

PRE-VISIT ACTIVITY

Simple Science Experiments

Three main areas of science are physics (study of motion and forces), biology (study of living things), and chemistry (study of matter).

“Magic” Water Trick—Physics

Materials:

Paper or plastic cups

Pieces of cardboard or cardstock, slightly larger than the top of the cup

Water

A sink or large bowl.



Steps:

- 1.) Fill the cup with water.
- 2.) Place the piece of cardboard over the top, so it completely covers the top of the cup.
- 3.) Over the sink/bowl, keep your fingers on the cardboard and turn the cup upside down quickly, keeping the cardboard in place.
- 4.) Let go of the cardboard (but not the cup!).

What happens? Why does the cardboard stay on the cup, holding the water inside?

It's because of physics. There are two concepts at work.

- 1.) The pressure of the air outside the cup is greater than the pressure of the air trapped inside. The pressure of the air, called **atmospheric pressure**, is helping to hold the water and cardboard in place.
- 2.) The other reason is because of the **forces** of the water molecules. Water is made of tiny little things called molecules (actually, everything is made of molecules!) Each water molecule acts like a tiny magnet, with like charges repelling each other and unlike charges attracting. Where the water molecules stick together through this attractive force, it is called **surface tension**. Water molecules are also attracted to other materials, such as the cardboard. We call this **adhesion**. In the “Magic” water trick experiment, the water molecules are attracted to the cardboard, and adhere to it, while also being attracted to each other through surface tension. This keeps the cardboard in place.

PRE-VISIT ACTIVITY

Penny Experiment—Chemistry

Materials:

10 pennies that were made before 1982

Salt

Vinegar or Lemon Juice

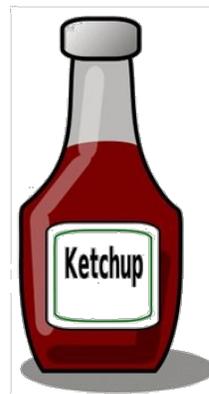
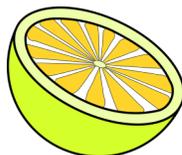
Ketchup

Cola (Coke or a generic brand)

Bowls

Warm water

Clock/watch



Steps:

1. In one bowl, mix 1 tsp of salt with 1/2 cup of vinegar or lemon juice, and stir until the salt dissolves. Add a penny or two and let sit for 5 minutes, then rinse them with water.
2. Place a couple pennies in a bowl and cover them with ketchup. Wait 5 minutes, then rinse them.
3. Place a couple pennies in a bowl and cover them with cola. Wait 5 minutes, then rinse them.

Which material cleaned the pennies the best? What happens if you don't rinse the pennies after cleaning them? What happens if you leave the pennies in the cola for longer?

What's going on? Pennies made before 1982 are composed of 95% copper. When exposed to air, the copper atoms combine with oxygen to form copper oxide, which is what makes the pennies appear dark and dull.

Copper oxide dissolves when in contact with a weak acid and salt. By using the vinegar/salt or ketchup, which contains both, the copper oxide is dissolved. When the pennies are rinsed, the copper oxide is removed.

If the pennies are not rinsed with water, the now free copper atoms join oxygen from the air and chlorine from the salt to make a blue-green compound called malachite.

References: http://www.exploratorium.edu/science_explorer/copper_caper.html

<http://www.wikihow.com/Clean-Pennies>

http://www.usmint.gov/about_the_mint/fun_facts/?action=fun_facts2

PRE-VISIT ACTIVITY

Worm Survey—Biology

Materials:

A container of Superworms (available at most pet stores)

Shoeboxes or deep trays with lids/cover

Aluminum foil

Newspaper

Cling wrap

Sandpaper

Tape

Clock/watch



Steps:

Superworms are the larval stage of the darkling beetle. They eat fruits and vegetables, not students or teachers. They prefer to be in the dark (presumably to avoid being seen and eaten by predators). This experiment allows students to determine on which kind of material superworms prefer to be.

1. Measure the bottom of the box or tray. Divide the area (length x width) by four. Use the measurement to cut out equal size pieces of the foil, newspaper, cling wrap and sandpaper for the bottom of the box or tray.
2. Secure the four pieces on the bottom of the tray. Superworms love to hide under things so they will burrow under the materials if there are gaps.
3. You and your students should decide how long to give the superworms to decide where they like to be. Ask your students to make a hypothesis as to which type of material the superworms will prefer.
4. Bravely remove the superworms from the container and place them in the center of the tray. Cover the tray and start the experiment. When time is up, lift the lid and have students write down the results. This step could be done using the superworms one at a time or en masse.

Which material did the superworms prefer? Was there more than one result?

AFTER-VISIT ACTIVITY

Science Extravaganza Quiz

1.) When the hydrogen and helium-filled balloons exploded, which type of gas made a louder noise? (circle one) Hydrogen Helium

Bonus: The stick with the candle, used to pop the balloons, is called a:

Balloon Exploder

Chicken Stick

Pop-o-rama

2.) Why does the pickle conduct electricity?

- A. Because pickles contain seeds
- B. Because pickles are made of cucumbers
- C. Because pickles contain salt (sodium chloride)

3.) When an excited electron returns to its normal level of energy/orbital, it emits what?

- A. A poof of smoke
- B. A photon of light
- C. A loud bang



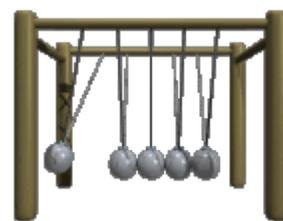
4.) There are five types of animals that have backbones. What is the word for them? (Circle one): Invertebrates Bicuspids Vertebrates

5.) The five types of animals with backbones are:

Fish, Amphibians, Reptiles, _____, and Mammals.

6.) Reptiles are characterized by what features? (circle 3)

- Scales on skin
- Slimy
- Cold-blooded (ectothermic)
- Produce milk
- Reproduce by eggs



7.) Newton's cradle (pictured) demonstrates transfer of energy. If you pick up one ball and let it go, how many balls will swing on the other side? _____ If you pick up 2 balls and let them go, how many will swing on the other side? _____ And if you pick up 4 balls and let them go? _____

8.) When two different substances are combined and produce a different substance or substances, it is called a _____? _____ reaction: (circle one) physical chemical ionic

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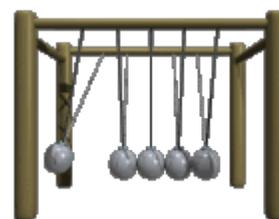
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