More Kids in the Woods
Snowflake Properties Lesson Plan

Objectives
Students will identify snowflake characteristics such as shape and size, discover why snow is white, and categorize types of snowflakes based on temperature.

Materials
1. Cotton balls (1 or 2 bags)
2. Pan large enough to hold at least one inch of water
3. Snowflake properties worksheet

Procedures

Opening Discussion
A. Start out by asking the students if they have ever looked close-up at a snowflake when they went to play outside in the snow? What did they see? *Some students should respond with snowflakes have six sides, some are big, some are little.* Explain to students that snowflakes come in many shapes and sizes and the reason has to do with the weather.

Lesson Presentation

B. Show PowerPoint presentation titled "Snowflake Properties"

C. After lesson, hand students the prepared "Snowflake Type and Temperature" worksheet that helps them identify temperature for types of snowflake and match snowflake type with its proper image.

Snow-to-Water Ratio Demonstration

D. While students are completing the worksheet, prepare for the snow-to-water ratio experiment. Set up your pan and fill it with enough water to soak cotton balls. Set cotton balls aside.

E. Once students complete the worksheet you are ready to start the demonstration.
   a. *Overview of Demonstration*
      The purpose of this experiment is to show students how wet cotton balls (wet snow) have more water and a smaller snow to water ratio than dry cotton balls (dry snow).

      Warmer air is able to hold more water than colder air. Thus, snow that forms near freezing holds more water than snow that forms in very cold temperatures. When temperatures are around freezing, the water in the atmosphere will likely result in larger, wet snowflakes. Because the

snowflakes hold so much water, it may take only about 8 inches of snow to hold one inch of water—i.e. the snow to water ratio is 8 to 1. However, when temperatures are near 0°F or colder, the air can't hold as much water. Snowflakes that form are smaller and drier, and it may take 14 inches of snow or more to equal 1 inch of water—the snow to water ratio is now 14 to 1.

b. Set approximately 10-20 dry cotton balls (which represent snowflakes) aside. Dip 10 cotton balls in water. Note: They do not have to be completely soaked.
c. Set the wet cotton balls in a pile. Now take 10 dry cotton balls and set them in a pile next to the wet cotton balls. The pile of wet cotton balls will likely be smaller than the dry cotton balls. Now consider the amount of water in each pile of cotton balls by considering the weight. Ask the students which group of cotton balls weighs more. Whether or not you use a scale, students should respond by saying the wet cotton balls are heavier.
d. Now, ask the students how many dry cotton balls (roughly) it would take to have the same weight (or the same water content) as the wet cotton balls. Students should respond by saying it would take a lot of dry cotton balls to have similar weight as the wet ones.
e. Purpose of Demonstration
Snow that contains more water (such as when temperatures are near freezing or there is lots of moisture present) has a lower snow-to-water ratio, i.e. it takes less snow to equal 1 inch of water. On the other hand, snow that contains less water (such as in very cold temperatures) has a high snow-to-water ratio, i.e. it takes more snow to equal 1 inch of water.

Group Discussion Questions

F. In Montana, do you think we have more higher or lower snow-to-water ratios? Why? *Students should be aware that Montana has a drier, colder climate. Because we are in a drier and colder climate, the majority of our snow has higher snow-to-water ratios, but not all the time. When temperatures aren't as cold or are around freezing, we can have lower snow-to-water ratios.*

What kind of snow is better for making snowballs – wet or dry snow and why? *Students should respond by saying wet snow because it easier to pack the wet snow together. Dry snow is loose and is hard to pack together.*