Extreme Temperatures

Death Valley National Park

Distance Learning, Pre-Virtual Trip
90 minutes

Essential Question

How can the landscape affect the weather and climate in an area?

Standards

Next Generation Science Standards

K-ESS2-1	Use and share observations of local weather conditions to describe patterns over time.
K-ESS3-2	Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.
2-ESS2-3	Obtain information to identify where water is found on Earth and that it can be solid or liquid.
3-ESS2-1	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
3-ESS2-2	Obtain and combine information to describe climates in different regions of the world.
3-LS4-3	Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
3-LS3-2	Use evidence to support the explanation that traits can be influenced by the environment.
3-LS4-2	Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
4-LS1-1	Construct and argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-PS3-2	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
5-ESS2-1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
MS-ESS2-2	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
MS-ESS2-5	Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.
HS-ESS2-2	Analyze geoscience data to make the claim that one change on Earth's surface can create feedbacks that cause changes to other Earth Systems.
HS-ESS2-3	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.
HS-ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

<u>Common Core Standards</u>

5.RI.7	Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
K-2.SL.1	Participate in collaborative conversations with diverse partners about kindergarten through grade 2 topics and texts with peers and adults in small and larger groups.
3-5.SL.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 through grade 4 topics and texts, building on others' ideas and expressing their own clearly.
1.SL.2	Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
2.SL.2	Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
3.SL.2	Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

4.SL.2	Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
5.SL.2	Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
1.W.7	Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions).
2.W.7	Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).
K-1.W.8	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
2.W.8	Recall information from experiences or gather information from provided sources to answer a question.
3.W.7	Conduct short research projects that build knowledge about a topic.
3.W.8	Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
4.W.8	Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

Objectives

Students will be able to:

- Locate temperature and precipitation data of an area and three National Park System units.
- Record and analyze data provided by the National Weather Service.
- Express, illustrate, and model data onto charts and graphs.
- Interpret, evaluate, compare, and contrast data.

Overview

Death Valley National Park is known as the land of extremes: one of the hottest, driest, and lowest places on Earth. The park drops 282 feet below sea level (-86m) and rises to 11,049 feet (3,368m) above sea level. Geographically, it is in a rain shadow, which means the park experiences the orographic effect lending to extreme temperatures and a dry, barren landscape. These factors are the ingredients to a recipe for an area with extreme temperatures.

Teacher Background Information

weather.gov/climate User Video

- Video tour for navigating the local National Weather Service climate data pages used in the Collecting Weather Data activity
- Direct URL: <https://youtu.be/8RRF45BTy-8>

Materials

- Web-enabled laptop(s) or computer(s) for the class or each student
- Internet connection
- Access to the National Weather Service's climate data pages
    - Direct URL: <https://www.weather.gov/wrh/climate>
- *Extreme Temperatures* video (available to download)
    - Direct URL: <https://go.usa.gov/xtJBN>
- "Collecting Weather Data Tutorial" PowerPoint
- Printed copies of the "Data Collection Form"
- Printed copies of "Graphing the Information" templates

Procedure

Anticipatory Set

Ask students, "What words come to mind when you hear the words 'Death Valley'?"

Have them discuss with a partner. After five minutes of partner discussion, in popcorn fashion, ask students to share results to the entire class.

Optional: Record responses to share with the live ranger during the scheduled Virtual Trip.

Video

Play the *Extreme Temperatures* video for students.

Collecting Weather Data

After the video concludes, explain to students that they will collect data to make observations about the weather in three National Park Service units in the Western United States, plus their home community. Data is collected from the National Weather Service's climate data pages (*see note below):

1) Load and project the "Collecting Weather Data Tutorial" PowerPoint for the entire class to see.
2) Distribute a copy of the "Data Collection Form" to each student.
3) Using the notes in the PowerPoint for reference, guide students through the process of collecting weather data.

**Note:* Weather data may be missing ("M") for some months depending on when records are accessed. Teachers should review data in advance and select twelve, sequential months with complete data.

The tutorial covers and displays two months (July and November) for one park unit/location: Death Valley National Park. During the tutorial, classes should fill in information for ALL months.

Data reported on the National Weather Service climate data pages is reported in degrees Fahrenheit for temperature and inches for precipitation. Classes can convert recorded data if preferred by using the following formulas:

- °C = (°F – 32) × 5/9
- mm = in / 0.039370 (number of inches divided by 0.039370)

Adaptations:

1. Students work in teams of 2-4. Each student can be responsible for 1-2 locations.
2. Students choose their fourth location (instead of the default of their home/local community) for variance across the class.

Graphing the Information

Using the information recorded on the data collection sheet, students will plot the data on two graphs and four charts:

1) Line graph for maximum daily temperature
2) Line graph for average daily temperature
3) Bar chart for average monthly precipitation (by season)
    a. Spring
    b. Summer
    c. Fall
    d. Winter

Extension Questions

- Why do some areas get less precipitation than others?
- How do mountains affect the weather or climate in an area?
- What factors or variables can affect weather (or climate) in an area?

- What features affect the weather (or climate) in your home or community?
- How can extreme temperatures affect living organisms?

Vocabulary

Climate: the usual weather conditions in a certain place or area.

Data: facts about something that you can use for reasoning and math.

Evaporation: the act or process of evaporating (changing from a fluid to a gas).

Forecast: a guess about the future, especially about weather.

Precipitation: water that falls to the ground as rain, snow, sleet, or hail.

Rain shadow: a region of reduced rainfall on the dry side of high mountains.

Variable: something that may or does vary or change.

Table: a way to organize data using rows and columns.

Weather: the state of the atmosphere in a place. Includes heat or cold, wetness or dryness, calm or storm, clearness or cloudiness.

Assessment

Verify students' graphs accurately reflect the data reported on the data collection form. Graphs should have a title; labels for each axis; and a legend.

Using recorded data and graphs, students should correctly identify which park unit's weather is most similar to their location or community.

References

Channel Islands National Park

- Information about Channel Islands in California.
- Direct URL: < https://www.nps.gov/chis/learn/index.htm>

Devils Postpile National Monument

- Information about Devils Postpile in California.
- Direct URL: <https://www.nps.gov/depo/learn/index.htm>

Death Valley National Park

- Information about Death Valley in California and Nevada.
- Direct URL: < https://www.nps.gov/deva/learn/index.htm>