SC.5.E.7.3 Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time. **SC.5.E.7.7** Design a family preparedness plan for natural disasters and identify reasons for having such a plan.

ESSENTIAL **QUESTION**

How Do Weather Patterns Help Us Predict Weather?

Engage Your Brain

Find the answer to the following question in this lesson and record it here.

What do you think will happen when the dark cloud moves over this place?

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ACTIVE **READING**

Lesson Vocabulary

List the terms. As you learn about each one, make notes in the Interactive Glossary.

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Signal Words: Details

This lesson gives many details about predicting weather. Active readers look for signal words to identify examples and facts about a topic. Some words and phrases that signal details are for *example*, *also*, and *in fact*.

Windy Weather

You can't see air. But you can feel it each time the wind blows. What exactly is wind, and why does it blow?

ACTIVE READING As you read this page, circle common, everyday words that have a different meaning in science.

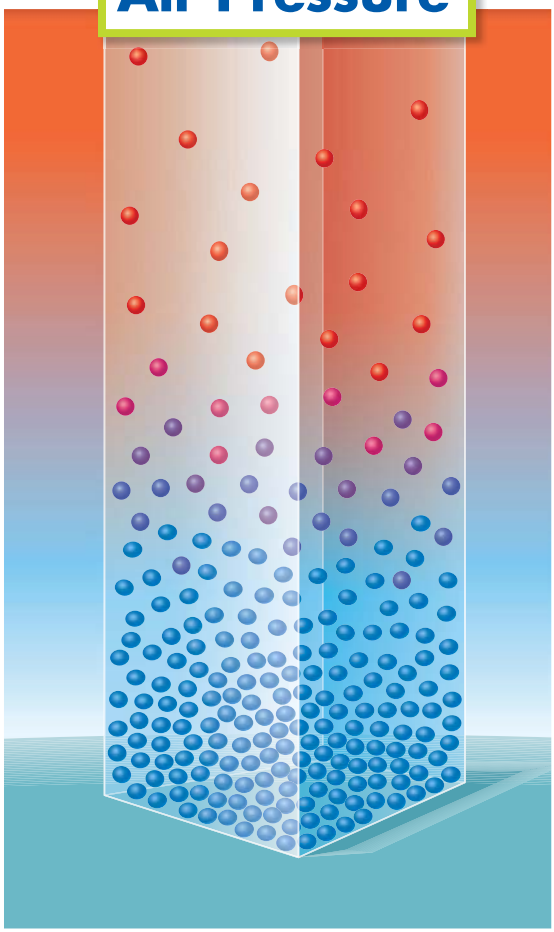
Air is made of matter. It has mass and volume. It presses on you from all sides. To understand wind, you must know more about air pressure. **Air pressure** is the weight of the atmosphere on Earth's surface.

The sun does not heat all parts of Earth's surface evenly. This uneven heating of Earth's surface causes differences in air pressure. The differences in air pressure cause air to move. **Wind** is moving air. In general, wind blows from areas of high pressure to areas of low pressure.

Lows

▶ What are two characteristics of air in a low pressure area?

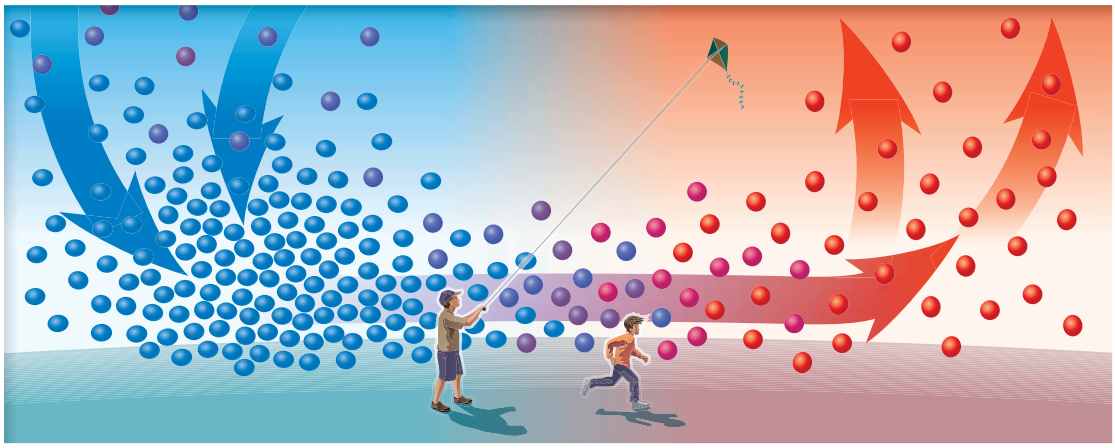
Air Pressure



Local Winds **Land heats up more quickly than water does. This means that during the day, the air above the land is warmer and has a lower density than the air above the water. Because of these differences, the warm air over the land rises and cool air over the water moves inland to replace it. This is called a *sea breeze*.**

At night, the land loses heat faster than the water does. The cool air over the land has a greater pressure than the warm air over the water. So, the cool air moves out to sea to replace the rising warm air. This is called a *land breeze*.

