2017 Everyday Science

1. **Float the M&M Letter**s

   Needed: A packet of M&M candies, two bowls, warm tap water, cool tap water.

   What to do: Pour about 6 cm. (1 ½ in.) of cool tap water into one bowl, pour about the same amount of hot water in the other bowl. Place the M&M candies under water in each bowl with the "M" facing up. Watch what happens. It should take about 5 to 10 minutes.

   Answer: 1. A. ___ Nothing happened. B. ___The letter "M" on each candy eventually peeled off and floated to the surface.

   2. In which bowl did the letters float to the surface first? A.___ The cool water, B. ___ The warm water.

   Explanation: The letter "M" is printed on a thin, edible "shell" over each candy. The shell won't dissolve in water. As the chocolate candy warms and dissolves it "sheds" the shell. When the chocolate dissolves, the shell peels off and floats to the surface of the water with the letter "M."

2. **The Exploding Sandwich Bag**

   Needed: One small (sandwich size) zip-lock bag, Baking soda, Warm water, Vinegar, Measuring cup, A short length of toilet paper (or a facial tissue. Toilet paper works better)

   What to do: Go outside – or at least do this in the bath tub. Put 1/4 cup of rather warm water into the bag. Add 1/2 cup of vinegar to the water in the bag. Put 3 teaspoons of baking soda into the middle of the tissue. Wrap the baking soda up in the tissue by folding the tissue around it.

   You will have to work fast now – partially zip the bag closed but leave enough space to add the baking soda packet. Put the tissue with the baking soda into the bag and quickly zip the bag completely closed.

   Put the bag in the tub or down on the ground (outside) and step back.

   Answer: The bag: _ swelled up and popped, _ Nothing happened. _ It just made a terrible mess.

   Explanation: The baking soda and the vinegar eventually mix (the tissue buys you some time to zip the bag shut) When they do mix, you create an ACID-BASE reaction and the two chemicals work together to create a gas, (carbon dioxide – the stuff we breathe out) well it turns out gasses need a lot of room and the carbon dioxide starts to fill the bag until the bag cannot longer hold more and, POP! Be sure to clean up well and recycle those plastic bags.

3. **A Colorful Iceberg**

   Needed: An ice cube tray or small plastic container to make one or more colored ice cubes, food coloring, tap water, a large clear container (perhaps a Pyrex container)..

   What to do: Add some food coloring to tap water and pour it into the ice cube tray or small plastic container. Place the tray or container in the freezer over night to make ice cubes. Fill the large clear container with hot tap water. Place an ice cube into the hot water. Observe.

   Answer: As the ice cube melted the colored water from it: A. __ Sank to bottom of the hot water, B. ___ Just melted.

   Explanation: The ice cube floats because its density is lower than that of the water. As it melts the cold water from the ice cube is denser than that of the hot water so the melted water sinks to the bottom of the container. As the colored water becomes warner it mixes with hot water.

4. **An Under Water Volcano**

   Needed: Food coloring, tap water, a small clear drinking glass or jar, a large clear container (perhaps a large Pyrex container), a pencil with a sharp point.

   What to do: Fill the large container with cold water and place it in the refrigerator for a few hours, fill the small clear glass with hot tap water and add food coloring. Cover the small container with clear plastic food wrap and secure it with a rubber band. Place the small container at the bottom of the large container of cold water. Use the pencil point to pierce to penetrate the plastic food wrap. Observe.

   Answer: ___ A "volcano" erupted through the hole in the food wrap. ___ Nope nothing happened.

   Explanation: The hot water in the small container is less dense than the cold water in the large container. When the hole is pierced in the food wrap the hot water escapes through the hole and rises to the surface of the cold water.

5. **The "bent" straw**

Needed: A clear glass, a drinking straw (or pencil), tap water.
What to do: A. With the glass empty look through the glass at the straw.
B. Fill the glass half full of water and look through the glass at the straw. Focus on the point where the straw enters the water.
Answer: A. With the glass empty the straw appears: _ straight, _bent.
B. With the glass half full of water at the point where the straw enters the water it appears _ straight, _bent
Explanation: Our eyes are using light to see various objects all the time, but when this light travels through different mediums (such as water & air) it changes direction slightly. Light refracts (or bends) when it passes from water to air. The straw looks bent because you are seeing the bottom part through the water and air but the top part through the air only. Air has a refractive index of 1.00 while water has a refractive index of about 1.33.

