Chapter 16 – Weather

Section 1

Objectives

- **Explain** how water moves through the water cycle.
- **Describe** how relative humidity is affected by temperature and levels of water vapor.
- **Describe** the relationship between dew point and condensation.
- **List** three types of cloud forms.
- **Identify** four kinds of precipitation.

The Water Cycle

- The condition of the atmosphere is affected by the amount of _____ in the air. Water in liquid, solid, and gaseous states is constantly being _____ through the water cycle.
- The **water cycle** is the _____ movement of water from sources on Earth's surface into the air, onto and over land, into the ground, and back to the _____.

Humidity

- **Humidity** is the amount of _____ in the air.
- The air's ability to hold water vapor changes as the _____ of the air changes.
- **Relative Humidity** is the amount of water vapor in the air compared to the _____ amount of water vapor that the air can hold at a certain _____.
- Calculate the relative humidity by using the formula:

- **Measuring Relative Humidity** A _____ is an instrument that is used to measure relative humidity. A psychrometer consists of two thermometers, one of which is a _____ thermometer.
- The _____ in temperature readings between the thermometers indicates the amount of water vapor in the air.

Condensation

- **Condensation** is the process by which a gas, such as water vapor, becomes a liquid.
- **Dew Point** The dew point is the temperature at which a gas _____ into a liquid.

Clouds

- A **cloud** is a collection of small _____ or ice crystals suspended in the air, which forms when the air is _____ and condensation occurs.
- Clouds are classified by form, and by _____.
- **Cumulus Clouds** are _____, white clouds that tend to have _____ bottoms.
- **Stratus Clouds** are clouds that form in _____.

- **Cirrus Clouds** are _____, feathery, white clouds found at _____ altitudes.

Precipitation

- **Rain** is the most _____ form of precipitation.
- **Sleet and Snow** *Sleet* forms when rain falls through a layer of _____. *Snow* forms when temperatures are so cold that water vapor changes directly to a _____.
- **Hail** are balls or lumps of _____ that fall from clouds.

Section 2

Objectives

- **Identify** the four kinds of air masses that influence weather in the United States.
- **Describe** the four major types of fronts.
- **Explain** how fronts cause weather changes.
- **Explain** how cyclones and anticyclones affect the weather.

Air Masses

- Changes in weather are caused by the _____ and interaction of air masses.
- An **air mass** is a large body of air where _____ and moisture content are _____ throughout.
- **Cold Air Masses** Most of the _____ weather in the United States is influenced by _____ polar air masses.
- **Warm Air Masses** _____ warm air masses influence the weather in the United States.

Fronts

- The area in which two types of air masses meet is called a **_____.**
- **Cold Fronts** A cold front forms where cold air moves _____ warm air, which is less dense, and pushes the warm air _____.
- **Warm Fronts** A warm front forms where warm air moves _____ cold, denser air.
- **Occluded Front** An occluded front forms when a warm air mass is caught between two _____ air masses. An occluded front has _____ temperatures and large amounts of _____.
- **Stationary Front** A stationary front forms when a cold air mass meets a warm air mass. A stationary front often brings _____ days of cloudy, _____ weather.

Air Pressure and Weather

- **Cyclones** are areas that have _____ pressure than the surrounding areas do.
- **Anticyclones** are areas that have _____ pressure.

Section 3

Objectives

- **Describe** how lightning forms.
- **Describe** the formation of thunderstorms, tornadoes, and hurricanes.
- **Describe** the characteristics of thunderstorms, tornadoes, and hurricanes.
- **Explain** how to stay safe during severe weather.

Severe Weather

- Is weather that can cause property damage and sometimes death.

- **_____** are small, intense weather systems that produce strong winds, heavy rain, lightning, and thunder.
    - 2 things required for thunderstorms to occur:
        1. Warm moist air near Earth's surface
        2. _____
    - Atmosphere is unstable when surrounding air is colder than the rising air mass.
    - When the rising air reaches its _____ the vapor condenses forming a _____ cloud.
    - In extremely unstable air the warm air continues to rise creating a large, dark, _____ cloud. (15 km high)

Lightning

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- **_____** is an electrical discharge that occurs between a positively charged area and a negatively charged area.
- An electrical charge builds up due to _____ between moving _____ in a cloud.
- Those charges _____ from one another, which eventually leads to an electrical discharge (lightning).
- **_____** is the sound that results from the rapid expansion of _____ around a lightning strike.

Tornados

- A **_____** is a small, spinning column of air that has high wind speeds and low central pressure and that touches the ground.
- It happens in only ____% of all thunderstorms.
- How it forms:
    1. Wind moving in _____ directions causes a layer of air to begin to _____.
    2. Strong _____ of air turn the spinning column of air vertically.
    3. The spinning column begins to move downward forming a _____ cloud.
    4. The funnel cloud becomes a tornado when it touches the ground.
- About _____% of all tornados occur in the U.S.
- Most happen in the _____ and early summer.

- Cold dry air from _____ meets warm moist air from the _____.

- Average wind speed is 120 to 180 km/hr, but some can reach speeds of _____ km/hr.

Hurricanes

- A large tropical weather system that has wind speeds of at least _____ km/hr is called a **hurricane** (aka typhoons and cyclones).

- Size can be 160 to _____ km/hr
- Hurricane formation:
  - Only in the _____ parts of the ocean
  - Two thunderstorms moving in _____ directions meet and start to _____
  - Gets its energy from the _____ of water vapor
  - Hurricane is fueled by warm water.
  - Hurricanes die out when they reach land or _____ ocean waters

- Parts of a hurricane:
  - **_____** – The calm, warm, center of a hurricane
  - **Eye wall** – Surrounds the eye and is made up of large cumulonimbus clouds with heavy rains and strong winds (300 km/hr)
  - **_____** – Outside the eye wall. The wind speed and rain decrease as the rain bands move outward from the eye wall.

- Hurricanes can cause a great deal of damaged due to high winds and flooding.

- A **_____** is a wall of water that builds up at a hurricane and can cause flooding as a hurricane hits the shore.

Severe Weather Safety

- **Thunderstorm Safety** Lightning is one of the most dangerous parts of a thunderstorm. If you are outside, stay away from _____, which can get struck down. If you are in the open, crouch down.

- **Tornado Safety** If there is a tornado warning for your area, find _____ quickly. The best place to go is a _____ or cellar.

- **Flood Safety** The best thing to do during a flood is to find a _____ place to wait out the flood.

- **Hurricane Safety** If you live in an area where hurricanes strike, your family should have a disaster _____ that includes enough water and food to last several days.

Section 4

Objectives

- **Describe** the different types of instruments used to take weather measurements.
- **Explain** how radar and weather satellites help meteorologists forecast the weather.
- **Explain** how to interpret a weather map.

Weather-Forecasting Technology

- **High in the Sky** Weather balloons carry electronic equipment that can measure weather conditions as high as ____ km above Earth's surface.
- **Measuring Air Temperature and Pressure** A tool used to measure air temperature is called a **_____.** An instrument used to measure air pressure is a **_____.**
- **Measuring Wind Direction** Wind direction can be measured by using a _____ or a wind vane.
- **Measuring Wind Speed** An instrument used to measure wind speed is called an **_____.**
- **Radar and Satellites** Radar is used to find the _____, movement, and amount of _____. Weather satellites that orbit Earth provide images of weather systems.

Weather Maps

- **Who Makes the Maps** The _____ produces weather maps based on information gathered from about _____ weather stations across the United States.
- **Reading a Weather Map** Weather maps that you see on TV include lines called _____. Isobars are lines that identify areas of _____, high, or low air pressure.