

Snow Scientists at Work!

Student will learn that scientists work together as a team to find answers. Students themselves will work as a team, participate in scientific data collection, and understand that scientist find snow a beautiful and fascinating topic to study.

Grade Level : 5th

Objectives:

- Students will reflect and then draw or write in their journal about things they found beautiful or fascinating about snow
- Students will participate in a team-building activity and display team work during data collection
- Students will graph at least two portions of information that they measured

Materials:

- Any measuring tools for the data collection– thermometers, rulers, etc.
- Journals
- Pencils
- Book: Snowflake Bentley by Jacqueline Briggs Martin and Mary Azarian
- Masking or duct tape
- Noisemaker - bell, buzzer, etc.
- Cookies, treats or prizes

Time Considerations

Preparations: 15 min.

Activity 1– Snow Scientists: 15 min.

Activity 2– Team Building: 15 min.

Activity 3– Snow Research: 20 min.

Related Activities:

Bring on the Snow Blanket



Nevada Department of Education Standards

- **Scientific Inquiry (Nature of Science Unifying Concept A) N.5: Students understand that science involves asking and answering questions and comparing the answers to what scientists know about the world. Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method.**
- **Matter (Physical Science Unifying Concept A) P.5: Students understand properties of objects and materials. Students know matter exists in different states (i.e., solid, liquid, gas) which have distinct physical properties.**

Excellence in Environmental Education Guidelines

- **Strand 1—Questioning, Analysis, and Interpretation Skills (A, B, C, G) Learners are able to develop question, design investigations, collect information, and draw conclusions in order to learn about the environment.**
- **Strand 2.1—The Earth as a Physical System (A, B) Learners are able to identify changes and differences in the physical environment and basic characteristics of and changes in matter.**

Background

Wilson Alwyn "Snowflake" Bentley (1865 – 1931), born in Jericho, Vermont, USA, is the first known photographer of snowflakes. He perfected a process of catching flakes on black velvet in such a way that their images could be captured before they either melted or sublimated. Bentley became interested in snow crystals as a teenager on his family farm. He tried to draw what he saw through an old mi-

croscope given to him by his mother. The snowflakes were too complex to record before they melted. So, Bentley attached a bellows camera to a compound microscope and, after much experimentation, he photographed his first snowflake on January 15, 1885.

He would capture over 5000 images of crystals in his lifetime. Each crystal was caught on a blackboard and transferred rapidly to a microscope slide. Even at subzero temperatures, snow-

flakes are ephemeral because they sublime. Bentley's work can be seen as occupying the intersection of the arts and the sciences.

Preparations

Display a basket with goodies. This is the prize for good teamwork. Set the plate or basket on a chair or table on the far side of a grid taped onto the floor with duct tape or masking tape (5 squares x 5 squares). Draw a paper grid exactly like the one on the floor (5 squares x 5 squares). Then select a path of squares that leads from one side to the other and draw this schematic plan on the paper grid. You will use this paper as your guide while the students are doing the activity. Gather any necessary measuring devices for the students to use with their data collection.



Doing the Activity

Activity 1— Snow Scientist

Today we are snow scientists. What do snow scientists do? Why do you think anyone would want to be a snow scientist? Read aloud *Snowflake Bentley* by Jacqueline Briggs Martin, both the story and the historical bars. Make sure the students see the photograph of him and his camera and his snowflakes on the very last page. If possible show the students his book *Snow Crystals*. "Why do you think Wilson Bentley studied snow? Did it make him

wealthy? Did it make him happy? He thought that his work gave the world a gift of beauty." Explain that when scientists study snow, they must work as a team in order to achieve their goals.



Activity 2— Team Building

Engage the students briefly in a team building activity: The students stand in a line on the opposite side of the grid from the treats. To reach the treat or prize, all of the students must work together and help each other get from one side of the grid to the other side where the treats are. Nobody gets any treats until everyone gets to the other side. The students must discover, by trial and error, this path across the grid. The first student to go is faced with 5 choices of squares in the first row in which to step. If they step in the one that the teacher has selected then the teacher does and says nothing. The student is safe and they can then choose the next square on which to step. If they select a square that is not in the schematic drawing, the teacher rings a bell or buzzer or a type of noisemaker. This signifies an error and the first student can try no more. They

must go to the end of the line. All of the students should be watching very carefully so they all can help student number two to remember which square in the first row was okay on which to step. And so the game continues, all players working together as a team in this memory game to get everyone across the grid. Debrief with students on how they worked together, for better or worse. See if they can discover changes that may help them when they do the next activity, research in the snow in teams.

Activity 3— Snow Research

Next, engage students in data collection, researching, and analyzing a specific class question about snow that they came up with on their own (ex: How deep is it? How hard is it?). Students work together as a team in groups of 3 or 4, sharing the duties and taking turns using the measuring tools. Students record their information in a data journal. As part of the data collection, walk around the school yard and see if anything has changed from when they last saw it. Is anything covered or exposed that was not the day before? Record the temperature, the wind direction, date



and time, etc. Return to class with the data recorded in the journals. Were there any teamwork problems present during the grid game that were extinguished while working as snow scientists?

