SCIENCE ACTIVITY BOOK

For elementary students

PREFACE

There is no doubt that practical work in science at schools is widely accepted as a vital component of teaching and learning.It is an effective way to enhance students motivation and extend their knowledge in understanding theories and ideas about natural world.It is also well known fact that students prefer practical work to any other learning activites.This book has been framed to improve students understanding of science and develop understanding of scientific enqury in addition to enhancing students motivation.

The lucid explinations in this book make it easy for both teachers and students to understand the basic phenomenas of science.I hope this book will help students to understand the science in a better way.

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Make an Egg Float in Salt Water

Have you ever seen what happens to an egg if you drop it in a glass of salt water (saturated)? When enough salt is added to the water, the salt water solution's density becomes higher than the egg's, so the egg will then float! The ability of something, like the egg, to float in water or some other liquid is known as buoyancy. An egg sinks to the bottom if you drop it into a glass of water but it is not same when you add salt to the same water. What happens if you add salt? The results are very interesting and can teach you some important facts.

What you'll need:

- Egg
- Water
- spoon
- Salt
- A tall drinking glass

Instructions:

1. Pour water into the glass until it is about half full.
2. Stir in lots of salt (about 6 tablespoons).Make it super saturated for effective results.
3. Carefully pour in plain water until the glass is nearly full (be careful to not disturb or mix the salty water with the plain water).
4. Gently lower the egg into the water and watch what happens.

What's happening?

When salt is dissolved in water, as it is in ocean water, that dissolved salt adds to the mass of the water and makes the water denser than it would be without salt. Because objects float better on a dense surface, they float better on salt water than fresh water.

Point to Ponder

Why log of wood floats on water? Why not it sinks..

Experiment with Salt Water Conductivity

Salt water is good conductor of electricity .Let's try an activity with students to know how salt water is good conductor of electricity. Salt molecules are made of sodium ions and chlorine ions. (An *ion* is an atom that has an electrical charge because it has either gained or lost an electron.) When you put salt in water, the water molecules pull the sodium and chlorine ions apart so they are floating freely. These ions are what carry electricity through water.

What You Need:

- 9V battery
- 2 popsicle sticks
- Glass of water
- Glass of salt water
- Masking tape
- Foil
- Buzzer /Switch

What You Do:

1. Wrap the Popsicle sticks in foil.
2. Tape the buzzer's red wire to the battery's positive (+) end.
3. Put one of the foil sticks on top of the black wire. Tape these together. Tape the other stick to the battery's negative (-) end.

4. Touch the two sticks together! Does the buzzer make a noise? If not, check again to see if everything has been taped.
5. Have your child put the tips of the foil sticks into the glass of salt water. Have him put them an inch apart so that they aren't touching. Does the buzzer go off? The salt in the water connects and completes the circuit!
6. Repeat step 5 in fresh water. What's the difference?

What Happened?

In the salt water, the salt breaks down into little "ions" that conduct electricity. Since fresh water doesn't have salt, it can't conduct electricity.

Point to Ponder

Can you guess what happens when we make a solution of an acid in water?

Experience Gravity Free Water

Why an object falls always on ground instead of rising up? Let's bend the rules a little with a cup of water that stays inside the glass when held upside down. You'll need the help of some cardboard and a little bit of air pressure.

What you'll need:

- A glass filled right to the top with water
- A piece of cardboard

Instructions:

1. Put the cardboard over the mouth of the glass, making sure that no air bubbles enter the glass as you hold onto the cardboard.
2. Turn the glass upside down (over a sink or outside until you get good).
3. Take away your hand holding the cardboard.

What's happening?

If all goes to plan then the cardboard and water should stay put. Even though the cup of water is upside down the water stays in place, defying gravity! So why is this happening? With no air inside the glass, the air pressure from outside the glass is greater than the pressure of the water inside the glass. The extra air pressure manages to hold the cardboard in place, keeping you dry and your water where it should be, inside the glass.

Point to ponder

Why does the water rise in capillary tube? Does not it goes against gravity?

Make a Crystal Snowflake!

Learn how to make a snowflake using borax and a few other easy to find household items. Find out how crystals are formed in this fun crystal activity, experiment with food coloring to enhance the look and keep your finished crystal snowflake as a great looking decoration!

What you'll need:

- String
- Wide mouth jar
- White pipe cleaners
- Blue food coloring (optional)
- Boiling water (take care or better still get an adult to help)
- Borax

- Small wooden rod or pencil

Instructions:

1. Grab a white pipe cleaner and cut it into three sections of the same size. Twist these sections together in the center so that you now have a shape that looks something like a six-sided star. Make sure the points of your shape are even by trimming them to the same length.
2. Take the top of one of the pipe cleaners and attach another piece of string to it. Tie the opposite end to your small wooden rod or pencil. You will use this to hang your completed snowflake.
3. Carefully fill the jar with boiling water (you might want to get an adult to help with this part).
4. For each cup of water add three tablespoons of borax, adding one tablespoon at a time. Stir until the mixture is dissolved but don't worry if some of the borax settles at the base of the jar.
5. Add some of the optional blue food coloring if you'd like to give your snowflake a nice bluish tinge.
6. Put the pipe cleaner snowflake into the jar so that the small wooden rod or pencil is resting on the edge of the jar and the snowflake is sitting freely in the borax solution.
7. Leave the snowflake overnight and when you return in the morning you will find the snowflake covered in crystals! It makes a great decoration that you can show your friends or hang somewhere in your house.

What's happening?

