

# Lessons 8–10

# Seasonal Weather Conditions

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## Prepare

In Lessons 8 through 10, students analyze data to describe how weather conditions change throughout an entire year. In Lesson 8, students use local weather data to build class graphs that show weather conditions experienced each month throughout a year. Students then further analyze and interpret these graphs in Lesson 9 to describe how the weather changes across different seasons. In Lesson 10, students apply what they have learned about seasons in a Conceptual Checkpoint as they analyze weather conditions experienced throughout a year in Galveston, Texas. This leads students to wonder whether the weather stays the same every year.

### Student Learning

#### Knowledge Statement

Seasonal changes occur in weather conditions throughout a year.

### Concept 1: Weather Conditions

#### Focus Question

How do we describe weather?

#### Phenomenon Question

How does the weather change throughout a year?

## Objectives

- Lesson 8: Graph and analyze yearlong temperature and precipitation data to describe weather conditions throughout a year.
- Lesson 9: Combine and interpret multiple data sets to describe weather conditions during each season.
- Lesson 10: Describe Galveston’s seasonal weather conditions to help explore what happened during the 1900 Galveston hurricane.

## Texas Essential Knowledge and Skills Addressed

- 3.2C **Construct maps**, graphic organizers, simple tables, **charts**, and **bar graphs using tools** and current technology to organize, examine, and evaluate measured data. (Addressed)
- 3.2D **Analyze and interpret patterns in data to construct reasonable explanations based on evidence** from investigations. (Addressed)
- 3.2F **Communicate valid conclusions** supported by data in writing, by drawing pictures, and **through verbal discussion**. (Addressed)
- 3.3B **Represent the natural world using models** such as volcanoes or the Sun, Earth, and Moon system and identify their limitations, including size, properties, and materials. (Addressed)
- 3.8A **Observe, measure, record, and compare day-to-day weather changes in different locations at the same time that include air temperature, wind direction, and precipitation**. (Addressed)

## English Language Proficiency Standards Addressed

- 2I Demonstrate listening comprehension of increasingly complex spoken English by following directions, retelling or summarizing spoken messages, responding to questions and requests, collaborating with peers, and taking notes commensurate with content and grade-level needs.
- 3B Expand and internalize initial English vocabulary by learning and using high-frequency English words necessary for identifying and describing people, places, and objects, by retelling simple stories and basic information represented or supported by pictures, and by learning and using routine language needed for classroom communication.
- 5G Narrate, describe, and explain with increasing specificity and detail to fulfill content area writing needs as more English is acquired.



## Materials

		Lesson 8	Lesson 9	Lesson 10
<b>Student</b>	Science Logbook (Lesson 8 Activity Guide)	●		
	Average temperature and total precipitation data table (1 per group)	●		
	Science Logbook (Lesson 9 Activity Guide)		●	
	Average monthly wind speed maps (3 maps per group)		●	
	Science Logbook (Lesson 10 Activity Guide)			●
<b>Teacher</b>	Same Trees During Different Times of Year Photographs (Lesson 8 Resource C)	●		
	January 2017 Average Wind Speed Map (Lesson 9 Resource A)		●	
	Anchor chart		●	
	Conceptual Checkpoint Graphs (Lesson 10 Resource)			●
	Anchor model, driving question board			●
<b>Preparation</b>	Prepare average monthly temperature and total precipitation data tables (see Lesson 8 Resource B).	●		
	Prepare average monthly wind speed maps (see Lesson 9 Resource B).		●	

# Lesson 8

**Objective:** Graph and analyze yearlong temperature and precipitation data to describe weather conditions throughout a year.

## Launch 5 minutes

Display the photographs of the same trees during different times of year (Lesson 8 Resource C). Ask students to closely observe the photographs as they Think–Pair–Share about the following questions.

► What are some similarities and differences between the two pictures?

- *The shapes of the branches and trunks of the two trees in the front look the same.*
- *There are trees in the back that look the same too.*
- *One picture shows green leaves on the trees and the other shows snow.*

► Why do you think the trees look different in the two pictures?

