LIFEPAC®

SCIENCE

STUDENT BOOK

7th Grade | Unit 6

Alpha Omega
PUBLICATIONS

SCIENCE 706
Weather

LIFEPAC Test is located in the center of the booklet. Please remove before starting the unit.

Author:
Allen Huebert, M.S.

Editor-In-Chief:
Richard W. Wheeler, M.A.Ed
Editor:
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Revision Editor:
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Nick Castro
Andi Graham
Jerry Wingo
Don Lechner

804 N. 2nd Ave. E.
Rock Rapids, IA 51246-1759

Weather

Introduction

The ocean of air surrounding the earth is the atmosphere. Only in the lowest layer, the troposphere, do daily changes occur. These changes continually affect man and the activities he has planned. Each day we make decisions that are affected by the weather. In the morning we decide which clothes we will wear to keep us cool or warm. We look at the clouds to see if we will need an umbrella or raincoat. If the morning is cold, we may need extra time to scrape the frost off the windshield of the car. If the afternoon is hot, we may need to run the air conditioner in the house or car.

Businesses also must make decisions affected by the weather. In rainy weather farmers cannot work in the fields, carpenters cannot build houses, and shoppers may stay home. People must be warned about tornadoes, hurricanes, blizzards, and floods.

Since the beginning of time, man has been interested in the weather. Most religions of the world worship gods that are supposed to control the weather. God's Word shows us that God created the earth and the atmosphere and is in control of the weather. Job summed up the power God has over nature in Job 42:2. "I know that thou canst do every thing, and that no thought can be withholden from thee."

Since we are continually affected by the weather, it would be helpful to have an understanding of what things make up weather and how they work together. From this understanding we can make forecasts about the weather. These forecasts can help us make better decisions about the activities we plan.

Objectives

Read these objectives. The objectives tell you what you will be able to do when you have successfully completed this LIFEPAC. When you have finished this LIFEPAC, you should be able to:

1. Name the main elements of weather and explain how temperature affects weather.
2. Explain what wind is, how it is produced, and how wind patterns are formed.
3. Explain what air pressure is and how it produces air movement around cyclones and anticyclones.
4. Describe the kinds of moisture in the air and how they are measured.
5. Describe the different air masses and where they are formed.
6. Describe the three basic cloud types and how they are formed.
7. Describe the four types of fronts and the weather that is associated with them.
8. Describe the characteristics of different storms.
9. Explain how weather information is gathered and put onto maps.
10. Explain how the meteorologist and the amateur can predict weather.
11. Explain why some weather sayings are useful and others are not.

Survey the LIFEPAC. Ask yourself some questions about this study and write your questions here.

1. ELEMENTS OF WEATHER

Weather is a description of the atmosphere: hot or cold, wet or dry, calm or stormy, clear or cloudy. The study of these conditions of the atmosphere is **meteorology**. Men who study weather are called meteorologists. The main elements of weather are **temperature**, **wind**, pressure, and moisture. These elements work together to produce the conditions of the atmosphere we experience from day to day.

SECTION OBJECTIVES

Review these objectives. When you have completed this section, you should be able to:

1. Name the main elements of weather and explain how temperature affects weather.
2. Explain what wind is, how it is produced, and how the wind patterns are formed.
3. Explain what air pressure is and how it produces air movement around cyclones and anticyclones.
4. Describe the kinds of moisture in the air and how they are measured.

VOCABULARY

Study these words to enhance your learning success in this section.

air pressure (ãr presh´ ur). The weight of the air pushing down on the earth.

anemometer (an u mom´ u tur). An instrument for measuring the speed of the wind.

barometer (bu rom´ u tur). An instrument for determining the air pressure.

bimetallic (bī mu tal´ ik). Made of two kinds of metal.

condensation nuclei (kon den sā´ shun nu klē ī). Particles of dust, soot, or salt on which water vapor can condense.

Coriolis effect (kōr ē ō´ lis u fekt´). The tendency of a moving object to curve due to the rotation of the earth.

dew point (dü point). The temperature to which the air must be cooled to become saturated with water vapor.

highs, or anticyclone (hīz; an tē si´ klōn). A system of winds that rotate clockwise around the center of a high-pressure area.

humidity (hyü mid´ u tē). The amount of water vapor present in the atmosphere.

jet stream (jet strēm). A ribbon of fast-moving air in the upper troposphere traveling often over two hundred fifty miles per hour.

lows, or cyclone (lōz; sī´ klōn). A system of winds that rotate counterclockwise around the center of a low-pressure area.

meteorology (mē tē u rol´ u jē). A study of the atmosphere, especially weather and weather forecasting.

precipitation (pri sip u tā´ shun). Moisture falling from the clouds as snow, rain, sleet, or hail.

relative humidity (rel´ u tiv hyü mid u tē). The ratio of the amount of water vapor in the air to the maximum amount of water vapor that the air could hold. Relative humidity is expressed as percent and varies with temperature.

temperature (tem´ pur u chur). The measure of the amount of heat an object possesses.

thermometer (thur mom´ u tur). An instrument for measuring temperature.

weather (weth´ ur). The state of the atmosphere.

wind (wind). The movement of air over the surface of the earth.

wind vane (wind vān). A movable instrument for showing the direction of wind.

