

Lessons 17–20

Local Weather Data

Prepare

In this lesson set, students analyze weather data to answer the Phenomenon Question **What can we find out by looking at weather data?** In Lesson 17, students analyze morning, afternoon, and night temperature data to identify patterns in daily temperature. In Lessons 18 and 19, students use counting and numbers to develop a summary of one month’s weather data, which they will revisit at the end of the school year when they look for long-term weather patterns. In Lesson 20, students learn how meteorologists use tools to collect data and identify patterns that help them predict future weather.

Student Learning

Knowledge Statement

Weather data collected over time may reveal patterns.

Objectives

- Lesson 17: Use weather data to identify and describe patterns in daily temperature changes.
- Lesson 18: Summarize monthly temperature data.

Concept 2: Weather Data

Focus Question

What does weather data reveal?

Phenomenon Question

What can we find out by looking at weather data?



- Lesson 19: Summarize monthly weather data.
- Lesson 20: Explore how meteorologists predict weather and develop weather forecasts.

Texas Essential Knowledge and Skills Addressed

- K.2C **Collect data** and make observations using simple tools. (Addressed)
- K.2D **Record and organize data and observations using** pictures, **numbers**, and words. (Addressed)
- K.3B **Make predictions based on observable patterns in nature.** (Introduced)
- K.3C **Explore that scientists investigate different things in the natural world** and use tools to help in their investigations. (Addressed)
- K.8A **Observe and describe weather changes from day to day** and over seasons. (Addressed)
- K.8B **Identify events that have repeating patterns**, including seasons of the year and **day and night.** (Addressed)

English Language Proficiency Standards Addressed

- 3H Narrate, describe, and explain with increasing specificity and detail as more English is acquired.
- 4A Learn relationships between sounds and letters of the English language and decode (sound out) words using a combination of skills such as recognizing sound-letter relationships and identifying cognates, affixes, roots, and base words.
- 4E Read linguistically accommodated content area material with a decreasing need for linguistic accommodations as more English is learned.



Materials

		Lesson 17	Lesson 18	Lesson 19	Lesson 20	
Student	Prepared bag of linking cubes (1 per student pair)		•	•		
	Science Logbook (Lesson 19 Activity Guide)			•		
	Completed weather log for first month of school (1 per student pair)			•		
	Weather forecast (1 per group)				•	
Teacher	Times of Day Photographs (Lesson 17 Resource A)	•				
	Daily temperature chart preparation: 3" × 3" construction paper squares in colors corresponding to local temperature data (15), chart paper or whiteboard (1), glue or tape, local temperature data for five consecutive days, marker (1), stickers (5), times of day photographs from Lesson 17 Resource A (1 copy of each photograph, optional)	•				
	Demonstration thermometer from Lesson 5	•	•			
	Photograph of students outside during the first week of school		•			
	Completed weather calendar for first month of school or a photograph of this weather calendar with 3" × 3" construction paper color squares for each day's temperature		•	•		
	Temperature and weather linking cube bag preparation (1 set per student pair): linking cubes (quantity and color will vary with local data), plastic bag (1)		•	•		
	Monthly weather poster: 3" × 3" construction paper square in a color corresponding to the temperature that happened most during the first month of school (1), 11" × 17" or larger paper (1 sheet), marker (1), glue or tape, photograph of students from first week of school (1, optional), photograph of weather calendar for first month of school (1, optional)			•	•	
	Cloud Cover Photographs (Lesson 19 Resource)			•		
	Summarize monthly weather data: completed weather log for first month of school (Lesson 7 Resource B), sheet of paper (1), stickers (2 to 5)			•		