- *I think the trees changed because the weather changed.*
- *I think the trees look different because the pictures were taken at different times of year.*
- *I think one picture was taken during the summer and the other picture was taken during the winter.*



## Agenda

Launch (5 minutes)

Learn (37 minutes)

- Plan to Collect and Graph Data (10 minutes)
- Graph Temperature and Precipitation Data (15 minutes)
- Analyze Yearlong Data (12 minutes)

Land (3 minutes)

Agree that the pictures were taken at different times of year and introduce the Phenomenon Question **How does the weather change throughout a year?** Ask students how they could begin to answer this question.

► **What could we do to determine how weather changes throughout a year?**

- *We could collect data for a whole year.*
- *Maybe we could collect data every month.*
- *We could graph data like we did in the last lesson but for a whole year.*

Highlight student responses that describe a need to create additional graphs and agree that it would be helpful to look at temperature and precipitation graphs for every month of a year to analyze how the weather changed throughout that year.

## Learn 37 minutes

### Plan to Collect and Graph Data 10 minutes

Work with students to generate ideas about how data for each month should be collected and graphed.

*Sample student responses:*

- *We can use the NOAA website to find data for other months.*
- *We already have data for one month. We need to gather the same data for the other months.*
- *We should make more graphs to represent the weather conditions during other months.*

Remind students that each of the graphs they analyzed in Lesson 7 had a separate bar for each day of the month. Point out that it would take a very long time to graph data for each day for an entire year. Explain that to reduce the amount of data they need to graph, students can instead use a single data point to represent the average temperature of a month and another data point to represent the total precipitation during that month. To better describe average temperature to students, explain that the average monthly temperature indicates about how hot or cold a month was in a particular location. 



#### Teacher Note

The following process is used to calculate average monthly temperature. First, the daily maximum temperature and daily minimum temperature for each day of a month are added together and divided by 2 to calculate daily averages. These daily averages are then added together and divided by the number of days in the month to find the average monthly temperature. However, students are not expected to know how to calculate averages. It is enough for them to understand that the average monthly temperature indicates about how hot or cold it was during a given month (21).

Summarize with students that each month will need one bar to represent the average temperature of the month and another bar to represent the total precipitation that occurred during the month.

► **Can you think of a way we can work together to graph average temperature and total precipitation data for each month of a year?**

- *Maybe we can all graph different months.*
- *We could break up into groups.*

Use student responses to agree that the class should divide into groups and split up the data points that need to be graphed.

Divide students into 12 groups and assign a different month to each group.  Explain to students that NOAA has already recorded average temperature and total precipitation data from the previous year and that these data points have been placed in a table for analysis (NOAA NCEI 2018b). Students will graph the data points so that they are easier to analyze. Distribute a populated data table (Lesson 8 Resource B) to each group, and ask students to highlight or circle their month's average temperature and total precipitation.

Explain that each group will create a single bar for two different graphs. One bar will show the average temperature for the group's month, and the other bar will show the total precipitation for that month. At the end of the activity, students will work together to arrange all the groups' bars to create two complete graphs.

Ask students to turn to the blank graphs in their Science Logbooks (Lesson 8 Activity Guide). Note that students will need to use only one blank average temperature graph and one blank total precipitation graph for each group, so students will likely have at least one extra set of blank graphs. If applicable, explain that if students make a mistake drawing a bar on one of the graphs, they can use one of their extra graphs to start over.

Explain that the vertical axis, horizontal axis, and scale on the graphs should be the same as the graphs they analyzed in Lesson 7, but the title and data should be different. Work with students to fill in an appropriate scale, labels, and a graph title.  When the graph's key elements are filled in, tell students they should use the same graphing procedure they used in Lesson 7 when they graphed maximum temperature at Station 1.



### Differentiation

When forming groups, consider each student's needs so that groups will have a variety of abilities and interests. For example, it may be helpful to group students with varied English language ability to support students as they develop interpersonal and academic language.