6. **Blobs in a bottle:**

Needed: A clean 1 liter clear soda bottle, tap water, vegetable oil, fizzing tablets (such as Alka Seltzer), food coloring

What to do:

Pour the water into the bottle until it is about three-quarters full. Use a measuring cup or funnel to slowly pour the vegetable oil into the bottle until it's almost full. You may have to wait a few minutes for the oil and water separate. Add about 10 drops of food coloring to the bottle (red is nice, but any color will look great.) The drops will pass through the oil and then mix with the water below. Break a seltzer tablet in half and drop the half tablet into the bottle. Watch it sink to the bottom and let the blobby greatness begin! To keep the effect going, just add another tablet piece. For a true lava lamp.
Answer: _ Yes!, we got blobs, __ We got just a mess.
Explanation: Initially, the oil stays above the water because the oil is lighter than the water or, more specifically, less dense than water. The oil and water do not mix because of something called "intermolecular polarity." (That term is fun to bring up in dinner conversation.) Molecular polarity basically means that water molecules are attracted to other water molecules. They get along fine, and can loosely bond together (drops.) This is similar to magnets that are attracted to each other. Oil molecules are attracted to other oil molecules; they get along fine as well. But the

structures of the two molecules do not allow them to bond together. Of course, there's a lot more fancy scientific language to describe density and molecular polarity.
When you added the tablet piece, it sank to the bottom and started dissolving and creating a gas. As the gas bubbles rose, they took some of the colored water with them. When the blob of water reached the top, the gas escaped and down went the water. By the way, you can store your "Blobs in a Bottle" with the cap on, and then anytime you want to bring it back to life, just add another tablet piece.

7. **Make a Needle Float**
Needed: A sewing needle, Tissue paper, A bowl of water, A pencil.
What to do: Fill the bowl with water. Trim a piece of tissue paper to a size slightly longer that the needle.
GENTLY drop the tissue flat onto the surface of the water. Then GENTLY place the needle flat onto the tissue (Try not to touch the water or the tissue. A tweezers is nice to use for this.) Use the pencil to carefully poke the tissue (not the needle) until the tissue sinks.
Answer: The needle _ stayed on the surface of the water, _ The needle always sank.
Explanation: The needle stayed on the surface of the water due to SURFACE TENSION. This means that there is a sort of "skin" on the surface of water where the water molecules hold on tight together. If the conditions are right, they can hold tight enough to support the needle. The needle is not truly floating, it is being held up by the surface tension.

8. **Is Black Hotter than White?**
Needed: 2 Equal Sized Coffee Mugs, Cool Tap Water, White Paper, Black Paper, 2 Rubber Bands.
What to do: Fill both mugs with the same amount of cool water. Cover the edges of one mug with white paper and the other mug with black paper. Secure both pieces of paper with a rubber band. Leave the mugs in direct sunlight for one hour. When you return, measure the temperatures of the water in both mugs by placing your finger in the water of each one.
Answer: The water felt warmer in the _ black covered mug, _ the white covered mug.
Explanation: Because dark surfaces (such as the black paper) absorb more heat and lighter surfaces (such as the white paper) reflect more light.

9. **Swirling Colors**
Needed: An empty jar or large clear glass, A small container or measuring cup, Food coloring, Warm tap water, About 3 Tablespoons of vegetable oil.
What to do: Fill the jar about 3/4 full with warm water. Put three tablespoons of vegetable oil in the small container. Carefully put drops of various colored food coloring into the oil. Stir the oil gently with a fork, just enough to disperse the food coloring a little bit. You'll notice it doesn't mix with the oil, it just breaks up into smaller dots. Now pour the oily and color mixture into the warm water in your jar.
Answer: _ The colors swirled around in a pretty pattern, _ Nothing happened.
Explanation: The reaction has to do with the density of each liquid. The food coloring will dissolve into the water, but the oil won't. By mixing the oil and food coloring together first, you

slow the mixing process that would normally happen with the water and the food coloring. The food coloring drops down into the water (because it is denser than the oil) while the oil stays on top of the water (water is also denser than the oil). When the food coloring eventually starts to mix with the water, it creates colorful swirls.

10. Float your own Boat

Needed: Aluminum foil, Sink or container of water, Lots of pennies or other coins.

What to do: Tear off several squares of aluminum foil each about one-foot square. Fold and crinkle the foil into the shape of a boat. Place coins one-by-one into the boat. Count how many coins you can put into your boat before it sinks.

Make another boat and see how many it will hold before sinking

Answer: A. My first boat held __ coins before it sank. B. My second boat held __ coins before it sank.

Explanation: How can the aluminum boat float and carry a load? It has to do with the "density or the mass per volume," of the vessel compared to the density of water. A simple explanation is that if an object (your boat) weighed less than the water it displaced it would float. If was heavier than the water it displaced it would sink. Adding the coins made the boat heavier and heavier until it sank.