# 16 March 2020 Experiment –Potato Power

## What you need:

* One potato
* Galvanized nails
* Pennies
* Small knife
* Alligator clips
* LED light with wire leads
* Digital ammeter

## Instructions:

1. Poke a nail into the potato so the head and a bit of the shaft is sticking out
2. Using the knife, make a small slit in the potato and push the penny halfway into the potato
3. Clip one alligator clip to the nail
4. Clip one alligator clip to the penny
5. Using the ammeter, measure the voltage between the two alligator clips
6. Clip the other end of the alligator clip attached to the nail to one leg of the LED
7. Clip the other end of the alligator clip attached to the penny to the other leg of the LED. What do you think will happen?

Potatoes don’t generate electricity! A redox reaction occurs between the zinc and copper – two electrons from the copper (penny) are lost and combine with the zinc (galvanized nail). The potato serves as a salt bridge between the penny and nail and allows electrons to flow. We have an electrical circuit. There are other foods you could use – bananas, strawberries – but we’ve *got* potatoes. So that’s what we’ve used 😊

# 17 March 2020 Experiment – Boat Building

## What you need:

* Water
* Sink
* Random stuff from around the house – plastic bottles, pipe cleaners, cups, string, cardboard

Buoyancy is an upward force exerted by water on an object. If you put a small, heavy object in water … it will sink. There’s still some upward force exerted on the object, but the force of gravity is greater. We want to build a boat that can hold a lot of pennies. Find various objects from around the house (ones that can get wet!) and create your boat. Fill the sink with water, and put your boat in the water. Start adding pennies – count how many pennies can be put on your boat before (1) you cannot add more pennies or (2) the boat sinks.

Can you redesign your boat to hold more pennies?

# 18 March 2020 Experiment – Desalinization

## What you need:

* Salt
* Water
* Two large glass containers
* Two small containers
* Rocks
* Clingfilm

## Instructions:

* Put two cups of water into a large glass container, heat this in the microwave for three minutes. Careful: it’s hot! Stir in 1 teaspoon of salt.
* Let cool a bit, then place the smaller glass container at the center of the larger one – it shouldn’t be submerged!
* Cover the large container with clingfilm and place a small rock on the clingfilm, over the smaller container.
* Place your bowl in the sunlight.
* Repeat this process but add 1 tablespoon of salt to the hot water.
* Leave the containers in the sunlight for several hours.
* Dip your finger in the smaller containers and taste the liquid.
* Dip your finger in the larger containers and taste the liquid

What do you have in the smaller container? Did the amount of salt in the water change how much liquid was collected in the smaller containers?

# 19 March 2020 Experiment – Surface Tension

## Bubble Recipe #1:

* ½ cup warm water
* 4 teaspoons liquid soap

## Bubble Recipe #2:

* ½ cup warm water
* 4 teaspoons liquid soap
* 1 tablespoon corn syrup

## Bubble Recipe #3:

* ½ cup warm water
* 4 teaspoons liquid soap
* 1 tablespoon glycerin

## Bubble Recipe #4:

* ½ cup hot water
* 4 teaspoons liquid soap
* ¼ packet gelatin
* 1 tablespoon glycerin

Mix each bubble recipe in a separate container. Blow bubbles with each recipe to see how they perform.

Which recipe creates the longest lasting bubbles? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which recipe creates the biggest bubbles? ­­­­­­­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which recipe is the hardest to make bubbles? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Other observations: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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# 20 March 2020 Experiment – Wave Blockers

## What you need:

* RC Car and remote
* Test materials – cotton fabric, aluminium foil, paper, glass, nitrile gloves, rubber sheet, etc

## Instructions:

* Wrap the remote control in one material and attempt to drive the car
* Wrap the remote in another material and try to drive the car again. Keep trying different materials and observe the results.
* Wrap the FireTV and TV remotes in the materials and see if *those* remotes work

How well does the remote work when wrapped in each material?

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| **Material** | **Does car move?** | **Does FireTV remote work?** | **Does TV remote work?** |
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The remote control for the car uses radio waves to transmit instructions to the vehicles. One way waves are measured is “frequency” – cycles per second. One Hertz is one cycle per second:



A wave with ten cycles per second, or 10 Hz, looks like this:



See how the shape of the wave changes as the frequency increases?

The frequency of the waves used in your RC remote will be listed on the bottom. The FireTV remote uses Bluetooth – 2.45 GHz. The TV remote usually use waves in the 30-60 KHz range. Humans here between 20 Hz to 20 kHz.