Crystals are made up of molecules arranged in a repeating pattern that extends in all three dimensions. Borax is also known as sodium borate, it is usually found in the form of a white powder made up of colorless crystals that are easily dissolved in water.

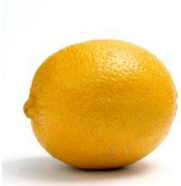
When you add the borax to the boiling water you can dissolve more than you could if you were adding it to cold water, this is because warmer water molecules move around faster and are more spread apart, allowing more room for the borax crystals to dissolve.

When the solution cools, the water molecules move closer together and it can't hold as much of the borax solution. Crystals begin to form on top of each other and before you know it you have your completed crystal snow flake!

Point to ponder

What is chemical composition of Borax? Do you know it chemical structure?

Invisible Ink with Lemon Juice



Making invisible ink is a lot of fun, Lets have fun with science and try to create magic. All you need is some basic household objects and the hidden power of lemon juice.

What you'll need:

- Half a lemon
- Water
- Spoon
- Bowl
- Cotton bud
- White paper
- Lamp or other light bulb

Instructions:

1. Squeeze some lemon juice into the bowl/cup and add a few drops of water.
2. Mix the water and lemon juice with the spoon.

3. Dip the cotton bud into the mixture and write a message onto the white paper.
4. Wait for the juice to dry so it becomes completely invisible.
5. When you are ready to read your secret message or show it to someone else, heat the paper by holding it close to a light bulb.

What's happening?

Lemon juice is an organic substance that oxidizes and turns brown when heated. Diluting the lemon juice in water makes it very hard to notice when you apply it the paper, no one will be aware of its presence until it is heated and the secret message is revealed. Other substances which work in the same way include orange juice, honey, milk, onion juice, vinegar and wine. Invisible ink can also be made using chemical reactions or by viewing certain liquids under ultraviolet (UV) light.

Point to ponder

What is oxidation reaction? How the UV radiations make some liquids invisible?

Potato Battery Activity

Who knew that those tasty spuds can also do double-duty as an undercover battery? Believe it or not, the common potato has the capacity to create enough electrochemical energy to power a small digital clock. The trace amount of acid and salt in the potato serves as an electrolyte and makes an excellent conductor.

What You Need:

- 2 potatoes (or one potato cut in half)
- 2 short pieces of copper wire
- 2 galvanized nails
- 3 alligator clips
- Piece of sandpaper or steel wool
- Low-voltage LED clock or watch

What You Do:

1. Remove the battery from the battery compartment of the clock or watch.
2. Number the potatoes as "1" and "2."
3. Insert one nail into each potato, as well as the copper wire.
4. Have her use one alligator clip to connect the copper wire in potato number 1 to the positive (+) terminal in the clock's battery compartment.
5. Use the other alligator clip to connect the nail in potato number 2 to the negative (-) terminal in the clock's battery compartment.
6. Use the third alligator clip to connect the nail in potato 1 to the copper wire in potato 2. What happens?
7. Does you think you can produce more energy by linking potatoes in a series?

Point to ponder

Have you try experimenting with different objects; will a lemon power the clock? How about an orange?

Egg in a Bottle Activity

Let's have fun with science.

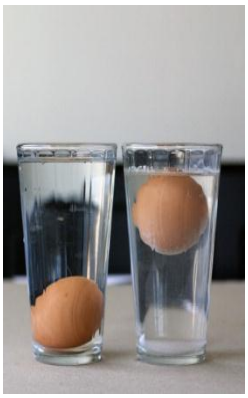
In this experiment, a hard-boiled egg will fit through a suspiciously small opening with the help of only a few matches.!

What You Need:

- Hard-boiled egg
- Glass bottle with opening slightly smaller than egg (apple cider or juice bottles work well)

- Matches

What You Do:



1. Hard boil an egg by placing the egg in a pot of cool water so the water entirely covers the egg and bring the water to a boil on high heat. You may want to hard boil several eggs at a time so you can do the trick more than once.
2. Once the water comes to a boil turn the heat off, but don't take the pot off the stove yet. After about 10 minutes, remove the pot from the stove and place the pot and egg under cold running water for a few minutes. Let the egg cool.
3. Remove the egg from the water and help your child peel the shell.
4. Have your child place the egg on the opening of the bottle. Point out that the egg will not simply fall into the bottle. Tell him that despite appearances, it *is* possible to get this egg into the bottle in one piece.
5. Take over duties and light two matches. Quickly drop them into the bottle. Have your child quickly place the egg on top of the bottle, wait a few seconds, and watch the egg drop into the bottle.

How it works:

This mind-blowing egg experiment is all about pressure. When you drop matches into the bottle, the air heats up. As the heated air expands, some of it escapes from the bottle. When the flames go out, the air inside the bottle cools and contracts and the egg on the bottle creates a seal. The pressure inside the bottle is now less than the pressure outside the bottle, and because nature trends toward all things being equal, the egg is forced into the bottle.

Point to ponder

What if we have to get egg out of bottle?

Density Demonstration Activity

Chemistry lessons don't have to be boring. With a couple of eggs and a little salt you can teach your child all about the concept of density. Science is everywhere and the ingredients for illustrating important scientific concepts are right in your very own kitchen!

What You Need:

- 2 eggs
- 2 clear glasses
- Measuring spoon
- Table salt
- Water

What You Do:

1. Fill two glasses with water.
2. In one of the glasses put in a teaspoon of salt.
3. Put an egg in each of the glasses and see what happens.
4. Have your child record the behavior of the eggs in the two glasses.
5. Experiment with adding more salt to the salted glass.

