

Jr. Scientist Newsletter

Cuyahoga County

January 2021

Happy February Jr. Scientist.

Welcome to the first month of our Jr. Scientist program. I hope you will enjoy the program, having some fun and learning a little something as well. As you finish each month's activities, please send me your pictures and share what you learned. I also appreciate your comments and suggestions. Email all pictures and comments to: Stone.363@osu.edu

Since this is a new program for us, we are still figuring out what works, so it's nice to hear your thoughts. This month our topic is Brrr....It's Cold Outside. So, bundle up and jump right in!!



OHIO STATE UNIVERSITY EXTENSION
Cuyahoga County 4-H

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#1 Heat Experiment

How heat affects things is sometimes difficult to understand. This experiment shows how heat cause molecules to move faster.

Materials

3 clear jars
Water
Food Coloring
Masking tape
Markers
Thermometer (optional)

Instructions

1. Label the jars with the temperatures you are going to use in the experiment. Use room temperature water (about 72 degrees), hot water (about 100 degrees) and cold water (about 40 degrees)
2. Turn on your sink faucet and measure the temperature. Adjust the faucet so the temperature is about 72 degrees. Fill the jar labeled room temperature (you can also fill a jar and let it sit out for a day to become room temperature.
3. Fill the jar labeled cold water with cold tap water. Add ice to the jar to cool the water even farther. (or you can place the jar in the refrigerator while you wait for your room temperature jar to be ready). Remove the ice from the jar before finishing your experiment.
4. Have an adult help with the hot water jar. Turn on your faucet as hot as it will go. Fill the jar labeled hot water with hot water. An adult could also heat up some water on the stove. Just be careful not to make it too hot. (100 degrees is hot but it won't burn the skin)
5. Add a drop of food coloring to each of the jars and observe what happens over time.

Questions

1. What happens to the drop of food coloring?
2. Does the food coloring behave the same in each of the jars?
3. What is different about the jars?
4. What can you say about the relationship between heat and the movement of molecules?

The Science Behind it

Molecules move faster when they are warmer and slower when they are colder. The drop of food coloring spreads out fastest in the hot water because the molecules are moving the fastest of the three jars. The food coloring spreads out quickly in room temperature water and slowest in the cold water. Eventually the food coloring spreads throughout all three jars.

#2 Impact of Cold Temperatures

Another way to observe cold temperatures impact is to watch a balloon deflate. Blow up a balloon inside in room temperature, then leave it outside in the cold and watch it deflate. Bring it back inside to warm up and watch it re-inflate. The cold temperature makes the air volume shrink and density increase.

#3 Make Your Own Thermometer

Are you looking for fun hands-on science activities to learn about temperature? Make your very own thermometer by following these quick steps.

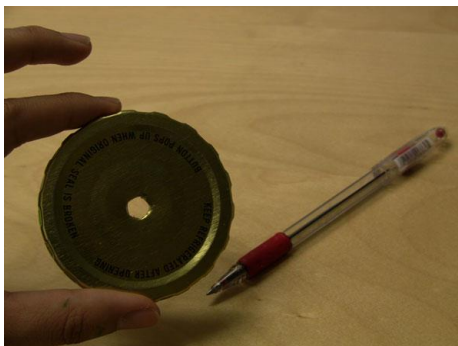
Materials

- 1-pint jar with cap
- 1 straw, preferably clear
- Some clay or play dough
- Water
- Rubbing alcohol
- Food Coloring
- 1 marker



Instructions

1. Fill the jar with equal parts water and rubbing alcohol about $\frac{1}{4}$ of the way up the jar.
2. Add a few drops of food coloring to color the temperature-sensitive liquid. Using red coloring best mimics, a standard mercury thermometer.
3. Food coloring emphasizes the liquid level.
4. Secure the cap and shake well to mix the liquid and to ensure the food coloring is evenly dispersed.
5. Punch a hole with a pen in the center of the cap, allowing the straw to feed through. (Have adults help you)
6. The hole should be sized closely to the straw.
7. Position the straw so that it dips into the liquid but does not touch the bottom of the jar.
8. Use the modeling clay or play dough to wrap around the straw where it enters the cap to create an airtight seal.
9. Use a marker to mark on the jar the water level in the straw at room temperature.
Place them in differently heated places to watch what happens. Take it outside; place it in a shadow, in the sun light or wherever to see how temperature reacts with their thermometers.



How does it work?

Liquids contract and expand depending on the temperature. Rubbing alcohol is more temperature-sensitive than water, so the liquid changes according to temperature quicker than using only water. When it is hotter, the liquid in the jar expands, pushing fluid up through the straw; the opposite is true for the cold. Water freezes at 0 degrees Celsius and boils at 100 degrees Celsius. Fahrenheit, on the other hand, has water freezing at 32 degrees and boiling at 212 degrees.

