

# Weather Systems

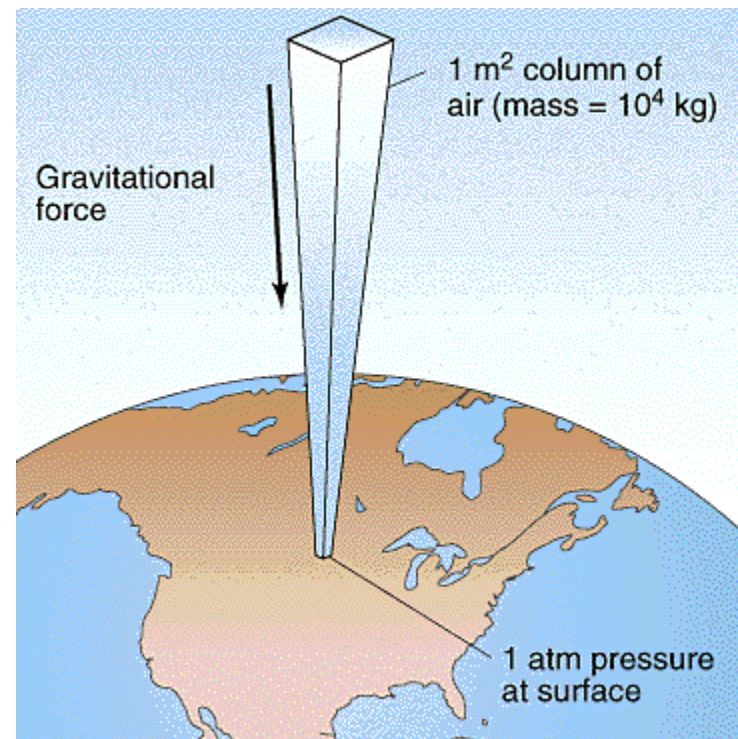
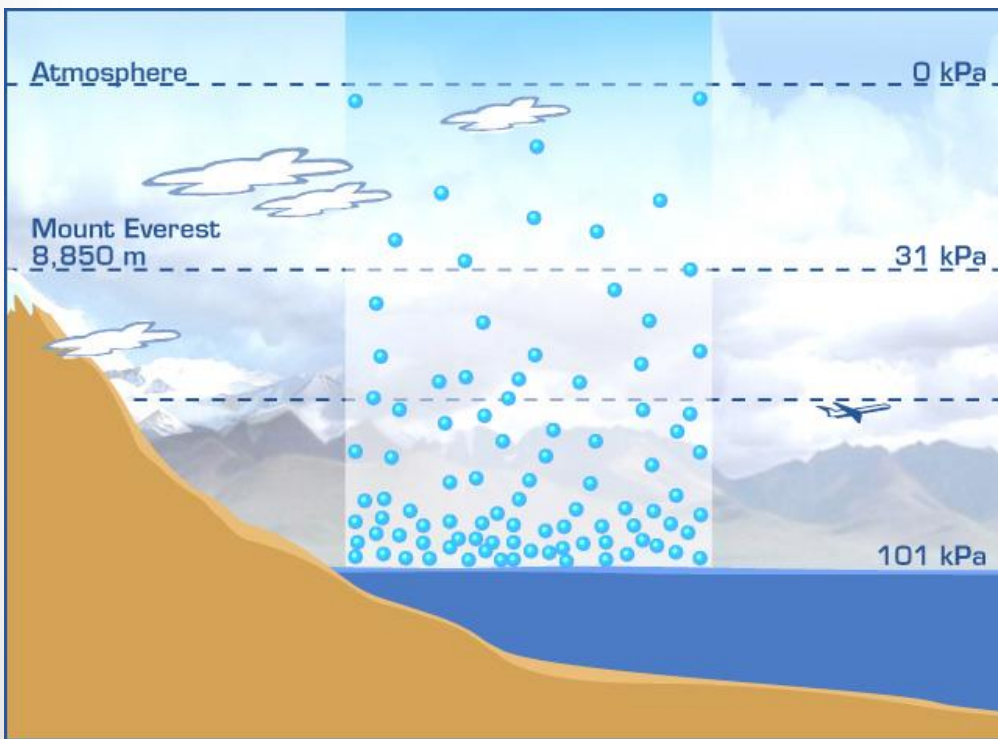


Outcome:

