Predicting Weather Vocabulary Definitions

Temperature is one of the most important factors affecting the weather. **Air temperature is usually measured with a thermometer.** A **thermometer** is a thin glass tube with a bulb on one end that contains a liquid, usually mercury or colored alcohol. Thermometers work because liquids expand when they are heated and contract when they are cooled. When the air temperature increases, the temperature of the liquid in the bulb also increases. This causes the liquid to expand and rise up the column.

A **barometer** (buh RAHM uh tur) is an instrument that is used to measure air pressure. **Two common kinds of barometers are mercury barometers and aneroid barometers.**

Even careful weather observers often turn to professional meteorologists for weather information. **Meteorologists** (mee tee uh RAHL uh jists) are scientists who study the causes of weather and try to predict it. Meteorologists are able to interpret information from a variety of sources, including local weather observers, instruments carried by balloons, satellites, and weather stations around the world. **Meteorologists use maps, charts, and computers to analyze weather data and to prepare weather forecasts.** They often use radar to track areas of rain or snow and to locate severe storms such as tornadoes. Forecasters can also follow the path of a storm system. Where do weather reporters get their information? Most weather information comes from the National Weather Service. The National Weather Service uses balloons, satellites, radar, and surface instruments to gather weather data.

Data from many local weather stations all over the country are assembled into weather maps at the National Weather Service. On some weather maps, you see curved lines. These lines connect places where certain conditions—temperature or air pressure—are the same. **Isobars** are lines joining places on the map that have the same air pressure. (*Iso* means "equal" and *bar* means "pressure.") The numbers on the isobars are the pressure readings. Air pressure readings may be given in inches of mercury or in millibars or both. **Isotherms** are lines joining places that have the same temperature. The isotherm may be labeled with the temperature in degrees Fahrenheit, degrees Celsius, or both.

Does the weather where you live change often, or is it fairly constant from day to day? **Weather** is the condition of Earth's atmosphere at a particular time and place. But what is the atmosphere? Earth's **atmosphere** (AT muh sfeer) is the envelope of gases that surrounds the planet. To understand the relative size of the atmosphere, imagine that Earth is the size of an apple. If you breathe on the apple, a thin film of water droplets will form on its surface. Earth's atmosphere is like that water on the apple—a thin layer of gases on Earth's surface.

The weather in an area changes every day. At a given location, the weather may be cloudy and rainy one day and clear and sunny the next. **Climate,** on the other hand, refers to the average, year-after-year conditions of temperature, precipitation, winds, and clouds in an area. For example, California's Mojave Desert, shown below, has a hot, dry climate. Scientists use two main factors—precipitation and temperature—to describe the climate of a region. A climate region is a large area that has similar climate conditions throughout. For example, the climate in the southwestern United States is dry, with hot summers.

As huge masses of air move across the land and the oceans, they collide with each other. But the air masses do not easily mix. Think about a bottle of oil and water. The less dense oil floats on top of the denser water. Something similar happens when two air masses with a different temperature and humidity collide. The air masses do not easily mix. The boundary where the air masses meet becomes a **front.** Storms and changeable weather often develop along fronts.

Winds are described by their direction and speed. Wind direction is determined with a wind vane. The wind swings the wind vane so that one end points into the wind. The name of a wind tells you where the wind is coming from. For example, a south wind blows from the south toward the north. A north wind blows to the south.

Wind speed can be measured with an **anemometer** (an uh MAHM uh tur). An anemometer has three or four cups mounted at the ends of spokes that spin on an axle. The force of the wind against the cups turns the axle. A meter on the axle shows the wind speed.

Relative humidity can be measured with an instrument called a psychrometer. A **psychrometer** (sy KRAHM uh tur) has two thermometers, a wet-bulb thermometer and a dry-bulb thermometer. The bulb of the wet-bulb thermometer has a cloth covering that is moistened with water. When the psychrometer is "slung", or spun by its handle, air blows over both thermometers. Because the wet-bulb thermometer is cooled by evaporation, its reading drops below that of the dry-bulb thermometer.

As you have learned, cold air holds less water vapor than warm air. As air cools, the amount of water vapor it can hold decreases. The water vapor condenses into tiny droplets of water or ice crystals. The temperature at which condensation begins is called the **dew point.** If the dew point is above freezing, the water vapor forms water droplets. If the dew point is below freezing, the water vapor may change directly into ice crystals.

How is the quantity of water vapor in the atmosphere measured? **Humidity** is a measure of the amount of water vapor in the air. Air's ability to hold water vapor depends on its temperature. Warm air can hold more water vapor than cool air.

Weather reports usually refer to the water vapor in the air as relative humidity. **Relative humidity** is the percentage of water vapor that is actually in the air compared to the maximum amount of water vapor the air can hold at a particular temperature. For example, at 10°C, 1 cubic meter of air can hold at most 8 grams of water vapor. If there actually were 8 grams of water vapor in the air, then the relative humidity of the air would be 100 percent. Air with a relative humidity of 100 percent is said to be saturated. If the air had 4 grams of water vapor, the relative humidity would be half, or 50 percent.