Standard: SC.6.E.7.3

Measuring Weather Conditions

Key Words • air pressure • barometer • temperature • thermometer • rain gauge • humidity • psychrometer • wind • anemometer • wind vane

Getting the Idea

How can you describe the weather? Using words such as *pleasant* or *rainy* is not very precise. Is one day rainier than another? How can you tell? By measuring the conditions that make up weather, you can be accurate. Measurements also make it easier to compare the weather from one day to the next.

Air Pressure and Temperature

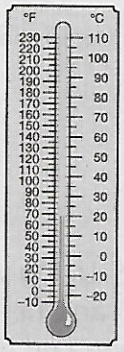
Air pressure is the weight of the atmosphere pressing in all directions. Air pressure is different at different locations. It also changes over time. Air pressure depends on whether the air is warm or cold, wet or dry. You can use an instrument called a **barometer** to measure air pressure.

Barometer

Differences in air pressure occur mostly because the sun heats Earth's surface unevenly. Air over a heated surface absorbs heat from that surface, expands, and becomes lighter. As the air becomes lighter, the air pressure decreases.

Changes in air pressure show that the weather is about to change. If the air pressure drops suddenly, a low-pressure system is moving into the area. A low-pressure system usually brings rainy or snowy weather. If the air pressure rises, a high-pressure system is moving into the area. When this happens, sunny, fair weather is probably on the way.

The temperature of the air is also part of weather. **Temperature** is a measure of how warm something is. A **thermometer** is an instrument used to measure temperature.



Thermometer

The temperature of the air determines how much water vapor the air can hold. Warmer air can hold more water vapor than cold air. Water also evaporates faster when the air is warmer. On warm days, surface water evaporates faster, putting more water vapor in the air. As warm, wet air cools, the water vapor may condense. Clouds may form, and the water may fall as precipitation.

Precipitation

Recall that precipitation is water that falls to Earth's surface. A **rain gauge** is an instrument used to measure the amount of rainfall. A rain gauge is a tall, open cylinder with a wide mouth and markings. The markings are most often in millimeters or inches. The gauge is left outside to collect rain. Then the markings are used to find the amount of rain. As more rain falls, less water vapor is left in the air.

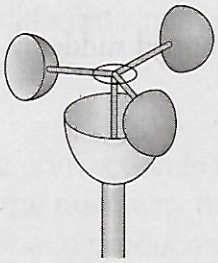
Rain gauge

Humidity

Humidity is the amount of water vapor in the air. Scientists measure humidity using an instrument called a psychrometer. Air that is very humid contains a lot of water vapor. A change in humidity shows a likely change in weather. Precipitation is more likely when the humidity is rising.

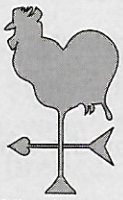
Wind

Scientists use two instruments to measure **wind**, or moving air. An **anemometer** is used to measure wind speed. An anemometer has three or four cuplike arms connected to a pole by spokes. As wind pushes on the inside of the cups, the cups rotate on the pole. The harder the wind blows, the faster the cups spin. The wind speed is read from a dial or digital display.



Anemometer

A **wind vane** is used to measure the direction of the wind. Wind vanes are usually shaped like arrows, with a point and tail. A wind vane spins freely in the wind. The front, or point of the arrow, points in the direction the wind is blowing from. So, if a wind vane points to the east, the wind is blowing from the east.



Wind vane

Weather instruments are used to measure and describe local weather. They only measure the conditions in the area where they are located. The weather these instruments measure is affected by worldwide patterns in the oceans and the atmosphere. You will learn more about how these patterns affect the weather in Lesson 12.

Discussion Question

Why do you think it is important to know the direction the wind is blowing from?

Lesson Review

1. Which instrument would you use to measure the humidity of the air?

   A. thermometer
   C. barometer
   B. psychrometer
   D. anemometer

2. The air pressure in your area has dropped suddenly. Which kind of weather is **most likely** coming?

   A. rain or snow
   B. fair weather
   C. high temperatures and low humidity
   D. sunny weather

3. Which instrument is used to measure air pressure?

   A. thermometer
   C. rain gauge
   B. anemometer
   D. barometer

4. Which of the following is determined by the temperature of the air?

   A. amount of rain
   B. amount of snow
   C. amount of water vapor the air can hold
   D. wind direction and speed