S2-4-04 Explain the formation and dynamics of selected severe weather phenomena

# High and Low Pressure Systems...

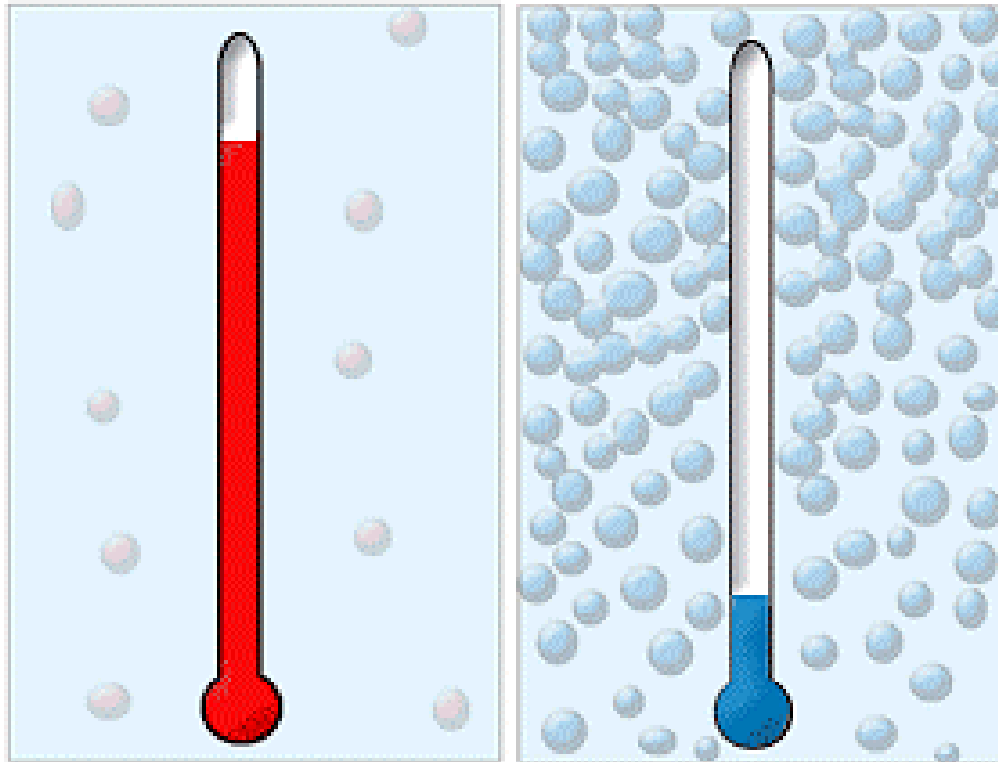
Remember that **AIR PRESSURE** is due to the **WEIGHT** of the column of air that is resting on each square meter of area on the earth's surface.



# High Pressure Systems...

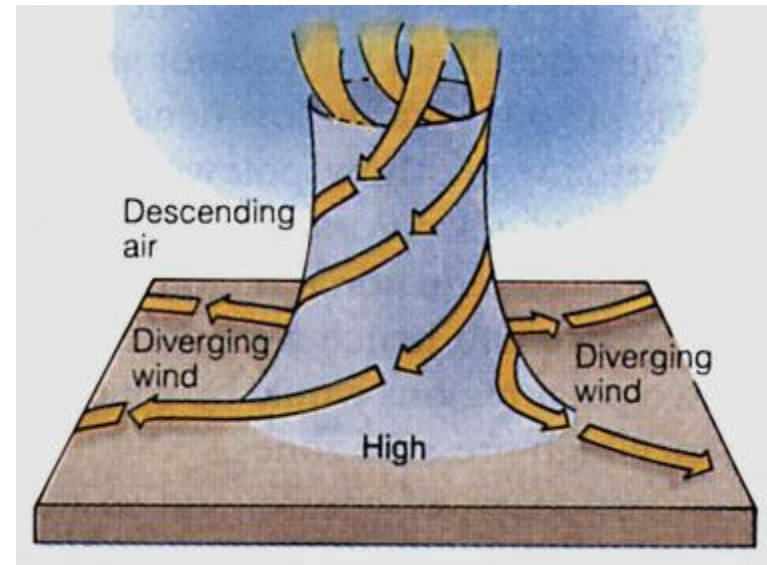
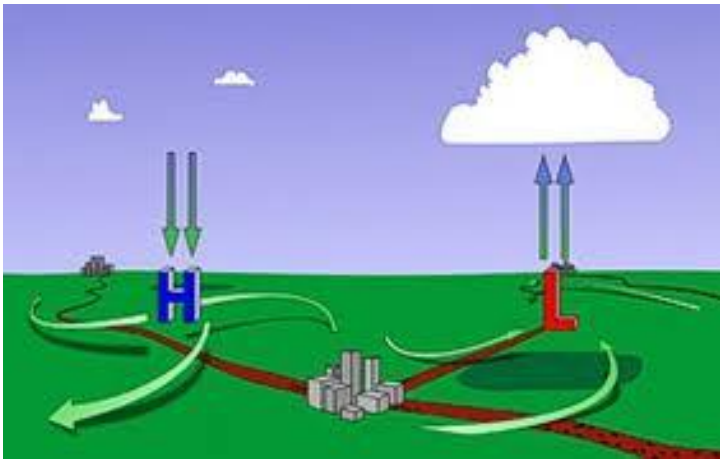
## High-Pressure Systems:

- If there are **MORE** molecules of air, the **WEIGHT** of the air column will be **LARGE** and the **PRESSURE** will be **HIGH**.
- This occurs when molecules of air are closer together, usually in **COOLER** air.



# High Pressure Systems...

- The **AIR** associated with a high-pressure system **SINKS DOWN** from above and warms as it does so and is very stable → causes **CLEAR SKIES**.



