

Lessons 10–11

Parts of Weather

Prepare

In Lessons 10 and 11, students use their knowledge of weather to investigate how different shelters can protect people from the weather. In Lesson 10, students explore how various kinds of homes can protect people from different parts of weather. During the Conceptual Checkpoint in Lesson 11, students observe and compare the weather at Mesa Verde with their current local weather. They then apply their understanding of the warming effect of sunlight to determine that on a hot day, people at Mesa Verde would have been warmer on top of the mesa than inside a cliff dwelling. Students also use the anchor model to investigate the effects of various parts of weather and to compare how different parts of the Mesa Verde cliff dwellings would have protected people from those parts of weather.

Student Learning

Knowledge Statement

Weather is the combination of sunlight, clouds, wind, rain and snow, and temperature in a particular place at a particular time. Different parts of weather have different effects on people and their surroundings.

Concept 1: Parts of Weather

Focus Question

What is weather?

Phenomenon Question

What is the weather like at Mesa Verde?

Objectives

- Lesson 10: Recognize that different homes are shelters that can protect people from the weather.
- Lesson 11: Describe how the cliff dwellings at Mesa Verde protected people from the weather.

Texas Essential Knowledge and Skills Addressed

- 1.2C **Collect data and make observations using simple tools.** (Addressed)
- 1.2D **Record and organize data using pictures, numbers, and words.** (Addressed)
- 1.4A **Collect, record, and compare information using tools, including** computers, hand lenses, primary balances, cups, bowls, magnets, collecting nets, notebooks, and **safety goggles** or chemical splash goggles, **as appropriate**; timing devices; **non-standard measuring items**; **weather instruments such as demonstration thermometers** and wind socks; and materials to support observations of habitats of organisms such as aquariums and terrariums. (Addressed)
- 1.6A **Identify and discuss how different forms of energy such as light, thermal, and sound are important to everyday life.** (Addressed)
- 1.8A **Record weather information, including relative temperature such as hot or cold, clear or cloudy, calm or windy, and rainy or icy.** (Addressed)
- 1.8B **Observe and record changes in the appearance of objects in the sky, such as the Moon and stars, including the Sun.** (Addressed)

English Language Proficiency Standards Addressed

- 2F Listen to and derive meaning from a variety of media such as audio tape, video, DVD, and CD ROM to build and reinforce concept and language attainment.
- 3F Ask and give information ranging from using a very limited bank of high-frequency, high-need, concrete vocabulary, including key words and expressions needed for basic communication in academic and social contexts, to using abstract and content-based vocabulary during extended speaking assignments.



Materials

		Lesson 10	Lesson 11
Student	Shelter poster activity (1 set per group): crayons or markers, glue or tape, prepared shelter poster (1), weather symbol cards (1 set)	•	
	Conceptual Checkpoint (Lesson 11 Resource B)		•
Teacher	Shelter poster preparation: 11" × 17" or larger paper (6 sheets), glue, color copy of each home photograph from Lesson 10 Resource (1), marker (1), scissors (1), color copies of weather symbol cards from Lesson 10 Resource (6 sets)	•	
	Conceptual Checkpoint: Mesa Verde Long Ago Knowledge Deck poster, access to an online weather resource, demonstration thermometer from Lesson 5 (1), prepared weather recording sheets from Lesson 11 Resource A (2)		•
	Anchor model demonstration: 4 oz spice shaker from Lesson 8 filled with water (1), 6"× 6" cardboard sheet from Lesson 8 (1), anchor model, flashlight (1), waterproof labels (6), permanent marker (1), small rocks ($\frac{1}{2}$ cup), wooden dolls from Lesson 2 (3)		•
Preparation	Cue yurt video, apartment building video, and cave dwelling video: http://phdsci.link/1515 , http://phdsci.link/1516 , and http://phdsci.link/1517 .	•	
	Prepare shelter posters and weather symbol cards. (See Lesson 10 Resource.)	•	
	Prepare two color copies of Lesson 11 Resource A to use during the lesson. Label one copy with a sketch of the school and the other copy with a photograph or other image of Spruce Tree House.		•
	Cue Spruce Tree House webcam (NPS 2020): http://phdsci.link/1518 .		•
	Prepare to distribute a copy of Lesson 11 Resource B to each student.		•
	Place small rocks inside and on top of the anchor model.		•
	Open Street View of Spruce Tree House on Google Maps™: http://phdsci.link/1471 .		•

Lesson 11

Objective: Describe how the cliff dwellings at Mesa Verde protected people from the weather.

