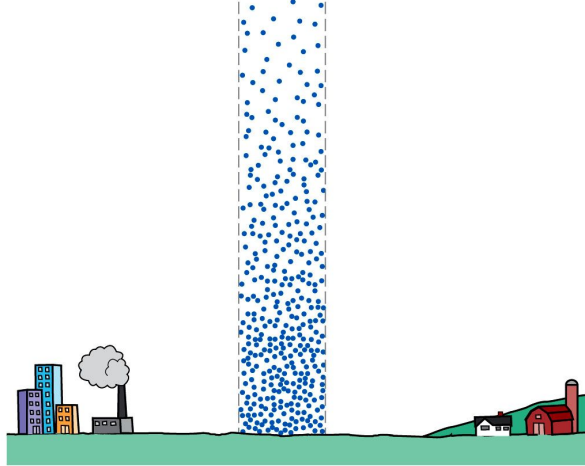


# Air Masses

# Vocabulary

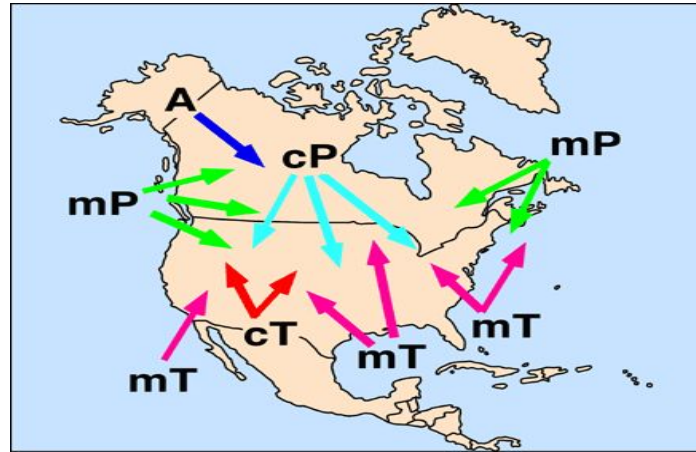
air pressure

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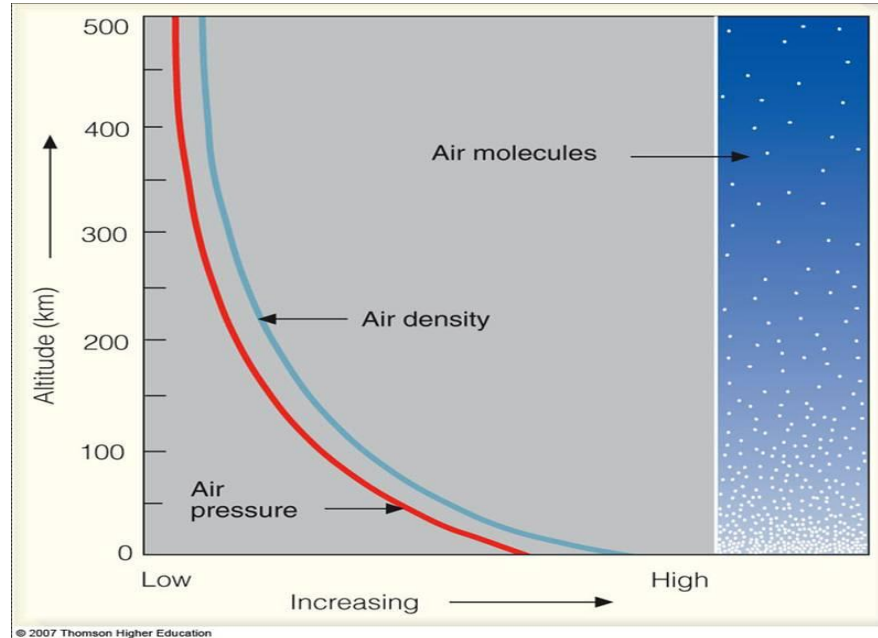
# Vocabulary

air mass



# Vocabulary

## Air density



# Vocabulary

temperature



# Vocabulary

humidity



# Vocabulary

hot/warm



# Vocabulary

bitterly cold/cold/cool





# Vocabulary

dry



# Vocabulary

moist (wet)



