SNOW SCIENCE

Raccoon Creek Explorers Activity #28

Supplies:

- Borax (found with laundry detergent)
- water
- glass jar or vase
- craft sticks or pencils
- string or ribbon
- pipe cleaners (blue and white work best!)

- magnifying glass (optional)
- black paper (optional)

Vocabulary:

avalanche- a mass of snow, ice and rocks falling rapidly down a mountainside

crystal structure- a description of the ordered arrangement or shape of atoms, ions or molecules in a material.

snowpack- a mass of snow on the ground that is compressed and hardened by its own weight

Background:

Hilly or mountainous areas that get lots of snow sometimes experience avalanches. Have you ever wondered why an avalanche happens, or how we know a specific place has a high danger of avalanches? When it snows, the snowflakes accumulate into what we call snowpack. Over time, layers and layers of snowpack build up, and some layers may be stronger or more stable than others. When a strong layer forms on top of a weaker layer, it might break off and slide downhill as an avalanche! This is why people who study avalanches dig pits in the snow to study the layers of snowpack. Another way we can learn about the likelihood of an avalanche is to look at the snowflakes themselves. There are different types of snowflakes, and each type can be more or less stable depending on its crystal structure. We can look at the crystal structure of the snowflakes and the way they have piled up in layers to determine the likelihood of an avalanche! For this experiment, we'll be growing our own crystals in the shape of snowflakes, as well as looking at the different shapes snowflakes can be.

Let's Get Started:

1.) Make pipe cleaner snowflakes. Cut a pipe cleaner into thirds, then place the pieces together and twist the middle to form a snowflake. Cut 6 small pieces of pipe cleaner (about 1.5 inches each) and twist one onto each arm of the snowflake.

2.) Tie a long piece of string to the center of the snowflake and wrap the other end around a pencil or craft stick.

3.) Be sure the opening of the jar or vase is big enough for the snowflake to fit. Also check that the string is the right length. The snowflake should hang in the jar without touching the bottom.

4.) Dissolve 3 Tbsp of borax powder for each cup of boiling water you use. (Have adult supervision for this part!)

5)Fill the jar with the borax solution and hang the snowflake inside. Set the jar somewhere safe where it won't be disturbed. It is important that the jar remain still for crystals to form. Leave them alone for at least 24hrs.

6) After 24hrs, gently lift out your snowflake crystals and let them dry on paper towels for an hour or so, then they're finished!

Reflect:

What causes snowflakes to form in different shapes?

What are some other factors that might lead to an avalanche?

Do you think your crystal snowflake has a stable or unstable structure? Why?

Apply:

Interested in learning more about the crystal structure of snowflakes? Check out this chart and try comparing it to the snow you see this winter! Take a magnifying glass and piece of black construction paper outside with you the next time it snows. Catch snowflakes on the paper and look at them through the magnifying glass to observe their structures. What kind of snow does it look like? Is it stable or unstable?

Shape	Name	How They Are Formed	Effect on Snowpack	Actual Image
	**Columns** (hollow or solid)	At 14–21 degrees Fahrenheit (°F)	unstable	
	**Needles** (simple, cluster or crossed)	At 25–21 °F	unstable	
	**Stellar Plates**	At 14–10 °F	stable	
	**Stellar Dendrites**	At 14–10 °F	stable	
	**Irregular**	At 3–10 °F	stable	
	**Graupel**	When snow crystals fall through very moist air	unstable	
	**Hail**	When precipitation becomes coated with a layer of ice	unstable	
	**Ice pellets**	When rain falls through very cold air	unstable	
	**Rime**	When extremely cold water droplets freeze almost instantly on a cold surface	unstable	

Wrap-Up:

Now that you know more about snowflake shapes and avalanches, how could you use this information to stay safe in snowy, hilly areas? Are their certain weather conditions we should avoid that are more likely to cause an avalanche? Can you think of other kinds of winter weather that pose their own risks? It turns out that lots of people have had these questions (and more!) In fact, there are scientist dedicated to the study and research of avalanches and other forms of extreme weather and weather hazards. These scientists might have different backgrounds form geology to climatology depending on their area of expertise. They help predict when and where avalanches will happen, and they may even be able to protect people and structures from avalanche damage!