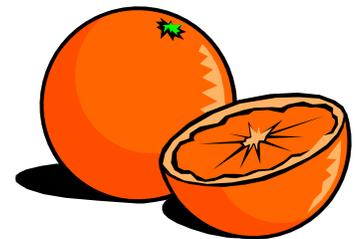
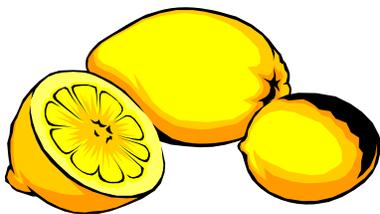
Let's create electricity using a piece of fruit.

Procedure:

1. Take a lemon.
2. Insert a piece of copper and a piece of zinc into the lemon, leaving part of each sticking out.
3. Attach the black wire to the zinc and the red wire to the copper.
4. Look at the meter as you attach the wires. What happens? Draw it on your data sheet.
5. Repeat with the orange and the lime. Clean the copper and zinc between each fruit.

Observations:

1. Did you see a difference in the meter with the orange or lime?
2. The copper and zinc are reacting to something inside the fruit. What is inside the fruit that causes this reaction?





How Does It Work?

There are two things inside of batteries: **electrodes** (ee-leck-trodes) and **electrolytes** (ee-leck-troe-lites).

Electrodes are pieces of metal that collect positive and negative charges. In the case of our fruit batteries, the copper and zinc are our electrodes.

The **electrolyte** is a substance that interacts with the electrodes to create the positive and negative charges. The juice inside of the fruit is acting as our electrolyte. Specifically it is something inside the juice called **citric** (si-trick) **acid**. This is the stuff that makes cuts sting if they get juice in them (ouchie!).

When the zinc and copper are connected to the meter, the negative charge in the zinc moves through the wire to the copper. As the charge moves, it creates electricity!

This type of battery is called a wet cell. The batteries inside most cars, trucks, and motorcycles are also wet cells, except they have MUCH stronger acids.

Take a look at the potato clock. You will notice there are NO BATTERIES connected to it - only potatoes. This clock is designed to work of the small amount of electricity created by potatoes.

How's that for potato power?



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MATERIALS

1. Milliammeter (mA)
2. Copper Electrodes
3. Zinc Electrodes
4. Two Wires
5. Steel Wool

ADDITIONAL MATERIALS

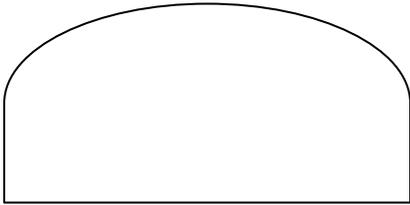
1. Cooler with lemons, limes, and oranges
2. Tray for fruit
3. Potato Clock
4. Data sheets and markers

DATA SHEET FOR ELECTRICITY

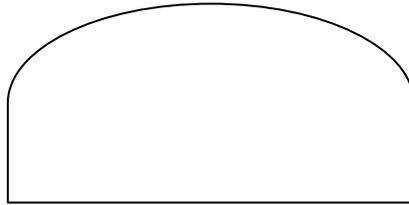


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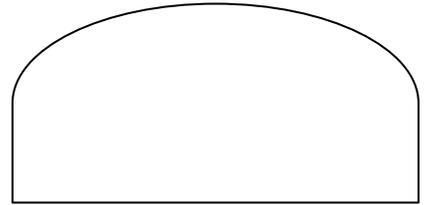
Draw the position of the needle in the meter in the spaces below



lemon



lime



orange