

HOW AND WHY DO WE OBSERVE AND MEASURE WEATHER?

UNIT 2: Weather
Lesson 5 — Grades 2-3
INSTRUCTIONS



Overview

Native practitioners and scientists alike use weather observations to note patterns in the weather and to have a written record of stories and information shared by others that can be used to predict and prepare for weather. In this activity, the class will keep a weather pictograph for one week*. At the end of the week, they will examine their entries and note any patterns or connections they find between various weather features.

Teacher's Note

* When this activity is conducted for longer than a week, students more accurately identify details and weather patterns. If possible, take a few minutes each day to extend this activity for the entire month. If you choose to do the activity for a month, it may be useful to have a class pictograph, rather than individual student pictographs.

Objectives

On successful completion of this lesson, students will be able to:

- monitor changes in weather by recording daily conditions; and
- and analyze changes in local weather.

Alaska Standards

Alaska Science Standards / Grade Level Expectations

- [3] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.
- [3] SA1.2 The student demonstrates an understanding of the processes of science by observing and describing the student's own world to answer simple questions.
- [3] SD3.1 The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by using recorded weather patterns (e.g., temperature, cloud cover, or precipitation) to make reasonable predictions.

Alaska Cultural Standards

- [B] Culturally-knowledgeable students are able to build on the knowledge and skills of the local cultural community as a foundation from which to achieve personal and academic success throughout life.
- [C] Culturally-knowledgeable students are able to actively participate in various cultural



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environments.

[D] Culturally-knowledgeable students are able to engage effectively in learning activities that are based on traditional ways of knowing and learning.

[E] Culturally-knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them.

Bering Strait School District Scope & Sequence

2nd Grade Sequence #10: Weather

3rd Grade Sequence #7: Water Cycle

Materials

- Student Worksheet: Weather Pictograph
- Student Worksheet: Weather Pictograph Images
- Chart paper
- Markers
- Glue or tape
- Document camera

Additional Resources

HSP II: Ch. 7, Lessons 1–3

HSP III: Ch. 9, Lessons 1–3

Activity Preparation

1. Invite a Native elder or culture bearer to help you learn the Native cloud and weather vocabulary. If possible, invite them to visit your class and assist your students in learning the vocabulary.
2. Make copies of the Weather Pictograph and the Weather Pictograph Images. If you choose to do the activity for longer than a week, make multiple copies. Multiple pictographs can be taped together, if desired. If using a single, class pictograph, ensure that it can be projected using a document camera.



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Whole Picture

Traditional Weather Observations

Long before news and weather forecasts on the radio and TV, Alaska Native people knew how to accurately observe and predict weather. Without this ability, a person might get stuck in unexpectedly inclement weather, which could have severe consequences, including spoiled game, personal injury, and even death.

The ability to accurately predict the weather requires a keen awareness of environmental signs in *ella* (variously translated as weather, climate, world, sky, outdoors, universe, etc.). The late Yup'ik elder Angayuqaq Oscar Kawagley wrote, "There are many environmental signs that the hunter-gatherer learns to read—clouds, sun, moon, northern lights with different colors and positions in the sky, the stars twinkling, strong winds moving through, and so forth" (Kawagley, 2006, p. 54). Each of these delicate signs can indicate a variety of impending changes in the weather. But, learning to read and understand them takes time and dedication.

Traditionally, people learned to predict the weather by closely observing subtle changes in *ella* over a long period of time. In research conducted with the Calista Elders Council, elders from various communities in Southwest Alaska shared their own observations and stories with Ann Fienup-Riordan and Alice Rearden. Nick Andrew, Sr., from Marshall, shared that a person's task each morning was to go outside and check the weather, thereby slowly building an acute understanding of *ella*. Paul John, from Toksook Bay, added that as he was going outside, his elders often told him, "Don't forget to observe the sky out there" (Fienup-Riordan and Rearden, 2012, p. 61). Frequently, he was unsure what he should notice; but heeding their admonitions, he observed the sun, the clouds, and the horizon, and slowly built an understanding of what the weather might do before the end of the day, or what might happen before daybreak.