Launch 5 minutes



Teacher Note

If it is not possible to take the class outside for this Launch, consider having students look out a window to observe cloud cover and whether it is raining or snowing. Then use an online weather resource to find local temperature and wind conditions (2F).

Take the class outside to observe and measure the current local weather. Guide the class to agree on a description of the current weather, including cloud cover, wind, rain or snow, and temperature. Record weather observations and measurements on the prepared weather recording sheet (Lesson 11 Resource A) labeled with a sketch of the school. 📄 Return to the classroom.

Learn 25 minutes

Prepare for Conceptual Checkpoint (5 minutes)

Tell students that they will now view the weather at Mesa Verde. Show students the webcam of Spruce Tree House (NPS 2020) (<http://phdsci.link/1518>). 📄 Explain that the webcam image shows a Mesa Verde cliff dwelling right now.

Agenda

Launch (5 minutes)

Learn (25 minutes)

- Prepare for Conceptual Checkpoint (5 minutes)
- Conceptual Checkpoint Part A (3 minutes)
- Conceptual Checkpoint Part B (5 minutes)
- Debrief Conceptual Checkpoint (5 minutes)
- Model How the Cliff Dwellings Protected People from the Weather (7 minutes)

Land (5 minutes)



Teacher Note

If students routinely complete the daily weather report during science, use the school weather recording sheet to update the weather calendar as well as the temperature and weather logs when the class returns to the classroom.



Teacher Note

The webcam shows a still view of the Spruce Tree House cliff dwelling at Mesa Verde National Park. Refresh the page to ensure that students see the most recent still shot. If the webcam is not working, use an online weather resource to describe the current weather at Mesa Verde or show students another webcam at the park, such as this one from the US Geological Survey: <http://phdsci.link/1556>.



► What is the weather at Mesa Verde right now?

- *We can see that it isn't raining or snowing.*
- *It looks like it may be sunny.*

► What can we not we tell about the weather at Mesa Verde from the webcam image?

- *We don't know what the temperature is.*
- *We can't tell how windy it is there.*

Tell students they will use what they have learned about weather to answer the Phenomenon Question
What is the weather like at Mesa Verde?

Display the prepared weather recording sheet (Lesson 11 Resource A) labeled with a photograph or other image of Spruce Tree House. Ask students to help identify whether a rain or snow symbol should be circled for the weather at Mesa Verde. Then use an online weather resource to determine the current cloud cover, temperature, and wind speed at Mesa Verde National Park. Show students the temperature on the demonstration thermometer, and have them identify the corresponding color band. Circle the appropriate cloud cover symbol, color band, and wind symbol on the Mesa Verde weather recording sheet. 

Display the completed school and Mesa Verde weather recording sheets.  

Show students the current local temperature on the demonstration thermometer. Then adjust the demonstration thermometer to again show students the current temperature at Mesa Verde. Invite students to act like the red line in the thermometer, first showing the local temperature and then showing the temperature at Mesa Verde. 

► Do you think the weather at Mesa Verde is the same as the weather everywhere else right now?

- *No, because it's far away.*
- *No, because the temperature here isn't the same as the temperature at Mesa Verde.*

Confirm that the weather can be different in different places.

Conceptual Checkpoint Part A (3 minutes)

Return students' attention to the two weather recording sheets. Distribute a copy of the Conceptual Checkpoint (Lesson 11 Resource B) to each student. Direct students' attention to the first question, and



Teacher Note

Use the following conversions to select the corresponding wind symbol:

- For 0–2.9 mph, circle the symbol for not windy.
- For 3–12.9 mph, circle the symbol for a little windy.
- For 13+ mph, circle the symbol for very windy.

See Lesson 4 Resource C for more information.



Differentiation

Consider displaying the parts of weather chart from Lesson 7 to help students recall weather symbol meanings.