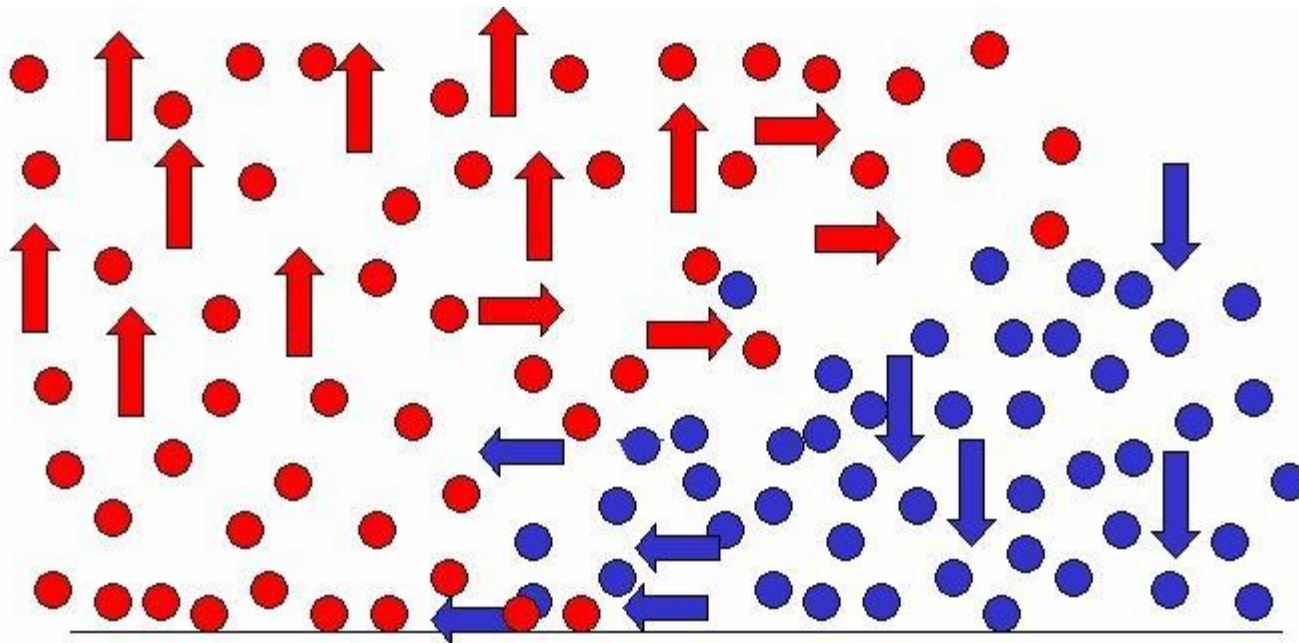
- The air **FLOWS** along the ground **AWAY** from the area of high pressure.
- When compared with low-pressure systems, highs tend to cover a greater area, move more slowly and have a longer life.



# Low Pressure Systems...

## Low-Pressure Systems:

- When the air is **WARM**, the molecules are spread further apart.
- Since warm air is **LESS DENSE** than cold air, it tends to **RISE**, drawing surrounding air **TOWARDS** this area of low pressure.

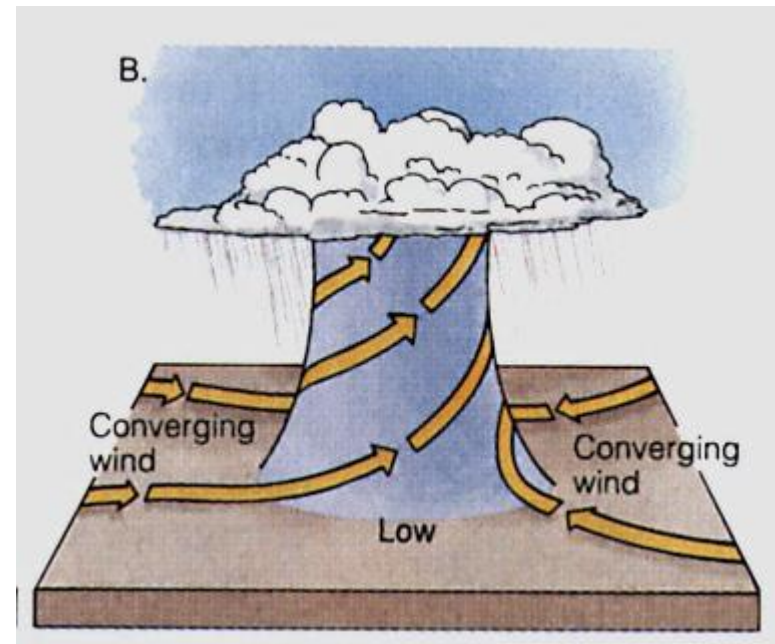
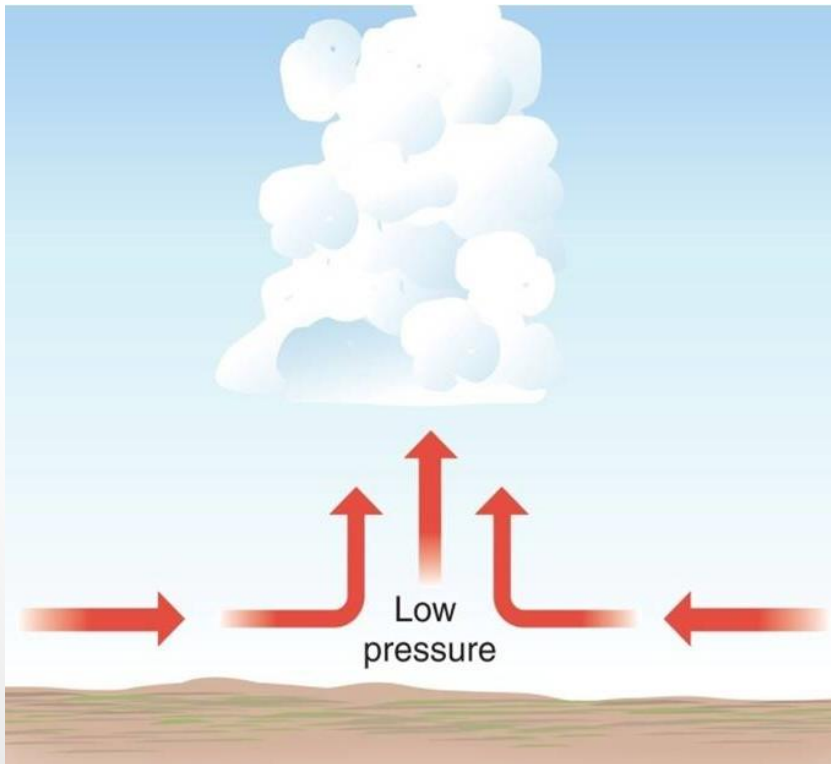