What made the team work better/worse the second time, while outside? What results did they have? Discuss what scientists may have to do when they get different results.

Evaluation—

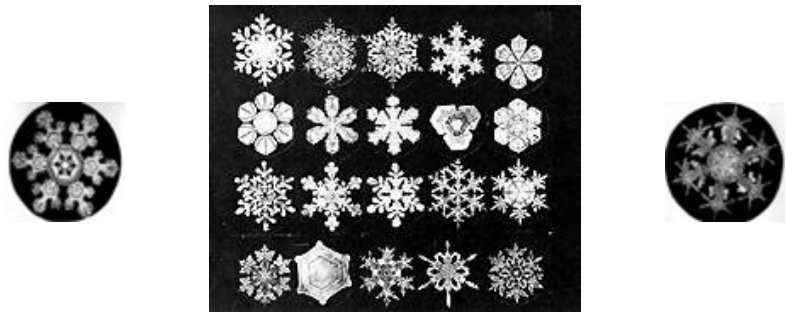
Have the students make a bar graph with the results of the data collected outdoors. Discuss any trends seen in the data.

Extension—

Ask the students to write about or draw a picture of what was beautiful or fascinating about snow to them. In the closing circle on the floor, ask them to each share what they wrote or drew and explain.

Sources—

Wikipedia. Wilson Bentley. Page last updated 2 May 2008. Accessed on 30 June 2008. http://en.wikipedia.org/wiki/Wilson_Bentley.



Vocabulary

Analyze- to examine something carefully in order to understand it

Data- information or facts

Ephemeral- Lasting a very short time.

Experiment- a scientific test to try out a theory or to see the effect of something

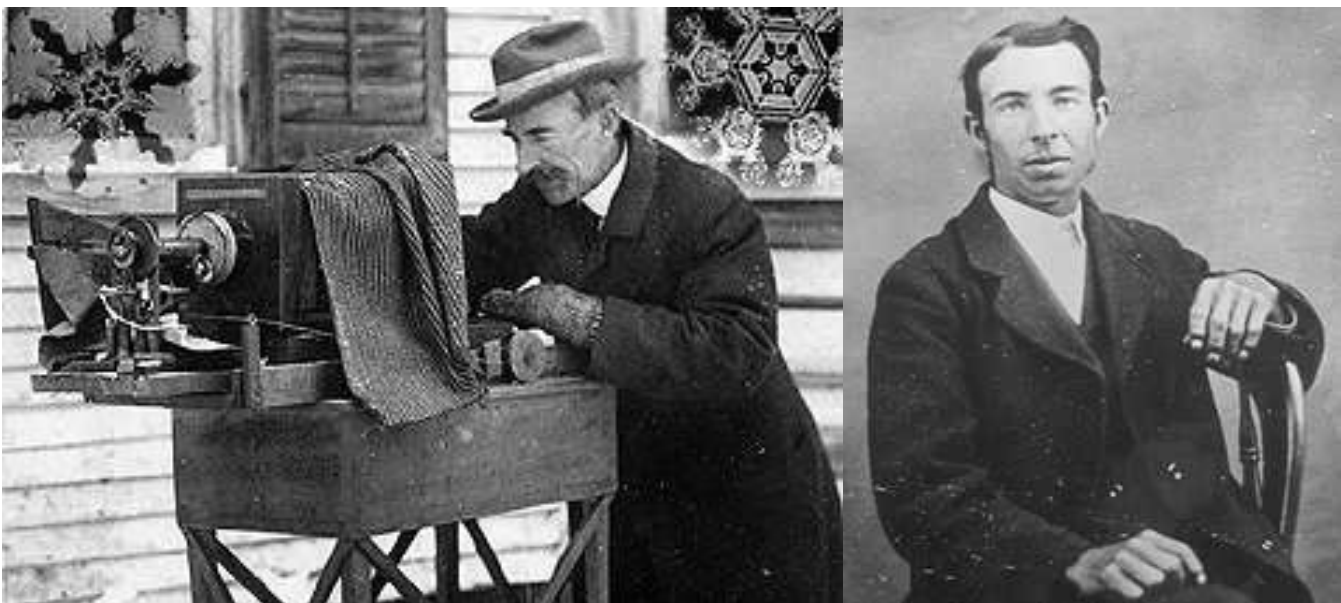
Graphs- a diagram that shows the relationship between numbers or amounts, Common graphs use bars, lines, or parts of a circle to display data.

Melting Point- the point where a solid changes to a liquid because of heat

Physical Properties- is any aspect of an object or substance that can be measured or perceived without changing its identity

Sublimate- To cause (solid or gas) to change state without becoming a liquid.

Team- A group of people working together for the same goal.



William "Snowflake" Bentley