What's Going On Here?

Density measures matter relative to the volume of a substance, which in this case is water. The water that we drink usually has low density, but when you add salt it absorbs the water. To better understand why the egg in the salted glass floats it's useful to know that salt is a desiccant, which means that it absorbs water. So, when you put salt it water, the salt molecules fill up with water molecules. This interaction creates a layer of salt water and the egg, unable to penetrate the salt layer, floats.

Point to ponder

Why a coin does not float in salt water ?

Find Out Why Leaves Change Color

Of all the natural processes around us, the annual changing of leaves from green to different shades of yellow, orange, and red is perhaps the most beautiful. But behind this show of color, there are important scientific processes at work.

Want to give your students a peek into the science behind a tree's changing leaves? With this hands-on activity, you'll show how those colors stay hidden in the leaf all year long!

What You Need:

- Leaves
- small jar (a baby food jar work well)
- cover for jars or aluminum foil or plastic wrap
- rubbing alcohol
- paper coffee filter
- shallow pan
- hot tap water
- plastic knife or spoon

What You Do:

1. Have your child collect 2-3 large leaves from the same tree type. You and your child should tear or chop the leaves into very small pieces and put them into small jars.
2. Add enough rubbing alcohol to the jar to cover the leaves. Using a plastic knife or spoon, carefully chop and grind the leaves in the alcohol. SAFETY NOTE: rubbing alcohol can be harmful if mishandled or misused. Use in a well-ventilated area, and avoid contact with skin.
3. Have your child cover the jar very loosely with a lid, plastic wrap or aluminum foil. Place the jar carefully into a shallow tray containing 1 inch of hot tap water.
4. Keep the jar in the water for at least a half-hour, longer if needed, until the alcohol has become colored (the darker the better). Twirl the jar gently about every five minutes. Replace the hot water if it cools off.
5. Have your child cut a long thin strip of coffee filter paper. Remove the jar from the water and uncovered. Place a strip of filter paper into the jar so that one end is in the alcohol. Bend the other end over the top of the jar and secure it with tape.
6. The alcohol will travel up the paper, bringing the colors with it. After 30-90 minutes the colors will travel different distances up the paper as the alcohol evaporates. Your child should be able to see different shades of green, and possibly some yellow, orange or red, depending on the type of leaf.

What happened?

Chlorophyll is a green compound that hides the other colored pigments present in leaves. In the autumn chlorophyll breaks down, allowing the other pigments to be seen. The mix of pigments in a leaf may be separated into bands of color by the technique of paper chromatography. Chromatography involves the separation of mixtures into individual components, which you just did using alcohol and energy (heat). Then, by "absorption" and "capillarity," separation can take place! The paper holds the substances using absorption, while capillarity pulls the substances up the paper at different rates. Pigments are separated on the paper and show up as colored streaks or bands. Pretty cool.

Point to ponder

What if we use the red pigments instead of chlorophyll.

Where's the Air?

One way we can tell that air exists is by observing some of the things it does. Air can fill a balloon, for example, and when it's in the form of wind, it can move leaves and blow your hair around. Lets understand the science behind it.

What You Need:

- Glass jar
- Lit candle

What You Do:

1. Have your child place the jar on a tabletop.
2. About ten inches behind the jar, place a short (4-inches tall or so) candle upright, and light it. The flame should be entirely centered behind the jar—not over to the side, and not taller than the jar.
3. Invite your child to make a scientific guess—a hypothesis—about this candle. If your child blows hard on the jar, not the candle, will anything happen? Will the candle flame stay the same?
4. Now ask your child to blow hard on the jar on the opposite side of the candle—so that the jar is directly in front of her with the candle directly behind it.
5. What happens when she blows on the jar? The candle should go out immediately! (If it doesn't, move it a little bit forward so it's closer to the back of the jar). How did this happen? Did the air travel through the jar? Ask your child what she thinks. What happened was that the air separated when it hit the sides of the jar and flowed around its curves to come together again and form a stream that hit the candle. Sure, you couldn't see it, but it happened!

When air comes into contact with objects, it flows around the contours of the object it hits, creating forces that can lift kites and blow out candles. In fact, the same property is what make flying a plane possible! This experiment will not only amaze your child, but it will also get her interested in learning some basic physics concepts regarding the important properties of air.

Point to ponder.

Air is mixture of gasses, without it life is impossible .What do you think what the percentage of different gasses constituting air.

Making Rain Activity

Rain, rain, go away"… but not yet! Help your budding scientist observe one of nature's most intriguing phenomena and make rain by recreating the water cycle in a bag. This experiment lets young learners explore the water cycle long before they can define the words precipitation, evaporation, and condensation. They'll delight in watching the "clouds" form and "rain" fall in the bag. Be sure to connect what they see in the bag with what they see in nature!

What You Need:

- Zip-top sandwich bag
- Half cup of dirt (potting soil, backyard dirt, etc.)
- Plant mister
- Tape
- Window

What You Do:

1. Ask your child to spoon the dirt into the sandwich bag.
2. Let your child generously "mist" the dirt inside the bag. The dirt needs to be moist, but not muddy.
3. Help your youngster zip the bag tightly shut.
4. Tape the bag in a sunny window.
5. Observe!

What's Going On?