Hot or sunny ground heats up the air above it.  
The molecules move faster and spread out.

Cool water or shady ground chills the air above it.  
The molecules move slower and are dense. The hotter air starts floating above.

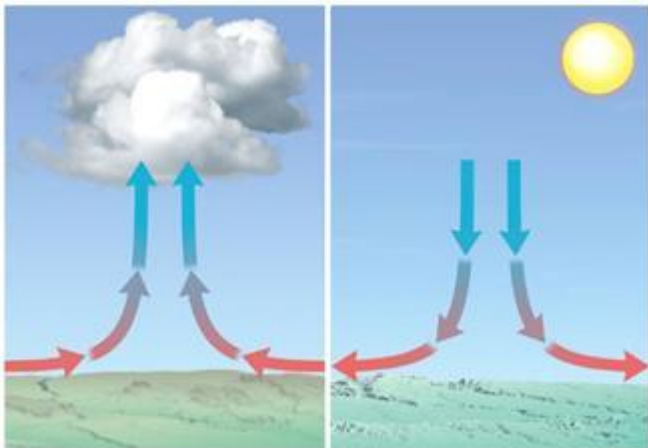
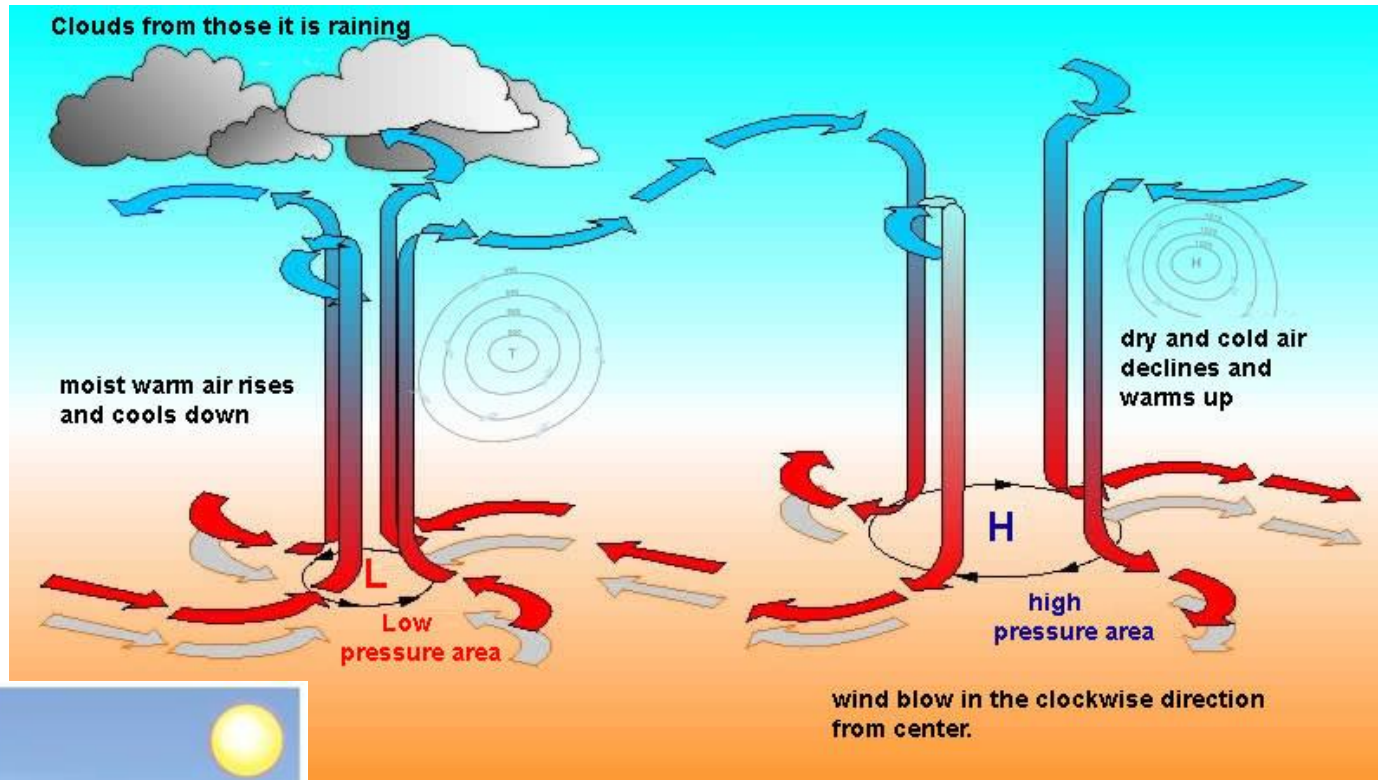
# Low Pressure Systems...