Waves can be blocked by different materials, and the way different frequencies are blocked by materials is different. The ability of waves to transfer through a material is called transmittance – some materials are good transmitters, some are not (good insulators)

# 23 March 2020 Experiment – How much iron is in your cereal?

## What you need:

* Cereal
* Blender
* Water
* Plastic bottle
* Tape
* Funnel
* Strong magnet (on the downstairs fridge)

## Instructions:

1. Tape the magnet onto the plastic bottle.
2. Put ½ cup of cereal in a blender. Add a cup of water. Blend on “liquify” until it’s all mush.
3. Using the funnel, pour the cereal mush into a plastic bottle
4. Pour about ¼ cup of water into the blender container to rinse it and pour that into the plastic bottle.
5. Slowly pour the mush out of the bottle, making sure it flows over the magnet.
6. Add about ¼ of water to the bottle, swirl it around to rinse the remaining cereal slush.
7. Slowly pour the water out of the bottle, making sure it flows over the magnet.
8. Leave the bottle to air-dry for an hour or two. Do you see anything in the bottle over the magnet?

# 24 March 2020 Experiment – Porosity and Particle Size

## What you need:

* Clear containers
* Dirt
* Sand
* Small rocks
* Large rocks
* Rimmed tray
* Water
* Measuring cup

## Instructions:

1. Place four clear containers on a rimmed tray
2. Put each material (dirt, sand, small rocks, and large rocks) into different containers.
3. Get two cups of water in the measuring cup. Slowly pour the water into the ‘dirt’ container until the water reaches the top of the dirt. How much water is left in your measuring cup? \_\_\_\_\_\_\_\_
4. Get two cups of water in a measuring cup. Slowly pour the water into the “sand” container until the water reaches the top of the sand. How much water is left in your measuring cup? \_\_\_\_\_\_\_\_
5. Get two cups of water in a measuring cup. Slowly pour the water into the “small rock” container until the water reaches the top of the rocks. How much water is left in your measuring cup? \_\_\_\_\_\_\_\_
6. Get two cups of water in a measuring cup. Slowly pour the water into the “large rock” container until the water reaches the top of the rocks. How much water is left in your measuring cup? \_\_\_\_\_\_\_\_

We can compute the amount of empty space between the particles – subtract the recorded amount of water remaining from the 2 cups we started with. How much space was between each material?

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| --- | --- | --- | --- |
| **Dirt** | **Sand** | **Small Rocks** | **Large Rocks** |
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Did the water move into each material at the same rate? Or did you need to pour more slowly in some materials?

# 25 March 2020 Experiment – Recycling Paper

## What you need:

* Paper from the recycling bin
* Water
* Blender
* Felt
* Rolling pin
* Large plastic container
* Large plastic tray (lid of the container works)
* Mold and deckle

## Instructions:

1. Cut paper up into 1” squares. Soak in water overnight
2. Add water to the blender and throw in a few handfuls of the paper
3. Blend until it’s a consistent slurry.
4. Pour paper slurry into a tray
5. Use the mold and deckle to scoop slurry, then shake to even out paper layer. Let water drain.
6. Lay a piece of felt on a towel
7. Quickly, invert the frame with your sheet onto the felt and lift one corner of the frame. The paper should stay on the felt.
8. Add a second layer of felt on top of your sheet.
9. Use a rolling pin to press the sheet that is between the felt.
10. Place the finished sheet on a plastic tray and allow to dry (this may take a few days!)

# 26 March 2020 Experiment – Color and Heat Absorption

## What you need:

* Different color construction papers – white, black, red, blue
* Digital thermometer

## Instructions:

1. Place each piece of construction paper in a sunny location for a few hours
2. Use the digital thermometer to measure the temperature of each sheet

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| --- | --- |
| **Color** | **Temperature** |
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Do you notice any difference in temperature between the colors?

# 27 March 2020 Experiment – Pixels

## What you need:

* Graph paper with various size squares
* Colored pencils, markers, or crayons

## Instructions:

1. Select a shape or picture (star, cat, horse, tree)
2. On the paper with the largest squares, color in squares to create the shape.
3. Follow the same process to create the shape on each sheet.

How many squares are in each sheet? How many were colored to create your shape?

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| **Graph Size** | **Total Squares** | **Colored Squares** |
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Each square in our graph is like a pixel. Electronic sign boards have very few huge pixels. Images on electronic sign boards can look pretty blocky. Old monitors had a larger number of not-quite-so-large pixels, so computer games were not very realistic. Modern displays have a *lot* more *very* tiny pixels. My laptop has 2,073,600 pixels.