#4 Frozen Bubble Experiment

Supplies

Bowl and spoon
200 mL warm water
2.5 Tbsp corn syrup (for thickness)
2 tablespoons sugar (for crystallization)
2.5 Tbsp dish soap (for bubble formation)
1 straw
1 water or pop bottle
modeling clay or playdough
A day that is cold with no wind



How to Make Frozen Bubbles

Being outside in these temperatures can be dangerous. Please take proper precautions.

For best bubble crystallization it needs to be at least 14F outside. The most important part is that there needs to be no wind.

Making the Special Frozen Bubble Juice Recipe

Start by making the bubble juice in a container with a lid. Add the warm water first. We used tap water as warm as it would come out of the tap. Then stir in the corn syrup until the water is clear.

Next add the sugar and stir until completely dissolved.

Finally, add the dish soap and stir until combined. Don't get too enthusiastic about stirring at this stage or you will create a lot of bubbles. Stir enough to just combine the soap with the solution.

This is why we leave the dish soap to last. The sugar and corn syrup require quite a bit of stirring to dissolve. We don't want to create bubbles in our solution now, we want to save them for later!

Place a lid on the container and set it in the freezer or outside for about 30 minutes to chill the mixture. We do not want it to freeze! Just chill.

Making the Bubble Blaster

While the juice is chilling, we need to make a special bubble blaster! For this you will need a water or pop bottle (500mL is a great size). Empty and dry the bottle.

Take the cap and drill a hole in the cap that is just big enough to fit your straw. This step should be done only by a competent adult!

Place the straw through the hole in the cap and secure it using modeling clay to create an airtight seal.

If you don't have modeling clay (we prefer it because it stays pliable even in the cold and maintained the seal), you can try play dough or even a glue gun. The goal is to secure the straw and create a seal.

Your Bubble Blaster is now ready!

#5 Frozen Oobleck

Ingredients

Cornstarch

Water

Liquid watercolors or food coloring

Glitter

Bowl

Spoon

Ice cube trays, silicone molds or a container to place in freezer

How to Make the Frozen Oobleck

1. Add about 1/2 cup of cornstarch to a large bowl.
2. Slowly add up to a 1/2 cup of water. You may not need all the water. Mix until you get the consistency you desire. If you add too much water, just add more cornstarch.
3. Add food coloring or liquid watercolors. Food coloring has the potential to stain. Watercolors are usually washable.
4. Pour the oobleck into molds. You can use ice cube trays or silicone heart molds or any plastic container.
5. Place the molds in the freezer for at least a few hours.

Freezing the oobleck creates a solid. As the oobleck melts, the consistency keeps changing.

1. After you take it out of the freezer, Place the frozen oobleck in a container and place a towel under the container or cover you work area. It could get messy.

The Science Behind It

Oobleck is a non-Newtonian fluid. It doesn't behave like a "normal" liquid. It has properties of both a solid and a liquid depending on the amount of stress applied. When stress is applied, the cornstarch and water mixture acts like a solid (your hand can't go through; you just squish it like play dough). When constant stress is not applied, the mixture acts like a liquid.

#6 How to Make Paper Snowflakes

Paper snowflakes are so fun and simple to make. You can create beautiful snowflake designs using a simple piece of paper and a pair of scissors – in less than 5 minutes! This classic craft never gets old and is a very inexpensive way to add some winter cheer to any room. You'll have your own little paper blizzard before you know it!

.Hang them on the fridge, or in the window. Or attach a piece of fishing line and tape them to the ceiling. This is such a great winter craft and a super fun way to make decorations that can stay up all winter long!

First, you'll need a square piece of paper

Using a standard piece of letter sized printer paper, take the bottom right corner of the paper and bring it up and over to the left edge. The bottom edge should line up perfectly with the left edge.

Run your fingers along the diagonal edge to make a fold. You should have a perfect triangle shape, with a long rectangular shape above it.

Cut the rectangular strip off right at the edge of the paper that was folded over. You'll be left with a triangle that unfolds into a perfect square!



How to Make Paper Snowflakes

Step 1: Take a square piece of paper and fold it in half diagonally to make a triangle.