Preparation	Identify three corners or areas of the classroom to use for a Question Corners routine. Prepare a color copy of each photograph in Lesson 17 Resource A. During the lesson, post one photograph in each corner.	•			
	Prepare daily temperature chart. (See Lesson 17 Resource B.)	•			
	1 Month Before: Take a class photograph outside during the first week of school.		•		
	On the weather calendar, identify a 3- to 5-day span during which the temperature remained in the same color band (e.g., five green squares in a row). Cover the rest of the weather calendar before Lesson 18 so that only the selected days are visible.		•		
	Prepare bags of linking cubes for temperature data analysis. For each student pair, prepare 1 bag of cubes that correspond in color and quantity to the temperature squares on the weather calendar for the first month of school.		•		
	Prepare a copy of the completed weather log for the first month of school for each student pair.			•	
	Prepare bags of linking cubes for weather data analysis. For each student pair, prepare 1 bag with enough linking cubes to represent the data on the first month of school's weather log for each part of weather. Consider using a different color linking cube for each part of weather.			•	
	Identify and cue a video of a local weather forecast from a television broadcast or online resource. If possible, use a video that shows the forecast for the upcoming weekend.				•
	Cue meteorologist video: http://phdsci.link/1557 .				•
	Prepare weather forecasts. (See Lesson 20 Resource.)				•

Lesson 18

Objective: Summarize monthly temperature data.

Launch 4 minutes



Teacher Note

If the temperature data recorded on the weather calendar for the first month of school shows little variation, consider combining Lessons 18 and 19.

Display the photograph showing students at the beginning of the school year. 

► What kinds of clothes are you wearing in the picture?

- *I am wearing shorts and sandals.*
- *I'm wearing a T-shirt because it was warm that day.*

Ask students to use a nonverbal signal to show whether the clothes they are wearing today are similar to or different from the clothes they have on in the photograph. Invite students with each type of response to share their thinking.

► Do you have on the same kinds of clothes today as you have on in the picture? Why or why not?

- *I wore a jacket to school today because it's colder now.*
- *I am wearing short sleeves in the picture and today, because I don't think it is that much colder now.*

Agenda

Launch (4 minutes)

Learn (25 minutes)

- Observe Monthly Weather Data (5 minutes)
- Analyze Monthly Temperature Data (20 minutes)

Land (6 minutes)



Teacher Note

If the clothing students wore to school today is very similar to what they wore at the beginning of the school year, consider this alternative prompt: What did you do on your last birthday? Encourage students to think about the activities they did and the clothing they may have worn on their birthday. To highlight that weather changes throughout the year, emphasize that students did different activities depending on when they celebrated their birthday.

Remind students that in the previous lesson, they explored daily temperature patterns. Tell students that in this lesson, they will look at other temperature data to figure out if there are additional temperature patterns they can identify.

Learn 25 minutes

Observe Monthly Weather Data (5 minutes)

Display the weather calendar with only the preselected 3- to 5-day span visible.  Point out the repeating temperature data. Ask students to Think–Pair–Share in response to the following questions.

- What do you notice about the temperature for these days?
 - *It was orange for 5 days.*
 - *The temperature didn't change.*
- How do we look for a pattern?
 - *We have to look for information that repeats.*
 - *We also have to see if there is enough information to figure out what happens next.*
- Do you think the data show a pattern? Why or why not?
 - *I think there is a pattern because the temperature is the same every day.*
 - *I'm not sure because I don't think the temperature stayed the same all month.*
- Do you think we can predict the next day's temperature? If so, what do you think it is?
 - *I think it is orange because it was orange every other day that week.*
 - *I don't think we can know for sure because I don't think the temperature is always the same.*

Acknowledge students' contradictory responses, and wonder aloud whether there is enough information to make a prediction about the weather for the next day. Tell students they can use the data on the calendar to determine whether their prediction is correct.



Teacher Note

The purpose of this activity is for students to understand that although daily temperature can change throughout a month, the way the temperature changes from day to day is not a consistent pattern like the change students observed throughout a day in the previous lesson. If the daily temperature is within the same color band for most or all of the month, consider using an online weather resource to find numerical temperature values, and then use the demonstration thermometer to help students more clearly see the temperature changes throughout the month.

Uncover the rest of the weather calendar to reveal the full month of data. 📅

► What do you notice about the weather calendar data?