Note: *All vocabulary words in this LIFEPAC appear in* **boldface** *print the first time they are used. If you are not sure of the meaning when you are reading, study the definitions given.*

Pronunciation Key: h**a**t, **ā**ge, c**ã**re, f**ä**r; l**e**t, **ē**qual, t**ė**rm; **i**t, **ī**ce; h**o**t, **ō**pen, **ô**rder; **oi**l; **ou**t; c**u**p, p**u**t, r**ü**le; **ch**ild; lo**ng**; **th**in; */ŦH/* for **th**en; */zh/* for mea**s**ure; */u/* represents */a/* in **a**bout, */e/* in tak**e**n, */i/* in penc**i**l, */o/* in lem**o**n, and */u/* in circ**u**s.

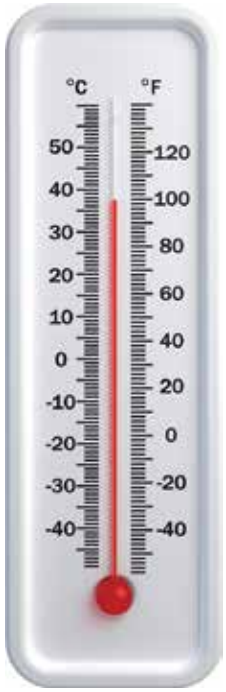
TEMPERATURE

Temperature is the measure of the amount of heat an object has. The higher the temperature, the more heat an object has. Temperature, more than anything else, affects the **weather**. To understand how weather is affected by temperature, we must look at the source of heat energy and how the heat of an object can be measured.

Solar radiation. Like many things in nature, weather needs energy to keep it going. The energy necessary for weather changes is heat energy. Nearly all heat energy comes from the sun. Some of the solar radiation received by the earth is reflected back to space by the atmosphere, clouds, and earth's surface. The rest is absorbed by the atmosphere and earth and is changed into heat energy. The troposphere is heated from *below* by the surface of the earth. As a result, the troposphere is warmer at the bottom than at the top.

Not all parts of the earth's surface receive the same amount of solar radiation. The equator is heated more by the direct rays of the sun. The sun's rays strike the polar regions at a low angle and heat the surface much less than at the equator. These *differences in temperature* are the main cause of weather conditions.

Thermometer. Words like *hot* or *cold* may mean different things to different people . A hot day to an Eskimo may be a cold day to someone living in the Sahara Desert. Scientists have devised a way of measuring the heat of an object so that people all over the earth can know exactly how hot it is. This instrument is called the **thermometer.** *Thermo-* means *heat* and *meter* means *an instrument for measuring; thermometer* means *an instrument for measuring heat.*



| Fahrenheit and Celsius Temperature Scales

All objects are made up of tiny particles called *atoms.* Atoms are continually in motion. The more heat an object has, the faster the atoms move. As the atoms move, they bump into one another and spread out. Heat causes an object to spread out, or *expand.* **Bimetallic** and liquid thermometers measure temperature by measuring how much the metal or liquid expands as it is heated.

In measuring the temperature of different objects, scientists use different temperature scales. Two common temperature scales are Fahrenheit and Celsius. In the Fahrenheit scale, water freezes at 32°F and boils at 212°F. On the Celsius scale, water freezes at 0°C and boils at 100°C. Although the numbers are different, they mean the same thing. Numbers like 72° and 100° are meaningless unless the scale used is also given.

Match these items.

1.1	_____	meteorology	a. means *heat*
1.2	_____	thermo-	b. study of the atmosphere
1.3	_____	thermometer	c. an instrument for measuring temperature
1.4	_____	temperature	d. a measure of the amount of heat in an object
			e. means *an instrument for measuring*

Write the letter of the correct choice.

1.5 Weather is affected more by _____ than by any other element of weather.
a. temperature b. wind c. pressure d. moisture

1.6 Energy for weather changes comes from the _____ .
a. top b. sun c. center of earth d. clouds

1.7 The warmest part of the troposphere is the _____ .
a. top b. middle c. bottom d. clouds

1.8 The part of the earth that receives more solar radiation than any other part is the _____ .
a. equator b. middle latitudes c. poles d. axis

Complete these sentences.

1.9 Common temperature scales are the a. _____ scale and the b. _____ scale.

1.10 The freezing point of water is a. _____ °F and b. _____ °C.

1.11 The boiling point of water is a. _____ °F and b. _____ °C.

Answer these questions.

1.12 What are the main elements of weather?

a. _____ b. _____

c. _____ d. _____

1.13 How is the troposphere heated? _____

_____

_____

1.14 Why do the poles receive less solar radiation than does the equator? _____

_____

_____

1.15 How does heat affect the atoms in an object? _____

_____

_____

1.16 How do thermometers work? _____

_____

_____

Use Data Table 1 to organize the weather information you will gather each day. The information can be obtained in many different ways. Weather reports are usually included as a part of news programs. Some newspapers print a record of the weather facts of the previous day. Many areas of the country have twenty-four-hour weather stations, which broadcast weather data continuously. You can gather information by using a high-low thermometer, **barometer**, hygrometer (for measuring humidity), **wind vane, anemometer**, and a rain gauge.

