

Lessons 4–7

Describing Weather Conditions

Prepare

In Lesson 4, students think about the different ways weather is described as they plan to collect and record weather data each day. Students then prepare to collect weather data by exploring various weather conditions, determining methods for data collection, and recording initial observations and measurements in Lessons 5 and 6. Finally, in Lesson 7, students create and analyze graphs using weather data as they describe stable and changing weather conditions during a single month.

Student Learning

Knowledge Statement

Weather data collected over time reveal stable and changing conditions.

Objectives

- Lesson 4: Build on prior knowledge to describe different types of weather conditions.
- Lesson 5: Make observations to describe wind speed and direction and cloud cover.

Concept 1: Weather Conditions

Focus Question

How do we describe weather?

Phenomenon Question

What is the weather like where we live?

- Lesson 6: Build a rain gauge to measure precipitation and use a thermometer to measure temperature.
- Lesson 7: Graph and analyze data to describe weather conditions throughout a month.

Texas Essential Knowledge and Skills Addressed

- 3.2B **Collect and record data by observing and measuring** using the metric system **and recognize differences between observed and measured data.** (Introduced)
- 3.2C **Construct maps,** graphic organizers, simple tables, **charts,** and **bar graphs using tools** and current technology to organize, examine, and evaluate measured data. (Introduced)
- 3.2D **Analyze and interpret patterns in data to construct reasonable explanations based on evidence** from investigations. (Introduced)
- 3.3C **Connect grade-level appropriate science concepts with** the history of science, **science careers,** and contributions of scientists. (Introduced)
- 3.4 **Record, and analyze information using tools,** including cameras, **computers,** hand lenses, metric rulers, Celsius **thermometers, wind vanes, rain gauges,** pan balances, graduated cylinders, beakers, spring scales, hot plates, meter sticks, magnets, collecting nets, notebooks, and Sun, Earth, and Moon system models; timing devices; and materials to support observation of habitats of organisms such as terrariums and aquariums. (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

- 2C Learn new language structures, expressions, and basic and academic vocabulary heard during classroom instruction and interactions.
- 3E Share information in cooperative learning interactions.
- 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.



Materials

		Lesson 4	Lesson 5	Lesson 6	Lesson 7
Student	Science Logbook (Lesson 4 Activity Guide, Module Question Log)	●			
	Cloud Sort Photographs (1 set per student pair)		●		
	Science Logbook (Lesson 5 Activity Guides A and B)		●		
	Thermometer			●	
	Science Logbook (Lesson 6 Activity Guide)			●	
	Cup of water with ice cubes (1 per student pair)			●	
	Science Logbook (Lesson 7 Activity Guide)				●
Teacher	Blade of grass or small leaf		●		
	Rain Falling in Flower Garden Photograph (Lesson 6 Resource A)			●	
	Build a Rain Gauge: Build a Rain Gauge Instructions (Lesson 6 Resource B), 2-liter plastic bottle with top cut off, 1 cup of pebbles, 2 rubber bands, 3 or 4 paper clips, ruler, sharp scissors, permanent marker, water			●	
	Using the NOAA NCEI Climate at a Glance Website: City Data Information (Lesson 7 Resource A)				●
	Weather Graph Stations: maximum temperature graph, minimum temperature graph, precipitation graph, maximum temperature data table, procedure sheet for each station, red writing utensil				●
Preparation	Prepare Cloud Sort Photographs (see Lesson 5 Resource A).		●		
	Cue wind videos: http://phdsci.link/1165 , http://phdsci.link/1166 , http://phdsci.link/1167 .		●		
	Cut plastic bottle for rain gauge (see Lesson 6 Resource B).			●	
	Prepare cups of ice water.			●	
	Navigate to the NOAA NCEI Climate at a Glance website (2018a): http://phdsci.link/1168 .				●
	Prepare weather graph stations (see Lesson 7 Resources B, C, and D).				●

Lesson 5

Objective: Make observations to describe wind speed and direction and cloud cover.

Launch 2 minutes

- If someone tells you that it is cloudy outside, how many clouds are in the sky? 
- *There are probably a lot of clouds, but I don't know the exact number.*
 - *There could be a few clouds or a lot of clouds.*
 - *Maybe the whole sky is covered in clouds.*

Draw attention to student responses that highlight uncertainty about the word *cloudy*. Tell students that in this lesson, they will come up with categories for weather conditions like cloud cover to help them make consistent observations when they gather their weather data.