- Warm air can hold **MORE MOISTURE** than cool air.
- As the rising moist air cools, **CLOUDS** will begin to form.
- The instability of the air will produce quite **LARGE VERTICAL** development of **CLOUDS** with associated **RAIN** showers.



# Low Pressure Systems...

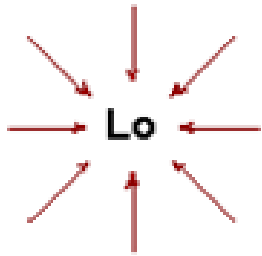
- Therefore air flows from regions of **HIGH** pressure **TO** regions of **LOW** pressure.



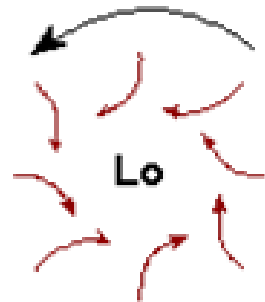
# High & Low Pressure Systems...

The falling or rising air in high and low pressure systems rotate because of the **CORIOLIS EFFECT**.

Top View:

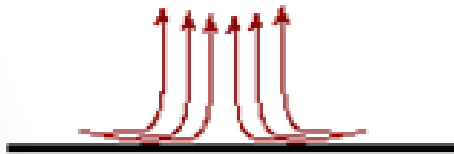


Counterclockwise  
Wind Flow

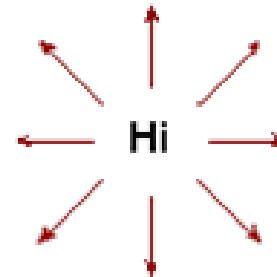


With Coriolis  
Effects

Side View:



Top View:

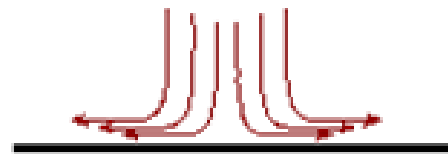


Clockwise  
Wind Flow



With Coriolis  
Effects

Side View:

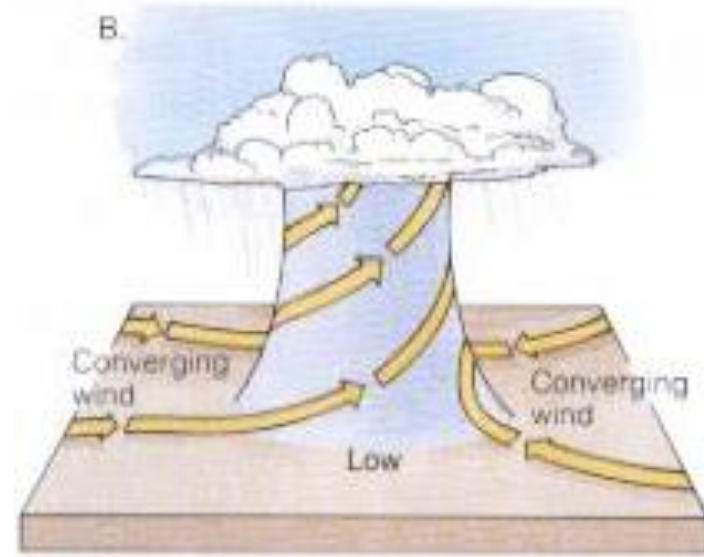
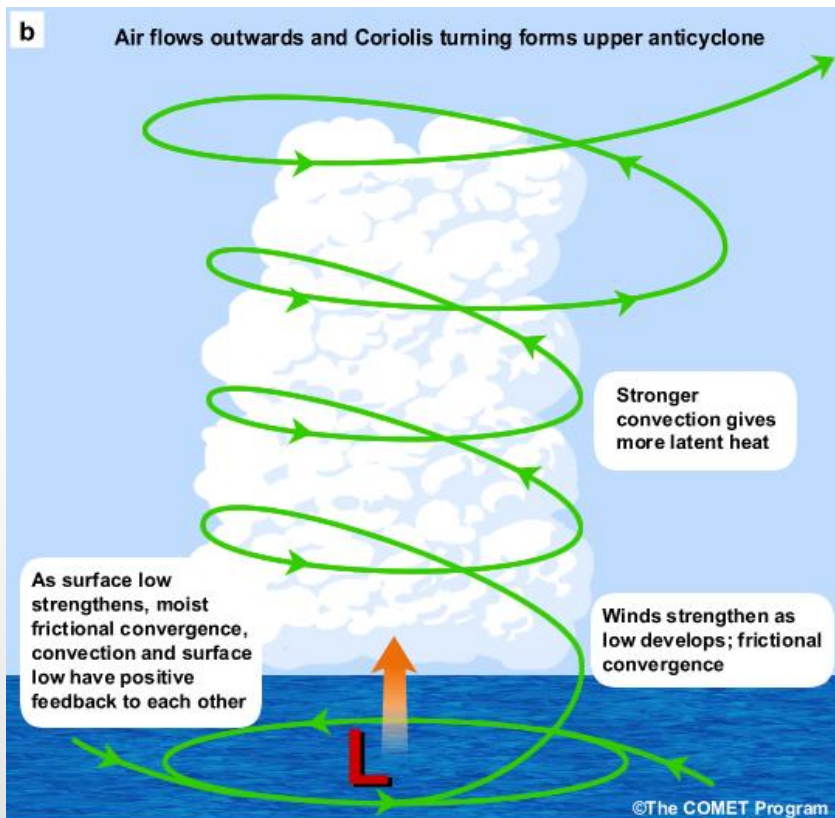