The weight of air particles at the top of the atmosphere presses down on the air particles underneath. So, air pressure is greater near Earth's surface than high above it.



Temperature can affect air pressure. In cold temperatures, where air particles move close together and sink, the air pressure is high. In warm temperatures, where air particles move apart and rise, the air pressure is low. Across Earth's surface, air moves from high-pressure to low-pressure areas.

Battling Bodies of Air

When you take a shower, the air inside the bathroom becomes warm and wet. When you open the bathroom door, the warm, wet air meets cool, dry air. You've made a front! Read on to find out more about fronts and how they affect weather.

ACTIVE READING As you read these two pages, draw boxes around each type of front that is described.

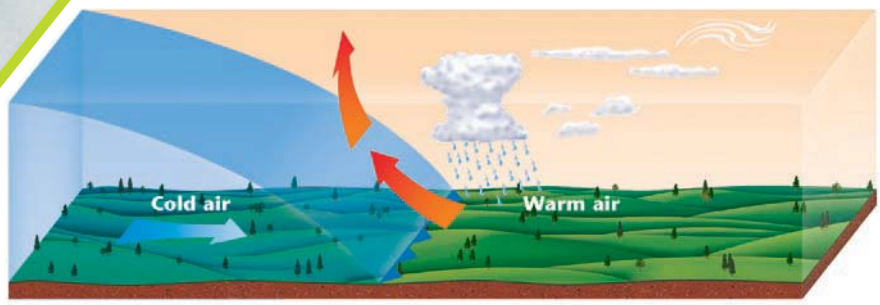
Meteorologists call a large body of air that has the same temperature and moisture properties throughout an **air mass**. The properties of an air mass depend on where it forms. An air mass that forms over warm land will be warm and dry. An air mass that forms over cold water will be cold and wet.

In the United States, winds often blow from west to east. The winds carry air masses from one place to another. Sometimes, two air masses with different properties meet. The boundary between the two air masses is called a **front**.

Different fronts bring different types of weather. A cold front forms where a cold air mass moves under a warm air mass. Severe weather often forms along cold fronts. Sunny skies and cooler air that can be wet or dry usually follow a cold front. A warm front forms where a warm air mass moves over a cold air mass. Light rains and snow showers are common along warm fronts. Behind a warm front, warmer temperatures and cloudy skies are common.

How Will the Weather Change?

▶ Look at the map to the right. In which direction is the cold front moving, and what kind of weather might it bring?



Warm air is lifted steeply upward along a cold front. Water vapor in the air cools and condenses into large cumulonimbus clouds. Hailstorms are possible.

Warm air rises and cools slowly along a warm front. Cloudy skies can extend over large areas. Steady rain or snow can fall.

Weather forecasters use symbols to show fronts. The triangles and half-circles on these symbols point in the direction the front is moving.

Mapping the Weather

A flashing red hand on a traffic signal means *don't walk*. You use symbols each time you cross a busy street. Weather forecasters use symbols, too, to show weather conditions.

ACTIVE READING As you read these two pages, circle clue words or phrases that signal a detail such as an example or an added fact.