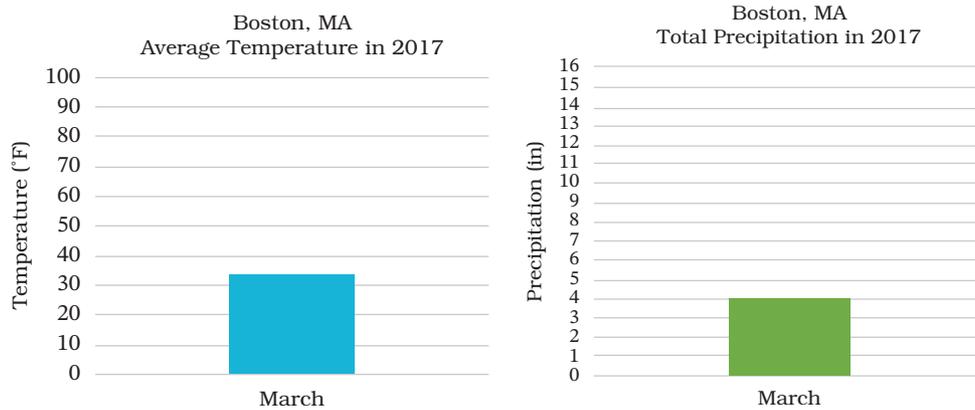
### Teacher Note

All students must use the same scale on the vertical axis for the bars that will be used to create each graph. The scales should be the same as the ones used for the graphs created in Lesson 7 (21).

## Graph Temperature and Precipitation Data 15 minutes

Students in each group should work together to make a bar for their month’s average temperature and a bar for their month’s total precipitation. Students should use a blue pencil or marker to fill in the bar showing average temperature and a green pencil or marker to fill in the bar showing total precipitation. As students work, circulate to support groups and individuals as needed.

Sample graphs:



## Analyze Yearlong Data 12 minutes

Once all groups finish making their bars, ask students to work together to post the bars for each graph in order from January to December in a location that is easily visible to all students. After they post all their bars, students should have two complete bar graphs: one that shows average monthly temperature and another that shows total monthly precipitation.



### Teacher Note

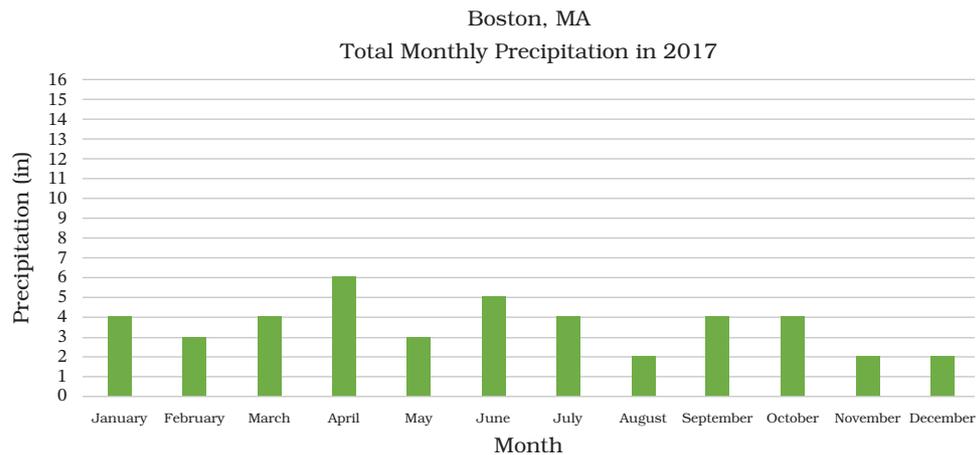
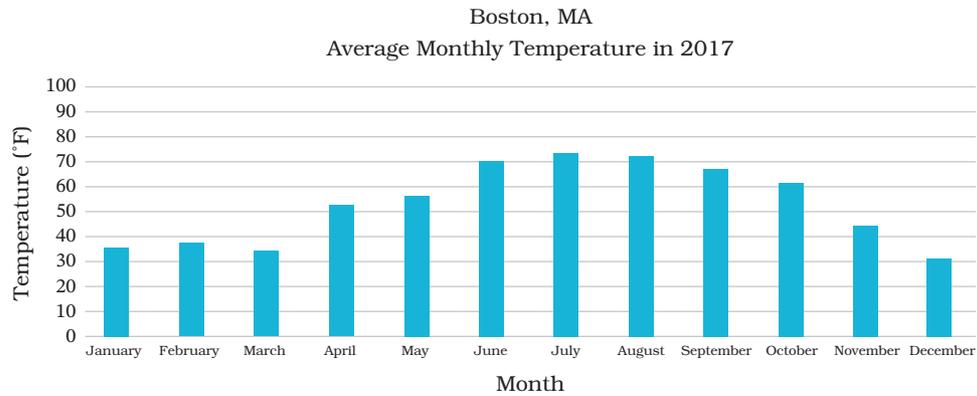
Another option is to help students cut out each of their bars to post on two pieces of chart paper. For this option, make sure to prepare chart paper ahead of time with appropriate markings to create blank graphs for each data set.