# Low Pressure Systems...

Low-Pressure Systems are also called CYCLONES

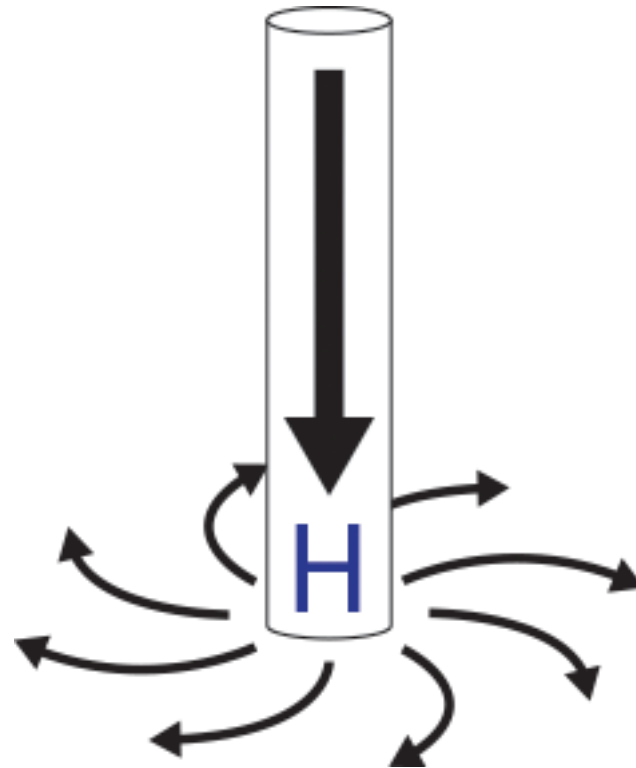
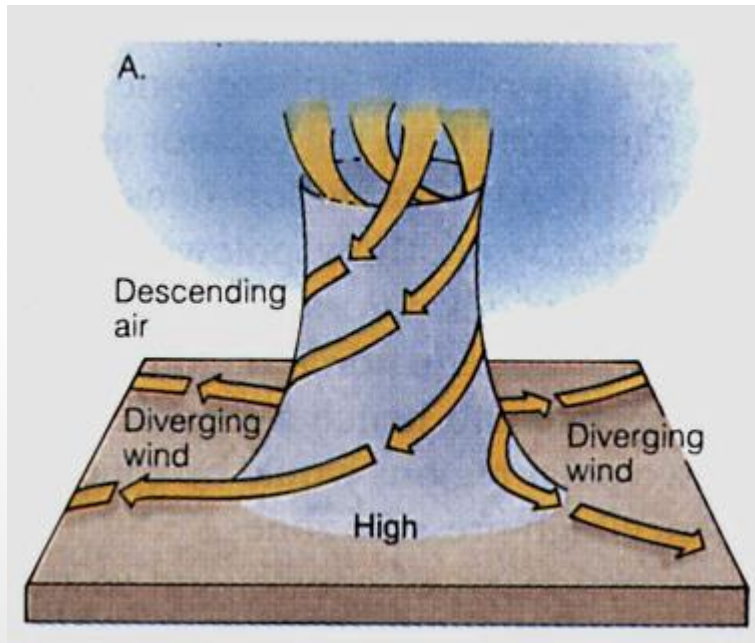
- Rotate COUNTERCLOCKWISE in the NORTHERN hemisphere (clockwise in the southern hemisphere).
- The WIND FLOW around low-pressure systems is also counterclockwise in the northern hemisphere (clockwise in the southern hemisphere).



# High Pressure Systems...

High-Pressure Systems are also called ANTICYCLONES:

- Rotate **CLOCKWISE** in the **NORTHERN** hemisphere (counterclockwise in the southern hemisphere).
- The wind flow around low-pressure systems is also clockwise in the northern hemisphere (counterclockwise in the southern hemisphere).



