

# Lessons 13–15

## Climate Zones

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### Prepare

In Lessons 13 through 15, students build on what they have learned about their local climate to find out whether the climate is the same everywhere. In Lesson 13, students work in small groups to analyze and interpret patterns in weather data to describe the climate in four other locations. In Lesson 14, students compare the climate of these four locations and their local climate as they investigate climate zones. Students use these comparisons as evidence to explain that climate varies in different regions of the world. In Lesson 15, students use what they have learned about climate in a Conceptual Checkpoint as they analyze the climate of Galveston, Texas, and make predictions about weather conditions expected during a particular season.

### Student Learning

#### Knowledge Statement

Different regions of the world have different climate zones that are determined by patterns in average monthly temperature and annual precipitation.

#### Concept 2: Climate

##### Focus Question

How do people know what weather to expect?

##### Phenomenon Question

Is the climate the same everywhere?

## Objectives

- Lesson 13: Analyze and interpret patterns in weather data to describe the climate of various locations.
- Lesson 14: Compare climate data to explain that climate varies in different regions of the world.
- Lesson 15: Analyze the climate of Galveston, Texas, and explain how climate data can be used to make predictions about weather conditions.

## 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)
- 3.3A **Analyze, evaluate, and critique scientific explanations by using evidence, logical reasoning**, and experimental and observational testing. (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

- 2E Use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborated spoken language.
- 3E Share information in cooperative learning interactions.



## Materials

		Lesson 13	Lesson 14	Lesson 15
<b>Student</b>	Science Logbook (Lesson 13 Activity Guide)	●		
	Climate data for US cities (1 set of graphs for 1 city per student pair)	●		
	Science Logbook (Lesson 14 Activity Guide)		●	
	Science Logbook (Lesson 15 Activity Guide)			●
<b>Teacher</b>	North America Climate Zone Map (Lesson 14 Resource A)	●	●	
	Map of the United States	●		
	Class climate chart from Lesson 12	●	●	
	Climate Zone Descriptions (Lesson 14 Resource B)		●	●
	World Climate Zone Map (Lesson 14 Resource C)		●	
	Anchor chart, anchor model, driving question board			●
	Conceptual Checkpoint Graphs (Lesson 15 Resource A)			●
	Conceptual Checkpoint Questions (Lesson 15 Resource B)			●
<b>Preparation</b>	Print copies of climate graphs for four US cities (see Lesson 13 Resources A, B, C, D, or E); each student pair will need graphs for one city.	●		

# Lesson 15

**Objective:** Analyze the climate of Galveston, Texas, and explain how climate data can be used to make predictions about weather conditions.

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## Launch 5 minutes

Present the following scenario to students.

- ▶ Imagine you are moving to a new location in a climate zone different from your own. Pick the climate zone you would want to move to and discuss with a partner what kinds of clothing you would need to bring with you and what kinds of clothing you would no longer need because of your move.
  - *I would move to somewhere in the dry/desert climate zone, so I would not need my raincoat anymore. I might need to take a sun hat because it is probably sunny a lot.*
  - *I would go somewhere in the polar/tundra zone, so I don't think I would need a swimsuit or sandals. But I would need to bring a warm winter coat.*
  - *I would want to move to the tropical climate zone so I could wear shorts all year long. I wouldn't need to bring my winter sweaters.*

Invite students to share their responses with the class, and point out that knowing a location's climate helps people know what kind of weather to expect in that location.

## Agenda

Launch (5 minutes)

Learn (35 minutes)

- Update Anchor Chart (6 minutes)
- Conceptual Checkpoint (20 minutes)
- Revise Anchor Model (9 minutes)

Land (5 minutes)

# Learn 35 minutes

## Update Anchor Chart 6 minutes

Display the anchor chart and ask students to consider how climate data can be used to help people make predictions about weather conditions.