Gather the weather information for two weeks. A longer period is more desirable. Record the month, day, year, and hour the facts are recorded. Take all readings at the same hour each day.

Data Table 1						
Time Mo/day/yr/ hr	Temperature range, (°C)		Relative humidity, percent	Air pressure, inches	Wind velocity, (mi per hr) and direction	Precipitation (inches)
	Max	Min				

Use Data Table 2 to record the weather patterns that occur in Data Table 1. Record the number of times each of the following combinations occurred during your weather watch. Compare the barometer reading with that of the previous day. If it has increased then record it as a rising barometer. If it has decreased record it as a falling barometer.

Temperature:

- Rising barometer and colder temperatures
- Rising barometer and warmer temperatures
- Falling barometer and colder temperatures
- Falling barometer and warmer temperatures

Wind:

- Rising barometer and wind between SW and N
- Rising barometer and wind between NE and S
- Falling barometer and wind between SW and N
- Falling barometer and wind between NE and S

Precipitation:

- Rising barometer and rain or snow
- Falling barometer and rain or snow

Humidity:

- Rising barometer and increasing humidity
- Rising barometer and decreasing humidity
- Falling barometer and increasing humidity
- Falling barometer and decreasing humidity

Data Table 2							
	Temperatures		Wind		Rain or Snow	Humidity	
	Colder	Warmer	SW-N	NE-S		Incr.	Decr.
Rising barometer							
Falling barometer							

Answer these questions.

1.17 What weather conditions occurred most often with a rising barometer?

_____

_____

_____

_____

1.18 What weather conditions occurred most often with a falling barometer?

_____

_____

_____

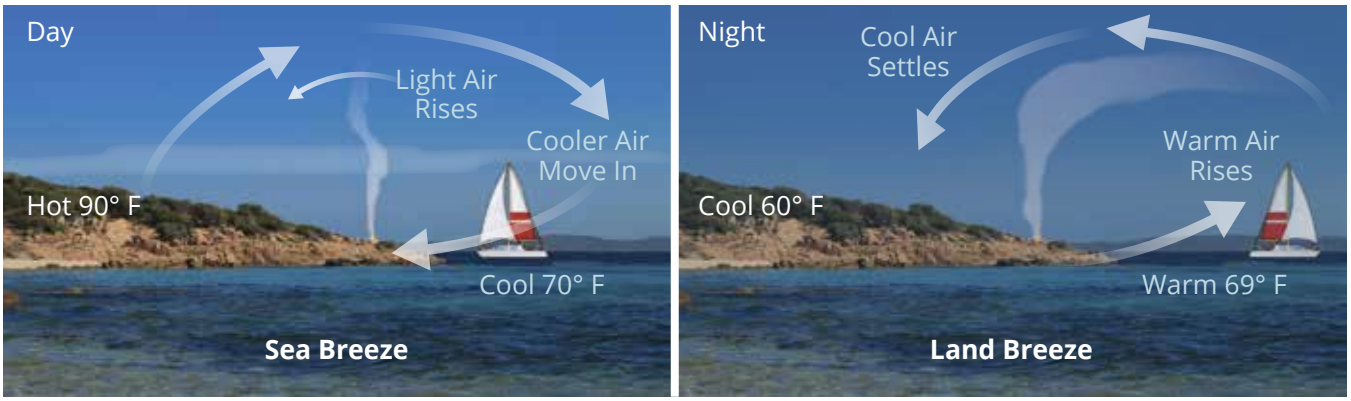
_____

WIND

Wind is the movement of air over the surface of the earth. The energy necessary for air movement comes from uneven heating of the earth and the resulting temperature differences. As air is warmed, it expands and becomes less dense (lighter) than surrounding air. Cooling air contracts and becomes more dense (heavier). Warm air rises, and cold air sinks to fill in the space left by the rising warm air. These differences in temperature and the resulting air movement produce wind.

Air movement plays an important role in weather. Meteorologists use instruments to measure the direction and speed of the wind. Air movement occurs on a small, local scale and on a large, worldwide scale.

Instruments. Wind vanes are instruments used to measure the direction from which the wind is coming. For example, a north wind is coming *from* the north. The arrow on the wind vane points in the direction *from* which the wind is coming. Winds coming from a direction between the points of a compass are named by using both directions, such as *northeast, southeast, northwest,* and *southwest.*



| Coastal Breezes

Anemometers are used to measure the speed of the wind. An anemometer has spokes with cups attached to the ends. As the wind blows, the cups spin. By measuring how fast the cups are turning, the meteorologist can determine the speed of the wind. In the United States the speed is measured in miles per hour.

