

THINKING AND ACTING LIKE A SCIENTIST

TEACHER'S GUIDE

What Is the Weather?

How does the weather change during a day and during a week?

GRADE K

Earth & Space





What Is the Weather?

Grade Level/ Content	K/Earth and Space Science
Lesson Summary	Students observe, record, and act out a weather report to discover how the weather changes during a day and during a week.
Estimated Time	10 minutes each day for a week (or month, if desired) for observations; 1, 45-minute class period (for analysis and explanation)
Materials (per team)	window access (for viewing the weather), pencils, crayons, thermometer (or weather app) to determine temperature outside, Investigation Plan , Observation Form , journal
Secondary Resources	National Geographic Little Kids First Big Book of Weather by Karen de Seve National Geographic Readers: Weather by Kristin Baird Rattini Weather Words and What They Mean by Gail Gibbons What Will the Weather Be? by Lynda DeWitt and Carol Croll Weather word cards and/or drawings for the classroom calendar Weather.com or a phone app from a weather service or a local television station
NGSS Connection	K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time.
Learning Objectives	<ul style="list-style-type: none"> Describe the weather in qualitative terms (such as sunny, cloudy, rainy, windy, cool, and warm). Describe differences in temperature over the course of a day. Describe the number of days of different types of weather conditions in a week and a month. Graphically display observations about weather conditions.
Cross-Curricular Project Connections	Clouds, Clouds, Clouds; Blow, Wind, Blow

How does the weather change during a day and during a week?

The weather is all around us, influencing what we wear, what we eat, and how we play. Each morning when students walk outside, their senses help bring the weather into focus. They can see whether the sun is shining or whether the sky is cloudy. They can feel whether it is cold or hot.

Students have likely watched weather reports on television or have looked at forecasts using a weather app. Asking students to log their observations of the weather will help them see patterns over time. As the saying goes, “If you don’t like the weather, wait a minute.”

Investigation is based on the Van Andel Education Institute (VAEI) Instructional Model for Inquiry-Based Science.

In all investigations:



Students don’t know the “answer” they are supposed to get.



Students play a driving role in determining the process for learning.



Teachers and students construct meaning together by journaling.



Students are working as hard as the teacher.

Part 1

INVESTIGATION SETUP

Students will need the following for this investigation:

- Outside access (or window access) for observing the weather
- Thermometer (or weather app) to determine the temperature outside
- Pencils
- Crayons
- [Investigation Plan](#)
- [Observation Form](#)
- Journal

CREATIVE THINKING

Ask the students to help you construct a TV or radio station in the dramatic play area or next to the calendar for a “live broadcast” of the weather. A large cardboard box can be transformed into a sit-inside television. A mid-sized box with a paper tube can become a television studio camera sitting on a tripod or the videographer’s shoulder in front of the studio broadcast desk (or table) with real or paper tube microphones for the reporters.

SHARED CONTROL

Role-playing as a weather reporter will help students take ownership of their learning. For their live weather reports, students will need to gather their own data and decide what to say just like an adult weather reporter.

Part 2

INVESTIGATION FACILITATION



Question

Introduce the investigation question.

How does the weather change during a day and during a week?

SELF-DIRECTION

Introduce the investigation question. Explain to students that they will spend the class time over the next week observing the weather to answer this question. Point out that it will be their responsibility when they first arrive each day to discuss the weather with their group and make their observations for the “morning” observation.



Personal Knowledge

Students capture what they already know about how the weather changes during a day and during a week.

- Ask students to share their thoughts about how weather changes during a day and during a week.
- Invite students to talk about their weather knowledge with a partner.



Prediction

Students communicate an expected outcome, based on prior knowledge.

- Display a timeline showing the 24 hours of a day. Give each student a “hottest” and “coldest” card and ask them to place their cards next to the time of day they predict would be the hottest and coldest.
- Take a picture of the timeline to capture the class predictions.
- Ask students to discuss how they think the weather might change during the week. Create a class list of their predictions.
- Discuss the class predictions, asking students to explain why they made the predictions they did.



Investigation Plan

Students make observations to determine how the weather changes over time.

- Introduce the [Investigation Plan](#). Explain to students what they will do during the investigation and model recording observations on the [Observation Form](#). Make sure they understand that you will give them time to make observations about the weather each “morning” and “afternoon.” Tell them that you will provide the information for the “evening” observation the next day.
- Divide the class into pairs or small groups for students to conduct the investigation. Emphasize that each group should work together to discuss the weather and their observations. Give each student an **Observation Form** to fill out independently.
- Students should record the temperature, a drawing, and whether it is rainy, sunny, cloudy, or windy.