Some people, who have not trained themselves to read *ella*'s signs may say that weather is too unpredictable. But John Phillip, Sr., from Kongiganak, disagrees: "Ella does not try to surprise people, but usually tells us ahead of time what it is going to do" (Fienup-Riordan and Rearden, 2012, p. 60). Yet, in order to hear these warnings, people must be very observant and know how to read the signs. This means that they must train themselves to perceive and understand tiny changes. For example, barely visible clouds high in the atmosphere can make the stars flicker. This flickering can be indicative of coming winds.

Western Science Weather Observations

In the same way that traditional practitioners rely on a review of prior knowledge as passed from one generation to the next, western scientists also rely on prior research



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findings and close observation of the environment to make predictions. One environmental element that scientists closely observe is cloud cover. In a method using trends, they monitor wind speed and direction in conjunction with radar images depicting density of cloud cover to make predictions about what kind of weather will appear in particular areas. This method, although useful, is not always 100% accurate — wind speed and direction can change and storms can dissipate. However, it can be very useful in short term predictions.

Vocabulary

precipitation	water that falls from the sky. Rain, snow, sleet, and hail are kinds of precipitation.
season	a time of year that has a certain kind of weather
temperature	the measure of how hot or cold something is
thermometer	a tool that measures an object's temperature
weather	a term used to describe the air (and atmospheric conditions) outside; for example hot, warm, cold, rainy, snowy
wind	air that is moving

Activity Procedure

1. Explain that traditionally, people predicted the weather by closely observing cloud patterns and other phenomena. Today, people rely on weather forecasters. Similar to traditional methods, weather forecasters closely observe and record cloud cover to predict the weather. In this activity, students will observe the weather in their area for a week (or a month).
2. Each day before discussing the weather, read the TEACHER INFORMATION SHEET: Chester Noongwook's "Rules of Weather Observation."
3. Instruct students to observe the weather (wind, clouds, temperature, etc.) as they come to school each day.
 - a. Explain that students should be ready to discuss the weather in class each morning.
 - b. Encourage them to talk about the weather with older siblings, parents, elders, and other culture bearers.
4. Each day for a week (or longer, depending on time available in your classroom), give students a few minutes at the beginning of class to discuss and record their weather observations.
 - a. Students record their observations by selecting pictures from those provided



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to accurately describe:

- i. the wind direction
 - ii. strength of the wind (no wind, slightly windy, very windy)
 - iii. the sky conditions (rain, snow, clouds, sun)
 - iv. the relative temperature (warmer, colder).
- b. Once students have selected appropriate pictures, they cut them out and glue or tape them onto the pictograph in the calendar square for that day.

Teacher's Note

If you choose to do this for a month, and use a class pictograph rather than individual pictographs, assign one student each day to be responsible for the cutting and gluing of the images.

- c. At the end of the week (or month), students will discuss their weather observations and look for connections between weather phenomena, such as cooler weather temperatures when the wind blows from the south, and patterns, such as three days of cold followed by three days of warm weather.
- d. Use chart paper to write a list of connections and patterns students find between weather phenomena, such as wind followed by rain.
- e. Post both the pictograph(s) and the list in the classroom for students to view.



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Extension Activity: Using Weather Tools

Teacher's Note

These two activities can be done independently, together, or as part of the above lesson. In both activities, students learn to use a scientific tool to measure some kind of weather.

Build and Use a Rain Gauge

Materials

- Clear plastic or glass jar (one per student or group)
- Centimeter ruler (one per student or group)
- Clear tape

Procedure

1. Tape the centimeter ruler to the outside of the plastic jar. Ensure that the ruler is in the vertical orientation.
2. Place the jar and ruler outside, and allow it to collect rain or snow.
3. After a predetermined amount of time (10 minutes, ½ hour, 1 day, etc.), bring the jar back inside and measure the amount of precipitation (if you have collected snow, allow the snow to melt before measuring).

Read and Measure Temperature

Materials

- Thermometer
- Temperature chart, drawn on the board

Procedure

1. Place the thermometer outside — you may wish to place it directly outside your window, with the temperature facing in, so that students can read the temperature without going outdoors.
2. At 1-hour intervals, from the time class begins to the end of the school day, instruct a student volunteer to read and record the temperatures and times.
3. At the end of the day, review all the recordings with students.
 - a. Did the temperature go down? When?
 - b. Did the temperature go up? When?
 - c. How much did the temperature change between each hour interval?
 - d. How much did the temperature change between the beginning of the day and the end of the day?



