

## WEATHER: PATTERNS AND CLIMATE

You often hear people say “it is humid out” but what exactly is humidity? **Humidity** is the amount of water vapor in the air. Now water vapor doesn’t just have to do with humidity; it also has something to do with how clouds are formed.

### How do clouds form?

Water in the air is called water vapor (an invisible gas). Now, when warm air rises, it expands and cools. When it cools, it loses its ability to hold a lot of water vapor – SO some of the water vapor condenses onto tiny pieces of dust in the air. When the water vapor combines with the dust in the air, a cloud begins to form.

*Lesson Checkpoint: How exactly do clouds form?*

### There are three main types of clouds:

**Stratus clouds** are the most often

ed. They



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**Cumulus clouds** are LARGE puffy-looking clouds. They look like large balls of cotton. These are the clouds that you look at in the sky and you can imagine them being in the shapes of different animals or objects.



**Cirrus clouds** are very high, wispy clouds. They often look like stretched out pieces of cotton.



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## **Precipitation**

When water droplets become too heavy for the cloud to hold onto, they fall as precipitation to the Earth's surface. Rain, sleet, hail, and snow are all forms of precipitation.

## **Air Pressure**

As air gets close to the Earth's surface and **warms up**, the particles in the air move farther apart. The **warm air** then pushes down with less pressure and then rises forming an area of low pressure. **Low air pressure** results in a cloudy day. As air gets close to the Earth's surface and **cools**, the particles in the air move extremely close together, this thick, cooler air sinks forming an area of high pressure. **High air pressure** results in clear skies.

***Lesson Checkpoint: What type of weather does high air pressure usually bring?***

## Wind

When air moves from an area of **high pressure** to a place with **low pressure**, WIND is created.

## Air Masses

An **air mass** is a huge body of air that has basically the same temperature and amount of moisture. The movements and contents of **air masses** cause most weather conditions.

The temperature of and moisture in an air mass depend on the area over which it formed.

## The Four Most Influential Air Masses that Affect the Weather in North America:


**Maritime**  
develops over the Atlantic Ocean.

**Maritime**  
forms over the Pacific Ocean and North America.

**Continental**  
develops over Northern Canada and affects North America.

**Continental Tropical Air Mass:** This is a hot and dry air mass that develops over the deserts of Northern Mexico and the Southwestern United States and usually only affects the weather in the United States during the summer months.

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*Lesson Checkpoint: Name and describe one major air mass that affects the weather in the United States*



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## Cold and

A **front** is when a warm air mass or is moving faster than cold front. A warm air mass that is moving fast, is not moving, or is moving at a slow pace.

forms moving more slowly bumps into

## What is needed for a thunderstorm to occur?

### Thunderstorm Recipe

#### Key ingredient #1: Moisture

Moisture is needed for clouds to form, which is where rain falls from! Thunderstorms develop in cumulus clouds only. The more moisture in the air, the more clouds develop in the sky.

#### Key ingredient #2: Instability

When warm air rises, it cools. If the warm air is warmer than the air around it as it rises, it keeps rising higher and higher causing the air to be unstable. The warm air rises until it cools and becomes the same temperature as the air around it, causing the air to be stable again.

### Key ingredient #3: Uplift

Warm air needs to rise for a thunderstorm to develop. Different things can make the warm air near the Earth's surface rise into the air. The heat from the Sun can cause the air to rise and wind can also cause warm air to rise.

*Lesson Checkpoint: What is the recipe for a thunderstorm?*

### What is a hurricane?

A **hurricane** is a storm that forms over oceans that bring winds reaching **over** 74 miles/119 kilometers per hour.

Hurricanes build up over oceans. Water vapor from the oceans condenses in the air; this process releases energy. The energy that is released causes the powerful winds of a hurricane. Since hurricanes are fueled by the oceans, hurricanes decrease in strength once they hit land. Hurricanes last longer and affect more area of land than tornadoes



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### What is a tornado?

A **tornado** is a funnel-shaped column of air that touches the ground. A tornado is very destructive as it destroys anything and everything in its path. Compared to a hurricane, a tornado is smaller but it brings stronger winds than hurricanes do.

### How do tornadoes form?

A change in wind direction before a developing thunderstorm and an increase in wind speed and height cause a horizontal column of spinning (or rotating) air near the Earth's surface.

Air then causes this rotating air to move from being horizontal (parallel to ground) to becoming vertical (straight up and down). A tornado is now formed and when it touches ground, it causes destruction to anything in its path.

## What is climate?

Climate is the typical yearly weather in a particular area. Two important factors that determine an area's climate are the area's air temperature and amount of precipitation.

The climate of an area determines what plants grow there and what animals will live there as well.

### Climate Factors

Various landforms affect the climate of certain areas. For example, areas on top of mountains are cooler in temperature than the lower areas. Location of land in relation to landforms also plays a part in the area's climate. For example, land on one side of a mountain may be cool and moist while the other side may be hot and dry. Being closer to a large body of water (like the ocean) affects an area's climate as well. Air inland changes faster than land that is near an ocean. So, during a hot summer day, it would be cooler by the ocean than it would be inland away from the ocean.

Lesson C



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Climate

## Climate

There are

- 🌐 Polar zone
- 🌐 Temperate zone
- 🌐 Tropical zone

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The location of the zone determines its climate.

### Several things can cause changes in climate:

- ✓ Volcano eruptions
- ✓ Meteoroid or asteroid impacts
- ✓ Carbon dioxide & other gases being constantly released into the atmosphere.