



STEM Newsletter - Week 27 (12.18.2020)

Happy Holidays!

Introduction

We've reached the end of 2020! This will be our last Newsletter of year, so you can check our website for older Newsletters for the next couple of weeks or wait until the start of the next semester for new ones. It's the time of year to reflect, maybe next to the fireplace with some nice hot chocolate? Or, maybe read this newsletter instead! We have a bunch of winter-themed fun activities and facts waiting to be unpacked!



Winter Science

How do we stay warm during the winter?

Our bodies help keep us warm through many different mechanisms such as vasoconstriction, thermogenesis, and hormonal thermogenesis. Vasoconstriction is when the blood vessels, the tubes that transport blood, under our skin become narrower. This means that there is less blood flow near our skin, retaining heat. Thermogenesis is when our muscles, organs, and brain produce heat. For example, our muscles shiver to produce heat. The last mechanism is when our metabolism increases to increase the energy our body creates and to produce more heat. Our bodies can lose the heat it produces, therefore we need clothes to prevent us from getting cold. During the winter months, large coats, scarves, mittens, and hats are essential. These items of clothing act as insulators, keeping warm air trapped between the pieces of the materials. The warmth produced by our body is preserved, keeping us warm!

Snowflake Formation

As the temperature drops, delicate snowflakes drift down from the sky and into soft white piles of snow for building snowmen and making snow angels. But where do these tiny specks come from? Snowflakes are formed as small particles of matter





travel through a cloud and water vapor freezes onto it. As more water vapor freezes onto the particle, it grows heavy enough to eventually fall from the sky and down to the ground. Each of these snowflakes is always six-sided but usually “unique” as there are over 100,000 water vapor droplets arranged on it. Though very rare, there actually have been instances of identical snowflakes!



Hibernation

As the winter begins, many animals go into a state known as hibernation. Contrary to popular belief, these animals aren’t just sleeping for months straight without waking up. During this period, they simply stay inactive to conserve energy. Their bodies adapt to the harsh weather conditions by lowering their body temperature, metabolic rate, and heart rate. For some, that can include sleeping for extended periods of time but they do awaken occasionally to replenish

their hunger or to relieve themselves. In the months of preparation for the winter, animals like bears, groundhogs, and even frogs will eat an abundance of food for extra fat to keep them warm. Some will collect food in their nests as well - like squirrels!

Activity

It wouldn’t be a Holiday Newsletter without having a snowman! This is an arts and crafts science activity that lets you build your own snowman while learning about crystallization. Crystals are natural solids that are made up of molecules that are connected together in a repeated pattern. Let’s make some crystal snowmen!

Materials Needed:

You can use any materials you want but here are some suggestions:

To make your snowman:

- Pom poms of various sizes
- Pipe cleaners
- Googly eyes
- Beads or sequins (anything you want to use to decorate your snowman!)
- An acorn top to use as a hat
- Acrylic paint

- Hot glue gun

To Crystallize the snowman:

- String
- Pencil
- Pot or jar
- Boiling Water
- Borax



Steps:

Assemble your snowman:

- Build your snowman by stacking different sized pom-poms on top of each other. Use the hot glue gun to glue them together.
- Add googly eyes and the other decoration to your snowman. Use the glue gun to glue them on.

Crystallize it:

- Tie a string around your snowman and tie a pencil with the other end of the string.
- Pour the boiling water into a jar or pot (a container that can fit your snowman), ask an adult to help you!
- Add 3 tablespoons per cup of water used and add it to the water, then mix it with a spoon.
- Lower your snowman in the water and leave it in there overnight. Once it's done, remove it and let it dry on a paper towel. Your snowman should be covered in crystals!



Discussion Questions:

- How do crystals form?
- Why does borax work with this activity? What properties enable it to form crystals?
- Take a magnifying glass and observe your crystals. What do they look like?

Fun Facts!

- Though you might assume the opposite, the **Earth is actually closest to the Sun during the wintertime!** This is because the temperature of the Earth has no correlation to the Earth's proximity to the Sun but rather the Earth's tilt.
- If you ever happen to hear the sound of thunder during a snowstorm - it could be **Thundersnow!** Though rare, snow and thunder/lightning can occur simultaneously - more commonly around lakes.
- Have you ever tried to pack some snow into snowballs but they just fall apart like powder? That's because it's **dry snow** which forms when snowflakes fall in a dry atmosphere. The ideal material for packable snowballs is **wet snow** which forms from



snowflakes falling through temperatures warmer than 0 degrees Celsius or 32 degrees Fahrenheit.

- The **Winter Solstice** is the shortest day of the year - more specifically, the least number of hours of sunlight!

Winter Journal

For this activity, grab a new notebook to use as your winter journal! Dedicate at least a page for each day of winter break. Each day, go outside and write down how cold it feels, observe, and write if it's windy, rainy, snowing, or maybe even sunny? Then do one of the following activities and write down your research and observations in your journal.

Here are some activities to do each day:

1. Collect items from outside such as acorns, leaves, twigs, etc.
2. Draw and label the items you collected.
3. Look outside the window and note down the weather, then go outside and see if you made an accurate prediction.
4. Write a short story that is winter-themed.
5. Collect some leaves and make some leaf rubbings in your journal.
6. On a windy day, make a quick windmill using paper, a straw, and a pin. Go outside and try it out!
7. Read and watch videos on a particular species of animal that lives in a cold habitat. Learn its lifeways, behavior, and what it eats. Write down what you learn in your journal.
8. Go outside and make a quick sketch of a tree.
9. Collect some leaves and make a collage (glue the leaves in the journal, make a pretty picture).
10. Go outside and guess the temperature in Fahrenheit, then google it and see how close you were!
11. On a day with snow, take some snow and put it in a zipper bag. Take it inside and time how long it takes for it to melt. Write down your observations in your journal.
12. On another day with snow, take a water bottle filled with room temperature water. Place it in the snow and time how long it takes it to freeze. Write down your observations in your journal.



Do Now

Winter Word Search

WORD BANK:

- ARCTIC
- BLIZZARD
- CONDENSATION
- EVERGREEN
- FROST
- GLACIAL
- HIBERNATION
- ICICLE
- PENGUIN
- REINDEER
- SNOWFLAKE
- THERMOMETER

Share Your Results

We'd love to know how the activity and/or the "do now" turned out! What worked and what didn't work? Please share with us something you learned and/or send us pictures! Email us at stem@northeastern.edu.

Related links/Extensions

- [Winter Science and Activities](#)
- [More Activities](#)
- [Antarctica Documentary](#)
- [Northern Lights Documentary](#)