# Vocabulary

severe weather



# Vocabulary

thunderstorms



# Vocabulary

tornado



# Vocabulary

hurricane



# Vocabulary

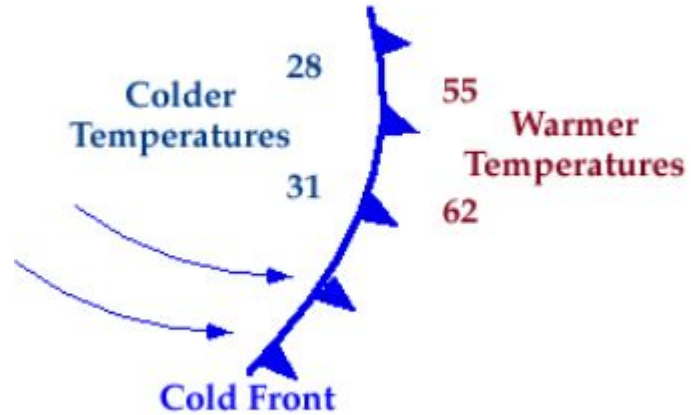
front



# Vocabulary

cold front

Cold Front





# Vocabulary

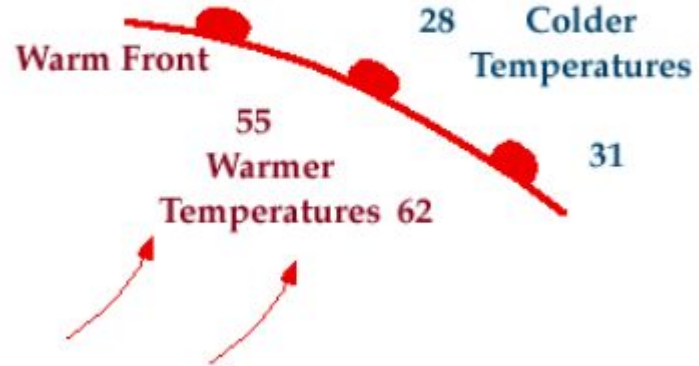
Cloud condensation



# Vocabulary

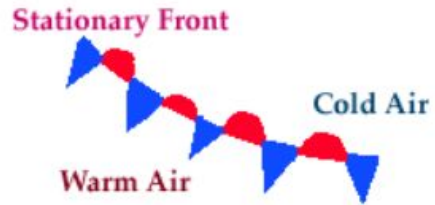
Warm front

Warm Front



# Vocabulary

## Stationary Front

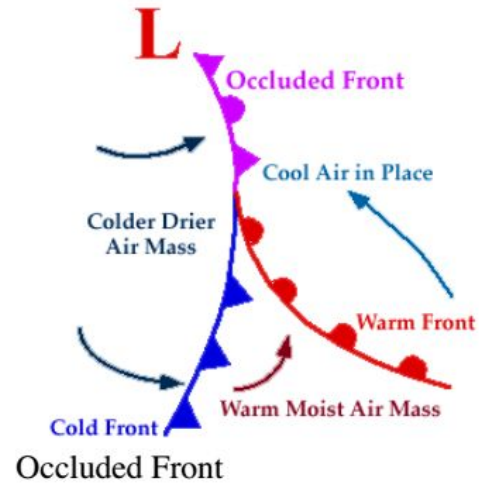


t

Stationary Front

# Vocabulary

## Occluded Front



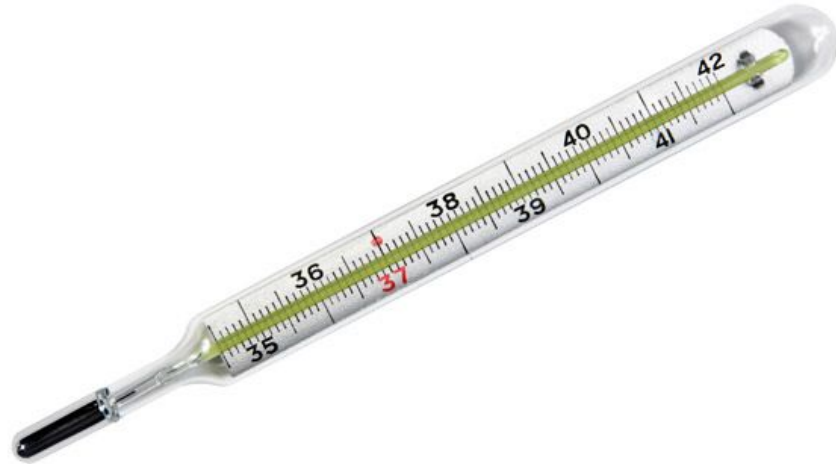
# Vocabulary

wind



# Vocabulary

thermometer



# Vocabulary

barometer



# Vocabulary

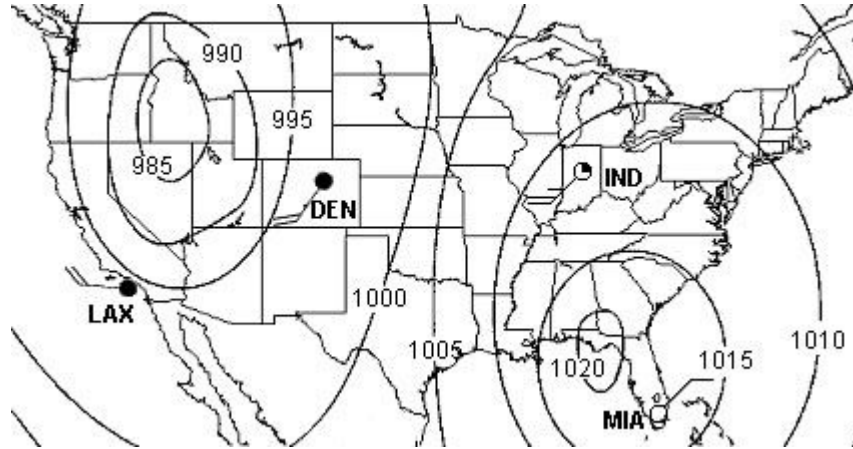
psychrometer





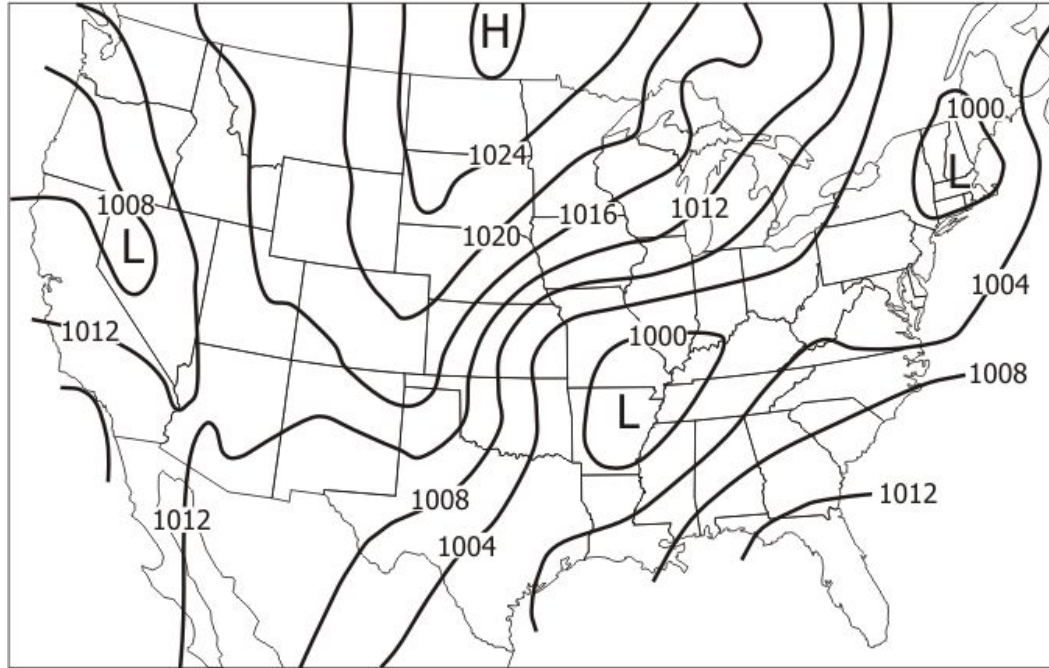
# Vocabulary

isolines



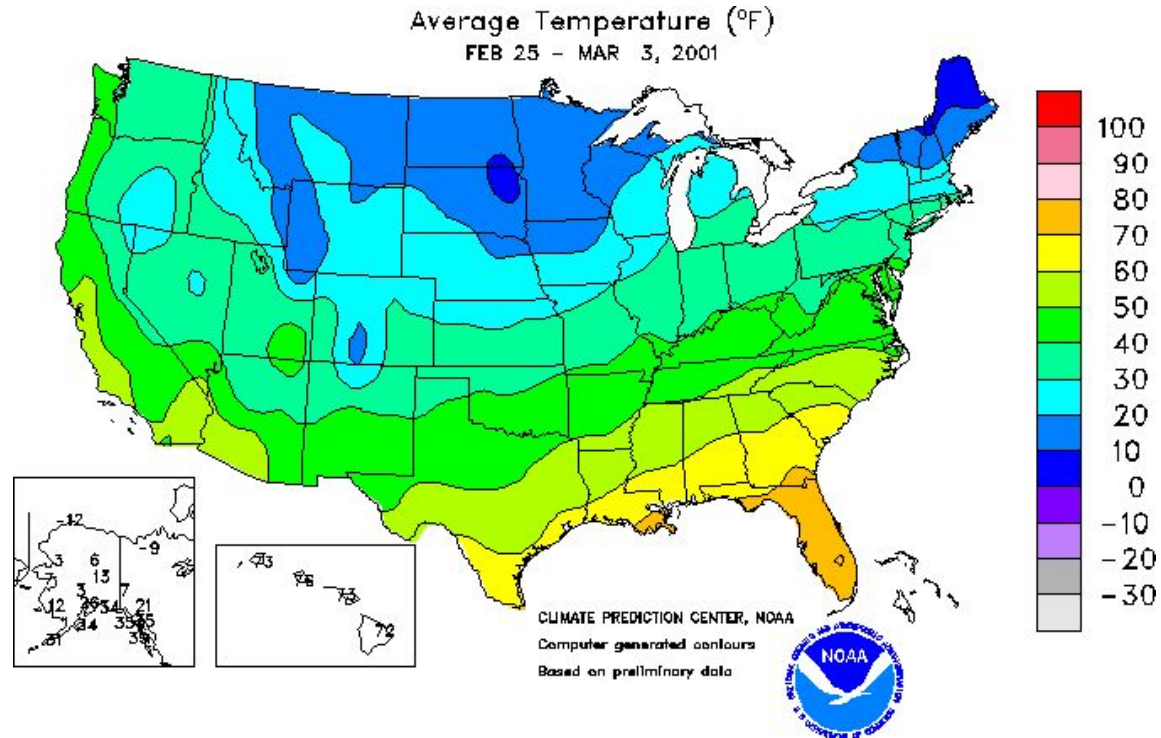
# Vocabulary

isobars



# Vocabulary

isotherms

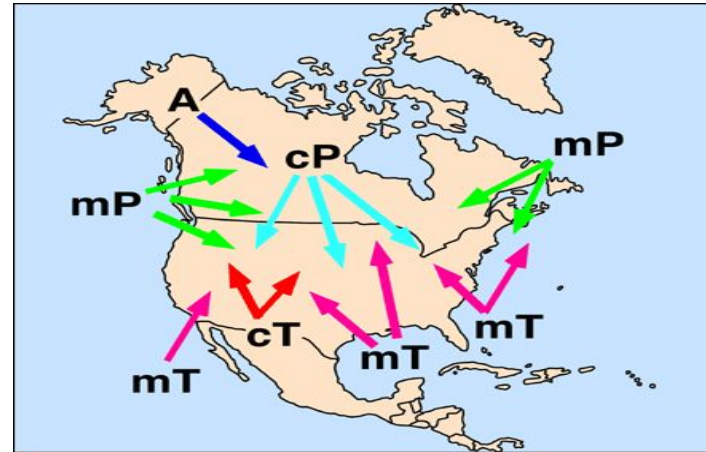