Local winds. Uneven heating in a small area can create gentle breezes. Not all parts of the earth's surface absorb heat equally. During the day air over water is cooler than air over land. Air over land covered by grass and trees is cooler than air over land that is barren.

Coastal breezes are caused by the differences in temperature over land and water during the day and night. At night the land cools faster than the water. Air over the land cools and sinks while air over the water rises. Warm and cool air move to fill the space left by the other. During the day the temperatures are reversed (warm land and cool water) and the air movement is reversed.

Differences in temperature over land can produce the same results as coastal breezes. Over cultivated fields, rocky mountain slopes, and paved cities, air is heated during the day and rises. Over the surrounding vegetation, air is cooler and sinks to fill the space left by the warm air.

Complete these sentences.

1.19 Wind is _____

_____ .

1.20 Wind is caused by _____ .

1.21 Air that is warmed becomes a. _____ and it

b. _____ .

1.22 Air that is cooled becomes a. _____ and it

b. _____ .

1.23 A wind vane is _____ .

Complete these statements.

1.24 An anemometer is _____ .

1.25 In the United States wind speed is measured in _____ .

1.26 During the day the air over a. _____ is cooler than air over b. _____ (land, water).

1.27 During the day the air over a. _____ is cooler than air over b. _____ (vegetation, bare ground).

1.28 During the night the air over a. _____ is cooler than air over b. _____ (land, water).

Answer these questions.

1.29 What is meant by a *south wind*? _____

_____

1.30 How are wind directions named if the wind is coming from a direction between the points of a compass? _____

_____

1.31 What causes a coastal breeze? _____

_____

_____

1.32 What might happen to the winds if the earth became cooler? _____

_____

_____

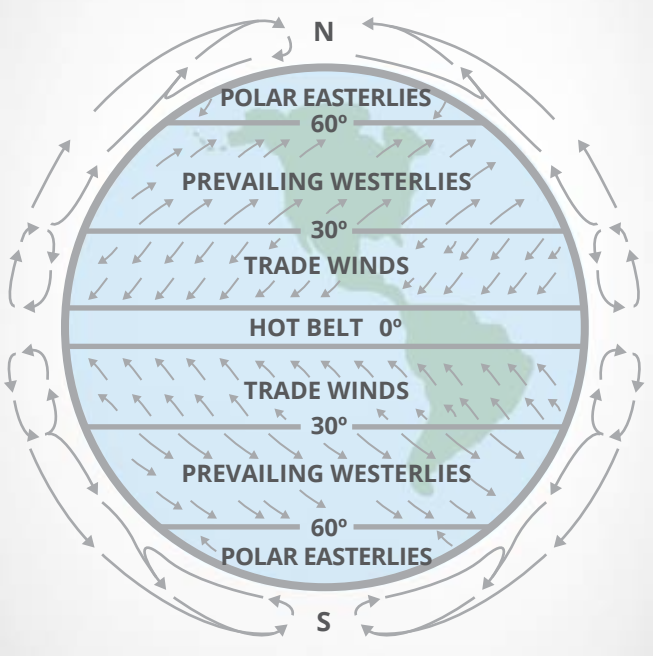
World-wide winds. Air is heated more at the equator than at the poles. Equatorial air usually rises to the upper part of the troposphere. Air over the poles is colder and sinks. Therefore, the general flow of air near the earth's surface is from the poles to the equator. Higher in the troposphere, the air is moving from the equator to the poles.

Ocean currents and air currents are affected by the earth's *rotation*, the turning of the earth on its axis. Objects moving in the Northern Hemisphere tend to curve to the right; those in the Southern Hemisphere tend to curve to the left. This tendency to curve produced by the rotation of the earth is called the **Coriolis effect**. Winds, instead of blowing directly from the north to south, are broken up into smaller parts.

The uneven heating of the earth's surface and the Coriolis effect produce overall wind patterns. Air rising over the equator moves in the upper troposphere toward the poles. At about

30° N and 30° S the air begins sinking to the surface. At the surface some of the air travels back to the equator. These winds curved by the Coriolis force are called the *tradewinds.* The rest of the sinking air continues to travel toward the poles. These surface winds are also deflected by the Coriolis force and are called the *prevailing westerlies.* Cold air traveling over the surface from the poles toward the equator meets the prevailing westerlies around 60° N and 60° S. Here the cold polar air lifts the warmer air of the prevailing westerlies. Some of the rising air is deflected back toward the equator and some is deflected toward the poles. Air moving toward the equator from the poles is called the *polar easterlies.*

An important wind occurring high in the troposphere is the **jet stream**. This ribbon of fast moving air separates the warmer air coming from the equator and the colder air coming from the poles. The jet stream is usually a few thousand feet thick, 80 to 100 kilometers (50 to 60 miles) wide, and moves from west to east. Wind speeds in the center of the jet stream may reach 500 kilometers (300 miles) per hour. The jet stream is somehow linked to the movement of weather patterns across the surface of the earth.



| Wind Belts of the Earth

Complete these sentences.