Learn 38 minutes

Determine Cloud Cover 20 minutes

Explain to students that they will work in pairs to examine photographs of different clouds to describe cloud cover, or how much of the sky is covered by clouds. Provide each student pair with a set of Cloud Sort Photographs (Lesson 5 Resource A) and a piece of chart paper. Ask students to work with their

Agenda

Launch (2 minutes)

Learn (38 minutes)

- Determine Cloud Cover (20 minutes)
- Determine Wind Speed and Direction (18 minutes)

Land (5 minutes)



Teacher Note

If time permits, consider taking students outside to record observations about clouds and wind. Have students compare their observations and point out any inconsistencies in how students describe these weather conditions. This should lead students to recognize the need for common language to make consistent observations.

partner to sort the photographs into four categories according to the amount of cloud cover shown in each picture. Students should write a name for each category on a sticky note and place the sticky notes on their piece of chart paper. Students should then tape the photographs they believe belong in each category underneath the sticky note with that category's name. 



Check for Understanding

As students come up with their initial categories, they should understand how cloud cover is related to the amount of sky visible.

Evidence

Look for evidence that all students

- sort the photographs in a way that is related to cloud cover and
- come up with category names that correctly describe the photographs in each category.

Next Steps

If students need additional support, ask follow-up questions to help them notice the amount of blue sky, the size and shape of clouds, and the color of clouds in each photograph.

After all student pairs have finished grouping their cloud photographs, have students participate in a Gallery Walk to view other pairs' categories.  Tell students to pay attention to how other pairs' categories are similar to or different from their own. After students have completed the Gallery Walk, display a piece of chart paper at the front of the room and explain that the class will now work together to come up with class categories for all students to use when collecting weather data. Start this discussion by asking what similarities students notice between each pair's categories.

Sample student responses:

- *Most of us put the pictures showing the sky covered in clouds in the same group.*
- *We all put the pictures showing no clouds in the same category.*

As the class discusses similarities in their categories, call on students to explain why they grouped certain photographs together. Ask the rest of the class to use nonverbal signals to indicate whether they agree or disagree with each grouping. If most students agree with a grouping, tape those photographs close to one another on the chart paper. As needed, guide students toward the four categories shown on the sample class cloud chart by calling attention to differences in the amount of sky visible in each photograph. Continue this discussion until all photographs have been posted on the chart paper.



Differentiation

For additional support, work with students to develop the category names. Ask students follow-up questions to help them notice similarities and differences between the clouds in each category.



Teacher Note

In a Gallery Walk, students' work is posted on chart paper or whiteboards around the room or at desk stations. Students circulate in their groups to each station to closely view and discuss others' work before debriefing with the whole class. A Gallery Walk benefits students by deepening engagement and understanding and by allowing students to share their work with peers (3E).

Explain that students will now need to come up with common terms to describe each category. Invite student pairs to share the category names they used when sorting the clouds and use these ideas to guide students toward the following category names: clear or sunny, mostly clear, mostly cloudy, and overcast.  Write each category name above the clouds in that category.

Sample class cloud chart:



Ask students to summarize what the photographs in each category look like. As students share, record their descriptions next to the photographs on the chart paper.

Sample descriptions:

- *Clear or sunny: There are no clouds in the sky.*
- *Mostly clear: There are some but not very many clouds in the sky.*
- *Mostly cloudy: More than half of the sky is covered by clouds.*
- *Overcast: The sky is almost or completely covered by clouds.*

Tell students that these are the categories they will use when they record daily cloud data. Students should record the categories in their Science Logbooks (Lesson 5 Activity Guide A).



Teacher Note

These terms are commonly used by meteorologists to describe cloud cover. As needed, build on student responses to suggest this more precise terminology. For example, students might use a phrase like “a lot of clouds;” use this phrase to introduce *overcast*, which means that the sky is almost completely covered by clouds (2C).

Determine Wind Speed and Direction 18 minutes

Remind students their weather tables also have a row to record wind data.

► What does it look like outside when it is windy?

- *The leaves of trees move and shake.*
- *When the wind blows hard, things can go flying around in the air.*
- *The flag outside the school waves when it is windy.*

Draw attention to responses about the wind moving objects such as flags or leaves. Play the three wind videos one at a time (video 1: <http://phdsci.link/1165>, video 2: <http://phdsci.link/1166>, video 3: <http://phdsci.link/1167>).