# Air Masses, Fronts

# Air Masses

- An **air mass** is a large body of air that takes on the characteristics of the area over which it forms (**temperature** and **humidity**)
- Named for the surfaces over which they form
  - Continental Tropical (cT)
  - Maritime Tropical (mT)
  - Continental Polar (cP)
  - Maritime Polar (mP)
  - Arctic (A)





**Continental Arctic**  
Bitterly cold, dry

**Maritime Polar**  
Cool, moist

**Continental Polar**  
Cold, dry

**Maritime Polar**  
Cool, moist

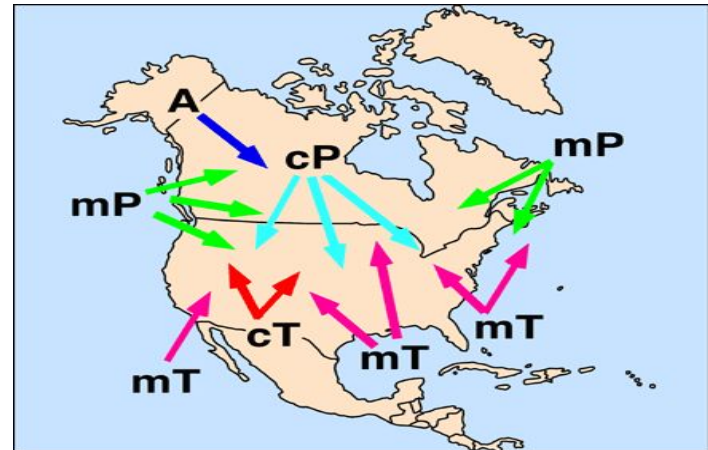
**Continental Tropic**  
Hot, dry

**Maritime Tropic**  
Warm, moist

**Maritime Tropic**  
Warm, moist

# Weather in the United States

- Continental Polar (cP) (cool, dry air) from Canada collides with Maritime Tropical (mT) (warm, moist) air from the Gulf of Mexico.
  - These air masses are responsible for most of the weather we experience in the United States



# Check for Understanding

Why is it useful to know what kind of air mass is moving through our region?