# North American Weather Systems...

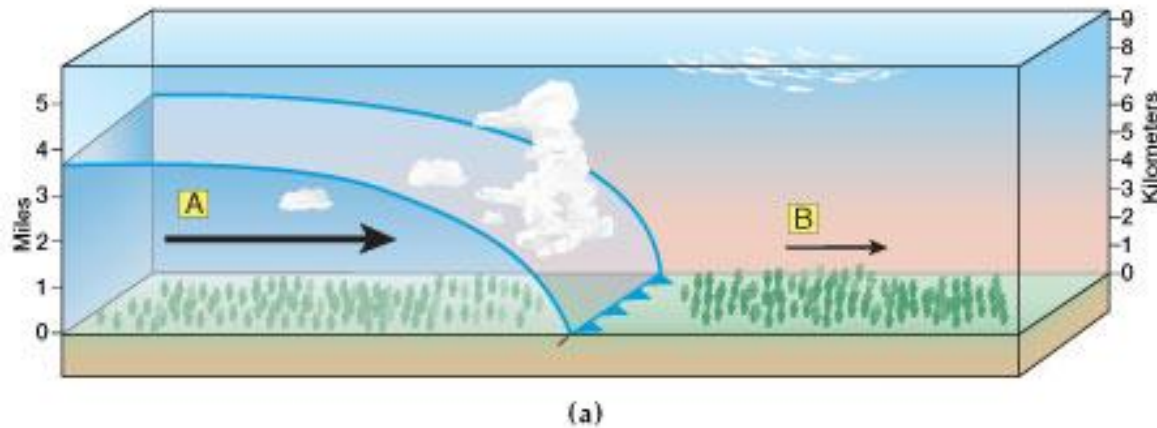
- A **WEATHER SYSTEM** is a set of **TEMPERATURE**, **WIND**, **PRESSURE** and **MOISTURE** conditions for a certain region that **MOVES** as a **UNIT** for a period of days.
- In the middle parts of North America, weather systems move from **WEST** to **EAST** because of the **PREVAILING WESTERLY** winds.
- As you can see from the diagram below, the middle of the North American continent is affected by many major air masses:



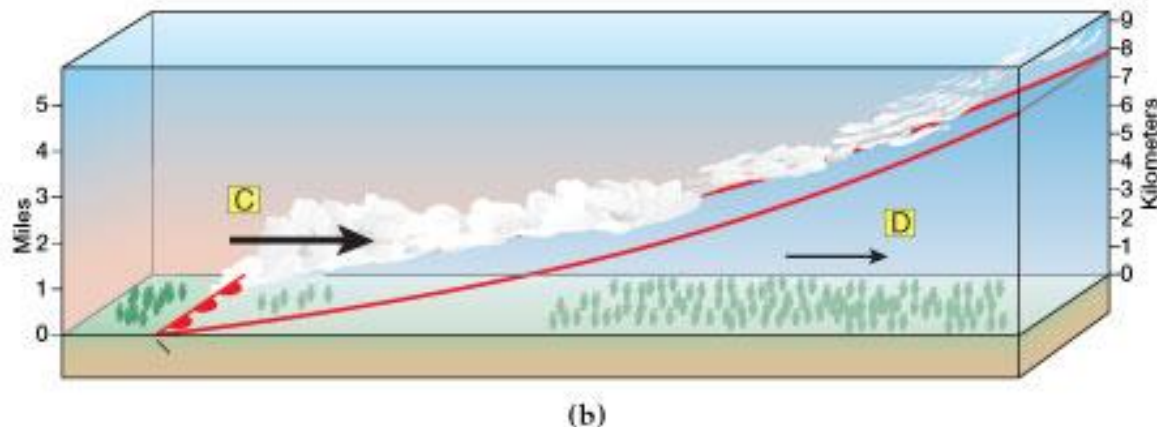
# Cold & Warm Fronts...

A **FRONT** is the boundary between **2 AIR MASSES** – a **COLD** air mass and a **WARM** air mass.

- A **COLD FRONT** is the leading edge of a **COLD AIR MASS**.
- A **WARM FRONT** is the leading edge of a **WARM AIR MASS**.