Watch the bag! It will become cloudy as the moisture evaporates and forms a foggy cloud inside the bag. Depending upon your specific conditions (where the window is, how much sunlight is available, outside temperature at the window) this could take two to three hours, or could take overnight. Once the "cloud" inside the bag can hold no more moisture, your child will notice "rain" coming down the inside walls of the bag. Open and gently mist the bag again, tape to the window, and watch the whole cycle repeat itself.

Observing and predicting are two key skills that help your child become a more focused thinker. Extend his or her thinking by preparing several bags and taping them to windows on opposite sides of the house. Also, let your child predict and then observe what happens when more or less moisture is misted into a bag.

Germ Science: Why Hand washing Matters Activity

Kindergarten kids need to build this healthy habit, but we all know that it can be a big power struggle. Children believe that if their hands look clean, they are clean. Use this very visual activity to help children understand the power of germs and the importance of hand washing. It's also a great way to introduce your kid to the art of scientific inquiry.

What You Need:

- Two or more slices of wheat or dark bread. (White bread takes longer to grow mold because it has so many preservatives in it, unless, of course, it's homemade!)
- Zippered sandwich bag for each slice of bread
- Tongs
- Permanent marker
- Plant mister

What You Do:

1. Set it up. This works best if you and your child set up the experiment after a trip to the playground (or other similarly dirt-laden fun) and before he or she washes hands.
2. Ask your child to "wipe" off his or her hands to get rid of visible dirt. (Most children believe this is clean enough!)
3. Help your child use the permanent marker to label two sandwich bags: "Touched" and "Not Touched."
4. Let your child use the tongs to remove a slice of bread from the wrapped loaf and place in the sandwich bag marked "Not touched."
5. Let your child take another slice of bread and rub his or her hands thoroughly on both sides of the bread. He or she should put this slice into the bag labeled "Touched." Before zipping the bag, allow your child to give one to two gentle mists of water into each bag. Zip the bags and tape or place on a shelf, in a closet, or inside a cupboard. Check the bags every few days. Which one grows the most mold first?

What's Going On? Mold will grow on both slices, but much sooner and more abundantly on the "Touched" slice. Help your child understand that the germs that he or she did not see on the "wiped-off" hands became food for the mold. We certainly wouldn't want to eat those germs, would we? Best to wash them off before we handle food! Teach your child to sing following song while scrubbing hands at the sink. It will keep them scrubbing long enough to get the germs off!

The Hand washing Song *(To the Tune of Frere Jacques)*

Over, under

Over, under

Scrub between

Scrub between

Rinse the tops and bottoms

Rinse the tops and bottoms

Hands are clean!

Hands are clean!

Volcano Project

Your child will be hooked on chemistry after she builds a model volcano by combining an acid and an alkaline substance. For extra fun, use red clay around the volcano's opening to simulate lava. Caution! Wear your safety goggles—you don't want to get the "lava" in your eyes.

What You Need:

- 1 tablespoon baking soda
- Modeling clay (like Plasticine)
- Newspaper
- 3 drops red food dye (optional)
- ¼ cup of vinegar
- 3 drops liquid soap
- Safety goggles

What You Do:

1. Have your child help you cover your work surface with newspaper.
2. Invite her to form a volcano shape out of the modeling clay. It should be about 6 inches high.
3. If you have red modeling clay or paint available, use it for the volcano's top. Ask her to attach a bit to the tip of the volcano to enhance its appearance.
4. Invite her to poke an opening in the volcano that's about 4 inches deep and 2 inches wide.
5. Add one tablespoon of fresh baking soda. (Stale soda will not create a proper alkaline reaction!) If available, add 3 drops of red food coloring to the baking soda in order to enhance the eruption.
6. Next, ask her to add 3 drops of liquid soap.
7. Now, it's time for her to put on her safety goggles! Get ready to stand back.
8. Finally, invite her to add the ¼ cup of vinegar, and see what happens! The reaction's sure to pique her interest in the science behind this volcanic activity.

What Happened?

The volcano "erupted" when the acidic vinegar came into contact with the alkaline baking soda, which neutralized it. The volcano then emitted carbon dioxide, which created the bubbles and popping noises.

An alkali, or base, will corrode surfaces. When combined with an acid, it forms a salt. Acids and alkalis are measured by the pH scale, with acids ranging between one and six, and alkalis ranging from eight to 14. Seven on the pH scale is pure water, which is devoid of either acidity or alkalinity.

Point to ponder.

What is the difference between lava and magma? Magma is underground liquid rock. As soon as magma shoots out of a volcano, it's called lava!

Use a Balloon to Amplify Sound

Small sounds can still make a big noise when you use a good sound conductor. Experiment with a balloon, compressed air and your own ears to find out how it works and the science behind it.

What you'll need:

- Balloon

Instructions:

1. Blow up the balloon.
2. Hold the balloon close to your ear while you tap lightly on the other side.

What's happening?

Despite you only tapping lightly on the balloon your ears can hear the noise loudly. When you blew up the balloon you forced the air molecules inside the balloon closer to each other. Because the air molecules inside the balloon are closer together, they become a better conductor of sound waves than the ordinary air around you.

Make a Ping Pong Ball Float

Can you control a ping pong ball as it floats above a hair dryer? Put your hand-eye coordination skills to the test while learning the important role that forces such as gravity and air pressure play in this simple experiment for kids.

What you'll need:

- At least 1 ping pong ball (2 or 3 would be great)
- A hair dryer

Instructions:

1. Plug in the hair dryer and turn it on.
2. Put it on the highest setting and point it straight up.
3. Place your ping pong ball above the hair dryer and watch what happens.

What's happening?