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References

Fienup-Riordan, Ann, and Alice Rearden. (2012) Ellavut — Our Yup'ik World and Weather. Continuity and Change on the Bering Sea Coast. Seattle and London: University of Washington Press.

Kawagley, Angayuqaq Oscar. (2006). A Yupiaq Worldview: A Pathway to Ecology and Spirit. Long Grove: Waveland Press.



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APPENDIX



Teacher Information Sheet: Chester Noongwook's "Rules of Weather Observations"

From 'Watching Ice and Weather Our Way', by Conrad Oozeva, Chester Noongwook, George Noongwook, Christina Alowa, and Igor Krupnik. Arctic Studies Center. Smithsonian Institution. 2004.

Read the following to students each day before discussing the weather.

- First thing, get out early in the morning and check the wind and sky conditions, whether the sky is cloudy, and also whether it is cold or warm in terms of your body feeling.
- In the old days, we always used to go down to the sea shore every morning — to check the ice and weather conditions at the water (sea level), how the current was moving, and where the tide was.
- Always talk to other people about weather and ice conditions; listen to other people's minds to see whether it is good to go out hunting.
- Check for any change in wind and weather condition; we are told to watch out for weather all the time, either we are on the ice or on shore — every hour, every minute or listen to other boats what they are saying.
- Keep watch for any change in water because of currents, or clouds, or waves — any sign of water change is very important.
- You can never make a good forecast for tomorrow based upon today's weather. Go out and check it in the evening. Make a guess and check it next day; it is better to see if it is correct or not.



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Student Worksheet: Weather Pictograph

Use students' daily observations to fill in the calendar below. For each day, list the wind direction, the strength of the wind (no wind, slightly windy, very windy), the sky conditions (rain, snow, sunny, cloudy), and the relative temperature as compared to yesterday (warmer, colder).

				Sunday
				Monday
				Tuesday
				Wednesday
				Thursday
				Friday
				Saturday













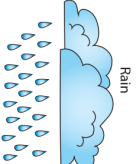
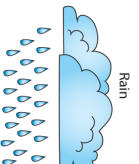




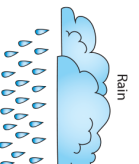
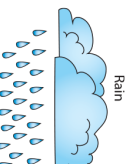
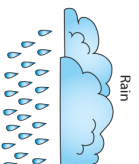
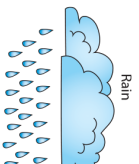
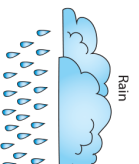
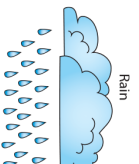
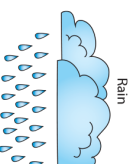
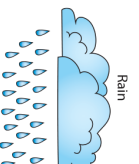
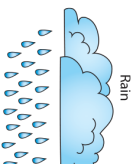
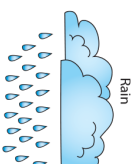
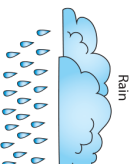
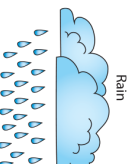
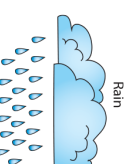
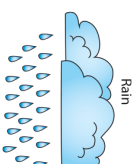
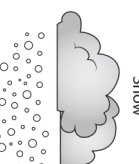
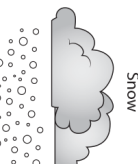
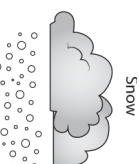
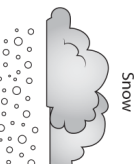
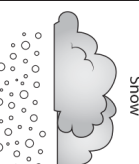
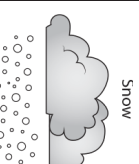
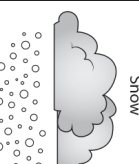
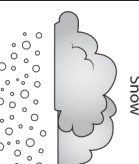
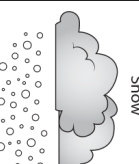
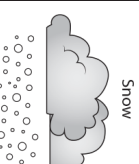
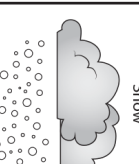
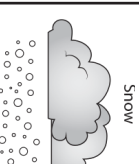
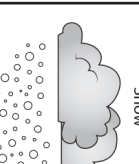
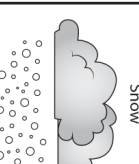
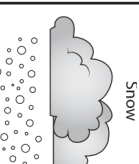
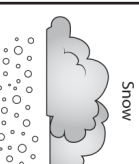


