Hey, Try This!

Post-Visit Activities

MARYLAND SCIENCE CENTER

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Potato Popper:

Objective:

- Students will observe projectile motion.
- Students will use air compression in order to send a piece of potato flying out of a plastic tube.

Materials:

- An adult safety partner
- One large potato
- 2 ½′ plastic tube (like a ½″ diameter PVC pipe)
- Long wooden handle (like you would find on a broom)

Procedure:

1. Ask your adult safety partner to make two potato plugs by cutting a potato into large chunks about two inches thick.
2. Shove a potato chunk into each end of the tube. It may help to place a potato piece on the ground and then shove the tube on top like it is a cookie cutter pressing in to dough.
3. Once both ends of the tube are plugged with potato, have your adult safety partner hold the tube horizontally by the middle of the tube.
4. Take the broom handle, and while your partner is holding the tube, gently push one of the potato plugs in six inches.
5. Now pull back on the broom handle and shove it quickly back at the potato plug. What happened to the potato piece at the far end of the tube?

Some Questions to Think About:

1. What kind of shape did the potato make as it flew through the air? Did it make an arc?
2. Try the experiment again; this time ask your adult to hold the tube at an angle so that the far end of the tube tilts slightly upward. Did the potato still make an arcing path?
3. Repeat the experiment several times, asking your adult to hold the tube the same way each time. Can you predict were the potato piece will land each time?
4. Why do you think it is important to have two potato pieces? Why would the experiment be less impressive with only one potato plug to push on?

Explanation:

As soon as the potato chunk comes out of the end of the tube it is experiencing projectile motion. Projectile motion is when an object is experiencing only the force of gravity. As the gravity pulls the potato down the potato makes an arc like a rainbow. If you launch the potato the same way every time, you can predict where it will land because gravity is the only force acting on it while it's in the air; and gravity does not change.

When you push on one of the potato chunks with the wooden handle, it makes the space between the two potato pieces smaller. When this space gets smaller it squeezes the air tighter and tighter. Eventually that space gets too small and the air pushes back on the other side of the tube, where the other potato chunk is, and that chunk is forced out of the tube.

Glass Harp

Objective:

- Students will learn how sound waves are created.
- Students will create sound by playing goblets filled with varying amounts of water.

Materials:

- Adult safety partner
- 7 glass goblets
- Large pitcher of water
- 2 pencils or mallets

Procedure:

- Place the goblets on a flat, stable surface and arrange in a row; this will be your harp.
- Using the pitcher of water, fill the goblets with different amounts of water. Try filling the first glass in the row with just a little bit of water, then add a little more water to each glass along the row.
- To play the glass harp, hold a glass at the bottom and then gently tap the side with the pencil or a mallet. Try running your pencil along the sides of the glasses in the row. Experiment with the different glasses and try to play a song.

Some Questions to Think About:

1. When you add more water to a glass what happens to the sound? What happens to the sound when you take water away from the glass?
2. Why do you think the sound changes with different amounts of water?
3. Would the sound change if you filled the glasses with something other than water? Try using yogurt, newspaper, or dried beans.

Explanation:

Sound is created when vibrations move through the air. When you hit the glass, it causes it to vibrate and it sends those vibrations into the water in the glass and into the air inside the glass. Eventually those vibrations, or sound waves, reach our ears and we hear them as different sounds. The reason that the glasses all make different sounds is because they have different amounts of air inside them for the sound vibration to travel through.

Invisible Glass

Objective:

- To observe the refraction, or bending, of light though glass and liquids.

Materials:

- 1 large glass bowl (about 1 quart)
- 1 small drinking glass (must fit in bowl)
- Baby oil (at least 1 quart)

Procedure:

1. Fill large glass bowl ¾ of the way with baby oil.
2. Place small drinking glass inside of bowl; observe how you can see the glass in the bowl of oil.
3. Begin to fill glass with baby oil, observe how the drinking glass becomes harder to see.

Notes: Be sure to pour oil slowly into the small glass so you limit the amount of air bubbles in the glass. Air bubbles keep the glass from appearing invisible.

Some Questions to Think About:

1. How is the baby oil different from water? Is it slower moving (thicker) or faster moving (thinner)?
2. Do you think the temperature of the oil can affect the amount of refraction? Try warming or cooling the oil and repeating the experiment to see if you get a different result.

Explanation:

What we are doing in this experiment is showing how light refracts, or bends, through different materials. In this case our materials are the baby oil, glass bowl, and the drinking glass. Before we add the baby oil to the bowl, you can easily see the small drinking glass inside of the large bowl. The drinking glass is visible because when the light hits the glass, it refracts, or bends, allowing us to distinguish between the glass and the air around it. The amount of refraction that occurs in an object is called the index of refraction. The index of refraction of the baby oil and the glass are very similar. When you add the baby oil to the inside of the drinking glass, it becomes very hard to see.

Salt Dough Circuit

Objective:

- Students will learn how to make a simple circuit.
- Students will use salt dough to experiment with conductivity and resistance.