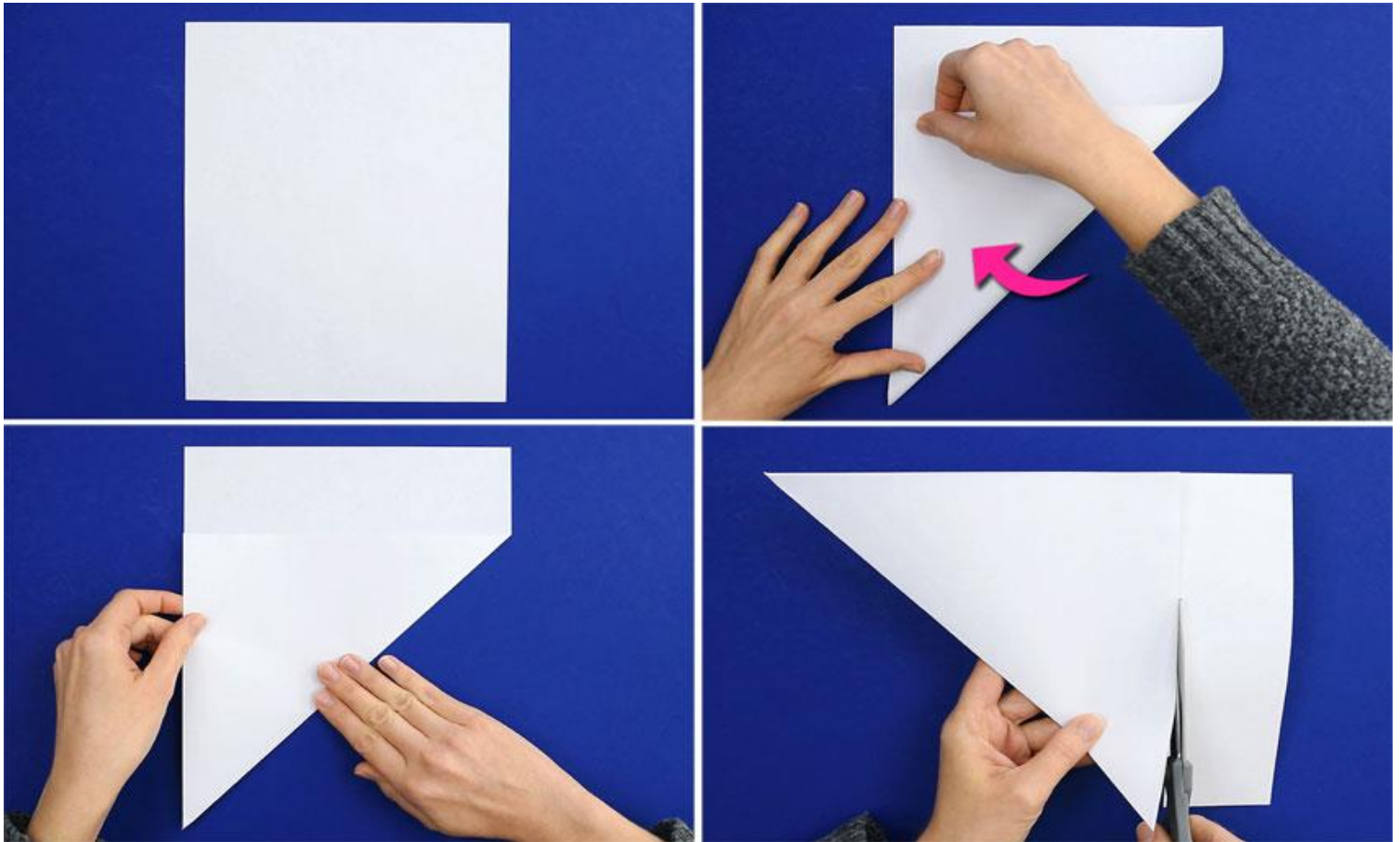
Step 2: Fold the triangle in half again to make a smaller triangle.

Step 3: Fold this smaller triangle into thirds. Start by bringing the right point towards the left by one third.

Step 4: Then bring the left point towards the right by one third. It's easy using the templates below, but if you're doing it freehand, you might have to adjust the folds to make sure the edges line up perfectly.

Step 5: Cut off the pointed ends so you're left with a small triangle.

Step 6: Cut your snowflake pattern into the sides of this small triangle. You can cut triangles, diamonds, curves, even half hearts. If you cut off the tip, you'll have a snowflake with a hole in the middle.



Step 7: Unfold your snowflake carefully and use your fingers to flatten it out. If you want it to be really flat, you can iron it using a very low heat setting.



#7 White Snow Play Dough

Recipe for bright white play dough:

- 1 cup cornstarch
- 1/2 cup salt
- 1 tbsp oil
- 1 tbsp cream of tartar
- 1 cup boiling (or nearly boiling) water
- few drops liquid glycerine (not essential but makes it even smoother!)
- silver glitter- optional! (but soooo pretty)

It works best to heat the ingredients gently in a pan, stirring until it comes together to form a non-sticky ball. When it has formed a ball, take it off the heat and put it on the surface to cool. When cool enough, knead it until soft and stretchy, rolling it in oodles of silver glitter to make it sparkle like snow!