- *The next day isn't an orange day like I thought it would be.*
- *After all of the hot days, there are a lot of warm days.*

► Do you think that the data show a pattern? Why or why not? ✓

- *No. The temperature was the same for five days, but we couldn't use it to figure out what the temperature would be the next day.*
- *I don't think so, because I thought the next day would be orange like the others, but it wasn't.*

Confirm that the information is not a pattern because, even though the temperature repeats, students could not use that information to predict what the temperature would be the next day.

► What else do you notice or wonder about our temperature data? 📅

- *There are mostly orange and yellow squares near the top but mostly yellow and green at the bottom.*
- *There is only one blue day.*
- *I wonder if we will have any more hot days.*

Highlight observations and questions that relate to change over time, with students comparing the weather earlier in the school year to more recent weather. 🌈



Teacher Note

If a full month of data is not available, display as much data as possible. For example, display both the current month's weather calendar and a photograph of the previous month's weather calendar. (See Lesson 4 Resource C.)



Check for Understanding

Listen for students to share their reasoning as to why the temperature data do not show a pattern (3H). Students should note that although there is repeated information, they cannot use that information to predict future temperatures .

As needed, revisit the temperature data in the weather calendar. Pose guiding questions such as these:

- Are the temperatures repeating?
- If the temperatures are repeating, can we use that information to predict what the temperature will be on the next day? Why or why not?



Teacher Note

Record relevant student questions on sticky notes, and add the notes to the driving question board.



Spotlight on Knowledge and Skills

Engage students in thinking about how the weather stayed the same and how it changed over the month. On the weather calendar, have students point out examples of when the temperature, cloud cover, rain or snow, or wind stayed the same for multiple days in a row. Also ask students to identify days when a part of weather was different from the previous day (K.8A).

► What was the weather like at the beginning of the school year? Is it the same now? 

- *It was hot and sunny at first, but now it's colder.*
- *There is more rain and it's cloudier now than at the beginning of the school year.*

Explain that to be sure about the temperature at the beginning of the school year, students can look at the data they recorded on the weather calendar.

Analyze Monthly Temperature Data (20 minutes)



Teacher Note

If the weather calendar still displays data for the first month of school, take a photograph of the weather calendar before removing the color squares during this activity. At the end of the lesson, refer to the photograph to place the squares back into the calendar pockets correctly.

If data for the first month of school is no longer displayed on the weather calendar, use a photograph of the first month's weather calendar or an online resource such as Weather Underground (<http://phdsci.link/1505>) to identify daily temperatures for that month. For each day of the month, gather a 3" × 3" color square that corresponds to the temperature color band for that day.

Bring students' attention to the weather calendar that has data for the first month of school. 

Sample weather calendar:



Teacher Note

Students may notice temperatures cooling between the start of the school year and the time of this lesson. A change in average daily temperature across one month or year is considered a trend. People can use trends to look for long-term patterns. In later levels, students will look at weather data for multiple years to identify seasonal patterns (K.8B).



Teacher Note

This activity requires weather data for an entire month. If students do not have a full month of data from the first month of school, either use an online weather resource to fill in any missing data or use the first weather calendar that has a full month of recorded data. Use the same month's weather calendar and weather log for Lesson 19.

Ask students to determine which color appears most often. Set the demonstration thermometer to the red color band, and ask students to stand up if they think the thermometer shows the temperature that happened the most during the month. Repeat this process for each color band on the demonstration thermometer.

- How can we figure out what temperature we measured the most throughout the month?
 - *We can look at the color squares on the calendar to see which color we used most.*
 - *We can count the different colors and see which one had the most and which one had the least.*

Build on student responses to explain that the class is going to sort and count the color squares. Remove the month title and the color squares from the calendar, or gather the month title and color squares that correspond to the first month of school. 📄

- How can we sort and compare the color squares?
 - *We can make piles or groups.*
 - *We can sort the squares and line them up by color, like in our temperature log.*

Distribute color squares so that each student receives at least one square. Ask students to choose a sorting method and to work together as a class to sort all the squares. If needed, guide students to arrange the squares into rows by color. 📄 Place the month's title card above the class temperature card sort.

Count aloud with students the number of color squares representing each temperature. Use notecards or sticky notes to label each row of squares with its temperature description and with the number of squares in the row. Include labels for temperature categories that had zero days associated with them.



