Chapter 24 General Science

Weather and Climate

24-1 Air on the Move

Words to Know

**weather**- the condition of the atmosphere at a certain time and place

**climate**- the average weather in a region over many years

**air mass**- a huge body of air that moves from place to place

**front**- the place where two air masses of different temperatures meet

**occluded front-** the front that forms when a cold front overtakes a warm front

**meteorology**- the scientific study of the Earth’s atmosphere and weather

\* How is the wind from a tornado different from ordinary winds? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* What safety measures should be taken if a tornado occurs? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* What is our school plan for a tornado? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* What problems might a tornado cause? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* Hurricanes and typhoons are the same storms with different names (Atlantic or Pacific Ocean).

\* Define the word front as we use it in everyday life. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* In science, the *front* or “part facing forward or beginning” is where two air masses of different temperatures meet.

\* The *occluded front* is the place where a cold air mass meets, and overtakes, a warm air mass.

\* How can weather affect your day? Consider both positives and negatives.

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\* Remember: Air pressure is the weight of the atmosphere pressing down on the Earth’s surface. Humidity is the amount of water vapor in the air. Precipitation is any form of water that falls to the Earth’s surface from clouds.

\* What does **weather** mean to you? What about **climate**? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* If you had a choice, where would you want to live? Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* Weather and climate affect people’s lives in many ways. Weather affects what people wear and what activities they can do outside.

\* Climate affects outdoor jobs such as farming, construction, and tourism. Many people choose where to live depending on the climate.

\* Temperature, air pressure, humidity, wind speed, clouds, and precipitation are all part of what makes up weather. However, the weather in an area changes because of **air masses**.

\* Air masses can cover land or ocean areas. They can have high or low humidity. They can be hot or cold. An air mass over the North Pole is very cold. An air mass over the equator is very warm.

\* An air mass can change an area’s temperature or humidity as it travels over an area.

\* Air masses can meet, but they do not mix together. Clouds and precipitation often form at **fronts**.

\* When a warm air mass moves into a cold air mass, a *warm front* forms. As the warm air rises over the cold air, the warm air cools. As it cools, water vapor condenses and forms precipitation. There is usually rain or snow along a warm front. After a warm front passes, the temperature rises.

\* Warm air rises along a long, gentle slop at a warm front. As a result, precipitation is lighter and lasts for a longer period of time.

\* The boundary between cold and warm air at a cold front is much steeper than at a warm front, bringing briefer but heavier precipitation.

\* When a cold air mass moves against a warm air mass, a *cold front* forms. The cold air pushes forward. This forces the warm air up over the cold air. The rising warm air quickly cools, causing short but heavy rain or snow showers. Temperatures drop as the cold front passes.

\* Cold fronts move much faster than warm fronts. Sometimes a cold front overtakes a warm front. An **occluded front** produces calmer weather than a cold front or a warm front.

\* Observations of weather conditions are taken at the same time several times per day at over 8,000 stations worldwide.

\* Weather forecasters (**meteorologists**) make their living doing this.

\* Information used for weather forecasts comes from many places. Weather stations have instruments that measure:

1.) air press

 2.) humidity

 3.) wind speed

 4.) wind direction

 5.) air temperature

 6.) the amount of precipitation

\* Weather information also comes from:

1.) satellites

2.) weather balloons

3.) ocean floats

 4.) airplanes that carry instruments

 5.) radar

\* Computers collect and process the data. The computers then make models of possible weather patterns.

\* Meteorologists use computers to put the information on maps.

*24-2 Storms*

**cumulonimbus cloud-** a tall, thick, white cumulus cloud that is dark at the bottom; also known as a thunderhead

**cyclone**- an area of low air pressure with circling winds

**hurricane-** a stormy cyclone with high winds that forms over the Atlantic Ocean

**typhoon-** a stormy cyclone with high winds that forms over the Pacific Ocean

**tornado-** a cyclone that extends down from a cumulonimbus could and forms a funnel-shaped cloud

\* What are some features of storms? Consider minor and major storms.

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\* An average of 40,000,000 (that’s million) lightning strikes hit the Earth’s surface each year. About 2,000 thunderstorms are occurring on Earth at any particular moment.

\* A thunderstorm is a short, violent storm with rain, lightning, and thunder.