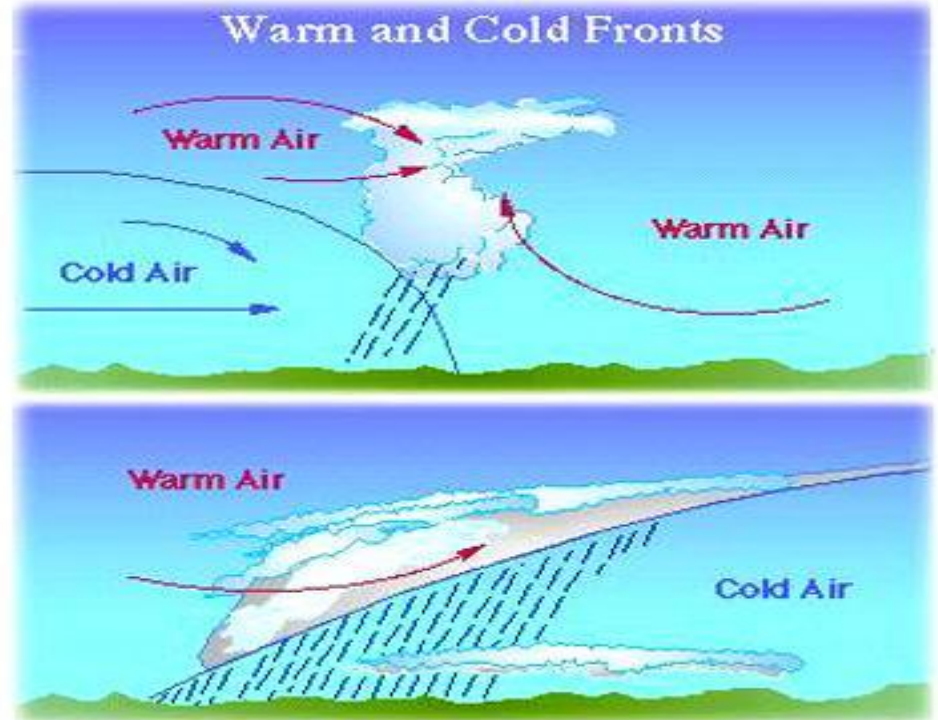


# Air Masses

- **Air masses move** when they encounter a **pressure difference** with a surrounding air mass
  - **Severe weather** (such as hurricanes, tornadoes) occur when air masses meet

Bill Nye Air Pressure

<https://www.youtube.com/watch?v=QeAp3CuGjk8>



# Types of Severe Weather

- Thunderstorms



- Tornadoes

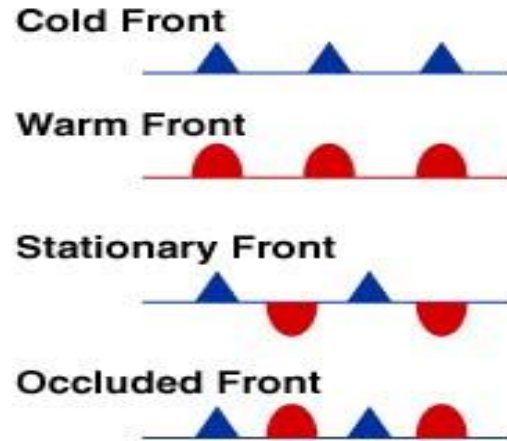


- Hurricanes



# Fronts

- A **front** is the region separating two **air masses** of **different densities**
  - Cold Front
  - Warm Front
  - Stationary Front
  - Occluded Front



# Fronts

**Meteorologists** track the movement of fronts to be able to predict temperature and humidity at a specific location



# Weather Maps

- **Weather Maps** are two-dimensional representations of fronts
  - Lines and symbols represent weather fronts with a view from above
  - Lines and symbols represent the direction in which the front is moving



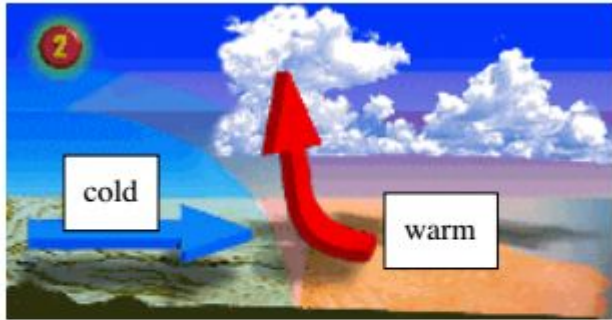
# Check for Understanding

Why do meteorologists track fronts?

# Cold Fronts and Warm Fronts Interactive

[http://www.classzone.com/books/earth\\_science/terc/content/visualizations/es2002/es2002page01.cfm?chapter\\_no=visualization](http://www.classzone.com/books/earth_science/terc/content/visualizations/es2002/es2002page01.cfm?chapter_no=visualization)

# Cold Front



Cold Front

Colder air pushes under warmer air lifting warmer air

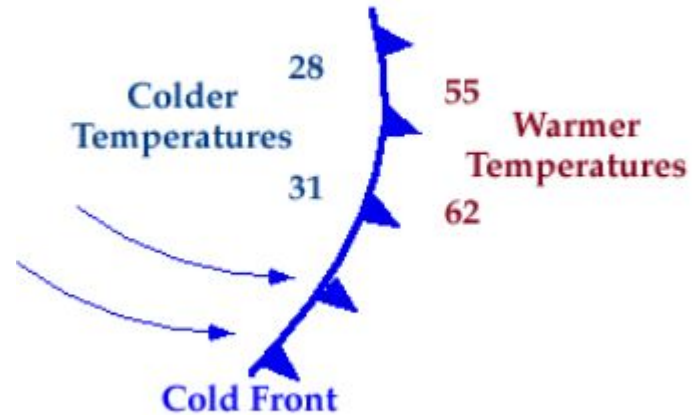
- Warm air rises and we see **cloud condensation**
- **Clouds, showers (rain)** and **thunderstorms** are associated with cold fronts