1.33 Air at the equator is _____ (rising, sinking).

1.34 Air over the poles is _____ (rising, sinking).

1.35 Objects moving in the Northern Hemisphere tend to curve to the _____ (left, right).

1.36 Objects moving in the Southern Hemisphere tend to curve to the _____ (left, right).

1.37 The air in the jet stream is moving from a. _____ to b. _____ (east, west).

Answer these questions.

1.38 What is the general flow of air near the earth's surface? _____

_____

1.39 What is the general flow of air high in the troposphere? _____

_____

1.40 What effect does the jet stream have on the weather? _____

_____

Define these terms.

1.41 jet stream _____

_____

1.42 Coriolis effect _____

_____

Match these items.

1.43 _____ polar easterlies

1.44 _____ prevailing westerlies

1.45 _____ tradewinds

a. winds between the equator and 30°

b. winds between 30° and 60°

c. winds between 60° and the poles

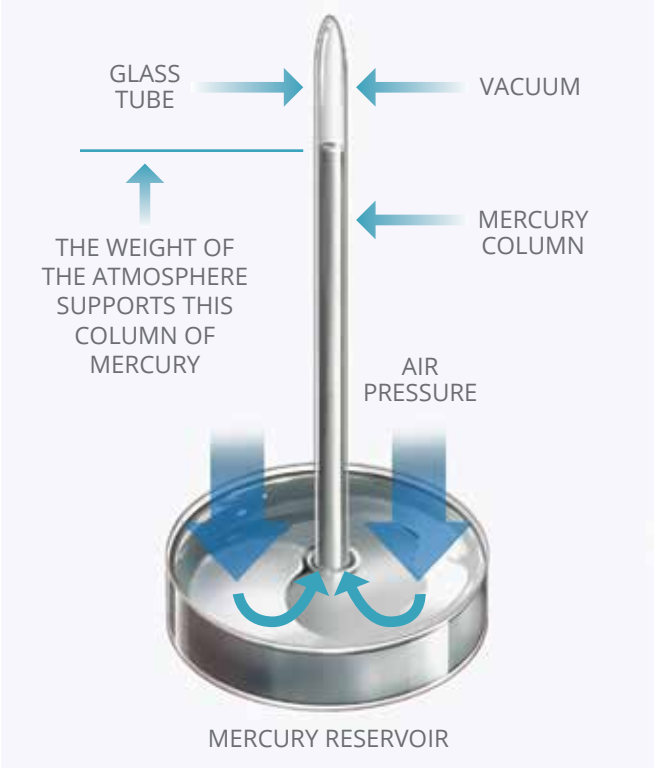
d. winds between 30° and the poles

PRESSURE

Air pressure is a measure of the weight of air pushing down on the earth. The pressure varies from place to place and from time to time. The average pressure is about 14.7 pounds per square inch. This average pressure means that the weight of a column of air over an area of one square inch is about 14.7 pounds. To understand how pressure is related to weather, we must look at the instruments used to measure pressure and at how high pressure and low pressure affect each other.

Barometer. Air pressure is measured with an instrument called a barometer. Barometers are of two types, the mercury barometer and the aneroid barometer. The mercury barometer is made of a long glass tube filled with mercury and sealed at one end. The open end of the tube is inverted into a bowl of mercury. Some of the mercury in the tube will flow into the bowl as gravity pulls on the mercury. Air pressure on the mercury in the bowl tries to push mercury back up the tube. The point at which the pull of gravity and the push of the air are *equal* is the air pressure. The distance from the top of the mercury in the bowl to the top of the mercury in the tube is the measure of the air pressure. The average air pressure at sea level is 76 cm (30 inches) of mercury.

An aneroid barometer is much smaller than a mercury barometer. Instead of mercury,



| How a Mercury Barometer Works

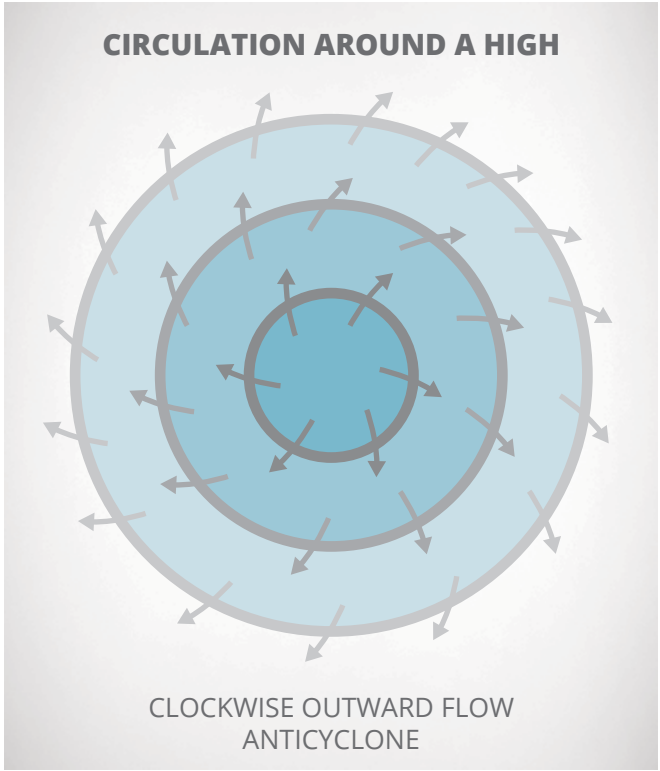
an aneroid barometer has a tiny metal container from which some of the air has been removed. *Aneroid* means *without air*. As air pressure pushes down on the metal container, the sides are pushed in. A series of levers and gears are connected to a pointer that indicates the changes in pressure. Numbers are marked on the dial that match those on a mercury barometer.

