FIVE GHOSTLY STEAM EXPERIMENTS

MATERIALS:

- White Tissue Paper
- Scissors
- Alka Seltzer
- Water Bottle
- Clear Cup
- Styrofoam Cups
- Baking Soda
- Funnel
- White Balloons
- Film Canisters
- Water
- Black Sharpie
- White Paint
- Air Cannon
- Vinegar
- Spoon

VOCABULARY:

- Force
- Electricity
- Static Electricity
- Charge
- Electrons
- Positive
- Negative
- Attract
- Repel
- Neutral
- Hydrometeors
- Molecules
- Chemistry
- Physics
- Forces
- Matter
- Solid
- Liquid
- Gas
- Reaction
- Newton's Laws
- Inertia
- Mass
- Acceleration
- Gravity
- Physical Reaction
- Chemical Reaction
- Density
- Hydrophobic
- Air
- Bernoulli's Principle
- Aerodynamic
- Vortex
- Endothermic

DANCING GHOSTS DIRECTIONS:

1. Cut the tissue paper pieces into small shapes, such as hearts, stars, etc.
2. Lay the shapes on a flat surface, like a table.
3. Blow up the balloon and tie it closed.
4. Rub the balloon on your hair to build up a charge.
5. Hold the balloon near the tissue paper shapes. The shapes should move and try to cling to the balloon.

THE STEAM BEHIND THE EXPERIMENT:

Static electricity is an imbalance of electric charges within or on the surface of a material or between materials. The charge remains until it is able to move away by means of an electric current or electrical discharge. Static electricity is named in contrast with current electricity, where the electric charge flows through an electrical conductor or space, and transmits energy.

When you rub the balloon on your hair, electrons build up a negative charge on the balloon. These electrons can then pull light and positively charged objects!

Lightning is caused by a buildup of static electricity inside a storm cloud. Moving around inside the cloud are tiny water molecules called hydrometeors. These hydrometeors are colliding and bumping into each other—creating a static electric charge.

MAKE IT AWESOME:

Try making other objects move with the charged balloon, such as: other balloons, your hair, Styrofoam cups, etc.

BAKING SODA GHOST BALLOON DIRECTIONS:

1. Safety first! Put on your safety goggles!
2. Place your empty soda bottle on a table. You may want to put a tray or disposable tablecloth down as this experiment can be messy!
3. Draw a ghost face on your balloon with your black Sharpie.
4. Using your funnel, fill your bottle about ¼ full of vinegar.
5. Use your funnel to add baking soda to the white balloon. Fill it about half full.
6. Carefully stretch the open end of the balloon over the top of the open bottle.
7. Hold the bottle with one hand and carefully stand the balloon upright.
8. Gently shake the balloon so the baking soda falls into the soda bottle to mix with the vinegar. Keep the bottle still on the table.

9. Observe what happens when the baking soda and vinegar mix. Notice the temperature change that happens in the bottle as the reaction happens!
10. When the reaction is complete, you can remove the balloon to release the carbon dioxide gas and dispose of the bottle.

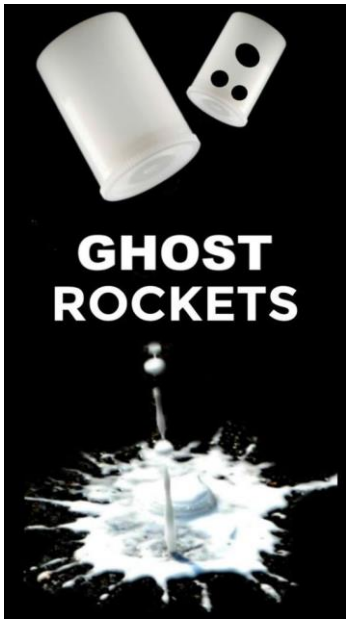
THE STEAM BEHIND THE EXPERIMENT:

This experiment is a great example of an acid-base reaction, a physical and chemical change, an endothermic reaction, and an experiment with the different states of matter! The baking soda is a base and vinegar is an acid. When they are mixed together they create carbon dioxide gas! A physical change is when you change the way something looks but don't actually change what it is. A chemical change is when you make something new and cannot go back to the original substance. The chemical change occurs in this experiment when the baking soda and vinegar mix to form carbon dioxide gas! You also work with the three states of matter: solid (baking soda), liquid (vinegar) and gas (carbon dioxide). Finally, the experiment is endothermic. This means it absorbs heat as the reaction happens and gets colder, which you can feel on the outside of the bottle.

MAKE IT AWESOME:

Make it bigger! Instead of using a small bottle, try using a 1 or 2-liter bottle. Or go even bigger! You can use a giant balloon and 5-gallon water jug! This means you will need to use more vinegar and baking soda to create an even BIGGER reaction!

