GROSSOLOGY

Family Science Night 2GO

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BONE BRIDGES

MATERIALS:
- COTTON SWABS
- MINI CLOTHESPINS
- RUBBER BANDS
- PIPE CLEANERS

CHALLENGE
- Use the materials provided to build your own bone bridge
- Be as creative as possible!

FUN BONE FACTS
- Your skeleton is made of more than 200 bones
- Bones are filled with a spongy tissue
- Babies are born with 300 bones
- The smallest bone in your body is in your ear
- The longest bone in your body is in your leg
- More than half of your bones are in your hands and feet
- Most people have 12 ribs, but some have 13
- The biggest joint in your body is your knee
- Bones are natural healers
- You can eat your way to stronger bones
BUBBLING WITCH’S BREW

MATERIALS:
- LARGE CONTAINER
- SMALL CONTAINER
- LARGE TRAY OR PAPER PLATE
- ½ CUP OF GLUE
- 5 TBSP OF BAKING SODA
- ¼ CUP OF VINEGAR
- FOOD COLORING
- 2 TSP OF CONTACT-LENS SOLUTION OR SALINE SOLUTION THAT CONTAINS BORIC ACID AND SODIUM BORATE
- STIRRING SPOON/SPATULA

PROCEDURES:
1. MIX THE GLUE AND 2 TBSP OF BAKING SODA IN THE LARGE CONTAINER.
2. ADD FOOD COLORING TO THE VINEGAR AND MIX WITH THE CONTACT-LENS SOLUTION IN THE SMALL CONTAINER.
3. PLACE BOTH CONTAINERS INTO THE TRAY OR PAPER PLATE. POUR THE VINEGAR SOLUTION INTO THE GLUE MIXTURE AND STIR A FEW TIMES. THE CONCOPTION WILL BUBBLE AS THE BAKING SODA REACTS WITH THE VINEGAR.
4. WHEN THE BUBBLING STOPS, MIX THE REST OF THE BAKING SODA INTO THE SLIME TO MAKE IT EASIER TO HANDLE.

THE SCIENCE BEHIND THE FUN

EYEBALL CATAPULTS

MATERIALS
❖ 9 CRAFT STICKS
❖ 6 RUBBER BANDS
❖ PLASTIC SPOON
❖ EYEBALL

PROCEDURES
1. Stack 7 craft sticks on top of each other and bind them together with the rubber bands. This will act as a base.
2. Stack the remaining 2 sticks and bind them with a single rubber band on the very edge of one end.
3. Next, pry open the 2 sticks to make a “V” shape. Place the bundle of 7 sticks at the very bottom of the “V” shape and secure it in a cross fashion to join the two pieces together. The closer the 7 stick bundle gets to the edge, the more leverage the catapult will have.
4. Use a few rubber bands to attach the plastic spoon on the end of the top craft stick.

THE SCIENCE BEHIND IT
A simple machine is a mechanical device used to change the direction or magnitude of a force. The catapult is an example of a lever type simple machine in which a beam or arm pivots at a fixed point called the fulcrum. In the catapult we built, as we pressed down on the arm, tension was building and energy was being stored. Energy that is stored when a material is compressed (think of a spring) or stretched (a slingshot) is called elastic energy. When you release the arm of the catapult, the elastic energy is converted into kinetic energy – the energy of motion. When you place an object like the eyeball on the spoon, the eyeball will move at the same speed as the arm and the bucket. When the arm stops, the eyeball continues to move forward due to Newton’s first law, which states that an object in motion, stays in motion. The eyeball becomes airborne. Gravity pulls the eyeball back toward the ground, giving the eyeball its trajectory, or path.
FRANKENWORMS

MATERIALS:
- GUMMY WORMS
- 3 TBSP BAKING SODA
- K NIFE
- 2 CUPS
- 1 CUP OF VINEGAR
- 1 CUP OF WARM WATER

PROCEDURES:
1. Cut the worms vertically into fourths with the knife.
2. In one cup, mix together baking soda and about a cup of warm water. Add the gummy worms and soak for 15 minutes.
3. In the second cup, pour the vinegar and using a fork take out one or two worms and drop them into the cup.
4. Watch the worms come to life!

WHAT IS HAPPENING?
Your worms should start to float and move as the vinegar (acetic acid) reacts with the baking soda (sodium bicarbonate) to form carbon dioxide gas bubbles on the worms. They look like they’re alive and will wiggle until the chemical reaction stops!
GOBLIN SNOT

MATERIALS:
❖ 4 OZ SCHOOL GLUE
❖ 1/4 LIQUID STARCH
❖ 5~10 DROPS OF FOOD COLORING
❖ 1/2 CUP OF WATER
❖ BOWL

PROCEDURES:
1. DUMP YOUR GLUE INTO A BOWL.
2. POUR 1/2 CUP OF WATER IN THE BOWL AND MIX UNTIL THE GLUE IS WATERY.
3. ADD THE LIQUID STARCH AND CONTINUE TO STIR AS THE MIXTURE THICKENS. THE SNOT SHOULD BE SUPER STRINGY, AND SLIMEY.