\* Thunderstorms happen when warm, moist air rises quickly. The air may be forced upward by a mountain or a cold front. The warm, humid air cools quickly as it rises. This turns the moisture in the air into rain.

\* Thunderstorms may also occur on hot summer afternoons, when the Earth’s surface heats moist air. As the warm air rises and cools, it forms cumulous clouds. More warm air, called an *updraft*, blows up through the clouds.

\* That updraft turns the cumulus clouds into a **cumulonimbus cloud (thunderheads)**.

\* Electric charges build up in thunderheads. When these electric charges are thrown off, or *discharged*, they cause lightning.

\* The heat from the lightning suddenly expands the air. This causes the sound of thunder.

\* In the even of a thunderstorm, seek shelter immediately.

\* If you cannot find shelter, lie down or crouch in a low spot, such as a ditch.

\* DO NOT go underneath a tree. Why do you think this is? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* When you watch the news weather forecast, the meteorologist talks about highs and lows. What do you think they are talking about? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* Wind is moving air. It forms when air moves from high-pressure areas to low-pressure areas. Usually winds blow out from the center of a high toward a low.

\* Most of the time, high pressure means clear weather.

\* Low pressure means rainy or stormy weather. Almost all storms are caused by lows.

\* The highest surface wind speed ever recorded was a gust of 231 miles per hour at the top of Mount Washington, New Hampshire in 1954.

\* **Cyclones** have circling winds. The low pressure is caused by warm air rising. Cyclones travel as they spin around across land at a rate of 500 to 1,000 miles a day.

\* **Hurricanes** form over the Atlantic Ocean near the equator. They get their energy from warm ocean water.

\* As a hurricane moves into colder northern waters or over land, it usually weakens. However, it can do a lot of damage along the coast and cause flooding inland.

\* A storm is not considered a hurricane unless the winds are greater than 74 miles per hour. However, winds of more than 130 miles per hour are common.

\* How do you think hurricanes are named? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* A six-year cycle of names is used. But the names of destructive storms, such as Gilbert, are never used again. Between 1953 and 1978, hurricanes were named for women, in alphabetical order. Since 1979, the list has included male names.

\* **Tornadoes** spinning winds sometimes reach 300 miles per hour.

\* If a tornado occurs, here are some safety tips:

 1.) Always stay inside if there is a tornado warning.

 2.) It is best to go to the basement.

3.) If there is no basement, stay on the ground floor.

4.) Keep away from windows.

 5.) Crawl under a stairway or heavy table and cover your head.

\* So many tornadoes occur over the Great Plains of the United States that the area is called Tornado Alley.

\* Tornadoes typically cover less ground than cyclones. However, they are much more violent.

\* Most tornadoes on Earth occur in the Great Plains and the Mississippi Valley of the United States.

*24-3 The Earth’s Climate Zones*

\* List as many adjectives as possible to describe your climate. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* What factors affect the climate that you live in? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* Here are some you may not have listed:

 1.) latitude- Regions near the equator get a lot of sunlight. Near the poles, the rays spread out over a much larger area. This makes the rays weaker. The rays near the equator almost strike the Earth directly.

 2.) mountains- The land on the side of the mountain facing the wind gets a lot of rainfall. This happens because winds drive clouds over mountains. As the clouds rise, they cool and drop rain or snow. After crossing the mountain, the winds are drier.

\* Deserts are often on the *leeward* side of a mountain.

 3.) water- Large bodies of water absorbs and holds heat well. Places near water have milder temperatures all year than places inland. On the local news, you will often hear the meteorologist say it is “cooler near the lake.”

 4.) ocean currents- the warmer current (in the Gulf Stream for example) flows across the northern Atlantic Ocean toward Europe. This current warms the winter air over northwestern Europe.

\* There are three main types of climate zones. They are:

 1.) *tropical*- warm with no true winter season, lots of rainfall

2.) *polar*- cold with no true summer season, little precipitation usually in the form of fine, dry snow. This is because the air is too cold to hold much water.

3.) *temperate*- warmer than polar but cooler than tropical, summers are warm and winters are cold, precipitation varies. Most of the United States has a temperate climate.

\* How can ANY climate be dangerous for people? Give examples. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* There is very little precipitation at the North and South poles. The thick snow and ice results because the snow and ice that forms does not really melt and build up over many years.