*Cold front*



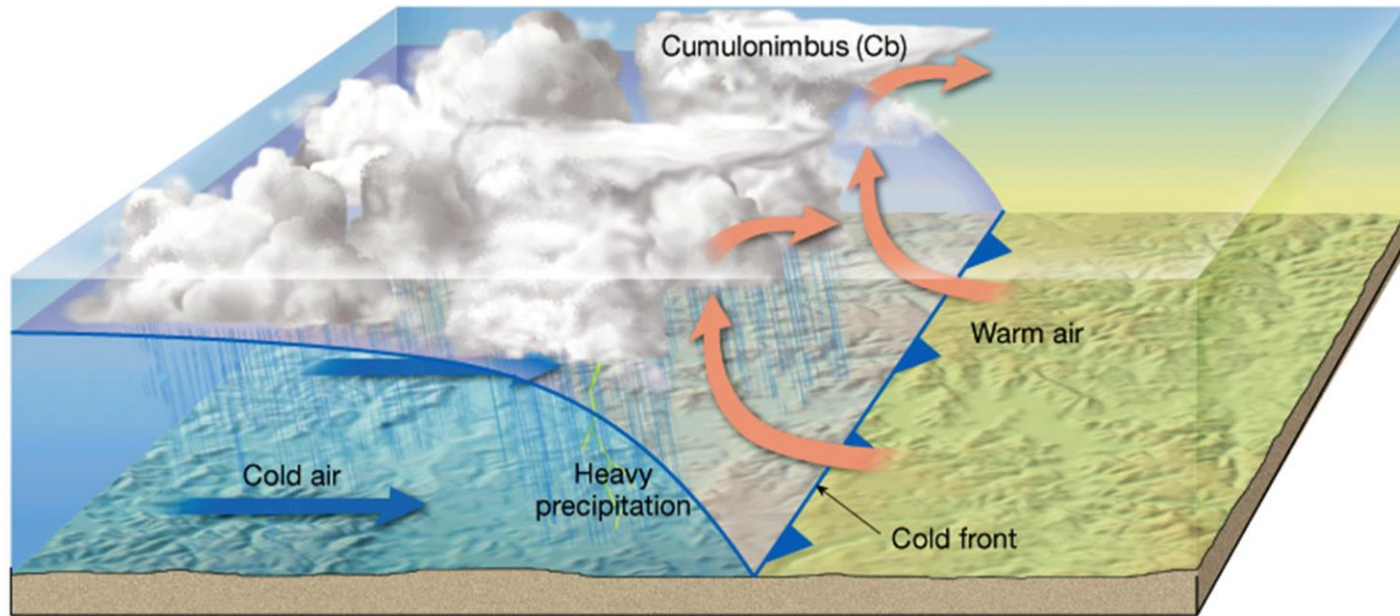
*Warm front*





# Cold & Warm Fronts...

When a cold front and a warm front COLLIDE, the COLD front acts as a WEDGE and PUSHES the lighter warm front UPWARD, causing the WARM, MOIST air to RISE fairly steeply.



This RAPIDLY rising warm, moist air creates a LOW-PRESSURE weather system that results in warm, moist air cooling as it rises in the troposphere and billowing CLOUDS begin to FORM (cumulonimbus clouds).

These clouds bring HEAVY RAIN OR SNOW. SEVERE WEATHER is normally associated with low-pressure systems.



# Weather Map Symbols...

The following are the **COMMON SYMBOLS** that are found on weather maps.



## **WARM FRONT**

Circles point in direction warm air mass is moving



## **COLD FRONT**

Triangles point in direction warm air mass is moving



## **STATIONARY FRONT**

When a cold and warm front meet, but neither is strong enough to overtake the other.



## **OCCLUDED FRONT**

When a cold front overtakes a warm front. Often causes stormy weather.



## **LOW PRESSURE SYSTEM**

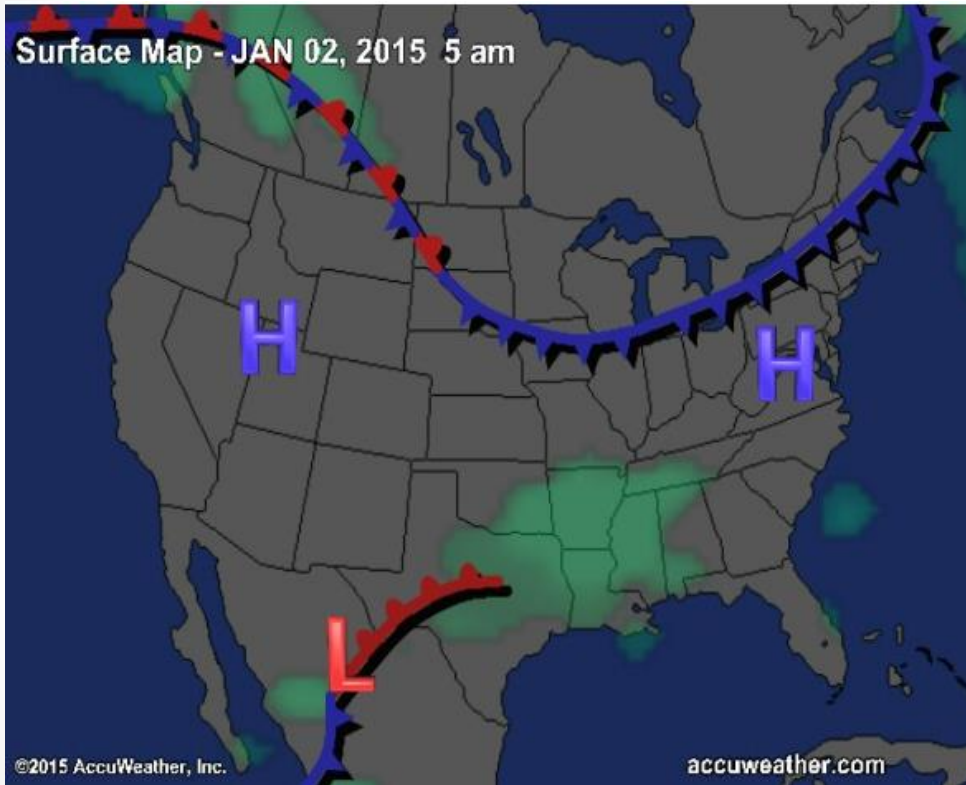
Warm air rising. Usually cloudy and rainy



## **HIGH PRESSURE SYSTEM**

Cold air falling. Usually sunny skies.

# Example of a Systems Map...



Today's Jetstream