- ▶ How can knowing the climate of a location help people predict what the weather will be like in that location throughout the year?
  - *Knowing the climate of a location tells you what the weather is usually like during each season.*
  - *Climate helps us know how hot or cold it usually is at different times of year.*

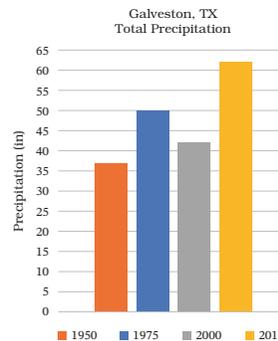
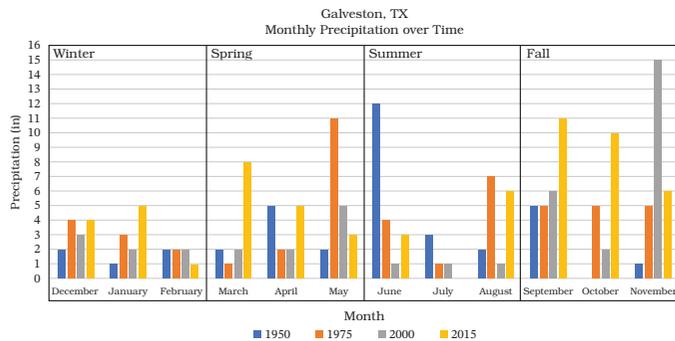
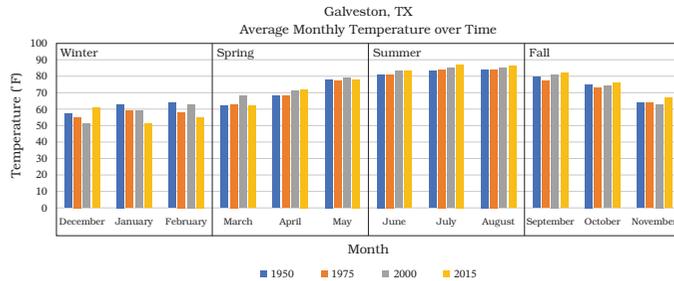
As students share, paraphrase their ideas into a statement that can be added to the anchor chart.

*Sample anchor chart:*

Weather and Climate
<p><b>Weather Conditions</b></p> <ul style="list-style-type: none"><li>• Weather is a description of the conditions in a certain place at a given time. Weather conditions include temperature, wind speed and direction, cloud cover, and amount of precipitation.</li><li>• Seasons (winter, spring, summer, fall) are periods of a year defined by similar weather conditions.</li></ul>
<p><b>Climate</b></p> <ul style="list-style-type: none"><li>• Climate is a description of the pattern of typical weather conditions in a location over time. Climate remains mostly stable, or the same, year after year.</li><li>• Knowing a location's climate can help people predict the types of weather conditions that may occur in that location during different times of year.</li></ul>

## Conceptual Checkpoint 20 minutes

Tell students they now will have the opportunity to explore what the climate is like in Galveston, Texas, as they complete a Conceptual Checkpoint. Display the climate data graphs for Galveston (Lesson 15 Resource A) and the descriptions of each climate zone (Lesson 14 Resource B). 



Then ask students to answer the following questions in their Science Logbooks (Lesson 15 Activity Guide). These questions are available as Lesson 15 Resource B and can be displayed or printed out for students to refer to during the Conceptual Checkpoint.

- ▶ Based on the climate data, which climate zone is Galveston in? Use evidence to support your answer. 
- ▶ Based on Galveston's climate, what would you expect the weather to be like in Galveston next fall?
- ▶ What do you think the weather was like in Galveston during the fall of 1900 when the hurricane occurred?



### Differentiation

Some students may benefit from having their own copy of each graph. Consider printing extra copies and distributing them as needed (2E).



### Content Area Connection: English

Students can use linking words and phrases to support their answers with evidence. Consider displaying words and phrases such as *because*, *therefore*, *since*, and *for example* for students to use to support well structured responses.

Sample student response for each of the Conceptual Checkpoint questions:

- The average monthly temperature in Galveston never gets below 32°F but there are months that are below 64°F. Several months are also above 50°F and it rains a lot throughout the year. That means Galveston fits best in the temperate climate zone.

Next fall, I would expect the average monthly temperatures to be between 63°F and 82°F. I would also expect the temperature to go down each month and at least some precipitation each month.

