Dr. Flake-N-Stein's Magic Laboratory

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(Have an adult help you with these experiments.)

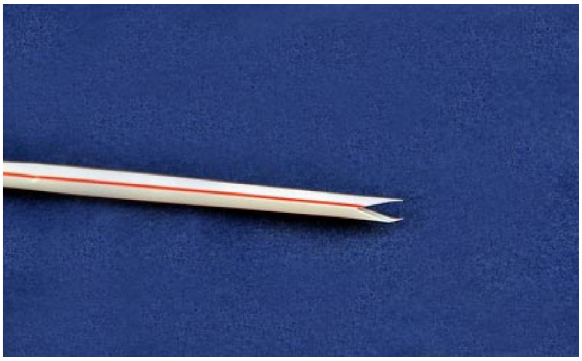
Screaming Balloon

What you need: a balloon, and a hex nut

1. Squeeze the hex nut through the mouth of the balloon. Make sure that the hex nut goes all the way into the balloon so that there is no danger of it being sucked out while blowing up the balloon.
2. Blow up the balloon, but be careful not to overinflate the balloon, as it will easily burst. Tie off the balloon and you're ready to go.
3. Grip the balloon at the stem end as you would a bowling ball. The neck of the balloon will be in your palm and your fingers and thumb will extend down the sides of the balloon.
4. While holding the balloon, palm down, swirl it in a circular motion. The hex nut may bounce around at first, but it will soon begin to roll around the inside of the balloon.
5. Once the hex nut begins to spin, use your other hand to stabilize the balloon. Your hex nut should continue to spin for 10 seconds or more.

How Does It Work?
This is actually a 2 for 1 experiment - you're learning about the science of motion and sound. The hex nut circles inside the balloon due to *centripetal* force. Centripetal force is the inward force on a body that causes it to move in a circular path. It is a "center-seeking" force. A hex nut has 6 sides, and these flat edges cause the hex nut to bounce or vibrate inside the balloon. The screaming sound is made by the sides of the hex nut vibrating against the inside wall of the balloon.

Musical Straw



What you need: a drinking straw, and scissors

1. Flatten the last inch of the straw with your teeth, making sure that you don't curl the end. Flatter is better, so really press down hard. Cut the corners off the straight, flattened end of the straw.
2. Now you're ready to make music! Place the cut end of the straw into your mouth, seal your lips around it, and blow until a "sound" is produced. You'll feel the entire straw

vibrate as the sound is made. Don't give up if you don't make music right away; you may need to re-position the straw and try it again. You've just made a "double reed" mouthpiece, similar to an oboe.

3. Cut small sections off the bottom of the straw while you're making the sound. Listen for changes in the pitch as you cut the straw shorter and shorter.

How Does It Work?
When adjusted properly, the flattened ends of the straw will vibrate as air flows over them. The vibration is passed on to the column of air inside the straw. This is just like the double reed on some woodwind instruments. The vibrating reed produces the oboe-like sound in the straw based on the length of the straw. By cutting off pieces of the straw, you alter the length of the air column and thus change the pitch. The English horn, oboe, and bassoon all use this same principle of vibration to make sound.

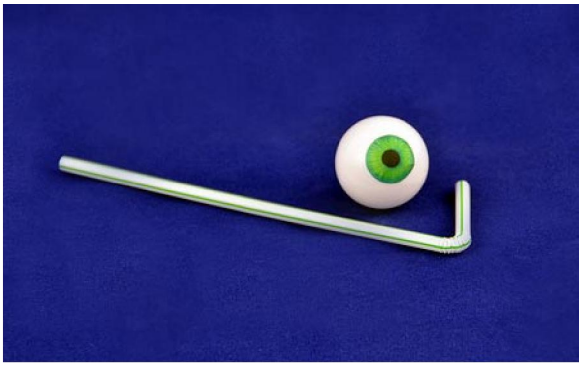
Lava Lamp

What you need: a clear plastic bottle with cap, vegetable oil, water, food coloring, Alka-Seltzer tablets, and a funnel

1. Fill the bottle 3/4 full with vegetable oil.
2. Fill the rest of the bottle with water (almost to the top but not overflowing).
3. Add 4-5 drops of food coloring.
4. Divide the Alka-Seltzer tablet into 4 pieces.
5. Drop one of the pieces of Alka-Seltzer into the oil and water mixture. Watch what happens. When the bubbling stops, add another quarter of Alka-Seltzer.
6. When you have used all of the Alka-Seltzer and the bubbling has completely stopped, secure the bottle cap.

How Does It Work?
Oil and water do not mix. If you try to shake up the bottle, the oil breaks up into small little drops, but the oil does not mix with the water. 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. Water is more dense than the oil. The Alka-Seltzer tablet reacts with the water to make carbon dioxide gas. These bubbles attach themselves to the colored water and cause them to float to the surface. When the bubbles pop, the color sinks back to the bottom of the bottle.

Floating Ping Pong Ball



What you need: a ping pong ball, and a bendable straw

1. Bend the straw into the shape of an “L”.
2. Balance the ping pong ball on top of the short end of the straw.
3. Blow through the long end of the straw.

How Does It Work?
The Floating Ping Pong Ball is a wonderful example of Bernoulli's Principle, the same principle that allows heavier-than-air objects, like airplanes, to fly.

Bernoulli, an 18th century Swiss mathematician, discovered something quite unusual about moving air. He found that the faster air flows over the surface of something, the less the air pushes on that surface. That means that the air pressure on the object is lower than average. The air from the straw, as you blow through it, produces the levitating ball phenomenon using Bernoulli's Principle. The fast air moving around the sides of the ball is at a lower pressure than the surrounding, stationary air. If you look closely, you'll see that the ball wobbles while it is levitating in midair. The ball is attempting to leave the area of low pressure, but the higher air pressure surrounding it forces it back into the low pressure area.