Teacher Note

Consider using a document camera to project the completed weather recording sheets so that students can easily view both sheets at the same time. Alternatively, display the weather symbols and temperature color band for each location on a sheet of chart paper or whiteboard.

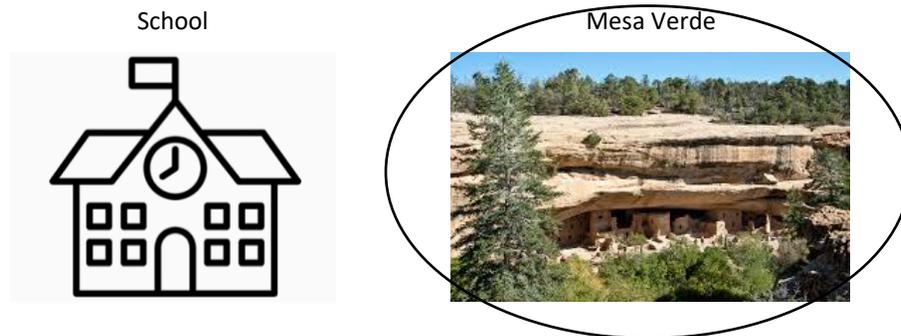


Teacher Note

If the current local weather is the same as the current weather at Mesa Verde, use an online weather resource to find weather data for another location with which students may be familiar. Compare the data with the current Mesa Verde weather data.

read the question aloud. Ask students to use the information on the weather recording sheets to identify and circle the picture of the warmer place. ✨

▶ Which place is warmer today? 📄



Conceptual Checkpoint Part B (5 minutes)

Show students the front of the Mesa Verde Long Ago Knowledge Deck poster, and read aloud the text on the back of the poster.

Emphasize that the people who lived at Mesa Verde experienced both cold weather and warm weather. Pointing to the illustration, clarify for students that the people at Mesa Verde spent time inside the cliff dwellings and grew food on top of the mesa. 🌱

Direct students' attention to the anchor model. Place one wooden doll on top of the mesa and two inside the cliff dwelling. Use a flashlight to model sunlight shining on the anchor model. Ask students to look at where the dolls are placed and think about the following question: Who would feel warmer on a hot, sunny day?

Next, read aloud the second Conceptual Checkpoint question (Lesson 11 Resource B). 👤👤👤 Ask students to circle where people would feel warmer on a hot, sunny day: either on top of the mesa or inside the cliff dwelling.



Spotlight on Knowledge and Skills

Have students describe and compare the weather at the two locations. Ask follow-up questions such as these: Where is it sunnier? Which place has more clouds? Is it windier today at school or at Mesa Verde?



Teacher Note

Student responses to this question will vary depending on current weather conditions. Look for students to correctly circle the picture of the warmer location based on the information on the weather recording sheets (3F).



Content Area Connection: Mathematics

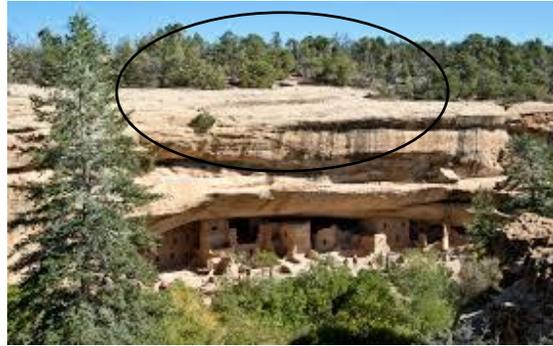
One way that young children begin to internalize patterns is by noting the reoccurrence of similar features. Students' awareness of patterns supports their understanding of cardinality and their early algebraic thinking. Looking for the effects of weather on objects and human activity activates and supports this development.



Differentiation

If students need support completing this part of the Conceptual Checkpoint, use the Mesa Verde Long Ago Knowledge Deck cards. Have students place a sticky arrow on the people in the painting who they think feel warmer: the people on top of the mesa or the people inside the cliff dwelling.

- Where would people feel warmer on a hot, sunny day?



Finally, read aloud the third Conceptual Checkpoint question and answer choices (Lesson 11 Resource B). Ask students to circle the true sentence for the part of the mesa they circled in the previous question.