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UNIT 2: Weather Lesson 5 — Grades 2-3 STUDENT WORK



Student Worksheet: Weather Pictograph Images

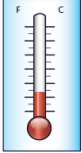
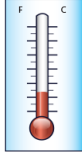
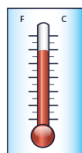
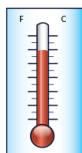
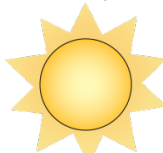
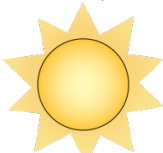
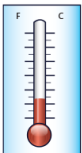
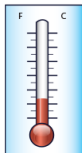
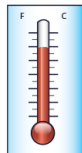
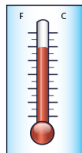
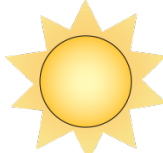
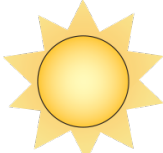
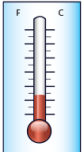
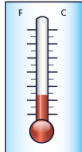
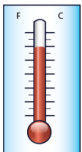
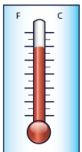
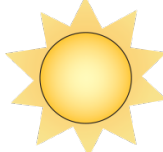
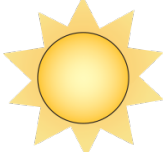
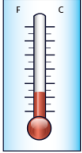
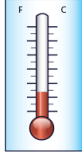
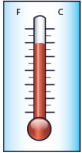
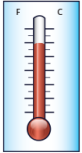
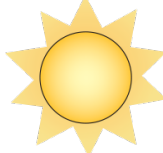
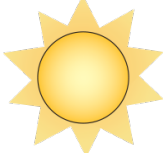
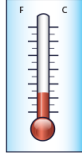
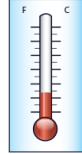
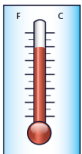
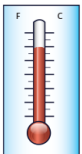
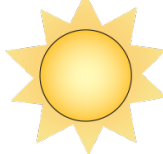
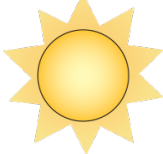
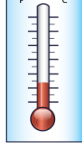
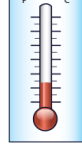
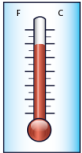
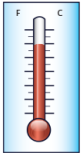
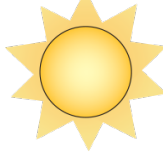
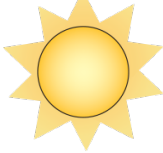
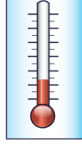
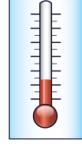
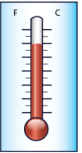
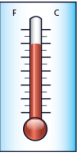
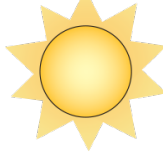
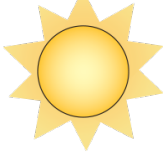
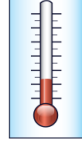
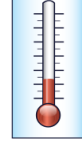
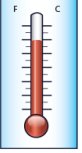
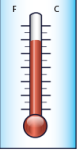
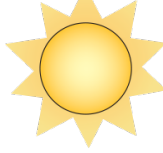
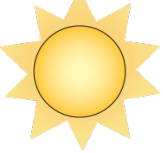
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 Cloudy	 Cloudy	 Cloudy	 Cloudy	 Cloudy	 Cloudy
 Rain	 Rain	 Cloudy	 Cloudy	 Cloudy	 Cloudy
 Rain	 Rain	 Rain	 Rain	 Rain	 Rain
 Rain	 Rain	 Rain	 Rain	 Rain	 Rain
 Rain	 Rain	 SNOW	 SNOW	 SNOW	 SNOW
 SNOW	 SNOW	 SNOW	 SNOW	 SNOW	 SNOW
 SNOW	 SNOW	 SNOW	 SNOW	 SNOW	 SNOW



HOW AND WHY DO WE OBSERVE AND MEASURE WEATHER?

