

Discovery Education and ESC Region XI Extreme Weather Virtual Field Trip



In partnership with





Extreme Weather

Grades: K-2

Running Time: Approximately 5 days

Lesson Overview

This science lesson for students in grades K-2 centers on a virtual field trip to the National Weather Center in Norman, Oklahoma. Before the field trip, students will take advantage of digital resources from Discovery Education; observe, record, and forecast the weather; and learn how to recognize and stay safe in severe weather. Reed Timmer of the Discovery Channel's *Storm Chasers* series will host this virtual field trip. After the field trip, students will make connections between weather events they previously studied and content presented during the field trip. Students will be made aware of careers related to weather and offered options on how to extend their study of weather at home. Both whole class and individual student assessment options are provided at the end of the lesson.

Background for Teachers

"Everybody talks about the weather, but nobody does anything about it." This popular quotation about weather is generally attributed to Mark Twain, although a friend of Twain's, Charles Dudley Warner, might also be credited with it. The topic of weather can come up in just about any conversation and at any time. The science of weather, meteorology, is an important subject for learners of all ages.

The National Oceanic and Atmospheric Administration (NOAA) defines weather as "The state of the atmosphere with respect to wind, temperature, cloudiness, moisture, pressure, etc. **Weather** refers to these conditions at a given point in time (e.g., today's high temperature), whereas **climate** refers to the "average" weather conditions for an area over a long period of time (e.g., the average high temperature for today's date)."

Energy from the sun heats the landmasses, oceans, and atmosphere and is the primary driver for weather. Both weather and climate depend on the transfer of energy in and out of the atmosphere. The transfer of heat energy between the atmosphere, the landmasses, and the oceans produces layers of different temperatures and densities in the atmosphere and oceans. These different densities cause layers of air in the atmosphere and water in the oceans to produce winds and ocean currents.

Weather forecasts provide vital information for the public about weather to come. In severe weather situations, short-range forecasts and warnings can help save lives. Knowledge of the many

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factors that determine weather is crucial for accurate forecasts. Such factors include wind speed and direction, air temperatures aloft and at ground level, humidity, atmospheric pressure, and cloud cover to name a few.

There are many private and governmental agencies devoted to weather. The study of weather is also prominent at many universities. Many of these agencies make weather data and forecasts available to the public as well as provide information related to the science of meteorology. The primary governmental agency devoted to weather is the National Oceanic and Atmospheric Administration (NOAA). The NOAA Weather Partners, located in Norman, Oklahoma, are five federal government organizations involved in severe weather research, forecasting and support. They are: the National Severe Storms Laboratory, the National Weather Service Forecast Office, the Radar Operations Center, the Storm Prediction Center, and the Warning Decision Training Branch. Also located in Norman is the National Weather Center, a research center at the University of Oklahoma devoted to education, training, operations, and research of the University's weather and climate academic programs. The National Weather Center also houses offices of NOAA and is the site for the virtual field trip around which this lesson is designed.

Notes for Teacher

You will be asking students to use a weather chart to record the local weather around the school. What you ask them to record depends on the level of student you're instructing, the materials and equipment available to you, the convenience and logistics of taking students outside, and other factors. Feel free to modify the weather chart provided with this lesson to accommodate your situation. Materials you might want to incorporate, if available, could include:

- thermometer
- rain gauge (class made)
- wind vane
- wind sock (class made or observe trees or grasses)

If you would like to make a model tornado for your students, locate two 2-liter soda bottles and some duct tape and assemble them the following way. Fill one bottle almost full with water and invert the empty second bottle over the first. Seal the two bottles together at the necks using duct tape. Quickly turn both bottles over so the bottle with the water is on top and the empty bottle is on the bottom. Begin to spin the very top (originally its bottom) of the bottle with water in a circular motion to start the water rotating. Hold the bottom of the empty bottle steady on a surface. A vortex of spinning water will form in the bottle of water as the water drains down into the empty bottle. This models the spinning vortex of air in a tornado.



If you have access to a weather radio, bring it to class and show students how it works. You might use this opportunity to invest in a weather radio for the classroom or for the school, if one is not already part of the school's safety/emergency program.

Take time to preview the Discovery Education (DE) resources so you can select ones you feel would be most appropriate for your students. Full DE videos referenced this lesson are about 15 minutes long and contain roughly 3 to 8 video segments. Both are listed and linked below and in the lesson.

Texas Indicators

Knowledge and Skills

Kindergarten

8A. observe and describe weather changes from day to day and over seasons;

Grade 1

8A. record weather information, including relative temperature, such as hot or cold, clear or cloudy, calm or windy, and rainy or icy;

8B. observe and record changes in the appearance of objects in the sky such as clouds, the Moon, and stars, including the Sun;

8D. demonstrate that air is all around us and observe that wind is moving air

Grade 2

8A. measure, record, and graph weather information, including temperature, wind conditions, precipitation, and cloud coverage, in order to identify patterns in the data;

8B. identify the importance of weather and seasonal information to make choices in clothing, activities, and transportation;

8C. explore the processes in the water cycle, including evaporation, condensation, and precipitation, as connected to weather conditions;

Process Skills for Grades K-2

(1) Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and uses environmentally appropriate and responsible practices. The student is expected to:



(B) discuss the importance of safe practices to keep self and others safe and healthy.