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Ask students to pay close attention to how the tree in each video moves. Instruct students to record what they notice about the videos in their Science Logbooks (Lesson 5 Activity Guide B).

Sample observations:

Video	Observations
1	<i>The leaves are moving a little. The branches are not moving very much.</i>
2	<i>The leaves are moving a lot. The larger branches are swaying up and down.</i>
3	<i>The whole tree is moving. The branches are bending because the wind is blowing so hard.</i>

► **In which video is the wind the strongest? What about the weakest? How do you know?**

- *I think the wind is blowing the strongest in the last video and the weakest in the first video. The tree leaves and branches are moving all around in the last video, but they are barely moving at all in the first one.*
- *The wind is the strongest in the third video because the tree branches are bending and the leaves are shaking. The wind is the weakest in the first video because the tree isn't moving as much.*

► **Is the wind weak or strong in the second video?**

- *It's weaker than the third video but stronger than the first.*
- *It's more like medium wind.*

Use student responses to suggest that a category might be needed for wind that is stronger than in the first video but weaker than in the third. Also point out that sometimes the wind does not blow at all. Use this discussion to come up with the following four categories: no wind, weak wind, moderate wind, and strong wind.

Work with the class to create category descriptions that the class can use when recording wind speed. Refer to the videos as necessary to help students develop the descriptions and record the descriptions on chart paper or a whiteboard. 🐛 Students should also record the categories in their Science Logbooks (Lesson 5 Activity Guide B).



Extension

Wind speed can be measured using a device called an anemometer. Students can build their own anemometer following the instructions outlined in Lesson 5 Resource B. This extension requires an additional class period.

Sample descriptions:

- *No wind: Objects do not move at all.*
- *Weak wind: Small objects (like leaves) move a little.*
- *Moderate wind: Small objects (like leaves) move a lot and medium-sized objects (like small branches) move a little.*
- *Strong wind: Small objects (like leaves) and medium-sized objects (like small branches) move a lot; even big objects (like large branches) move a little.*

After recording the wind speed descriptions, hold up a blade of grass or a small leaf and blow on it, explaining that this is like a weak gust of wind.

► How does the grass move when I blow on it?

- *It moves away from you.*
- *It moves to the right.*
- *It bends down.*

Use student responses to explain that when the wind blows, it pushes on objects and makes them move in the direction the wind is blowing. Replay the second wind video.

► What direction is the wind blowing in the video?

- *It looks like it is blowing to the right because that's the direction the leaves are moving.*
- *The tree is swaying to the right, so that must be the way the wind is blowing.*

► Imagine that you walked to the other side of the tree. What direction would the wind be blowing then?

- *It would be blowing the same direction. The wind wouldn't change.*
- *I think it might be blowing to the left.*

Use student responses to point out that the wind blows in the same direction no matter where a person stands, but that a person might describe the direction of the wind differently based on where they are standing. Suggest that when students record their wind data, they can describe the direction of the wind in relation to a marker around the school. For example, if they stand facing the school, they can describe whether the wind is blowing right, left, up, or down. 

**Extension**

As an extension, students can use a compass to determine cardinal directions from the location from which they decide to make their wind observations. If this is done, students can report wind direction in terms of cardinal direction when gathering daily weather data.



Land

5 minutes

Tell students that they now have common language to use to describe wind speed and direction.

- ▶ **What might we be able to observe outside around the school to help us determine how fast the wind is blowing and in what direction?**
 - *We could look at trees like in the videos.*
 - *Maybe we could look at the flag in front of the school.*

As needed, suggest that students can observe trees, flags, grass, or similar objects when gathering their wind data.  Discuss what observations students should make about the specific marker (or markers) they choose. If the school is not located near trees (or if trees are not chosen as a marker), add notes to the wind speed descriptions about what students think will happen to their marker for wind of each category.

Direct students' attention back to the weather data table in their Science Logbooks (Lesson 4 Activity Guide).

- ▶ **We now have a way to record data about cloud cover and wind speed and direction. What else do we need before we can start recording weather data?**
 - *We still need to figure out how to measure temperature and precipitation.*
 - *I think we need a thermometer to measure temperature and something to measure rainfall.*

Agree that students still need a way to record data about temperature and precipitation.



Teacher Note

Wind direction can be very difficult for students to observe using static objects. If students have difficulty gathering data for wind direction, consider throwing small pieces of grass or leaf matter up in the air and asking students to observe which way the pieces move. Explain that the direction that the pieces move is the direction that the wind is blowing.