- Which sentence is true?

▪ *The people would feel warmer because they are inside the cliff dwelling.*

▪ *The people would feel warmer because they are not inside the cliff dwelling.*



Conceptual Checkpoint

This Conceptual Checkpoint assesses student understanding of the Concept 1 Focus Question: **What is weather?**

Evidence	Next Steps
<p>Students select the picture that corresponds to the location (the school or Mesa Verde) with the warmer temperature.</p> <p>Students recognize that people on top of the mesa would be warmer than people inside the cliff dwelling because the people on top of the mesa are in sunlight.</p>	<p>If students do not select the location with the warmer temperature, ask students to act like the red line in a thermometer to show the local temperature. Then ask them to act like the red line to show the temperature at Mesa Verde.</p> <p>Students who do not select the top of the mesa may benefit from revisiting the sunlight, shade, and temperature investigation data in their Science Logbooks (Lesson 9 Activity Guide).</p>

Debrief Conceptual Checkpoint (5 minutes)

Have students discuss with a partner which location they circled for the first Conceptual Checkpoint question (the school or Mesa Verde) and why they selected that location. Then debrief as a class.

- Which place is warmer today, our school or Mesa Verde?
 - *Our school, because it is hot here and warm at Mesa Verde.*
 - *Mesa Verde, because the weather there is warm and the weather here is cool.*

Draw students' attention back to the wooden dolls on the anchor model, and debrief Part B of the Conceptual Checkpoint.

- Who do you think would feel warmer on a hot, sunny day? Why do you think so?
 - *The person on top of the mesa because it is sunny there.*
 - *I think the person on top of the mesa would feel warmer because that person is in the sunlight.*
- How do you think a cliff dwelling protected people from getting too warm on a hot, sunny day?
 - *The people inside the cliff dwelling were in the shade, so I think they felt cooler.*
 - *The top of the cliff dwelling made shade, so it was cooler inside than outside.*

Confirm with students that people on top of the mesa would feel warmer than people inside a cliff dwelling because it is warmer in the sunlight than in the shade.

Model How the Cliff Dwellings Protected People from the Weather (7 minutes)

Show students the Street View of Spruce Tree House on Google Maps™ (<http://phdsci.link/1471>), and explain that the photograph shows what the cliff dwelling would look like if students were standing in it today. Point out the rooms, the ceiling, and the sides of the cliff dwelling. Tell students that as a class, they will determine the parts of the cliff dwelling that protected the people who lived there from different parts of weather.

Invite students to gather around the anchor model. Dim the classroom lights, and shine a flashlight on the top of the anchor model.

- Which parts of the cliff dwelling protected people from sunlight?
 - *The top of the cliff dwelling protected people because it made shade.*
 - *I think the sides are like walls and made shade too.*

Write Protects from Sunlight on labels, and attach the labels to the parts of the model that students suggest protected people from sunlight. 



Teacher Note

Consider drawing the symbol for each part of weather on the labels, either along with the word or in place of the word.

- Which parts of the cliff dwelling do you think protected people from parts of weather other than sunlight?

- *I think the top of the cliff dwelling protected people from rain.*
- *I think the sides protected people from wind.*

Invite a student volunteer to use a sheet of cardboard to model wind blowing on the side of the anchor model.  Ask students to think about how the wind may have affected the people at Mesa Verde and to share their observations.

- What do you notice?

- *The rocks inside the cliff dwelling didn't move very much.*
- *Some of the rocks on top moved, but the rocks inside didn't because they are protected from the wind.*

- If people were in the room inside the cliff dwelling, how do you think the wind would have affected them?

- *I don't think they would have felt the wind very much, just like we don't feel it when we are inside.*
- *There are holes in the walls of the rooms, but I think the rooms helped protect people from the wind a little.*

As students identify parts of the cliff dwelling that protected people from the wind, add the word *wind* (or the wind symbol) to the labels affixed to the model. Also write Protects from Wind on a new label and attach it to the room inside the cliff dwelling.

Next, help students investigate how the cliff dwelling may have protected people from rain by using a spice shaker to sprinkle water gently over the anchor model.  Invite students to Think–Pair–Share about the parts of the cliff dwelling that protected people from the rain.