GHOST ROCKET DIRECTIONS:



1. Safety first! Put on your safety goggles!
2. This is an outdoor experiment! Set up a table or launch the rockets right off the ground- but only do this outside!
3. Draw ghost faces on your film canisters using black Sharpie. Be sure you draw them so the face is upright when the film canister is flipped upside down.
4. Fill each of the five film canisters about ¼ full of the water.
5. Break up an Alka Seltzer tablet into small pieces.
6. Add a piece of Alka Seltzer to each film canister and quickly add the cap- make sure you hear it click!
7. Flip each canister over as you close it so they are all upside down on your launch surface.
8. Stand back and watch!

THE STEAM BEHIND THE EXPERIMENT:

As the antacid tablet fizzes, carbon dioxide is released inside the canister. Pressure from the gas builds and eventually pops the lid off. The thrust, or push, of your rocket is related to how much pressure built up inside the canister before the top popped off. This activity demonstrates Newton's Three Laws of Motion:

1. An object at rest will stay at rest, and an object in motion will stay in motion, until an unbalanced force acts upon it. (For this experiment, the rocket is not going to move by itself. We have to apply a force. In this case, we use pressure from carbon dioxide gas build up inside the rocket. The rocket does not stay in motion forever because of gravity and drag from air molecules).
2. Force = Mass x Acceleration. (For this experiment, the rocket does not have a lot of mass, so it does not take lot of force to move it. The more pressure that builds up, the more force is applied, and the higher or further the rocket will fly).
3. For every action, there is an equal and opposite reaction. (For this experiment, we flip the bottle upside down. When the pressure makes it pop, it pushes down, which makes the rocket go up!).

MAKE IT AWESOME:

You can also decorate a small cup to look like a ghost and place it over the film canister to see what happens.

GHOST LAVA LAMP DIRECTIONS:

1. Safety first! Put on your safety goggles!
2. Place your empty clear cup on a table. You may want to put a tray or disposable tablecloth down as this experiment can be messy!

3. Use the funnel to fill the bottle 1/3 full with water.
4. Add a few drops of white paint to the water. Swirl to mix them.
5. Draw a ghost face on a white balloon using the black Sharpie.
6. Use the funnel to fill the remaining 2/3 of the cup with clear baby oil. Leave about 1" empty at the top.
7. Break a tablet of Alka Seltzer into pieces. Do not ingest Alka Seltzer and have parent supervision as it is medicine.
8. Add the pieces of Alka Seltzer to the bottle one piece at a time.
9. Observe what happens when the Alka Seltzer and water mix. Notice the bubbles that rise through the liquids.

THE STEAM BEHIND THE EXPERIMENT:

This is a great example of a physical and chemical change, differences in density, the concept of hydrophobia, and an experiment with the different states of matter! A physical change is when you change the way something looks but don't actually change what it is. A chemical change is when you make something new and cannot go back to the original substance. In this experiment, the physical change occurs when you dye the water and the chemical change occurs when the water and Alka Seltzer mix and form carbon dioxide gas! You also work with the three states of matter: solid (Alka Seltzer), liquid (water and oil) and gas (carbon dioxide). Density is how much matter is packed into a space. Matter is anything that has mass and takes up space. Water and oil have different densities. This means they will not mix and the water will always sink below the oil forming two layers. The other reason the two liquids do not mix is that oil molecules are hydrophobic- meaning they are afraid of water and will not mix with them.

MAKE IT AWESOME:

Make it bigger! Instead of using a cup, try using a 16 oz. bottle or a 2-liter bottle. This means you can use more supplies to create an even BIGGER reaction! You can also turn out the lights and shine a flashlight through your lava lamp for a fun effect.

AIR CANNON DIRECTIONS:

1. Draw ghost faces on 6 Styrofoam cups using the black Sharpie.
2. Stack the Styrofoam Cups in a pyramid.
3. Stand back a few feet.
4. Pull back on the small handle of the air cannon with one hand while holding the large handle with the other hand.
5. Aim for the cups.
6. Release the small handle and knock the cups over.

THE STEAM BEHIND IT:

The air cannon is a way to 'see' air as it moves objects within its 'blast zone'. The air that shoots out of the cannon is in a vortex. A vortex is a spinning flow of fluid or gas. The air cannon works by quickly applying force to the air molecules inside the cup. When the plastic surface snaps forward it collides directly with the air molecules inside the cup, pushing and accelerating them toward the hole at the end of the cup. Bernoulli's principle states that as the speed of air increases, the pressure of that air decreases. With the air cannon, when you pull back and release the plastic covering, you force air out at a higher speed than the air around it.

MAKE IT AWESOME:

Try knocking a cup off a friend's head!

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