

Mad Scientist Resources

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Lion

Gizmos and Gadgets

Rolling stuff down an inclined plane. Here is an example:

Puzzle: <https://youtu.be/HgCXdNhVC1Q?t=54>

Solution: <https://youtu.be/72DCj3BztG4?t=34>

Lessons learned: the honey needs to be warmish. If you store it in a cold garage it will be too viscous to perform and will act like a solid.

Static electricity

Used a balloon and rubbed on wool or hair to transfer some electrons (charge) to the balloon.

Then using an empty aluminum can it will attract it once it gets close enough

<https://youtu.be/MeVD1-BYpOc> or with just balloons <https://youtu.be/oU8Fe6846d4>

Ink and Paper filter experiment (Ink chromatography)

<https://youtu.be/kqIKHO29zOk>

Use water based markers or check to see if they react better with a little rubbing alcohol beforehand as some pens and sharpies do.

Mobius strip cutting

<https://youtu.be/f-19NLKxNUc>

Cut mobius strip once and it adds a twist cut again and they separate into two loops that are linked. You can also cut a single mobius strip one third over the whole way around twice, what does it do?

Step through a piece of paper experiment <https://youtu.be/8y9i8ag2WTK>

Wolf

Germs Alive

The first den leaders' guide had the wrong instructions. There are a million+ youtube channels of kids making slime. Just pick one, here is a random one I found.

Making mucus <https://youtu.be/oMjl-8TPtRw>

Then blow glitter, cocoa powder or other powder across it to show how mucus (snot) catches particulates to protect your lungs.

FAKE MUCUS RECIPE

Materials

- ◆ Borax
- ◆ Warm water
- ◆ White school glue
- ◆ Food coloring
- ◆ Two plastic containers
- ◆ Quart-size zippered storage bag
- ◆ Pinch of dirt, flour, glitter, or cocoa
- ◆ Paper plate

Container One

- ◆ 1/8 cup borax
- ◆ 2 cups warm water

Container Two

- ◆ 2 teaspoons white glue
- ◆ 3 teaspoons warm water



Instructions

1. Dissolve borax into the warm water in container one.
2. Dissolve glue into the warm water in container two.
3. Add a few drops of yellow or green food coloring to the container of glue, and mix.
4. Add one to two teaspoons of the borax mixture to the glue mixture. Begin stirring, and watch as the mixture starts to form into "slime."

Bears

Layering Different liquids

<https://youtu.be/fE2KQzLUVA4>



Just sugar water <https://youtu.be/RkJXcVyMuik>



Float or sink: can do egg in water and salt water, like we did in the lesson, but this is a different spin with soda cans and sugar content <https://youtu.be/MzsORE0ae10>

Buoyancy in a bottle. AKA Cartesian Diver

Using a pipette, washers, and a rubber band, make a dive capsule and put in a 2 litre bottle filled with water. Adjust the water in the pipette so it is about $\frac{2}{3}$ the way up and seal the bottle. By pushing on the outside you are increasing the pressure in the bottle reducing the air bubble and thus making the pipette less buoyant. At a certain point it switches from being positively buoyant to negative and will sink. See if they can adjust it so it is neutrally buoyant and hang in one spot.



Webelos/AOL

Super Science

The goal is to perform several experiments while you only modify one variable.

Water bottle rocket: change amount of water in it for propulsion or add mass to the nose cone for inertia and see how much higher it continues after the initial impulse.

Model rocket

Change the size of the rocket engine or add mass to the rocket.

Single pole motor

<https://youtu.be/ooLdxQwVUU4>

This works due to an electric current moving through a magnetic field making an electromotive force, ie. motor.

Playground. We took the scouts there with several different pieces of fabric: cotton, potato sack, and a satiny material and had them go down the slide to see how friction affected the speed.

We also went to the swings and discussed pendulums and what affects the period or time it took for them to complete a cycle. Many think it is their weight, but it does not factor into it. Just the length of the pendulum. Per the equation where T is the period in seconds, L is length of pendulum and g is the gravitational constant of feet per second²

$$T \approx 2\pi\sqrt{\frac{L}{g}}$$

You can see a good demonstration here: <https://youtu.be/YhMiuzyU1ag>

Elephant Toothpaste

https://youtu.be/edEfc_fiGXs

I demonstrated using 40 volume clear Hydrogen Peroxide from the beauty supply store (\$5), some yeast, soap, and dye.

To make it more reactive you can use a different catalyst like Potassium Iodide. I purchased some crystals from Amazon and put them in a water solution myself. I have not had the luck that Mark Robler has had for his channel, guess I need to keep experimenting.

https://youtu.be/Kou7ur5xt_4

Or Science Bob with some sodium iodide catalyst <https://youtu.be/p1eG2y2mn54>

I heard there is a science supply store in Seattle from a participant last year, but I haven't reached out to them to see if we can purchase as just a member of the public. I think this is the one they mentioned. <https://ssenw.com/home> 619 S Snoqualmie St, Seattle, WA 98108

More scientific instructions for elephant toothpaste

https://www.cae.tnitech.edu/~dcashman/demos/demo_elephants-toothpaste.html

Hope you got something useful from the class. It was intended to be an in-person hands-on class where you **Take chances, make mistakes, and get messy**. So that the science part of it is not overwhelming to the new den leaders that haven't played with science since they took chemistry in High School.

I highly recommend Emily Calandrelli's new show on Netflix, Emily's science lab. Many of these experiments are demonstrated there as well. Plus, it is awesome to see women represented in STEM fields.

Steve Spangler has similar stuff and he sells many experiment kits.

<https://www.youtube.com/user/TheSpanglerEffect>

www.stevespanglerscience.com

-Sam and Dave