Your ping pong ball floats gently above the hair dryer without shifting sideways or flying across the other side of the room. The airflow from the hair dryer pushes the ping pong ball upwards until its upward force equals the force of gravity pushing down on it. When it reaches this point it gently bounces around, floating where the upward and downward forces are equal.

The reason the ping pong ball stays nicely inside the column of air produced by the hair dryer without shifting sideways is due to air pressure. The fast moving air from the hair dryer creates a column of lower air pressure, the surrounding higher air pressure forces the ping pong ball to stay inside this column, making it easy to move the hair dryer around without losing control of the ping pong ball.

Make an Easy Lava Lamp

Learn how to make an easy lava lamp with this fun science experiment for kids. Use simple household items such as vegetable oil, food coloring, Alka-Seltzer and a bottle to create chemical reactions and funky balls of color that move around like a real lava lamp.

What you'll need:

- Water
- A clear plastic bottle
- Vegetable oil
- Food coloring
- Alka-Seltzer (or other tablets that fizz)

Instructions:

1. Pour water into the plastic bottle until it is around one quarter full (you might want to use a funnel when filling the bottle so you don't spill anything).
2. Pour in vegetable oil until the bottle is nearly full.
3. Wait until the oil and water have separated.
4. Add around a dozen drops of food coloring to the bottle (choose any color you like).
5. Watch as the food coloring falls through the oil and mixes with the water.
6. Cut an Alka-Seltzer tablet into smaller pieces (around 5 or 6) and drop one of them into the bottle, things should start getting a little crazy, just like a real lava lamp!
7. When the bubbling stops, add another piece of Alka-Seltzer and enjoy the show!

What's happening?

If you've tried our oil and water experiment you'll know that the two don't mix very well. The oil and water you added to the bottle separate from each other, with oil on top because it has a lower density than water. The food coloring falls through the oil and mixes with the water at the bottom. The piece of Alka-Seltzer tablet you drop in after releases small bubbles of carbon dioxide gas that rise to the top and take some of the colored water along for the ride. The gas escapes when it reaches the top and the colored water falls back down. The reason Alka-Seltzer fizzes in such a way is because it contains citric acid and baking soda (sodium bicarbonate), the two react with water to form sodium citrate and carbon dioxide gas (those are the bubbles that carry the colored water to the top of the bottle).

Adding more Alka-Seltzer to the bottle keeps the reaction going so you can enjoy your funky lava lamp for longer. If you want to show someone later you can simply screw on a bottle cap and add more Alka-Seltzer when you need to. When you've finished all your Alka-Seltzer, you can take the experiment a step further by tightly screwing on a bottle cap and tipping the bottle back and forth, what happens then?

Design and Test a Parachute

Learn about air resistance while making an awesome parachute! Design one that can fall slowly to the ground before putting it to the test, making modifications as you go.

What you'll need:

- A plastic bag or light material
- Scissors
- String
- A small object to act as the weight, a little action figure would be perfect

Instructions:

1. Cut out a large square from your plastic bag or material.
2. Trim the edges so it looks like an octagon (an eight sided shape).
3. Cut a small whole near the edge of each side.
4. Attach 8 pieces of string of the same length to each of the holes.

5. Tie the pieces of string to the object you are using as a weight.
6. Use a chair or find a high spot to drop your parachute and test how well it worked, remember that you want it to drop as slow as possible.

What's happening?

Hopefully your parachute will descend slowly to the ground, giving your weight a comfortable landing. When you release the parachute the weight pulls down on the strings and opens up a large surface area of material that uses air resistance to slow it down. The larger the surface area the more air resistance and the slower the parachute will drop.

Cutting a small hole in the middle of the parachute will allow air to slowly pass through it rather than spilling out over one side, this should help the parachute fall straighter.

Blowing Up Balloons with CO_2

Chemical reactions make for some great experiments. Make use of the carbon dioxide given off by a baking soda and lemon juice reaction by funneling the gas through a soft drink bottle and in to your awaiting balloon!

What you'll need:

- Balloon
- About 40 ml of water (a cup is about 250 ml so you don't need much)
- Soft drink bottle
- Drinking straw
- Juice from a lemon
- 1 teaspoon of baking soda

Instructions:

1. Before you begin, make sure that you stretch out the balloon to make it as easy as possible to inflate.
2. Pour the 40 ml of water into the soft drink bottle.
3. Add the teaspoon of baking soda and stir it around with the straw until it has dissolved.
4. Pour the lemon juice in and quickly put the stretched balloon over the mouth of the bottle.

What's happening?

If all goes well then your balloon should inflate! Adding the lemon juice to the baking soda creates a chemical reaction. The baking soda is a base, while the lemon juice is an acid, when the two combine they create carbon dioxide (CO2). The gas rises up and escapes through the soft drink bottle, it doesn't however escape the balloon, pushing it outwards and blowing it up. If you don't have any lemons then you can substitute the lemon juice for vinegar.

Make a Tornado in a Bottle

Learn how to make a tornado in a bottle with this fun science experiment for kids. Using easy to find items such as dish washing liquid, water, glitter and a bottle you can make your own mini tornado that's a lot safer than one you might see on the weather channel. Follow the instructions and enjoy the cool water vortex you create!

What you'll need:

- Water
- A clear plastic bottle with a cap (that won't leak)
- Glitter
- Dish washing liquid

Instructions:

1. Fill the plastic bottle with water until it reaches around three quarters full.
2. Add a few drops of dish washing liquid.
3. Sprinkle in a few pinches of glitter (this will make your tornado easier to see).
4. Put the cap on tightly.
5. Turn the bottle upside down and hold it by the neck. Quickly spin the bottle in a circular motion for a few seconds, stop and look inside to see if you can see a mini tornado forming in the water. You might need to try it a few times before you get it working properly.