INVESTIGATION PLAN
WHAT IS THE WEATHER?

1. In the morning, look outside. What do you observe about the weather? Talk about your observations with your group.
2. Draw a picture of what the weather looks like.
3. Write the temperature.
4. Write weather words. Some words you might use are:

sunny	cool	cooler
cloudy	warm	warmer
rainy	cold	colder
windy	hot	hotter
5. Repeat steps 1-4 in the afternoon.
6. Fill in the evening section with information from your teacher.
7. Repeat steps 1 to 6 each day for a week.

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Investigation Plan

CRITICAL THINKING

Use the [Fair Test](#) checklist to help students think critically about the investigation plan. Help them understand that a good investigation plan must include a test that is repeatable, generates quality data, and minimizes error. The more critically students think about their investigation plan, the more confident they can be in their results.



Observation

Students record how the weather changes during each day and during the week.

- Students fill out the **Observation Form** each “morning” and “afternoon.”
- You will need to record observations for the “evening” and share them with the class the next day.

COLLABORATION

Develop student listening skills by guiding their collaborative discussions about the weather. Encourage them to share their ideas, but connect them to their classmates’ ideas. For example, use the frame “You said the weather was _____. I agree that _____ and I think _____.”

OBSERVATION FORM
WHAT IS THE WEATHER?

NAME: _____
DATE: _____

1. Write the temperature.
2. Draw a picture of the weather.
3. Write a weather word:
sunny, cloudy, rainy, windy, cool, or warm.

	Morning	Afternoon	Evening
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			

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Observation Form



Data Analysis

Students make sense of their data by organizing it and representing it visually.

Help students analyze their data. You may wish to use the [Data Analysis](#) prompt as a guide.

- Have students **evaluate** their data for trustworthiness.
- Then, have them analyze their data to find patterns and trends. They will need to **organize** the data and represent it visually to understand what it means. They should use graphs, charts, or other visuals to show how the weather changed during each day and during the week.
- Have them use math skills to quantify their data (*count how many sunny days, for example*). You may also help them with higher-level math (*averaging the morning temperatures, for example*) if that will help them make sense of their data.
- If students are not sure how to organize their data, prompt them with these questions:
 - *How many sunny days were there?*
 - *How many rainy days were there?*
 - *How many cloudy days were there?*
 - *How did the temperature change from the morning to the afternoon to the evening each day?*
- Have students **interpret** what the identified patterns or trends mean.
- Ensure students record enough data that it can be used as evidence to support a claim.

COLLABORATION

Sharing their data with peers each day will give individuals with fewer descriptive words on their **Observation Form** the opportunity to expand their descriptions.



Secondary Knowledge

Students use secondary sources to understand how the weather changes during a day and during a week.

- Each of these books begins by explaining that the weather is always changing before going into more detail about each type of weather that the students may experience:
 - [National Geographic Little Kids First Big Book of Weather](#) by Karen de Seve
 - [National Geographic Readers: Weather](#) by Kristin Baird Rattini
 - [Weather Words and What They Mean](#) by Gail Gibbons
 - [What Will the Weather Be?](#) by Lynda DeWitt
- Weather word cards and/or drawings for the classroom calendar can be used to reinforce meaning.
- You may also wish to use an online weather service, such as [Weather.com](#), or a phone app from a weather service or a local television station to show up-to-the-minute weather for your area.
- After reviewing these resources about the weather, students should be able to write the name of the current weather condition on a class chart and describe it in qualitative terms. They should also understand how the weather changes from one day to the next and also throughout the day.
- Have students revisit their predictions and discuss what they learned.

Continued

RISK-TAKING

Revisiting predictions is a good opportunity to promote risk-taking in your classroom, especially if your investigation yields a result that differs from the prediction. Explain that the reason we do investigations is to learn, and remind students that scientists make incorrect predictions all the time. That is how they learn and move their science forward.



Explanation

Students write a claim and provide evidence and reasoning to support it.

- Have students use what they've discovered from their analyzed data to develop an explanation that answers their investigation question. You may wish to use the [Explanation](#) prompt as a guide. You can create the explanation as a Shared Writing activity.
- Have students develop a **Claim** to answer the question: How does the weather change during a day or during a week (if applicable)?
- Then, have them add **Evidence** (the analyzed data) to support their claim.
- Finally, have them add **Reasoning** to their claim. Reasoning should include the information obtained from this investigation as well as science principles they have learned.