(2) Scientific investigation and reasoning. The student develops abilities to ask questions and seek answers in classroom and outdoor investigations. The student is expected to:

(D) record and organize data and observations using pictures, numbers, and words.

(3) Scientific investigation and reasoning. The student knows that information and critical thinking are used in scientific problem solving. The student is expected to:

(C) explore that scientists investigate different things in the natural world and use tools to help in their investigations.

(4) Scientific investigation and reasoning. The student uses age-appropriate tools and models to investigate the natural world. The student is expected to:

(A) collect information using tools, including computers, hand lenses, primary balances, cups, bowls, magnets, collecting nets, and notebooks; timing devices, including clocks and timers; non-standard measuring items such as paper clips and clothespins; weather instruments such as demonstration thermometers and wind socks; and materials to support observations of habitats of organisms such as terrariums and aquariums.

Essential Questions

What is weather?

How do we observe, measure, describe, and forecast the weather?

What kind of weather is dangerous and how can we stay safe in it?

Resources

Student Resource Page 1 – Weather Chart

Discovery Education Resources

Video Segments

[Reading a Table](#)

[Prediction: What do You Know?](#)

[Book Reviews: Storms, Tornado Alert, and Weather](#)

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[Lightning](#)

[Severe Weather](#)

[Water Can Change Earth](#)

[Clothing](#)

[Clothes in the Hot and Cold](#)

[The Water Cycle](#)

[Real World Example: Using Positive and Negative Numbers on a Thermometer](#)

[Meteorology: Predicting the Weather](#)

Videos

[Weather: Changes and Measurement](#)

Images

[A tornado in Denver](#)

Song

[Teacher and the Rockbots: How's the Weather](#)

Teach

Engage

1. Ask students what they think weather is.
2. Ask students to look out the window and describe the weather. As they provide their descriptions, write key words or concepts they share on the board. Engage them in a discussion about the weather, terms they might use, and make note of any misconceptions they might hold. How would they compare today's weather with yesterday's weather or the day before? Can anyone say what the weather might be like tomorrow? Elicit any stories students could share of a memorable experience they might have had with weather.
3. Optional: show the Discovery Education image [A Tornado in Denver](#). If this is not convenient now, simply ask how many students have seen a tornado? How many have seen pictures of a tornado? Ask if any students have ever been in bad weather and to describe the experience to the class. Add any relevant key words to the list you had started on the board. Try to limit lengthy narrations so more students can share; this might allow a variety of types of weather to be mentioned. Tell students that in this lesson they will learn about different types of bad weather - specifically lightning, flash floods, and tornadoes. They will learn about forecasting weather and how to stay safe in the event of bad weather.



Explore

4. Mention to students that observing and recording the weather is something people have done for hundreds of years. People who study weather are called meteorologists and the study of weather is called meteorology. Show the DE video segment [Reading a Table](#), which shows how the weather can be recorded in a monthly table.
5. Tell students that you would like them to observe the weather outside the school for several days and to make a record of it. Look over the list you made from the students' experiences with weather to brainstorm what aspects of the weather they could observe and record. Hand out a student resource page "Recording the Weather" to each student and enter the quantities or aspects students have brought up and that you feel you and they have the capability to record. Depending on what equipment you have available, arrange to take students outdoors to make their observations on a daily basis if possible. Younger students can draw pictures of the clouds and you might need to assist students or yourself measure and report the temperature. Continue this weather recording for at least a week.
6. Show the DE video [Weather: Changes and Measurement](#) to develop your students' understanding of what weather is, how air and the Earth are involved in weather, and how temperature, wind and water play a role in weather. The video is 13 minutes in length and contains six segments that can be shown individually over several days.
7. When students have finished recording the daily weather conditions at school, review their weather charts. Did everyone record similar data? Were there any noticeable patterns in the data during the period? To introduce (or review) prediction to students and to show them what professional meteorologists do with weather data, show and discuss the DE video segment [Prediction: What do You Know?](#) Using a week's worth of school weather data, can students predict what tomorrow's weather will be?
8. The DE video segment [Book Reviews: Storms, Tornado Alert, and Weather](#) is a good general look at weather with a specific focus on tornadoes.
9. Show and discuss the following DE resources to students as you introduce them to tornadoes, lightning, and floods and appropriate safety measures.
 - a. [Lightning](#)
 - b. [Severe Weather](#)
 - c. [Water Can Change Earth](#)