What's happening?

Spinning the bottle in a circular motion creates a water vortex that looks like a mini tornado. The water is rapidly spinning around the center of the vortex due to centripetal force (an inward force directing an object or fluid such as water towards the center of its circular path). Vortexes found in nature include tornadoes, hurricanes and waterspouts (a tornado that forms over water).

What Absorbs More Heat?

When you're out in the sun on a hot summer's day it pays to wear some light colored clothes, but why is that? Experiment with light, color, heat and some water to find out.

What you'll need:

- 2 identical drinking glasses or jars
- Water
- Thermometer
- 2 elastic bands or some cello tape
- White paper
- Black paper

Instructions:

1. Wrap the white paper around one of the glasses using an elastic band or cello tape to hold it on.
2. Do the same with the black paper and the other glass.
3. Fill the glasses with the exact same amount of water.
4. Leave the glasses out in the sun for a couple of hours before returning to measure the temperature of the water in each.

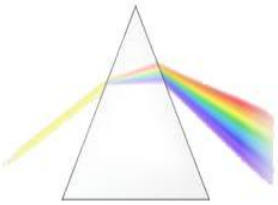
What's happening?

Dark surfaces such as the black paper absorb more light and heat than the lighter ones such as the white paper. After measuring the temperatures of the water, the glass with the black paper around it should be hotter than the other. Lighter surfaces reflect more light, that's why people where lighter colored clothes in the summer, it keeps them cooler.

Point to ponder.

Why do wear woolen clothes in winter and cotton clothes in summer ?

Make Your Own Rainbow



Learn how to make a rainbow with this fun science experiment for kids. Using just a few simple everyday items you can find out how rainbows work while enjoying an interactive, hands on activity that's perfect for kids.

What you'll need:

- A glass of water (about three quarters full)
- White paper
- A sunny day

Instructions:

1. Take the glass of water and paper to a part of the room with sunlight (near a window is good).
2. Hold the glass of water (being careful not to spill it) above the paper and watch as sunlight passes through the glass of water, refracts (bends) and forms a rainbow of colors on your sheet of paper.
3. Try holding the glass of water at different heights and angles to see if it has a different effect.

What's happening?

While you normally see a rainbow as an arc of color in the sky, they can also form in other situations. You may have seen a rainbow in a water fountain or in the mist of a waterfall and you can even make your own such as you did in this experiment.

Rainbows form in the sky when sunlight refracts (bends) as it passes through raindrops, it acts in the same way when it passes through your glass of water. The sunlight refracts, separating it into the colors red, orange, yellow, green, blue, indigo and violet.

Bending Water with Static

Try bending water with static electricity produced by combing your hair or rubbing it with an inflated balloon, can it really be done?

What you'll need:

- A plastic comb (or an inflated balloon)
- A narrow stream of water from a tap
- Dry hair

Instructions:

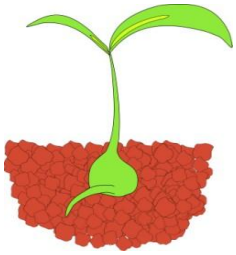
1. Turn on the water so it is falling from the tap in a narrow stream (just a few millimeters across but not droplets).
2. Run the comb through your hair just as you normally would when brushing it (do this around 10 times). If you are using a balloon then rub it back and forth against your hair for a few seconds.
3. Slowly move the comb or balloon towards the stream of water (without touching it) while watching closely to see what happens.

What's happening?

The static electricity you built up by combing your hair or rubbing it against the balloon attracts the stream of water, bending it towards the comb or balloon like magic!

Negatively charged particles called electrons jump from your hair to the comb as they rub together, the comb now has extra electrons and is negatively charged. The water features both positive and negatively charged particles and is neutral. Positive and negative charges are attracted to each other so when you move the negatively charged comb (or balloon) towards the stream, it attracts the water's positively charged particles and the stream bends!

Plant Seeds & Watch Them Grow



Learn about seed germination with this fun science experiment for kids. Plant some seeds and follow the growth of the seedlings as they sprout from the soil while making sure to take proper care of them with just the right amount of light, heat and water. Have fun growing plants with this cool science project for children.

What you'll need:

- Fresh seeds of your choice such as pumpkins seeds, sunflower seeds, lima beans or pinto beans.
- Good quality soil (loose, aerated, lots of peat moss), if you don't have any you can buy some potting soil at your local garden store.
- A container to hold the soil and your seeds.
- Water.
- Light and heat.

Instructions:

1. Fill the container with soil.
2. Plant the seeds inside the soil.
3. Place the container somewhere warm, sunlight is good but try to avoid too much direct sunlight, a window sill is a good spot.
4. Keep the soil moist by watering it every day (be careful not to use too much water).
5. Record your observations as the seeds germinate and seedlings begin to sprout from the seeds.

What's happening?

Hopefully after a week of looking after them, your seedlings will be on their way. Germination is the process of a plant emerging from a seed and beginning to grow. For seedlings to grow properly from a seed they need the right conditions. Water and oxygen are required for seeds to germinate. Many seeds germinate at a temperature just above normal room temperature but others respond better to warmer temperatures, cooler temperatures or even changes in temperature. While light can be an important trigger for germination, some seeds actually need darkness to germinate, if you buy seeds it should mention the requirements for that specific type of seed in the instructions.