HOW DOES IT WORK?
WHY DON'T THE PEPPER FLAKES SINK OR DISSOLVE IN THE WATER? PEPPER IS HYDROPHOBIC MEANING THAT WATER IS NOT ATTRACTED TO IT. BECAUSE OF THAT, THE PEPPER CAN'T DISSOLVE IN THE WATER. BUT WHY DO THE FLAKES FLOAT ON TOP OF THE WATER? WATER MOLECULES LIKE TO STICK TOGETHER. THEY LINE UP IN A CERTAIN WAY THAT GIVES THE TOP OF THE WATER SURFACE TENSION. BECAUSE PEPPER FLAKES ARE SO LIGHT, AND HYDROPHOBIC, THE SURFACE TENSION KEEPS THEM FLOATING ON TOP. THE NEXT QUESTION TO THINK ABOUT IS WHY THE PEPPER SHOOTS TO THE SIDES WHEN SOAP TOUCHES THE WATER. SOAP IS ABLE TO BREAK DOWN THE SURFACE TENSION OF WATER—that's part of what makes soap a good cleaner. AS THE SOAP MOVES INTO THE WATER, AND THE SURFACE TENSION CHANGES, THE PEPPER NO LONGER FLOATS ON TOP. BUT THE WATER MOLECULES STILL WANT TO KEEP THE SURFACE TENSION GOING, SO THEY PULL BACK AWAY FROM THE SOAP, AND CARRY THE PEPPER ALONG WITH THEM.
PUKING PUMPKINS

MATERIALS:
- PUMPKIN
- 1.5 OZ OF WARM WATER
- ½ TBSP SOAP
- 1 TBSP BAKING SODA
- 2 OZ VINEGAR
- CARVING UTENSILS
- CUP

PROCEDURES:
PLEASE NOTE: THERE ARE ENOUGH INDIVIDUALLY PACKAGED MATERIALS TO DO THIS ACTIVITY TWICE.

1. Have a parent help you carve out a simple face on the pumpkin.
2. In a cup, mix together the water, soap, and baking soda.
3. Pour mixture inside the pumpkin.
4. Add the vinegar to the mixture inside the pumpkin and watch what happens.

WHAT’S THE SCIENCE?
This puking pumpkin science eruption is called a chemical reaction. When the baking soda (base) and vinegar (acid) mix, they react. The reaction is a gas called carbon dioxide. Therefore, you can see the bubbling fizzing action the gas produces. The addition of the dish soap creates suds that make for a more dramatic appearance.
SPOOKY LAVA LAMP

MATERIALS:
- Plastic bottle
- 1 1/2 cup vegetable oil
- Food coloring
- Water
- Alka-Seltzer tablet

PROCEDURES:
1. Fill the plastic bottle 3/4 full with vegetable oil.
2. Pour a few drops of food coloring in the water and fill the rest of the plastic bottle with the colored water (almost to the top, but not overflowing).
3. Divide the Alka-Seltzer tablet into 8 pieces.
4. Drop one of the tiny pieces of Alka-Seltzer into the oil and water mixture. Watch what happens. When the bubbling stops, add another chunk of Alka-Seltzer.
5. When you have used up all of the Alka-Seltzer and the bubbling has completely stopped, screw on the soda bottle cap. Tip the bottle back and forth and watch the wave appear. The tiny droplets of liquid join together to make one big lava-like blob.

HOW DOES IT WORK?
The molecules of the water do not like to mix with the molecules of oil. Even if you try to shake up the bottle, the oil breaks up into small little drops, but the oil doesn’t mix with the water. Also, food coloring only mixes with water, it does not color the oil. When you pour the water into the bottle with the oil, the water sinks to the bottom and the oil floats to the top. Oil floats on the surface because water is heavier than oil. Scientists say that the water is denser than the oil. Here’s the surprising part... the Alka-Seltzer tablet reacts with the water to make tiny bubbles of carbon dioxide gas. These bubbles attach themselves to the blobs of colored water and cause them to float to the surface. When the bubbles pop, the color blobs sink back to the bottom of the bottle!
VAMPIRE SHOOTER

MATERIALS
- Black paper cup
- Black balloon
- Wing template
- Colored paper
- Stapler/staples
- Glue sticks
- Scissors
- Duct tape
- Googly eyes

PROCEDURES:

1. Have a parent help you by using a pair of sharp scissors to stab the bottom of the paper cup and then cut the bottom out.
2. Cut out the bat wings and staple them to the cup.
3. Use the paper to cut out teeth and glue them onto the cup. Stick the googly eyes onto your cup.
4. Knot the deflated balloon and cut off the upper third. Put the end with the knot over the bottom edge of the paper cup. You might need to duct tape the balloon onto the cup.
5. Put a pom-pom inside the cup and pull the balloon. Watch what happens.