### Teacher Note

In the next lesson, students will rearrange the bars of these graphs based on the seasons. When posting the graphs, consider using lightweight tape so that the graphs can be easily rearranged without being broken or torn.

Sample class graphs:



Call the class back together and ask students to closely observe the graphs. Instruct students to record in their Science Logbooks (Lesson 8 Activity Guide) what they notice about how average temperature and amount of precipitation changed throughout the graphed year. 🌈



**Content Area Connection:  
Mathematics**

Model and encourage the use of comparison language such as *more*, *less*, and *fewer*. For example, students may say, “The average temperature in July was almost 40 degrees Fahrenheit more than the average temperature in January.” or “There was less precipitation in August than there was in October.” Post sentence frames such as the ones below for students to use while they study changes in temperature and precipitation throughout the module. This not only supports the use of academic language from the lesson but also reinforces math learning when students solve one- and two-step problems such as “How many more” and “How many less.”

- (Month) had \_\_\_\_\_ inches more precipitation than (Month).
- The average temperature in (Month) was \_\_\_\_\_ degrees Fahrenheit more than the average temperature in (Month).

Sample student responses: 

How did average temperature change throughout the year?	How did amount of precipitation change throughout the year?
<ul style="list-style-type: none"> <li>▪ <i>It looks like the temperature got hotter in the summer and colder in the winter.</i></li> <li>▪ <i>The temperature was hottest in the middle of the year and coldest at the beginning and end.</i></li> <li>▪ <i>December was more than 10 degrees Fahrenheit colder than November.</i></li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>April had the most precipitation.</i></li> <li>▪ <i>The end of the year had the least precipitation.</i></li> <li>▪ <i>There were some months without very much precipitation, but other months had a lot.</i></li> <li>▪ <i>April had two more inches of precipitation than March.</i></li> </ul>

Invite students to share what they notice about the graphs. Build on student responses to describe the major trends in weather conditions throughout the year. Trends in weather conditions may include the following: 

- The temperature was coldest in January, February, and December and warmest in June through August.
- The temperature steadily increased during one part of the year and steadily decreased during another part of the year.
- Most of the precipitation occurred during certain months of the year.



**Check for Understanding**

Students should begin to recognize trends in weather conditions throughout a year.

**Evidence**

Look for evidence that all students describe trends in temperature and precipitation throughout the year by combining and summarizing multiple data points.

**Next Steps**

Note any students who need support in describing and summarizing weather conditions for the entire year. Ask students to describe the trends they notice in smaller intervals, such as every three months. Once students describe the weather conditions they noticed during these smaller intervals, ask them to apply those trends to the whole year.



**Teacher Note**

Some students may mention seasonal differences in weather conditions. In the next lesson, students will describe seasonal variations in weather conditions in greater detail. In this lesson, allow students to share their existing conceptions about seasons without guiding or correcting their thinking.



**Teacher Note**

Trends in weather conditions will vary based on location. Some locations may not demonstrate distinct seasonal trends in precipitation.

# Land

3 minutes

Refer to the trends in weather conditions throughout the year, and ask students whether they were surprised by what they noticed.

*Sample student responses:*

- *No, I expected the temperature to be hot from June through August because those months are during the summer.*
- *I was not surprised. I always know when winter is coming because from September through November the temperature starts to get colder.*

Highlight student responses that refer to a particular season, and ask students to share what they know about the weather conditions during that season.

*Sample student responses:*

- *I know it's always hot in the summer.*
- *It is always cold when we are out of school in December for winter break.*
- *The weather starts to get colder in the fall and the leaves start falling from the trees.*

Build on student responses to agree that learning more about the seasons may help further explain the trends in weather conditions that students observed.

## Optional Homework

Ask students to record different observations and clues that signal the end of one season and the beginning of another season. For example, students may note that the start of a new school year signals the end of summer and the beginning of fall.