Predicting the Weather

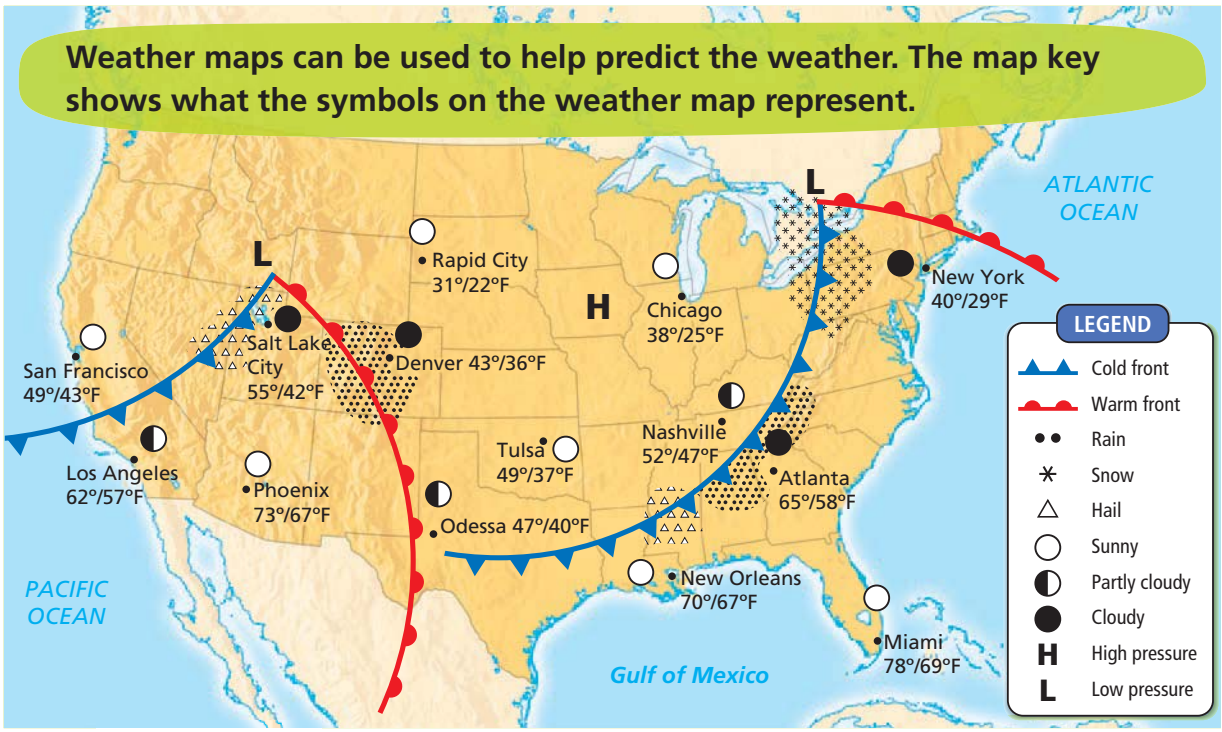
▶ **Use the weather map on the right to describe the weather for the city of Denver and to predict how it will change .**

Maps are useful tools. A **weather map** is a map that uses symbols to show weather data. You already know the symbols for cold fronts and warm fronts. Weather maps also use symbols to show areas of high pressure (H) and areas of low pressure (L). They might also show temperature, cloud cover, and wind direction for different places.

How do meteorologists get the data they need to make weather maps? They use weather tools such as thermometers, barometers, and anemometers. These tools are placed in weather stations. A *weather station* is a structure that has tools for measuring and recording weather data at a given location. Weather stations are found all across the United States.

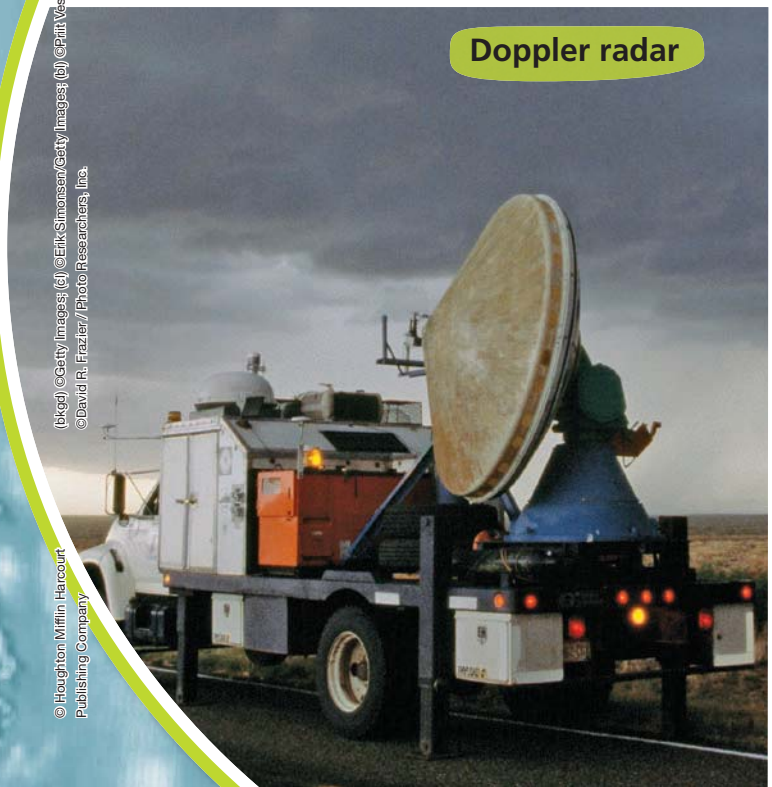
Meteorologists also get weather data from other sources. Satellites high above Earth send back information about cloud cover and storms. Doppler radar uses radio waves to track storms. Meteorologists look for patterns in the data they collect. For example, high pressure often brings fair weather. Low pressure often brings stormy weather. A weather report is based on the patterns that meteorologists find in the data they collect.