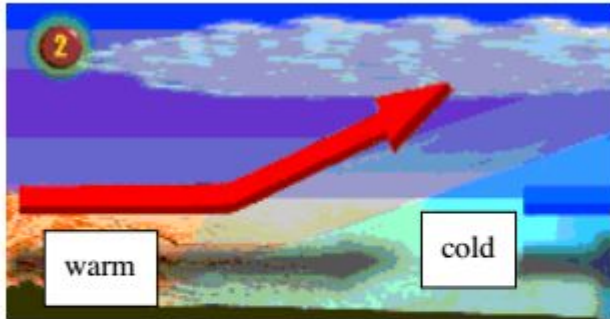


# Cold Front

## Cold Front



# Warm Front



Warm Front

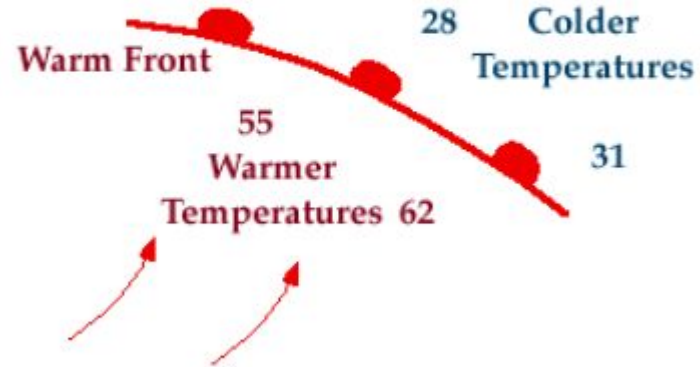
Warmer air pushes over cold air

- In a **warm front**, warm air displaces cold air
  - A warm front is characterized by extensive **cloudiness** and **precipitation**

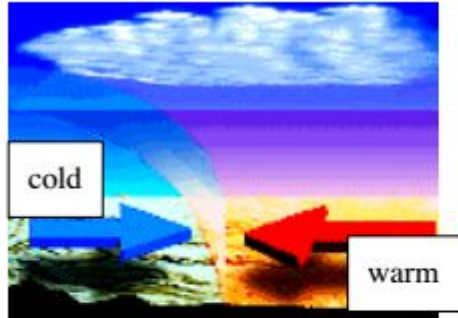


# Warm Front

Warm Front



# Stationary Front



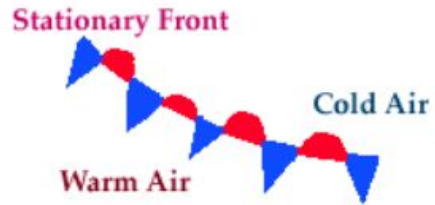
Stationary Front

Cold and warm air masses meet but neither one pushes the other (warm air still rises upward)

- There are **rarely any clouds or heavy precipitation**



# Stationary Front



t

Stationary Front

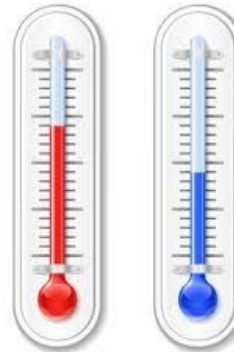
# Occluded Front



## Occluded Front

Cold front catches up to warm front lifting and trapping warm air above

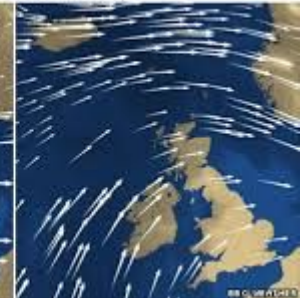
**Change in temperature and wind shift** are typically associated with an occluded front



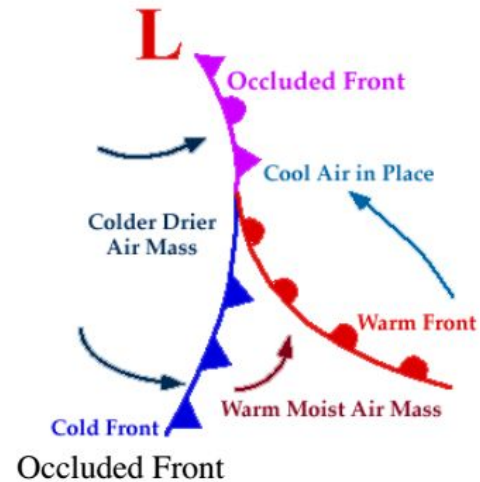
Wind direction  
20 April 2010  
North-westerly



Projected wind direction  
24/25 April 2010  
South-westerly

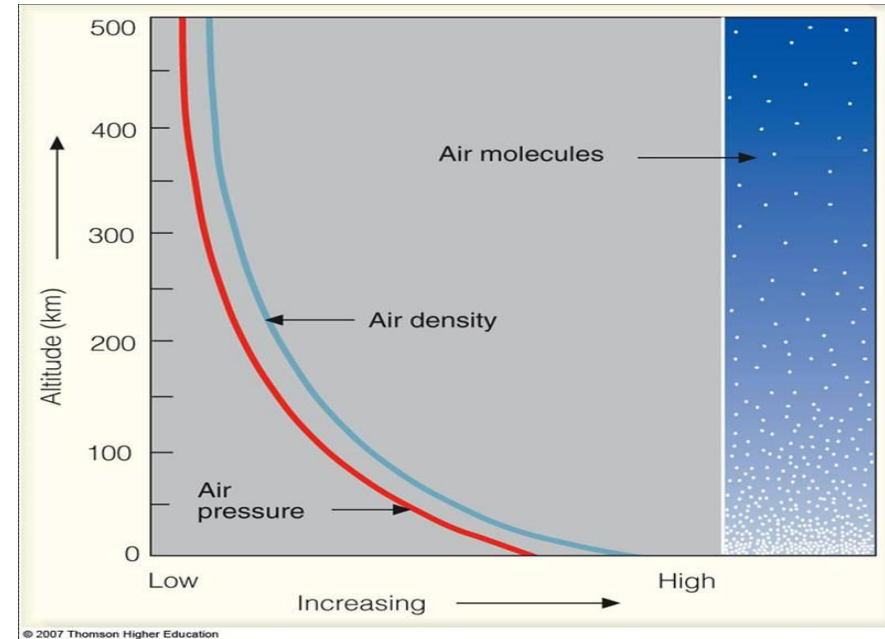


# Occluded Front



# Air Density

- **Air Density** is the amount of air contained in a specific volume





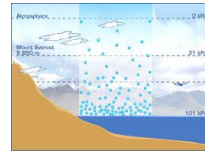
# Air Density

- Factors that affect air density:

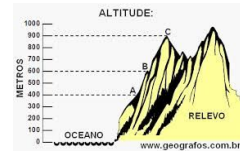
a. **Temperature** -As temperature increases, air density decreases



b. **Air Pressure** - As pressure increases, air density increases



c. **Altitude** - As altitude increases, air pressure and density decreases



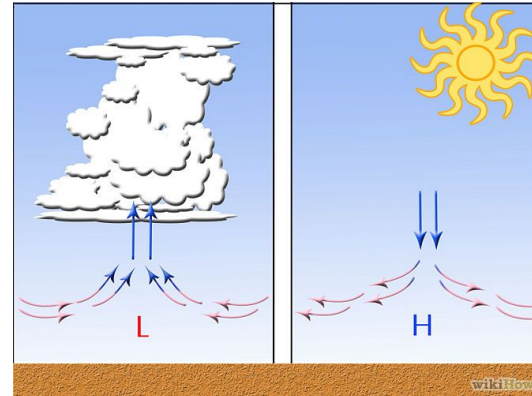
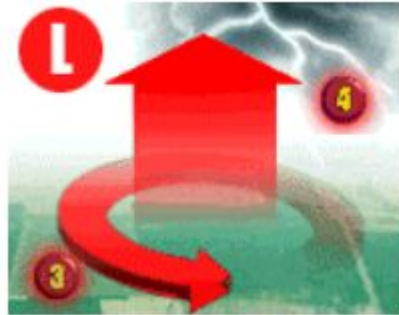
d. **Humidity** - As humidity (moisture in the air) increases, air density decreases



# Wind

Unequal heating of the Earth's surface creates large areas of warm, rising air

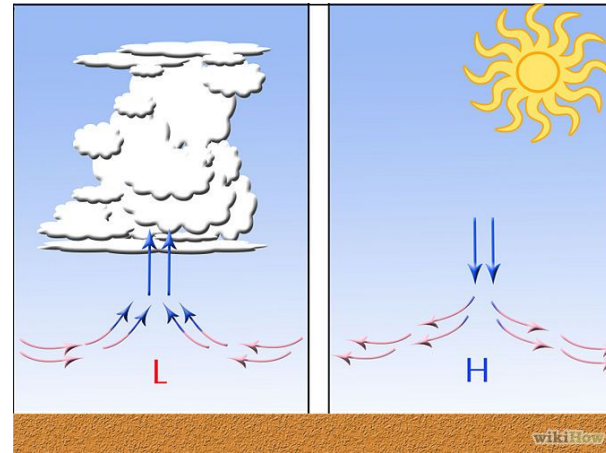
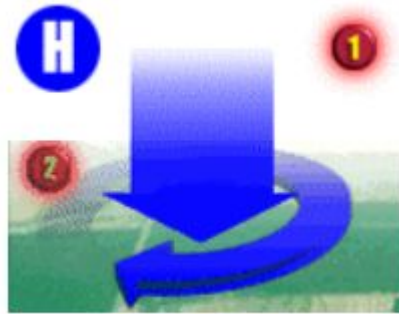
- This creates areas of **low pressure**
- **Leads to clouds and stormy weather**



# Wind

Areas where there is cooler, sinking air creates areas of **high pressure**

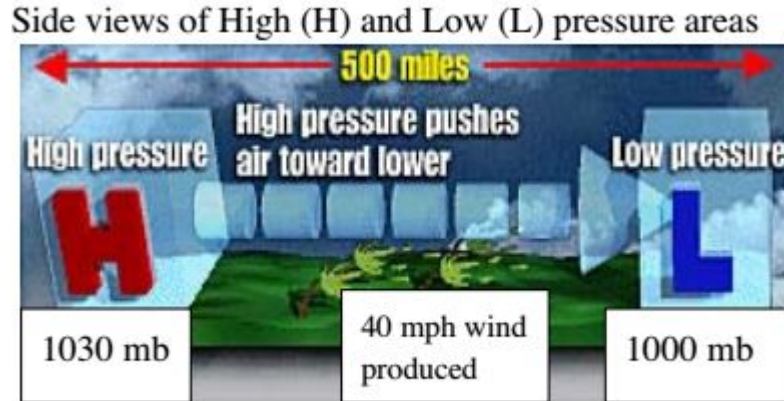
- Leads to air drying out, leaves sunny skies



# Wind

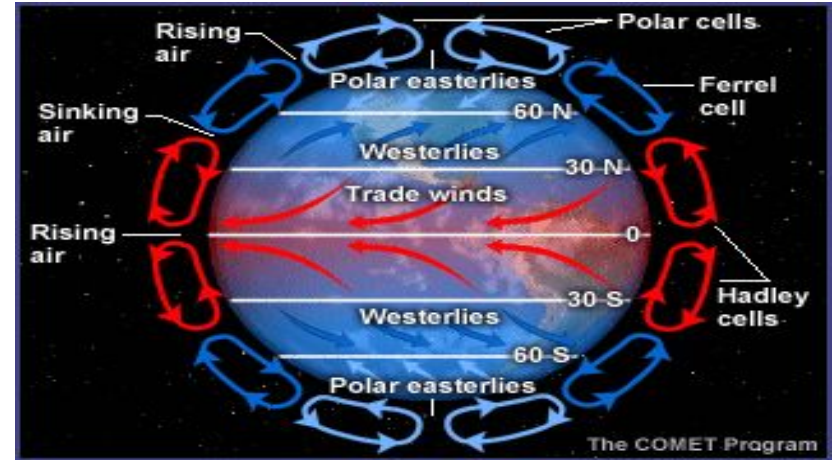
Due to surface pressure differences, air is forced from areas of **high pressure** to areas of **low pressure**.

- The effect is called **wind**!
- The more difference in air pressure, the stronger the wind.



# Wind Systems

Due to the **Coriolis Effect**, wind turns **clockwise** in the Northern Hemisphere and **counterclockwise** in the Southern Hemisphere.