Air pressure decreases with height above the earth. At high altitudes, the column of air pushing down is shorter and weighs less. Since very few places on the earth are at sea level, the air pressure readings are converted to sea level pressure. The conversion makes weather forecasting easier.

High Pressure. Cool, sinking air is heavier than warm air. Since cool air weighs more, a high-pressure area is produced where the cool air sinks. Areas of high pressure are called **highs**, or **anticyclones**. *Anti-* **means** *opposite* or *against.* The conditions around a high-pressure area are the opposite of those around the low-pressure area. Air always moves from an area of high pressure to an area of low pressure. The general air movement is out of a high-pressure area. The Coriolis effect causes the air movement to be curved to the right in the Northern Hemisphere. As a result the air moves in a clockwise direction around a high, or anticyclone. Air moving out of a high rotates slower as it moves farther from the high.

High-pressure areas generally have fair weather with little precipitation. The sinking air compresses the air below it and warms it. The warming of the air has the effect of drying the air. As a result more evaporation can take place, making the formation of rain clouds difficult.

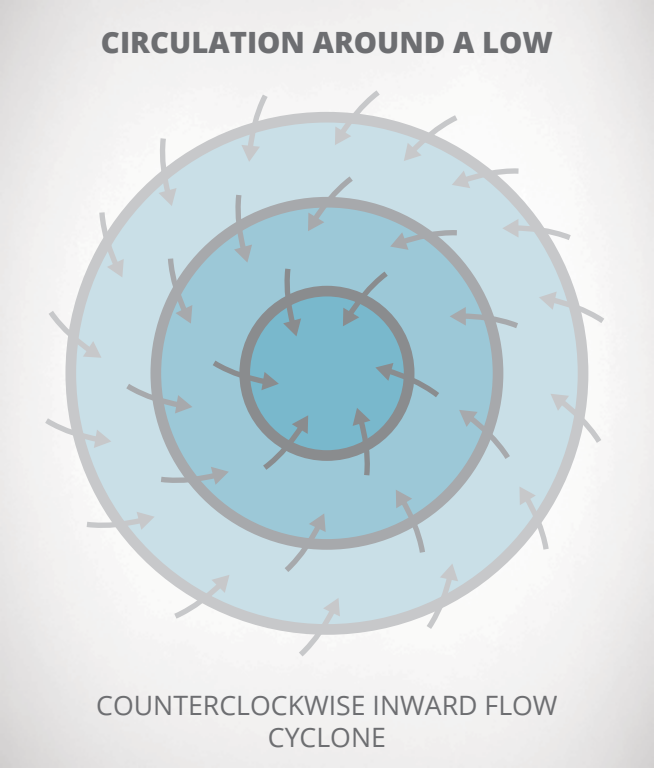
Low pressure. As air is warmed from below by the earth, it expands and rises, creating a low-pressure area. Low-pressure areas are called **lows**, or **cyclones**. Air from a high-pressure area moves *into* the low-pressure area.



| Clockwise Outward Flow Anticyclone

The Coriolis effect again causes the air to curve to the right in the Northern Hemisphere. The inward motion to the right produces a counterclockwise rotation of the air around a low-pressure area. As the air moves inward, it begins to move faster for the same reason that a rock twirled on the end of a string spins faster as the string is pulled in. The counterclockwise winds around a low are much stronger than those around a high.

Unlike high-pressure areas, lows are usually associated with bad weather. The rising, expanding air becomes cooler. Cooling favors condensation and the formation of rain clouds. As more air rises at the center than moves in from the side, a low-pressure area is maintained.



| Counterclockwise Inward Flow Cyclone

Match these items.

1.46 _____ air pressure

1.47 _____ aneroid

1.48 _____ anti-

1.49 _____ anticyclone

1.50 _____ barometer

1.51 _____ cyclone

a. an instrument for measuring air pressure

b. the weight of air pushing down on earth

c. means without air

d. a high-pressure area

e. means *opposite* or *against*

f. a low-pressure area

g. an instrument for measuring temperature

Write the letter of the correct choice.

1.52 The average sea-level pressure in pounds per square inch is nearest to _____ .
a. 1 b. 10 c. 100 d. 1,000

1.53 The average sea-level pressure is _____ inches of mercury.
a. 760 b. 100 c. 30 d. 14.7

1.54 Highs or anticyclones usually have _____ weather.
a. fair b. wet c. cloudy d. muggy

1.55 Lows or cyclones generally have _____ weather.
a. dry b. fair c. cloudless d. bad

Complete these sentences.