UNIT 2: Weather Lesson 5 — Grades 2-3 STUDENT WORK



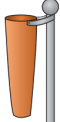
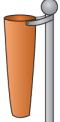
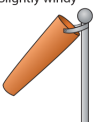



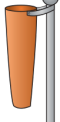
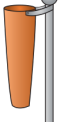
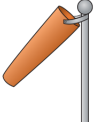
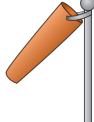


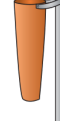
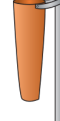
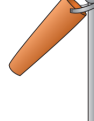
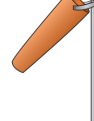


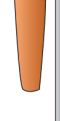
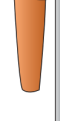

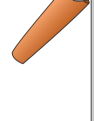


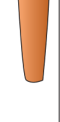
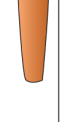
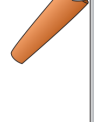
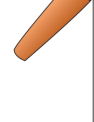


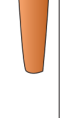
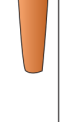
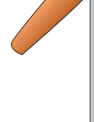
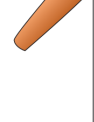




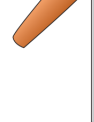
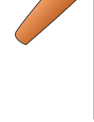




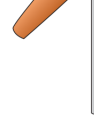



Colder 	Colder 	Warmer 	Warmer 	Sunny 	Sunny 
Colder 	Colder 	Warmer 	Warmer 	Sunny 	Sunny 
Colder 	Colder 	Warmer 	Warmer 	Sunny 	Sunny 
Colder 	Colder 	Warmer 	Warmer 	Sunny 	Sunny 
Colder 	Colder 	Warmer 	Warmer 	Sunny 	Sunny 
Colder 	Colder 	Warmer 	Warmer 	Sunny 	Sunny 
Colder 	Colder 	Warmer 	Warmer 	Sunny 	Sunny 
Colder 	Colder 	Warmer 	Warmer 	Sunny 	Sunny 



HOW AND WHY DO WE OBSERVE AND MEASURE WEATHER?

UNIT 2: Weather Lesson 5 — Grades 2-3 STUDENT WORK



No wind 	No wind 	Slightly windy 	Slightly windy 	Very windy 	Very windy 
No wind 	No wind 	Slightly windy 	Slightly windy 	Very windy 	Very windy 
No wind 	No wind 	Slightly windy 	Slightly windy 	Very windy 	Very windy 
No wind 	No wind 	Slightly windy 	Slightly windy 	Very windy 	Very windy 
No wind 	No wind 	Slightly windy 	Slightly windy 	Very windy 	Very windy 
No wind 	No wind 	Slightly windy 	Slightly windy 	Very windy 	Very windy 
No wind 	No wind 	Slightly windy 	Slightly windy 	Very windy 	Very windy 
No wind 	No wind 	Slightly windy 	Slightly windy 	Very windy 	Very windy 



HOW AND WHY DO WE OBSERVE AND MEASURE WEATHER?

UNIT 2: Weather Lesson 5 — Grades 2-3 STUDENT WORK



East wind 	East wind 	North wind 	North wind 	Whirlwind 	Whirlwind
East wind 	East wind 	North wind 	North wind 	Whirlwind 	Whirlwind
East wind 	East wind 	North wind 	North wind 	Whirlwind 	Whirlwind
East wind 	East wind 	North wind 	North wind 	Whirlwind 	Whirlwind
East wind 	East wind 	North wind 	North wind 	Whirlwind 	Whirlwind
East wind 	East wind 	North wind 	North wind 	Whirlwind 	Whirlwind
East wind 	East wind 	North wind 	North wind 	Whirlwind 	Whirlwind
East wind 	East wind 	North wind 	North wind 	Whirlwind 	Whirlwind



HOW AND WHY DO WE OBSERVE AND MEASURE WEATHER?

UNIT 2: Weather Lesson 5 — Grades 2-3 STUDENT WORK



South wind 	South wind 	West wind 	West wind
South wind 	South wind 	West wind 	West wind
South wind 	South wind 	West wind 	West wind
South wind 	South wind 	West wind 	West wind
South wind 	South wind 	West wind 	West wind
South wind 	South wind 	West wind 	West wind
South wind 	South wind 	West wind 	West wind
South wind 	South wind 	West wind 	West wind