# Weather Analysis



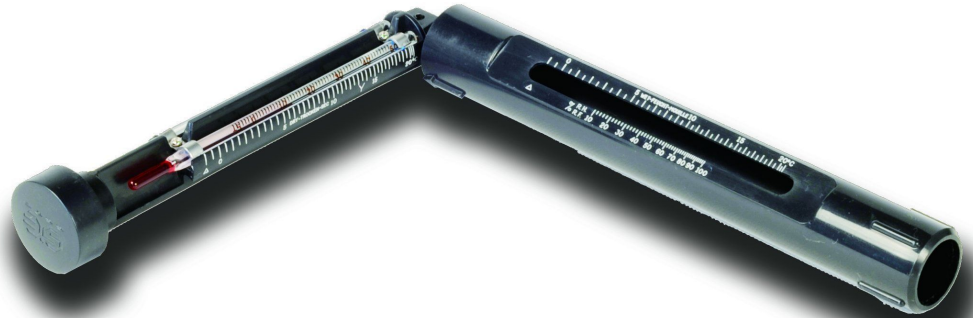
# Gathering Weather Data

- Meteorologists use the following tools to **gather information about weather conditions**
  - **Thermometer** - Measures **temperature**
  - **Barometer** - Measures **air pressure**
    - **Storms** generally form in **low pressure systems**

# Gathering Weather Data

Scientists use a **psychrometer** to measure differences in reading between two thermometers