Weather maps can be used to help predict the weather. The map key shows what the symbols on the weather map represent.

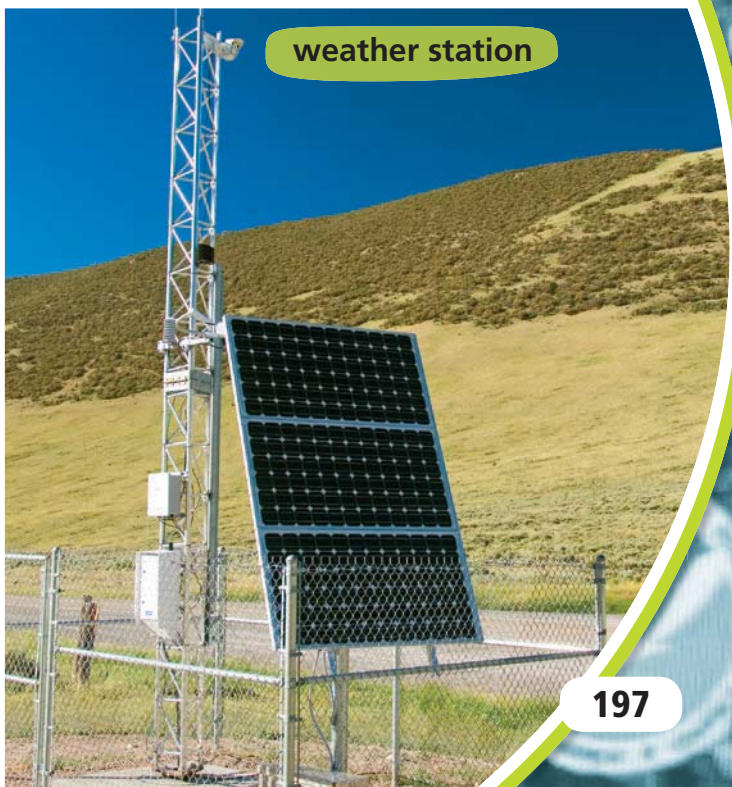


weather satellite

Meteorologists use satellites, Doppler radar, computer models, and weather stations to make weather reports. Using all of these tools, meteorologists are able to accurately track and predict the weather.



Doppler radar



weather station

Why It Matters

When Disaster Strikes

Tornadoes. Hurricanes. Blizzards. Sometimes, the weather can turn dangerous. What should you do to stay safe when bad weather strikes?

ACTIVE READING As you read these two pages, circle two sentences that describe how to stay safe during a disaster.

A hurricane is a low-pressure storm. Its center, or eye, is calm. But wind speeds around the eye can be as fast as 250 km/hr. The strong winds cause much of the damage that a hurricane brings.

Thunder is crashing overhead. You look outside. You see a whirling column of air that stretches from a dark cloud to the ground. It's a tornado! Tornadoes, hurricanes, and blizzards are types of severe weather.

- A *tornado* has a funnel shape. Its strong winds can toss cars into the air. It can form from violent thunderstorms.
- A *hurricane* is a strong storm that forms over warm ocean water. When a hurricane moves over land, it can cause flooding, tornadoes, and thunderstorms. It is the most powerful storm of all.
- A *blizzard* is a strong winter storm. Blizzards have high winds and heavy snowfall.

Preparedness plans **help people stay safe when disasters strike. Before and after a disaster, volunteers help provide assistance for people in need. They might help to sandbag riverbanks to prevent flooding or deliver water and food to those who need it.**

Meteorologists track severe weather. They rank the storms by how strong the winds are or how much damage the storms might cause. They put out warnings so that people can seek shelter before a storm hits.

If possible, you should always go indoors when a storm is near. To prepare for severe weather, you can help your family put together an emergency kit. Your kit should have water, flashlights, batteries, canned food, first-aid supplies, and a radio. Listen to the radio for storm warnings.

DO THE **MATH**

Solve Word Problems

The table shows how much water people of different ages should drink each day. Suppose a family wants to be sure they have enough water in case a natural disaster strikes. The family includes a mother, a father, a 10-year-old son, and a 6-year-old daughter. About how many gallons of water should they store to cover their needs for 3 days?

Remember: 16 cups equal 1 gallon.

Age Range	Amount of Water Needed Each Day
1 to 3 years	4 cups
4 to 8 years	5 cups
9 to 13 years	8 cups
14 years to adult	10 cups

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