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10. To help students make choices in choosing the proper clothing for different kinds of weather, show and discuss the DE video segment [Clothing](#). Very young students might enjoy viewing the DE video segment [Clothes in the Hot and Cold](#).
11. This activity is for older students in grade 2, and optional for younger students.
 - a. Fill two cups or other non-glass wide-mouth containers with a liter each of water.
 - b. Set one container in a warm place in the classroom, even under a lamp if one is available, and the other in a noticeable cooler place.
 - c. After a few days, measure how much water is still left in each container.
 - d. Ask and discuss with students what happened to the missing water. (*It evaporated into the air.*)
 - e. Did both containers lose the same amount of water to evaporation? Why? (*No, because evaporation requires heat so the cooler container did not lose as much water as the warmer one.*) Ask what students think would happen to the evaporation if a third container were put in a cool place. (*Not as much water would evaporate because there is not much heat available.*) Suggest to students that investigating water evaporation this way, with surroundings of different temperature, is what a science experiment is all about.
 - f. While the containers of water are left to evaporate, place a can or bottle of a liquid such as water or soda in a cold environment like a refrigerator. After the container has been chilled for several hours, remove it from the cold and set it on a table for students to observe.
 - g. What is happening on the outside surface of the container? (*It is becoming wet with water.*) Why? (*The moisture is forming because the invisible water in the surrounding air that we call water vapor is condensing on the cold surface of the container.*)
 - h. After students have observed both phenomena of evaporation and condensation, show the DE video segment [The Water Cycle](#) and relate it to the containers in the classroom that demonstrated evaporation and condensation.
12. Review with students various ways to stay safe during types of severe weather such as tornadoes, lightning, and floods. Mention and discuss weather-related safety items such as: a weather-alert radio, flashlights, first aid kit, extra food and water, cell phone, etc. and behaviors: pick a safe place in your house, go indoors during lightning and thunderstorms, listen for weather alerts, stay away from floodwaters, etc.

Explain

13. Remind students of the weather charts they made, some of the instruments people use to measure weather, weather forecasting, severe weather, and how to stay safe in bad



weather. Explain that they will be taking a virtual field trip to the National Weather Center in Norman, Oklahoma and that Reed Timmer of the *Storm Chasers* series on the Discovery Channel will host it. They will learn how meteorologists study weather, especially extreme weather. Students should be on the lookout for the tools and machines the meteorologists use. Encourage students to keep questions in mind they think of during the field trip.

14. Take students on the virtual field trip to the National Weather Center.
15. After the virtual field trip, you might want to show one or more of the DE resources you've shown prior to the trip. After the experience of the virtual field trip, some of these resources might hold more meaning for students. Possible follow-up discussion questions include:
 - a. What was their reaction to the virtual field trip?
 - b. What specialized instruments or equipment do professional meteorologists use to study weather?
 - c. How do scientists work as a team and what advantages might that offer?
 - d. How could the work of the scientists at the National Weather Center affect them?
 - e. What are some of the best ways people can stay safe during severe weather?
16. If you made a tornado model with 2-liter bottles (see Notes for Teacher), this would be an appropriate time to let students either try it or watch you demonstrate it. This is something that could remain in the classroom for some time.
17. There are many opportunities for writing about weather and the virtual field trip.
 - a. An experience they've had with unusual weather
 - b. Best practices to stay safe in severe weather
 - c. Their reactions to the virtual field trip
 - d. A short narrative centering around weather

Extend

18. As a math extension, show the DE video segment [Real World Example: Using Positive and Negative Numbers on a Thermometer](#).
19. Ask students how many have heard of Groundhog Day. After a brief discussion, show the DE video segment [Meteorology: Predicting the Weather](#) that describes Groundhog Day and Punxsutawney Phil and is also a nice review of the science of weather.
20. Students could be encouraged to continue their study of weather at home with any of the following activities.



- a. Record the weather conditions at their home for an extended period of time, up to and including months and years.
- b. Involve their family in developing a safety checklist for tornadoes, lightning, and flash floods.
- c. Build a weather station for home use.
- d. Visit the Internet site for the Discovery Channel's *Storm Chasers* as well as watch episodes on the Discovery Channel.

Evaluate

21. Options for a class summary assessment project

- a. Teams of students (or the entire class) design their own customized storm chase vehicles. The designs could involve details and sketches for specialized equipment, colored drawings, and even 3D models.
- b. Teams of students (or the entire class) design and make a diorama that shows a particular kind of weather, e.g. sunny day with puffy clouds, a stormy day with a tornado, or a windy day.

22. Options for individual student assessment

- a. Ask students to write a review or summary of the virtual field trip they took to the National Weather Center.
- b. Ask students to write a narrative that incorporates some aspect of weather and that includes details that indicate a basic knowledge of different types of severe weather, weather forecasting, instruments for measuring weather, and weather safety.
- c. Design a chart that shows what type of clothes to wear for a variety of weather conditions.
- d. Have students write or draw a type of severe weather and write or draw what to do to stay safe in that weather.
- e. Have students explain either in writing or with a drawing what a meteorologist does.

Wrap Up

Play the song [Teacher and the Rockbots: How's the Weather](#) for students; movement or dancing while listening is teacher's discretion.



Name _____

Recording the Weather