Materials:

- An adult safety partner
- 2 pieces of copper wire that has been stripped at the ends (ask you adult safety partner for help with this)
- 4 or 5 batteries (AA, C cell and D cell will all work)
- 2 or 3 small flashlight bulbs (LED bulbs will also work)
- A flat piece of wood or board (this will serve as an insulator)
- Electrical tape
- Salt dough (see recipe below)

Procedure:

1. Tape down two batteries on your board, touching end to end. Electricity flows from (-) to (+) so make sure that the (+) end of one battery is touching the (-) end of the other battery.
2. Use electrical tape to connect one end of one wire to the (-) end of your batteries.
3. Wrap the other end of your wire around the metal bottom of your light bulb. You can use electrical tape to secure the wire to the bulb.
4. Wrap the second wire around the bottom of the bulb and secure with electrical tape.
5. Tape the end of this wire to the (+) end of your batteries. Your circuit is closed and you light bulb should be glowing!
6. Now that you have created a circuit you can experiment by adding salt dough to different points along the circuit.

Some Questions to Think About:

1. Try adding different sizes of salt dough to your circuit. Does anything change when you use different amounts of dough? What changes?
2. Why is your dough able to conduct electricity? Would this experiment work with other kinds of dough (like bread or cookie dough)? Why or why not?

Explanation:

Electrons are tiny particles that are negatively (-) charged. When electrons move through a closed circuit we call this electricity. In our circuit we use the electricity from batteries to light our light bulbs. Basically the negative (-) end has too many electrons and the (+) end doesn't have enough and when they are connected the (-) end is attracted to the less crowded (+) end. When our circuit is closed, meaning that everything is connected correctly, electrons are free to pass from the (-) end of the batteries through the bulb and back to the (+) end of the batteries. The piece of wood is an insulator which means that it will not allow electrons, or electricity, to flow through it. This prevents the electricity from flowing to the table top. Just like copper wire the dough conducts electricity. This means that electrons are able to pass though the dough and on to the light bulb or next wire. As the size of the lump of dough increases the amount of space the electrons need to pass through also increases, which results in a dimmer light bulb. This is called resistance. When a second lump of salt dough is added the light bulb ceases to glow because the resistance of the second lump does not allow enough electrons through and thus opens the circuit.

Salt Dough Circuit

Salt Dough Recipe:

- 1 cup of water
- 1 cup of flour
- ¼ cup of salt
- 1 tablespoon of vegetable oil
- 3 tablespoons of cream of tartar
- Food coloring (optional)

1. Mix all of the ingredients together in a large pot.
2. Put the pot over medium heat and continuously stir while bringing the mixture to a boil.
3. When the mixture forms a ball, remove from the heat and place on a lightly floured surface.
4. After letting the mixture cool, knead into preferred consistency.
5. Store in an airtight container. At room temperature the dough will last for several weeks, in a refrigerator the dough will last for several months.

Bibliography

If you are interested in more "Hey Try This!" kind of science experiments you should know that we found these books helpful:

- *The Book of Potentially Catastrophic Science: 50 Experiments for Daring Young Scientists* by, Sean Connolly. Workman Publishing, 2010.
- *The Book of Totally Irresponsible Science: 64 Daring Experiments for Young Scientists* by, Sean Connolly. Workman Publishing, 2008.
- *Naked Eggs and Flying Potatoes: Unforgettable Experiments That Make Science Fun* by, Steve Spangler. Greenleaf Book Group Press, 2010

If you are interested in more physics explanations, videos, and experiments you should know that we found these websites helpful:

- *www.physicsclassroom.com* The Physics Classroom offers tutorials that are clear and easy to understand. The content may be geared toward secondary students, but this is honestly a great resource for any teacher who needs to refresh their physics before leading a discussion with students.
- *www.stevespanglerscience.com* Steve Spangler offers a lot of videos that can take you step-by-step through a science experiment, often with a nice explanation of what is occurring during the experiment.
- *www.veritasium.com* This website offers a number of videos that give clear and succinct physics explanations that might just help teachers answer tricky questions from students.
- *www.youtube.com/user/NatSciDemos* This is a channel on YouTube that contains a lot of wonderful physics demonstrations. They may not all be things that you can reproduce in the classroom, but they can certainly serve as starting points for classroom discussion. This channel even includes a video for a Pendulum Wave Machine that inspired the one that the Maryland Science Center's Traveling Science Program built.
- *www.web.media.mit.edu/~*silver/drawdio <http://www.web.media.mit.edu/~silver/drawdio> This is the MIT web page for the Drawdio, or "singing pencil". If you are interested in more hands on circuit experiments, the Drawdio is a very good investment. The website also includes ideas on how you can modify your Drawdio kit to make a singing paintbrush or even singing fruit. If you are interested in purchasing a Drawdio kit for your classroom you can do a basic web search and find a number of websites that offer the kit, usually for around $20.

If you are interested in the vocabulary that was used during the presentation you should know that we used the Maryland Voluntary State Curriculum (www.mdk12.org) to help guide our curriculum. Specifically we focused on:

- Grade 3, Standard 5, Topic A.2
- Grade 3, Standard 5, Topic D.2
- Grade 4, Standard 5, Topic C.1
- Grade 4, Standard 5, Topic C.2
- Grade 5, Standard 5, Topic A.1
- Grade 5, Standard 5, Topic D.3