Sample student responses:

- *I think the top of the cliff dwelling kept people from getting wet.*
- *The sides protected people too.*

As students identify parts of the cliff dwelling that protected people from the rain, add the word *rain* (or the rain symbol) to each part they suggest. 



Teacher Note

Be sure some of the small rocks from lesson preparation are placed on top of the mesa and others are placed inside the cliff dwelling before inviting a student to model wind.



Extension

Snow is a common occurrence at Mesa Verde. Consider using kinetic sand to model snowfall. Kinetic sand crumbles easily and piles up like snow. If students are unfamiliar with the properties of snow, explain that it is like rain in that it falls from the sky but that it only falls when the temperature is cold. Explain that unlike rain, snow can accumulate on the ground and can remain there in cold weather. Clarify that when the weather becomes warmer, the snow melts into liquid water. If students model snowfall, add to the anchor model students' understanding of how the cliff dwelling may have protected people from snow.



Content Area Connection: English

Labeling models reinforces the foundational understanding that spoken words are represented in written language by specific sequences of letters. Consider labeling each part of the model with its name and asking students to provide the letter that makes the initial sound (e.g., *r* for “roof”).



Use students' ideas to also update the summary posted near the anchor model.

Sample anchor model:



Mesa Verde Cliff Dwellings

The cliff dwellings at Mesa Verde protected the Ancestral Pueblo people from the weather. The top and sides of the cliff dwellings protected people from sunlight, wind, and rain. The rooms inside blocked the wind.

Remind students of their wind and rain investigation and sunlight investigation from Lesson 8. Ask students what happened to the soil, rocks, and plants when they modeled wind, rain, and sunlight.

Sample student responses:

- *The wind blew the dirt and rocks around.*
- *The sunlight made the rocks warm.*
- *The rocks, dirt, and plant got wet when we sprinkled water on them.*
- **How do you think the cliff dwellings at Mesa Verde protected materials inside the cliff dwellings?**
 - *I think the sides and the top protected materials in the cliff dwellings too.*

Land 5 minutes

Display the driving question board and read aloud the question on each sticky note. Have students use a nonverbal signal to show whether they can now answer each question, and sort the questions into two columns on the driving question board. If students signal that they can answer the question, place the sticky note with that question in the first column. If students cannot answer the question, move the sticky note to the second column. Continue this process until the class has sorted all the questions.

► What do you notice about our questions in the first column?

- *The questions are about clouds and temperature.*
- *All the questions are about what weather is.*

Use student responses to introduce students to the Concept 1 Focus Question: **What is weather?** Write the Focus Question at the top of the first column.

Sample driving question board: 

Essential Question: How did the cliff dwellings at Mesa Verde protect people from the weather?	
<p>What is weather?</p> <ul style="list-style-type: none"> ▪ <i>Why did my partner say it was warm, but I said it was cold?</i> ▪ <i>How can it be cool even when it is sunny?</i> ▪ <i>Why didn't my partner and I draw the same number of clouds?</i> 	<p>Unanswered Questions</p> <ul style="list-style-type: none"> ▪ <i>How do people know what tomorrow's weather will be like?</i> ▪ <i>Why doesn't it snow here?</i> ▪ <i>Is a thunderstorm part of the weather?</i> ▪ <i>Why does it feel cool outside today, but yesterday it felt warm?</i> ▪ <i>Where does rain come from?</i>
<p>Related Phenomena</p> <ul style="list-style-type: none"> ▪ <i>The roof over the park picnic tables protects me from rain.</i> ▪ <i>Our school keeps us cool when it is warm outside.</i> ▪ <i>Tents and yurts protect from sunlight.</i> 	



Teacher Note

Place student questions related to what weather is and how to describe weather under the Concept 1 Focus Question: **What is weather?** Keep questions related to changes or patterns in weather in the Unanswered Questions column as students will learn more about these topics when they answer the Concept 2 Focus Question: **What does weather data reveal?** (3F).

- Based on what we have learned so far, what is weather?
- *Weather is rain, snow, and wind.*
 - *It is also temperature and clouds.*
 - *We learned that the weather can be different in different places.*
 - *The weather in a place isn't always the same.*