Because the climate of a location remains mostly stable over time, I think the weather conditions in Galveston during the fall of 1900 were probably similar to the conditions shown on the graphs and like what I predicted for next fall. I think there could have been more precipitation during the month that the hurricane occurred, though. Maybe it was similar to the precipitation shown for November in 2000.



### Conceptual Checkpoint

This Conceptual Checkpoint assesses student understanding of the Concept 2 Focus Question: **How do people know what weather to expect?** Students should demonstrate an understanding of climate and recognize that knowing a location's climate can help people make predictions about weather conditions.

#### Evidence

Look for evidence that all students

- identify that Galveston is in the temperate climate zone by using evidence from the graphs,
- use patterns in average monthly temperature and amount of precipitation to make a reasonable prediction about the weather in Galveston next fall, and
- recognize that the general weather conditions during the fall of 1900 would likely be similar to the weather conditions represented by the data on the graphs.

#### Next Steps

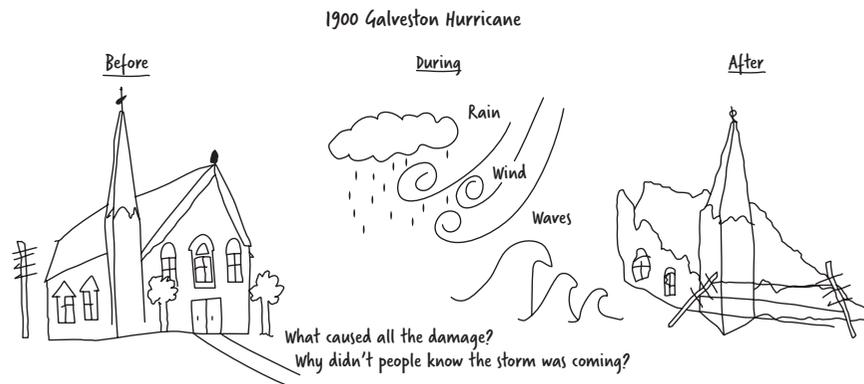
Some students may describe the possibility of additional precipitation during the fall of 1900 in Galveston. This may lead students to wonder what a precipitation graph would look like if a hurricane did occur. Explain that storms other than hurricanes can also cause a lot of precipitation, so it may be difficult to know whether a graphed data set represents a hurricane or another kind of storm.

In the next concept, students will learn more about the weather conditions related to hurricanes and patterns in when and where hurricanes usually occur.

## Revise Anchor Model 9 minutes

Display the anchor model and help students think about how what they have learned about climate relates to the 1900 Galveston hurricane. Focus students' attention on the anchor model explanation and ask students how they might be able to revise it based on their new understandings. Guide students toward updating the anchor model explanation to use precise terminology related to climate.

Sample anchor model:



A hurricane hit the city of Galveston, Texas, on September 8, 1900. Before the hurricane, Galveston was a successful city. The hurricane destroyed the city. We're still not sure how the hurricane caused all the damage, but we know that a location's *climate describes the typical weather conditions over time, and these conditions occur in seasonal patterns.*

## Land 5 minutes

Revisit the Phenomenon Question **Is the climate the same everywhere?** and ask students to answer this question based on what they have learned.

*Sample student responses:*

- *We know that climate is not the same everywhere because we investigated the climate of other locations and found out that different locations have different weather conditions at different times of year.*
- *The data that we collected helped us see that climate is not the same everywhere.*
- *There are different climate zones around the world and these climate zones are really different from one another.*

Display the driving question board and review whether any questions have been answered. Invite students to also share any new questions they have because of new learning. Add these questions to the driving question board.

*Sample questions:*

- *Can we use climate data to predict hurricanes?*
- *How are hurricanes predicted?*
- *Do hurricanes happen at certain times of year?*
- *Do hurricanes happen in patterns like seasonal weather does?*

Draw attention to questions related to whether hurricanes occur in patterns like seasonal weather does. Explain to students that learning more about weather conditions related to severe weather such as hurricanes may be a good place to start investigating the Concept 3 Focus Question: **How can we plan for severe weather?**