Continue to look after your seedlings and monitor their growth. For further experiments you could compare the growth rates of different types of seeds or the effect of different conditions on their growth.

Create an Ocean in a Bottle Activity

Watching the waves move back and forth, splashing and tumbling shells along the beach, can be mesmerizing. The natural sway of the water is soothing and exciting at the same time. Waves are energy in motion. The tides are caused by the pull of the moon's gravity on the earth's water as the earth turns.

Every person who has walked along the beach wonders: what will wash up on the shore with the next wave? This activity creates an ocean in a jar complete with waves, and will leave your child entranced with the magic of the ocean.

What You Need:

- Glass bottle or jar
- Hot glue gun
- Water
- Vegetable oil
- Blue food coloring
- Sand
- Seashells

What You Do:

1. Make sure your jar is washed out and clean. Help your child spoon some sand into the jar.
2. Add water until ½ full. Add 1 drop of blue food coloring or more until you get a color you like.
3. Have your child add a few shells to your "ocean."
4. Add vegetable oil until almost full. Leave a small space for air at the top.
5. Taking over duties, use the hot glue gun and put glue around the lid and then place the lid on the bottle.

Turn your ocean on its side and watch the waves go back and forth. Watch the sand gently move as the waves go by. Shake up the bottle. What happens to the sand? What happens to the shells? Does all the sand move as the waves move or just a little at a time? Your ocean in a jar is too small to mimic the tidal patterns of the real ocean but will offer a great opportunity to see the effects of energy in motion.

Static Electricity Experiment

They say opposites attract and that couldn't be truer with these fun static electricity experiments. Find out about positively and negatively charged particles using a few basic items, can you control if they will be attracted or unattracted to each other?

What you'll need:

- 2 inflated balloons with string attached
- Your hair
- Aluminum can
- Woolen fabric

Instructions:

1. Rub the 2 balloons one by one against the woolen fabric, then try moving the balloons together, do they want to or are they un attracted to each other?
2. Rub 1 of the balloons back and forth on your hair then slowly it pull it away, ask someone nearby what they can see or if there's nobody else around try looking in a mirror.
3. Put the aluminium can on its side on a table, after rubbing the balloon on your hair again hold the balloon close to the can and watch as it rolls towards it, slowly move the balloon away from the can and it will follow.

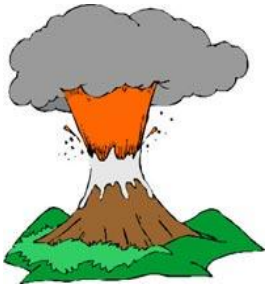
What's happening?

Rubbing the balloons against the woolen fabric or your hair creates static electricity. This involves negatively charged particles (electrons) jumping to positively charged objects. When you rub the balloons against your hair or the fabric they become negatively charged, they have taken some of the electrons from the hair/fabric and left them positively charged.

They say opposites attract and that is certainly the case in these experiments, your positively charged hair is attracted to the negatively charged balloon and starts to rise up to meet it. This is similar to the aluminum can which is drawn to the negatively charged balloon as the area near it becomes positively charged, once again opposites attract.

In the first experiment both the balloons were negatively charged after rubbing them against the woolen fabric, because of this they were unattracted to each other.

Make Glowing Water



Make glowing water with the help of a black light in this fun science experiment for kids.

Tonic water doesn't look very strange under normal light but what happens when you look at it under a black light? Does the dye from a highlighter pen do the same thing? Find out what happens and why it happens with this cool experiment that you can do at home.

What you'll need:

- A black light (you can find them at places like Walmart and hardware stores, as well as online stores like Amazon).
- Tonic water or a highlighter pen.
- A dark room to do the experiment.

Instructions:

1. If you are using a highlighter pen carefully break it open, remove the felt and soak it in a small amount of water for a few minutes.
2. Find a dark room.
3. Turn on the black light near your water, how does it look.

What's happening?

Simple explanation:

The ultra violet (UV) light coming from your black light lamp excites things called phosphors. Tonic water and the dye from highlighter pens contain phosphors that turn UV light (light we can't see) into visible light (light we can see). That's why your water glows in the dark when you shine a black light on it.

Black lights are used in forensic science, artistic performances, photography, authentication of banknotes and antiques, and in many other areas.

Detailed explanation:

Black light (also known as UV or ultra violet light) is a part of the electromagnetic spectrum. The electromagnetic spectrum also includes infrared, X-rays, visible light (what the human eye can see) and other types of electromagnetic radiation. A black light lamp such as the one you used emits a UV light that can illuminate objects and materials that contain phosphors. Phosphors are special substances that emit light (luminescence) when excited by radiation. Your water glowed under the black light because it contained phosphors. If you used a highlighter pen then the UV light reacted with phosphors in the dye. If you used tonic water then the UV light reacted with phosphors in a chemical used in tonic water called quinine.

Point to ponder.

What are different types of luminescence?

Mixing Oil and Water

Some things just don't get along well with each other. Take oil and water as an example, you can mix them together and shake as hard as you like but they'll never become friends.....or will they? Take this fun experiment a step further and find out how bringing oil and water together can help you do your dishes.