1.56 Cold sinking air produces a _____ -pressure area.

1.57 Rising warm air produces a _____ -pressure area.

1.58 Air always moves from a. _____ pressure to b. _____ pressure.

1.59 The movement of air around a low is a. _____ (clockwise, counter-clockwise) and b. _____ (inward, outward).

1.60 The movement of air around a high is a. _____ (clockwise, counter-clockwise) and b. _____ (inward, outward).

Answer these questions.

1.61 How does a mercury barometer measure air pressure?

_____

_____

_____

1.62 What happens to the air pressure as you climb a mountain?

_____

1.63 What is done to the actual air pressures at locations which are not at sea level to help meteorologists forecast weather?

_____

_____

1.64 What usually keeps rain clouds from forming around highs?

_____

_____

1.65 What happens to the air as it gets closer to the center of a low?

_____

_____

1.66 Why do rain clouds usually form around lows?

_____

_____

1.67 How is a low maintained?

_____

_____

MOISTURE

An element of weather that affects how we feel from day to day is the amount of moisture in the atmosphere. If the air contains much moisture, we say it is muggy. The amount of moisture present in the atmosphere varies from place to place and from time to time. Meteorologists use instruments to measure the moisture in the air.

Humidity. The amount of water vapor present in the atmosphere is called the **humidity**. The amount of water vapor is usually expressed as weight of water in a certain volume of air. A certain volume of air can hold a limited amount of water vapor. When the volume holds all the water vapor it possibly can, it is said to be *saturated.* Warm air can hold more water vapor than can cold air.

The atmosphere is usually not saturated with water vapor. The comparison of the actual amount of water vapor in the air to the maximum amount it could hold expressed as percent is called the **relative humidity**. Relative humidity is affected by temperature. If warm air with a relative humidity of 60% is cooled enough, the relative humidity may reach 100%, or saturation. The temperature at which the air becomes saturated with water vapor is called the **dew point**.

Precipitation. When water vapor is cooled, it condenses to form water droplets. Water droplets are very small but many of them can be seen as a cloud. Continued cooling of the water vapor causes water droplets to grow in size. A million cloud droplets are needed to make a

single raindrop. For water droplets or ice crystals to form, small particles of dust, soot, or salt are needed. These particles are **condensation nuclei**.

Raindrops can form in several ways. First, water droplets in the cloud evaporate and provide a source of the water vapor for the growth of ice crystals present in the cloud. This process continues until the ice crystals are too heavy to stay in the cloud. As they fall from the cloud into warm air, they melt and fall as raindrops. Second, a few larger drops begin falling through the cloud. As they bump into smaller water droplets, they capture them. This process continues until the droplets are too large to remain in the cloud, and they fall from the cloud as rain.

Moisture falling from the atmosphere is called **precipitation**. The main forms of precipitation are rain, snow, sleet, and hail. Snow is formed when temperatures in the cloud are well below freezing. Water droplets freeze into ice crystals of many different shapes. Sleet is formed when raindrops fall through air under the cloud that is below freezing. The raindrops freeze to form ice pellets. Hail is formed by strong vertical air movements in a cloud. As falling raindrops are forced up in the cloud, they freeze. Later they continue falling through the cloud and grow in size. Repeating this up-and-down motion allows the ice pellets to grow until the air movement in the cloud can no longer hold them up. As the vertical air movement in the cloud becomes stronger, the hail stones become larger.

Instruments. Humidity and precipitation are measured with different instruments. Relative humidity can be determined using two thermometers. One thermometer has the bulb wrapped with a piece of material that can be moistened. Air is forced over both thermometers. Water evaporates from the *wet bulb thermometer*, cooling the bulb. The wet bulb is lower than the *dry bulb temperature*. This *difference* in temperature can be converted to relative humidity using the proper tables. As the relative humidity increases, the difference in temperature decreases.

Precipitation is measured using a rain gauge. The amount of rain that falls is expressed as the depth of water in inches and hundredths of an inch. The amount of water in snow is much less than in rain. Snow caught in a rain gauge is melted before it is measured. About ten to twelve inches of freshly fallen snow equals one inch of rain.

Define these terms.

1.68 humidity _____

_____

1.69 saturated air _____

_____

1.70 relative humidity _____

_____

1.71 dew point _____

_____

1.72 precipitation _____

_____

Write true or false.

1.73 _____ Cold air can hold more water vapor than warm air.

1.74 _____ The relative humidity is affected by the temperature.

1.75 _____ Water droplets form from water vapor by evaporation.

Answer these questions.

1.76 What kinds of particles help to form water droplets?

_____

1.77 What are these particles called? _____

1.78 What are the two ways that raindrops can form?

a. _____

_____

b. _____

_____

1.79 What are the main forms of precipitation? _____

_____

1.80 How is snow formed? _____

_____

1.81 How is sleet formed? _____

_____

1.82 How is hail formed? _____

_____

1.83 How is the amount of water in snow measured? _____

_____

Complete the sentences.

