

Weather

State Objectives 4.c, 4.d, 4.h.

Discussion

What are some ways in which weather affects your everyday life?

What is Weather?

- _____ is the layer of gases surrounding Earth.
- _____ is the conditions of the atmosphere.
- It includes: Temperature, air pressure, humidity, wind, clouds, and precipitation.
- Main cause for changes in weather is energy from the _____.

Temperature- Indicates the amount of heat (kinetic energy) in the atmosphere.

- Represents the _____ of the molecules.
- The _____ the temperature, the faster the air molecules are moving.
- Warmer air rises and cooler air sinks which causes _____ currents.
- Measured with a _____.
- Standard unit is _____ (°F)
- SI Unit is _____ (°C)

Air Pressure/Barometric Pressure

Air has weight because it has _____.

Air pressure is a _____ of the force of air being exerted on a given area of Earth's surface.

As temperature _____, pressure decreases.

Cool air is _____ which causes it to sink (high pressure).

As altitude _____, air pressure decreases.

Weather and Air Pressure

Changes in pressure indicated a change in weather is approaching.

_____ pressure systems are associated with clouds & precipitation.

_____ pressure systems are associated with clear skies.

Steady pressure indicates current conditions will continue.

Measured with a _____ in inches of mercury or in millibars.

Humidity

Humidity is the amount of _____ in the air.

- _____ humidity is a percentage of the amount of water vapor in the air compared to the maximum amount of water vapor it can hold at that temperature.
- The _____ the temperature, the more water vapor it can hold.
- Saturated means the air is holding 100% of the water vapor it can hold at that temperature.
- Measured with a _____ or a psychrometer

Dew is the water vapor that has condensed on a surface into a liquid.

Depends on two factors:

Amount of _____ in the air

_____ near the surface

Dew point is the _____ at which water vapor condenses into a liquid.

Wind

- Caused by differences in _____
- Air moves from areas of high pressure to areas of low pressure
- Wind Speed- measure of how fast the air is moving.
- Measured with an _____.
- Wind Direction- direction from which the wind is coming, NOT the direction it is blowing. Ex. North winds blow from N to S
- Measured with a _____.

Global Wind Patterns

Blow steadily across Earth in paths that are thousands of kilometers long

Steer weather in certain directions (usually _____ in the U.S.)

Caused by _____ from the sun

The sun does not heat the surface evenly causing uneven heating of the atmosphere.

Types of Global Winds

- Surface winds at low altitudes:
- Trade winds: blow from east to west near the equator.
- Westerlies: blow from west to east in the mid-latitudes.
- _____ Effect: Earth's rotation causes winds to curve to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.
- _____ at high altitudes are bands of strong winds (up to 350 km/h) near the top of the troposphere at the northern and southern boundaries of the prevailing westerlies.
 - Race from west to east

Clouds form when air rises, cools, and condenses. They are classified according to their _____ and _____.

Precipitation

Precipitation – occurs when drops of water or crystals of ice become too large to be suspended in a cloud and fall in the form of rain, freezing rain, sleet, snow, or hail.

The Water Cycle

- The _____ is the constant movement of water on Earth.
- The _____ provides the energy for the water cycle.

Parts of the Water Cycle

- _____ occurs when water changes from a liquid into a gas after gaining heat energy from the Sun.
- _____ is the evaporation of water from the leaves of plants.
- _____ occurs when water vapor changes into liquid water to form clouds or fog.
- _____ occurs when water droplets fall to Earth.

What is an Air Mass?

An _____ is a large body of air that develops over a particular region.

It has characteristics of the area over which it develops.

Cold, dry air masses come from Canada and warm, dry air masses develop over Mexico.

Fronts

A _____ is a boundary between two air masses.

- When two fronts meet, the cold air mass will move under the warm air mass because the _____ air is denser.

Types of Fronts

1. A _____ forms when a cold air mass pushes under a warm air mass. Cumulus clouds form and thunderstorms may occur.
2. A _____ forms when a warm air mass moves up and over a cold air mass. Cirrus and stratus clouds form and light, steady precipitation occurs.
3. A _____ front forms when a warm air mass meets a cold air mass but neither advances.
4. An _____ front forms when a fast-moving cold air mass overtakes a slower warm air mass. Weather is similar to, but less severe than, the weather along a cold front.

_____ - A scientist that studies the weather & uses the data to make _____ about weather.

- Observe patterns & create weather maps
- A weather _____ is a prediction of present conditions based on observations and data.

Weather Maps

- _____ map: allow meteorologists to monitor weather on the global scale
- _____ Map: uses electromagnetic waves to monitor velocity and altitude.

Weather Map Symbols: Draw symbols for each type of front.

Warm front:

Cold front:

Stationary front:

Occluded front:

Severe Weather

Thunderstorms: brief, intense storms produced by rapidly rising clouds.

- _____ (thunderheads) - vertical clouds that may be over four miles tall. They form where cold air forces warm air to rise quickly.
- May produce hail
- Lightning is huge electrical discharges.

A _____ is a violent, whirling wind that moves in a narrow path over land.

Watches and Warnings

A _____ is issued when conditions are favorable for severe weather to occur.

A _____ is issued when severe weather has been sighted.

The _____ monitors weather and issues watches and warnings when appropriate.

What is a Hurricane?

- A _____ is a low-pressure system that forms over tropical oceans.
- Also called _____ or tropical _____.

Disturbances, Depressions, and Storms

- A _____ is an area of organized convection that originates in the tropics. It has no eye or rotation.
- A _____ is a cyclone that has a maximum wind speed of 38 mph.
- A _____ has a wind speed between 39 mph and 73 mph.

Ingredients of a hurricane

- Warm ocean waters of at least 80° F.
- High humidity in the troposphere.
- An atmosphere that quickly cools with altitude.
- A distance of at least 300 miles from the equator.
- A surface system with convergent winds.
- Low wind shear. Wind shear is the rate of wind speed or direction change with altitude.

Parts of a Hurricane

- The _____ is the circular area of calm, relatively light winds at the center of a hurricane. It is the area of _____ pressure.
- The eyewall is the ring surrounding the eye that contains the highest wind speeds.
- Rainbands are bands of heavy rain that spiral outward from the storm's center.

When Hurricanes Occur

- The Atlantic hurricane season lasts from _____.
- These dates include about 97% of hurricanes.
- Most occur from August to October.

Tracking Hurricanes

- Hurricanes can be tracked using _____, _____ (near land), and hurricane hunters.
- _____ is the nickname of the 53rd Weather Reconnaissance Squadron of the Air Force Reserve. They are based in Biloxi, Mississippi.

Paths of Hurricanes

- Depends on where the hurricane forms.
- Trade winds cause hurricanes to move _____ near the equator.
- As hurricanes move north, they begin to turn back to the _____ after the _____ latitude line.

Effects of Hurricanes

- _____
- _____ and flooding
- _____ after landfall
- _____ is the rising wall of water that comes ashore with a hurricane. It causes the most damage and is responsible for 90% of deaths.

Rating Hurricanes

The _____ scale is used to rate the strength of hurricanes.