What you'll need:

- Small soft drink bottle
- Water
- Food colouring
- 2 tablespoons of cooking oil
- Dish washing liquid or detergent

Instructions:

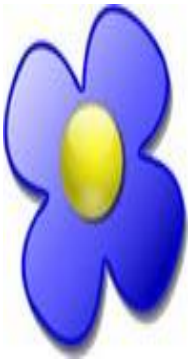
1. Add a few drops of food colouring to the water.
2. Pour about 2 tablespoons of the coloured water along with the 2 tablespoons of cooking oil into the small soft drink bottle.
3. Screw the lid on tight and shake the bottle as hard as you can.
4. Put the bottle back down and have a look, it may have seemed as though the liquids were mixing together but the oil will float back to the top.

What's happening?

While water often mixes with other liquids to form solutions, oil and water does not. Water molecules are strongly attracted to each other, this is the same for oil, because they are more attracted to their own molecules they just don't mix together. They separate and the oil floats above the water because it has a lower density.

If you really think oil and water belong together then try adding some dish washing liquid or detergent. Detergent is attracted to both water and oil helping them all join together and form something called an emulsion. This is extra handy when washing those greasy dishes, the detergent takes the oil and grime off the plates and into the water.

Relax with Beautiful Bath Salts



Whether you're making a special present for someone else, experimenting at home or just want to relax in a hot bath, give this experiment a go. Create your own bath salts with a variety of refreshing fragrances, experiment with different essential oils to see which you like best.

What you'll need:

- 1 cup of washing soda
- A plastic bag
- A rolling pin (or something similar that can crush lumps)
- A bowl
- A spoon for stirring
- Essential oil
- Food coloring

Instructions:

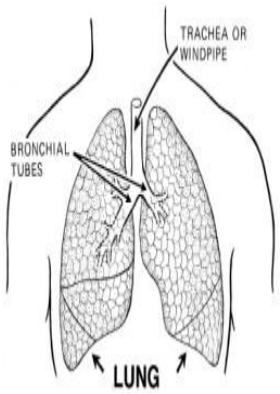
1. Take the cup of washing soda and put it into a plastic bag. Crush the lumps with a rolling pin or similar object.
2. Empty the bag into a bowl and stir in 5 or 6 drops of your favorite essential oil such as rosemary, lavender or mint.

3. Stir in a few drops of food coloring until the mixture is evenly colored.
4. Put the mixture into clean dry containers and enjoy as you please.

What's happening?

Bath Salts are typically made from Epsom salts (magnesium sulfate), table salt (sodium chloride) or washing soda (sodium carbonate). The chemical make up of the mixture makes it easy to form a lather. Bath salts are said to improve cleaning and deliver an appealing fragrance when bathing

What is Your Lung Volume?



Do you think you're fit and healthy? Let's test your lung volume to find out. Just how much air can your lungs can hold? With the help of a few simple household objects, some scientific know how and a dash of curiosity you can make this experiment look easy.

What you'll need:

- Clean plastic tubing
- A large plastic bottle
- Water
- Kitchen sink or large water basin

Instructions:

1. Make sure the plastic tubing is clean
2. Put about 10cm of water into your kitchen sink.
3. Fill the plastic bottle right to the top with water.
4. Put your hand over the top of the bottle to stop water escaping when you turn it upside down.
5. Turn the bottle upside down. Place the top of the bottle under the water in the sink before removing your hand.
6. Push one end of the plastic tube into the bottle.
7. Take a big breath in.
8. Breathe out as much air as you can through the tube.
9. Measure the volume of air your lungs had in them.
10. Make sure you clean up the area to finish.

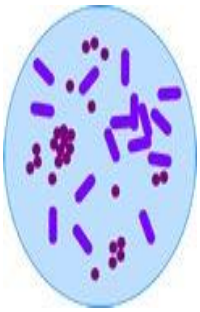
What's happening?

As you breathe out through the tube, the air from your lungs takes the place of the water in the bottle. If you made sure you took a big breath in and breathed out fully then the resulting volume of water you pushed out is equivalent to how much air your lungs can hold. Having a big air capacity in your lungs means you can distribute oxygen around your body at a faster rate. The air capacity of lungs (or VO2 max) increases naturally as children grow up but can also be increased with regular exercise.

Point to ponder.

How the exchanges of different gasses occur in lungs?

Microscopic Creatures in Water



Water can be home to a lot of interesting creatures and microorganisms, especially if its dirty water found in ponds or near plants. Take some samples, view them under a microscope and see what you can find. How clean is the water from your tap compared to the water found in a pond? Experiment and see what kind of microscopic creatures you can find!

What you'll need:

- A concave slide
- A dropper
- A microscope
- Different samples of water (tap water, pond water, muddy water etc). Near plants or in the mud are good places to take samples as they usually contain more microorganisms.

Instructions:

1. Set up you microscope, preferably using its highest setting.
2. Use the dropper to take some water from one of your samples and put it on the concave slide. Focus the microscope, what can you see? Be patient if you can't see anything. If you still can't see anything and have checked that you are in focus, try a different water sample.
3. Look at how the creatures move. After observing their movements you might like to record their behaviors and draw them.

What are you looking at?

Some of the creatures and microorganisms you might be able to see include:

- Euglenas - These are between a plant and an animal, they have a long tail called a flagellum which allows them to move.
- Protozoa - They have a flagella (tail) which can be hard to see, the difference between protozoa and algae is often hard to define.
- Amoebas - These microorganisms swim by wobbling. They also surround their food like a blob in order to eat it.
- Algae - Not considered to be plants by most scientists, these organisms might be colored yellowish, greenish or reddish. They may also be found by themselves or in chains.
- There might even my larger creatures such as worms or brine shrimp in your water samples, depending on where you took them from.

Point to ponder

What do you think about virus .How they are different from bacteria ?

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