Claim

The temperature is hotter in the afternoon than it is in the morning and evening. Weather can change from day to day.

Evidence

The average temperature was 70°F in the morning. It was 85°F in the afternoon. It was 75° F in the evening. It was sunny for two days. It was cloudy and windy one day. After that, it rained for one day. Then, it was sunny again. See our chart that shows the number of days for different kinds of weather.

Reasoning

Investigation: I looked at the weather outside each day for five days. I found that the temperature changed during the day. It was hottest in the afternoon and coolest in the morning. I also found that the weather changed during the week. It was sunny for three days, cloudy and windy for one day, and rainy for one day.

Science: From our reading and discussions, I learned that as the sun comes out, the temperature gets hotter each day. I also learned that weather can change day to day.



Evaluation

Students reflect on the investigation.

- Ask students to describe something that surprised them about how the weather changed throughout the week or throughout a day.
- Ask students to name one way they might change the way they make their weather observations if they conducted this investigation again.

**Application**

Students demonstrate their understanding of how weather changes during a day and during a week.

- Have students work in groups to act out a weather forecast for each day of the week they observed. One student can give the forecast for the morning, and another student can give the forecast for the afternoon. Invite other students to participate as a “live” studio audience as the student reporters talk about the weather.
- Provide an opportunity for students to continue their weather reporting by presenting a summary of what the weather was each day. Students can use information obtained from an online weather service to present both qualitative and quantitative details.
- Encourage students who are part of the “live” studio audience to ask questions about the weather that day that the student reporters must answer.

Assessment

For a **formative assessment**, meet with the students individually throughout the week and ask them to review the data on their **Observation Form**. If needed:

- Guide students to describe the weather in qualitative terms (*such as sunny, cloudy, rainy, windy, cool, and warm*) by pointing to the labeled drawings on the classroom calendar.
- Have students provide a quantitative description of the weather by asking them to count the number of days for each type of weather so far that week. Students should identify how many days were sunny, windy, etc.
- Discuss what to do when the weather changed midday, and introduce the idea of counting a changing weather day in more than one category.

For a **summative assessment**, have students conduct the Application activity and evaluate their “live” weather reports. Evaluate their explanations (written or “live” reports) on how well they:

- Describe the weather in qualitative terms (*such as sunny, cloudy, rainy, windy, cool, and warm*).
- Describe differences in temperature over the course of a day.
- Describe the number of days of different types of weather conditions in a week.
- Graphically display observations about weather conditions.

Extension

- Have students continue this investigation for three more weeks to gather a full month of data. Then, have them revisit their explanation to see if the additional data changes their claim.

Take This Lesson Across the Curriculum

Clouds, Clouds, Clouds

Students expand their weather observations by studying clouds.

Reading/Language Arts	Math	Science	Social Studies
<p>Ten Kinds of Clouds</p> <p>Students read and discuss the ten types of clouds explained in <i>The Cloud Book</i> by Tomie dePaola.</p> <p>CCSS.ELA-LITERACY. RI.K.2</p>	<p>How Many Clouds?</p> <p>Students count the clouds they observe in the sky.</p> <p>CCSS.MATH.CONTENT. K.CC.B.4</p>	<p>Do You See What I See?</p> <p>Students make a 3-D art log or chart of the clouds they observe.</p> <p>NGSS: K-ESS2-1</p>	<p>What the Clouds See</p> <p>Students make a map of their home or school from a cloud's point of view.</p> <p>NCSS: D2.Geo.1.K-2</p>

Blow, Wind, Blow

Students add wind observations to their weather studies.

Reading/Language Arts	Math	Science	Social Studies
<p>Feel the Wind</p> <p>Students read and discuss <i>Feel the Wind</i> by Arthur Dorros.</p> <p>CCSS.ELA-LITERACY. RI.K.2</p>	<p>How Far?</p> <p>Students measure how far the wind moves items of different weights.</p> <p>CCSS.MATH.CONTENT. K.MD.A.1</p>	<p>Invisible Power</p> <p>Students select and test how far the wind moves items of different weights.</p> <p>NGSS: K-ESS2-1</p>	<p>Blowing in the Wind</p> <p>Students build small home models to test in the wind and discuss how weather affects choices.</p> <p>NCSS: D2.Geo.4.K-2</p>

For additional lessons or to customize this lesson, go to www.nexgeninquiry.org.



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INVESTIGATION PLAN

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cool

cooler

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warm

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rainy

cold

colder

windy

hot

hotter

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