Teacher Note

In subsequent months, students will use each month's temperature log to analyze and summarize temperature data.

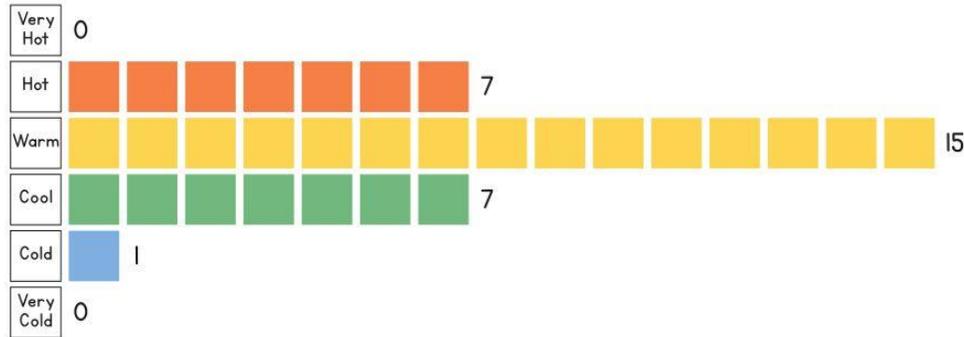


Teacher Note

Identify a classroom space for students to sort the color squares, such as a large table or the floor of the class meeting area. Consider taking a photograph of the temperature card sort and projecting the photograph for students to view.

Sample temperature card sort:

September



Place students in pairs. Give each student pair a prepared bag containing linking cubes that correspond in color and quantity to the temperature cards that the class sorted. Instruct pairs to use the linking cubes to create a tower for each color. Then ask students to count the number of cubes in each tower. 🧑🧑

Post two sentence frames in a location visible to all students to guide student thinking for comparing temperature data:

- There were more ____ days than ____ days.
- There were not as many ____ days as ____ days.

Have partners take turns comparing the number of squares of each color. 🧑🧑 Encourage students to use the linking cubes and sentence frames to help them. Then invite students to share their comparisons with the class.

Sample student responses:

- I noticed there were more warm days than cool days. I counted 15 yellow days and 7 green days.
- There were not as many cold days as cool days. There was only 1 cold day.



Differentiation

If students need support counting linking cubes, count the cubes as a class after student pairs build their towers. Counting together may be particularly useful if the number of linking cubes exceeds 10 for any color.



Content Area Connection: Mathematics

When students count cards and then compare color-coded rows, they are pairing one object with one number and then showing that they understand that the last number they counted means the total number of items.

Land 6 minutes

Draw students' attention back to the temperature card sort. Ask students to Think–Pair–Share in response to the following question:

- What temperature did we measure the most throughout the month? How do you know?
 - *We measured warm the most because there are 15 yellow squares.*
 - *I think there were the most warm days. I can tell because the row of yellow squares is longer than the others.*

Come to an agreement about the temperature that happened the most during the month. Then develop a monthly weather poster that shows the temperature that happened the most during the month.  Tell students they will use this poster, along with other monthly weather posters they create, to look for patterns in temperature throughout the school year.

Sample monthly weather poster: 



Teacher Note

Consider adding to the poster a photograph of the weather calendar and the photograph of students at the beginning of the school year. In Lesson 19, the class will update this poster to summarize other parts of weather for the month.



Teacher Note

If two color bands are tied for most on the weather calendar for a given month, include both colors on the weather poster.

Bring students' attention back to the weather calendar that has data for the first month of school. Remind students that although they did not find a pattern in the day to day temperature changes throughout the month, they are going to summarize each month's temperature data so they can look for patterns throughout the school year.

► Where else can we look for a pattern in our weather calendar data?

- *Maybe we can sort the cloud cover squares and figure out if the month was mostly sunny or cloudy.*
- *We can use our calendar to count how many rainy days there were.*

Acknowledge students' ideas about how to use weather data to look for other weather patterns. Explain that in the next lesson, students will continue to explore the Phenomenon Question **What can we find out by looking at weather data?** as they look at additional weather data.