1.84 The relative humidity is measured using a. _____ and b. _____ bulb thermometers.

1.85 Precipitation is measured using a _____ .

1.86 One inch of rain equals about a. _____ to b. _____ inches of snow.

View 706 Dew Point, from the Grade 7 SCIENCE EXPERIMENTS Video

Determine the dew point.

These supplies are needed:

- shiny metal can
- ice cubes
- water
- thermometer

Follow these directions and answer the questions. Put a mark in the box when each step is completed.

☐ 1. Record the temperature of the air.

☐ 2. Fill a shiny metal can with water at room temperature.

☐ 3. Slowly add ice to the water and stir gently with the thermometer. Continue to add ice until a film of water appears on the surface of the metal can.

☐ 4. Read the temperature of the water in the can as soon as the moisture appears. This temperature is the dew point.

☐ 5. Repeat this experiment to confirm the data.

Dew Point Experiment

Trial	Air Temperature	Dew Point
1		
2		

1.87 Why must the metal can be shiny? _____

_____

1.88 Why must the ice be added slowly? _____

_____

1.89 What advantages would be in repeating the experiment several times?

_____

_____

1.90 What is the average dew point? _____

TEACHER CHECK _____ initials _____ date

Dew Point Experiment

Review the material in this section in preparation for the Self Test. The Self Test will check your mastery of this particular section. The items missed on this Self Test will indicate specific areas where restudy is needed for mastery.

SELF TEST 1

Match these items (each answer, 2 points).

1.01 _____ air pressure
1.02 _____ anticyclone
1.03 _____ Coriolis effect
1.04 _____ cyclone
1.05 _____ dew point
1.06 _____ humidity
1.07 _____ meteorology
1.08 _____ precipitation
1.09 _____ temperature
1.010 _____ wind

a. a study of the atmosphere and the weather
b. a measure of the amount of heat in objects
c. the movement of air over the earth's surface
d. the tendency of a moving object to curve due to the earth's rotation
e. the weight of the air pushing down on the earth
f. a high-pressure area; a high
g. a low-pressure area; a low
h. the amount of moisture in the air
i. the temperature at which the air becomes saturated
j. the moisture that falls from the clouds
k. an instrument for measuring temperature.

Write the letter of the correct choice (each answer, 2 points).

1.011 The element that affects the weather most is _____ .
a. temperature b. wind c. pressure d. moisture

1.012 The energy necessary for weather changes to occur comes from _____ .
a. evaporation b. condensation
c. heat in the center of the earth d. the sun

1.013 The instrument used for measuring the temperature of an object is the_____ .
a. thermometer b. barometer c. anemometer d. wind vane

1.014 Temperature differences on the surface of the earth produce _____ .
a. rain b. clouds c. humidity d. wind

1.015 As air is warmed by the surface of the earth it _____ .
a. rises b. sinks c. condenses d. boils

1.016 The general flow of air from the poles to the equator occurs _____ .
a. in the stratosphere b. in the upper troposphere
c. at the surface of the earth d. only on a nonrotating earth

1.017 Objects tend to curve to the right _____ .
a. in the Southern Hemisphere b. in the Northern Hemisphere
c. only in North America d. only in South America

1.018 The jet stream affects _____ .
a. the movement of weather patterns b. the humidity
c. the temperature d. the dew point

1.019 The instrument used to measure air pressure is the _____ .
a. thermometer b. barometer c. anemometer d. wind vane

1.020 The movement of air around an anticyclone is _____ .
a. upward b. inward c. counterclockwise d. clockwise

1.021 Lows generally have _____ .
a. bad weather b. clear skies
c. little precipitation d. fair weather

1.022 As air is cooled it _____ .
a. rises b. sinks c. evaporates d. freezes

1.023 An instrument used to determine the direction of air movement is the _____ .
a. thermometer b. barometer c. anemometer d. wind vane

1.024 The general flow of air from the equator to the poles occurs _____ .
a. in the stratosphere b. in the upper troposphere
c. at the surface of the earth d. only on a nonrotating earth

1.025 An instrument for measuring the speed of the wind is the _____ .
a. thermometer b. barometer c. anemometer d. wind vane

Write true or false (each answer, 1 point).

1.026 _____ Highs are generally accompanied by fair weather.

1.027 _____ The movement of air around a cyclone is counterclockwise.

1.028 _____ Relative humidity is affected by temperature.

Complete these sentences (each answer, 3 points).

1.029 Particles of dust, soot, and salt on which water vapor condenses are called _____ .

1.030 The main forms of precipitation are a. _____ , b. _____ , c. _____ , and d. _____ .

1.031 The main elements of weather are a. _____ , b. _____ , c. _____ , and d. _____ .

Answer these questions (each answer, 4 points).

1.032 What is relative humidity? _____

_____

_____

1.033 In which direction does air always move? _____

_____

_____

71/88 **SCORE** _____ **TEACHER** _____ _____
initials date

NOTES

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PUBLICATIONS

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