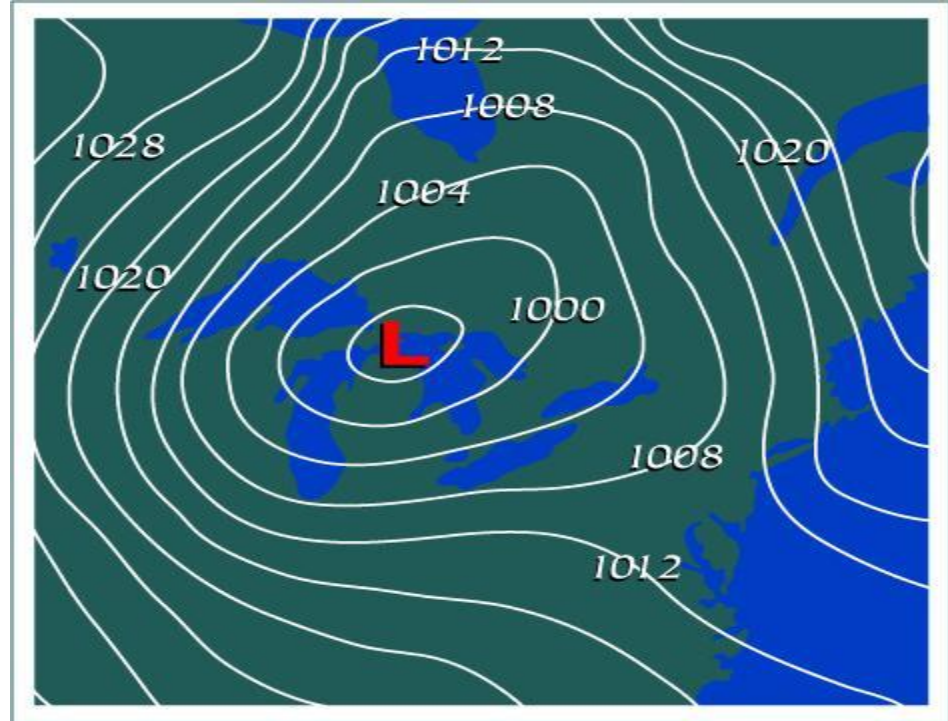
- Measure **relative humidity**



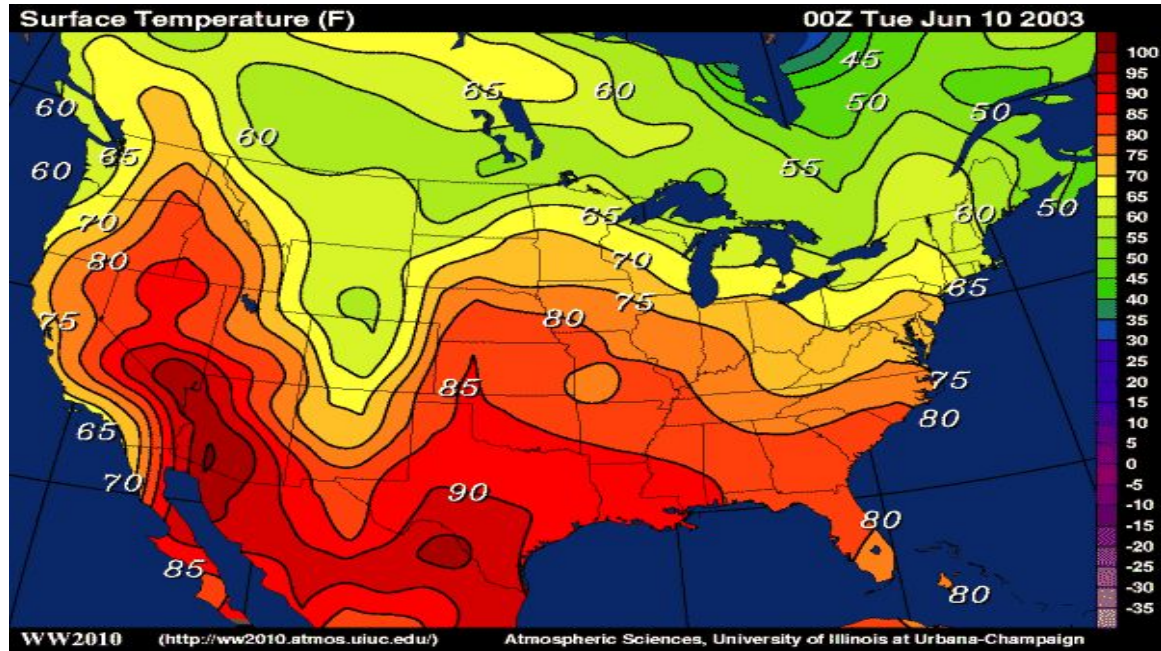


# Weather Maps

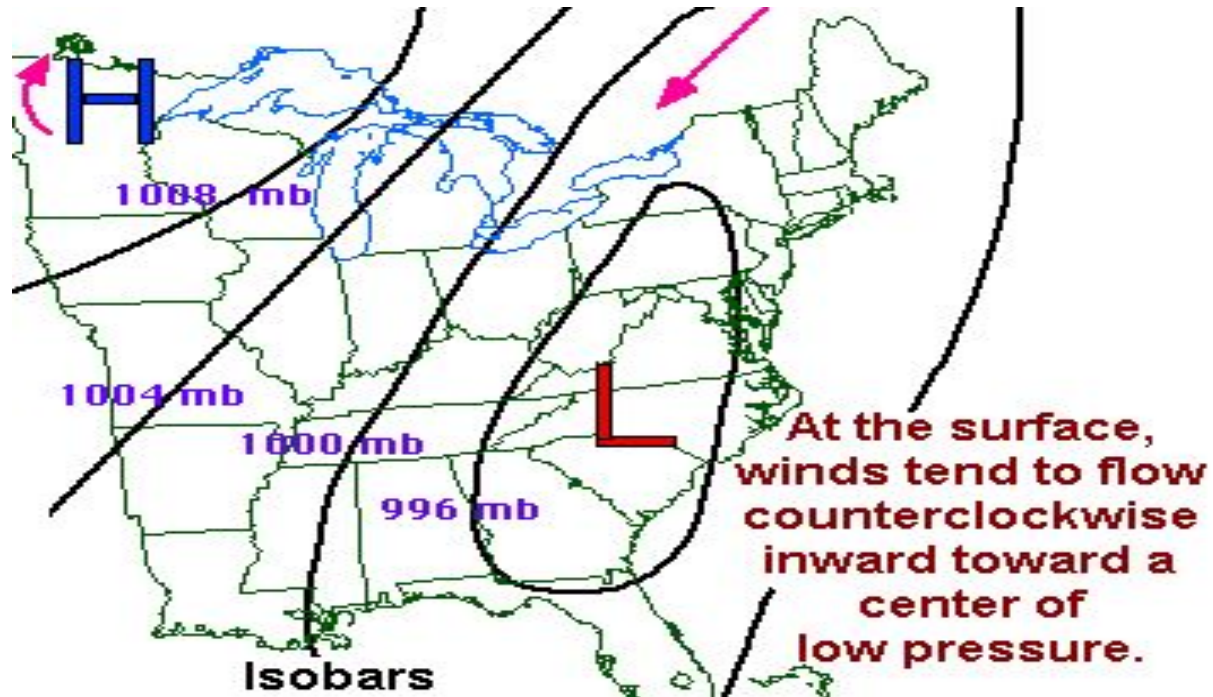
- Meteorologists use **isolines** on weather maps to show **areas of similar conditions**
- **Isolines** - Connect points of the same quantity
  - **Isobars** - Connect points of equal **pressure**
  - **Isotherms** - Connect points of equal **temperature**



# Isotherms



# Isobars

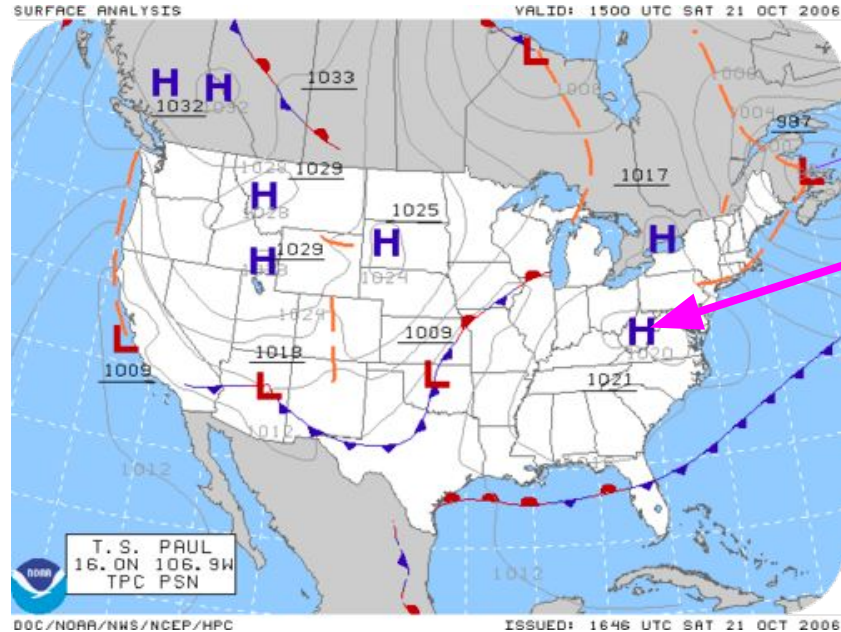


# Vocabulary Puzzles

1. I am going to pass out vocabulary words and definitions.
2. You have 3 minutes and 25 seconds to find the person who has either the matching WORD or matching DEFINITION to yours.
3. When you find that person, read the word and definition out loud to one another.
4. Sit down together.
5. Be ready to share your word and definition out loud.

# Reading Weather Maps...

Let's practice together...



Describe what the weather might be like in the Eastern US

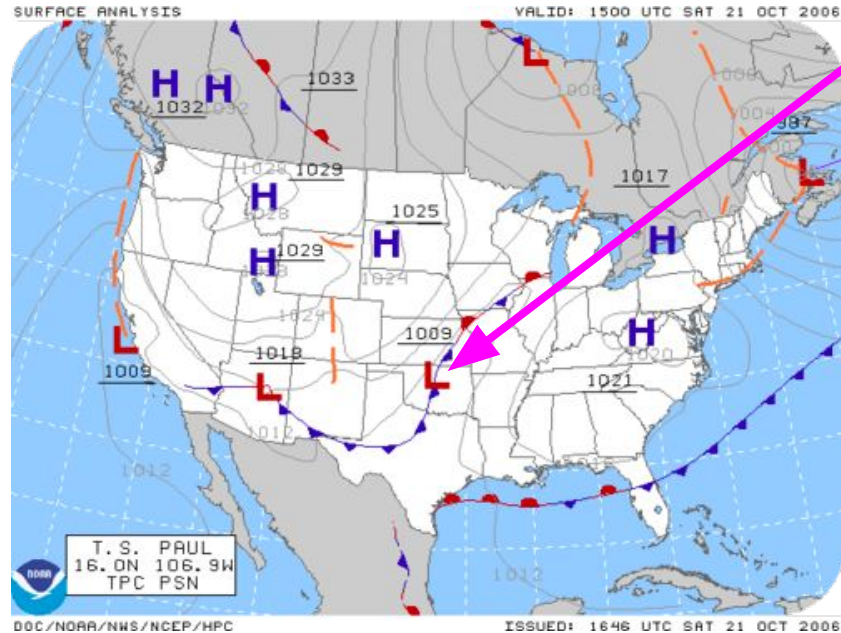
An area of high pressure means **SUNNY SKIES!**





# Reading Weather Maps...

Let's practice together...



Describe what the weather might be like in the Midwest.

An area of low pressure means CLOUDY SKIES. A COLD FRONT means RAIN and possible THUNDERSTORMS