NEWTON’S THIRD LAW OF MOTION

The third law says that for every action (force) there is an equal and opposite reaction (force). Forces are found in pairs. Think about the time you sit in a chair. Your body exerts a force downward and that chair needs to exert an equal force upward or the chair will collapse. It’s an issue of symmetry. Acting forces encounter other forces in the opposite direction. There’s also the example of shooting a cannonball. When the cannonball is fired through the air (by the explosion), the cannon is pushed backward. The force pushing the ball out was equal to the force pushing the cannon back, but the effect on the cannon is less noticeable because it has a much larger mass. That example is similar to the kick when a gun fires a bullet forward.
VANISHING GHOSTS

MATERIALS:
- Biodegradable packing peanuts
- Small bowl
- Hot water
- Wooden dowel

PROCEDURES:
1. Fill a small bowl with hot water.
2. Have the student place one ghost on top and watch what happens. You can use the dowel to hold down the ghost if needed.
3. You will start to see small bubbles appearing on the sides of the packing peanut ghost. The ghost will disappear right before your eyes!

Want to take it a bit further?
Have your student use a stopwatch to time how fast the ghosts dissolve in different temperatures of water.

WHY DO BIODEGRADABLE PACKING PEANUTS MELT?
These new packing peanuts are made out of biodegradable corn starch, which means they break down easily instead of just sitting in the garbage dump for years and years like the older style ones. The water helps break them down even faster.
WIZARDS POTION

MATERIALS:

- ¼ CUP LIQUID 40 VOLUME HYDROGEN PEROXIDE
- FOOD COLORING (OPTIONAL)
- 4 TBSP OF WARM WATER
- 1 PACKET OF YEAST PACKETS
- GRADUATED CYLINDER
- TRAY OR PLATE
- SMALL CUP
- A SQUIRT OF DISH SOAP

PROCEDURES:

Please note: The hydrogen peroxide used in this activity is higher than the normal grade peroxide. This experiment is messy, please make the proper accommodations before continuing.

1. Pour the hydrogen peroxide into the graduated cylinder. You can add food coloring at this point if you would like.
2. Add some dish soap to the peroxide and gently swirl the cylinder to mix the soap with the peroxide.
3. In a small cup, pour the yeast into the warm water and mix well.
4. Once the yeast and water are mixed well, pour into the peroxide mixture and see how quickly the reaction happens!

HOW IT WORKS:

Hydrogen peroxide ($H_2O_2$) is a reactive molecule that readily decomposes into water ($H_2O$) and oxygen: $2H_2O_2 \rightarrow 2H_2O + O_2(g)$

In this demonstration, yeast catalyzes the decomposition so it proceeds much more rapidly than normal. Yeast needs warm water to reproduce, so the reaction won’t work as well if you use cold water (no reaction) or very hot water (which kills the yeast). The dishwashing detergent captures the oxygen that is released, making foam. Food coloring can color the film of the bubbles so you get colored foam. In addition to being a nice example of a decomposition reaction and a catalyzed reaction, the wizard’s potion demo is exothermic, so heat is produced. However, the reaction just makes the solution warmer, not hot enough to cause burns.
**FLYING GHOST ROCKETS**

**MATERIALS:**
- EMPTY TEA BAGS
- LIGHTER OR MATCHES
- PLATE

**PROCEDURES:**
1. STAND THE EMPTY TEA BAG UPRIGHT. YOU MIGHT NEED TO USE THE PLATE FOR A SOLID BASE.
2. HAVE STUDENTS STAND BACK AS YOU LIGHT THE TEA BAG.
3. WATCH THE FLYING GHOST!

**HOW DOES THIS WORK?**

As the flame burns down the cylinder, it heats the air inside of the tea bag. When air’s temperature increases, so does its volume. Consequently, if the mass of air stays the same but the volume increases, the pressure will have to decrease, making the air less dense. Faster moving air molecules in the hot air will rise and the cooler air will settle beneath them. This flow of rising hot air within the cylinder creates a convection current of air, generating an upward force. At the same time, the tea bag’s mass keeps decreasing as it burns, and the ashen skeleton that remains is much less massive than the original tea bag. Once the flame has burned to the bottom, the convection current provides enough force to lift the remaining ash into the sky.