#8 MELTING SNOWMAN EXPERIMENT

SUPPLIES:

- Baking Soda
- White Vinegar
- Water
- Black Beads or Google Eyes
- Orange Foam Paper
- Basters, Eyedroppers, or Spoons
- Glitter and Sequins

HOW TO MAKE BAKING SODA SNOWMEN!

STEP 1. Start by slowly adding water to a good amount of baking soda. You want to add just enough until you get a crumbly but pack-able dough. It shouldn't be runny or soupy or like oobleck

STEP 2. Pack the mixture together to make them into snowballs! You can use plastic cling wrap to help keep the shape if needed.

STEP 3. Gently press two beads or google eyes and an orange triangle nose into the snowball for the snowman's face. You can also mix in buttons and sequins! STEP 4. Place in the freezer for as long as you like. The more frozen the balls, the longer it will take to melt them! Alternatively, you can make these melting snowmen inside small plastic or paper cups as seen below. You can add a face to the bottom of the cup and then pack the picture in on top of it. It's a quick and easy way to make a whole team of snowmen!



HOW TO MAKE YOUR SNOWMEN FIZZ

It's time for the fizzing fun with your baking soda snowmen!

STEP 1. Set out your snowman activity with a baster, eyedropper, squirt bottle or spoon, and a bowl of vinegar. You will want to make sure to put your snowmen on a tray or dish that will hold the liquid. You can even add a drop of blue food coloring to the vinegar for an icy blue winter look! It made the dish so pretty as the snowmen fizz. Of course, you can add even more glitter for a festive look!

STEP 2. Add vinegar to the baking soda snowmen and watch what happens!

WHAT HAPPENED TO THE SNOWMEN?

It may look like the baking soda snowmen are melting away when you add the vinegar. However, melting involves a physical change of state from a solid to a liquid, like our melting crayons. Instead of melting, a chemical reaction occurs between the baking soda and the vinegar and it produces a new substance called carbon dioxide gas. This happens when a base (baking soda) and an acid (vinegar) mix. That's all the bubbling and fizzing you can hear, see, smell, and touch!

#9 Exploding Snowman

The great thing about this exploding snowman science experiment is that it's versatile. You can draw a monster and make it in an exploding monster science experiment. Or a heart for Valentine's Day. You get the idea.

Because you only need a few materials to do this simple STEM experiment, it's an awesome boredom buster to keep in mind for the cold, wintery days when you are stuck inside.

Do note that this is an EXPLODING snowman, so vinegar and baking soda will probably spill on the floor. You may want to do this experiment in the shower or outside if it's not too cold so you don't end up with a mess.

Materials:

- A sandwich bag
- Permanent markers
- Baking soda
- Vinegar
- Paper towel or tissue paper



Directions

1. Get a zip lock sandwich bag to decorate with permanent markers.
2. Wrap 3 teaspoons of baking soda inside a piece of paper towel or tissue.
3. Place the baking soda packet inside the plastic bag.
4. Pour about 1-2 cups of white vinegar into the sandwich bag and seal the bag quickly. It should swell up quickly.
5. Stand back and watch it explode!



Why Did the Snowman Explode?

As baking soda, or sodium bicarbonate, mixes with vinegar, carbon dioxide is created. The bag starts to fill with carbon dioxide (and that's why you see the bag start to swell up) until the pressure is too much and ... BOOM!

More Fun with this Exploding Snowman Experiment

Try different variables for each bag. Here are some ideas:

- What happens if you don't use a paper towel to wrap the baking soda and put the baking soda directly in the bag?
- What happens if you add more vinegar or more baking soda?
- If you use the same amount of vinegar and baking soda, can you explode a bigger bag (try a gallon-sized bag)?

How you ever thought about being a Polar Scientist?

Polar scientists make observations and collect data to answer questions about the Arctic (the north polar region) and the Antarctic (the south polar region). These regions are unique and isolated. However, the Earth is a global system, so all regions are related.

As global climate has garnered worldwide attention, the polar regions have been found to react acutely to fluctuations in climate and temperature. Since ice tends to reflect solar radiation and water absorbs it, melting in the polar regions can exert a strong influence on both atmospheric climate and ocean circulation.

Most polar scientists have college and graduate degrees (a master's degree and/or Ph. D.) in their particular field of science.

Science is a wonderful career that can fulfil you like I believe few professions can. Seek out knowledge; embrace experiences; and enjoy the company you make. And whatever you do, hold on and hold on tight. Because success in a science career – like success in life – comes from those who can hold on the longest.

Using data from the Bureau of Labor Statistics, we found the highest-paying jobs for scientists. Physicists, natural-sciences managers, and paleontologists were among the highest-paid professions.



Parents/guardians are responsible for maintaining care, custody, and control of their minor(s) and are responsible for monitoring the activities their child is participating in.