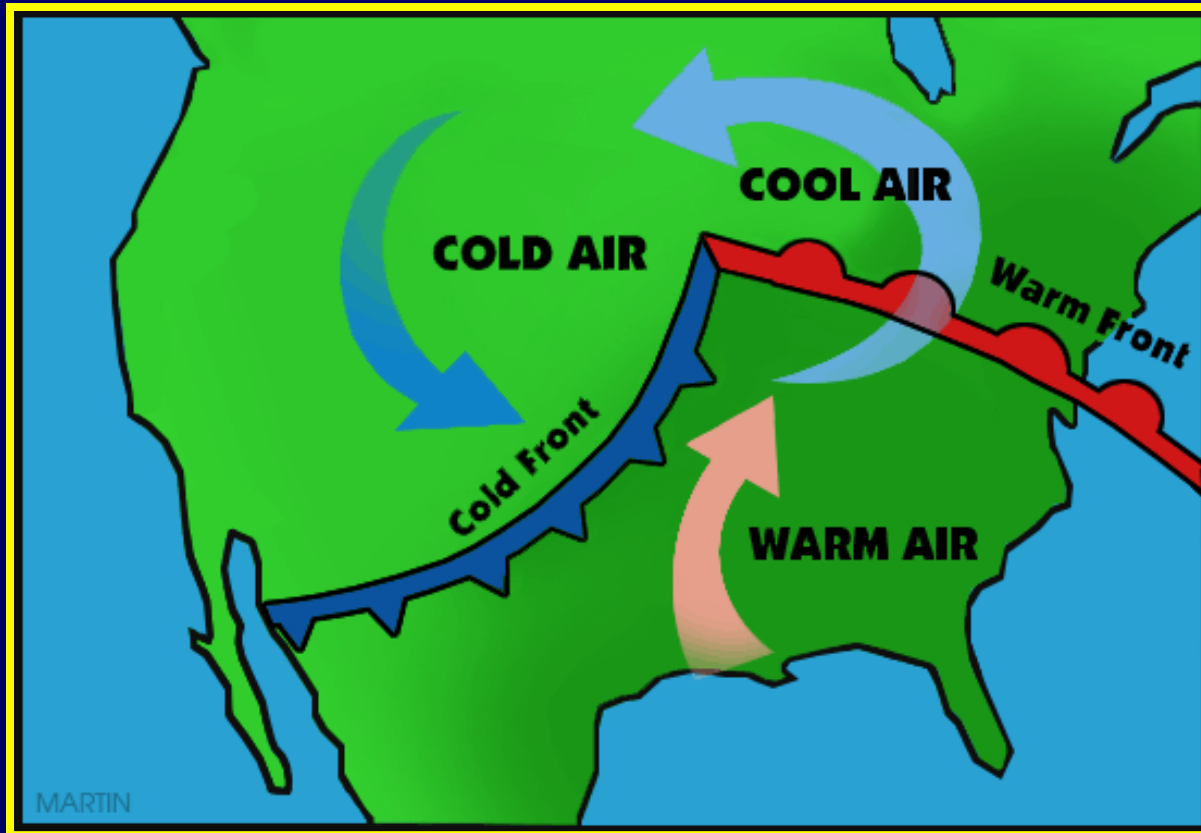


# Air Masses & Fronts



# Essential Standard 2.5

Understand the structure of and processes within our atmosphere.

## Learning Objective 2.5.2

Explain the formation of typical air masses and the weather systems that result from air mass interactions.

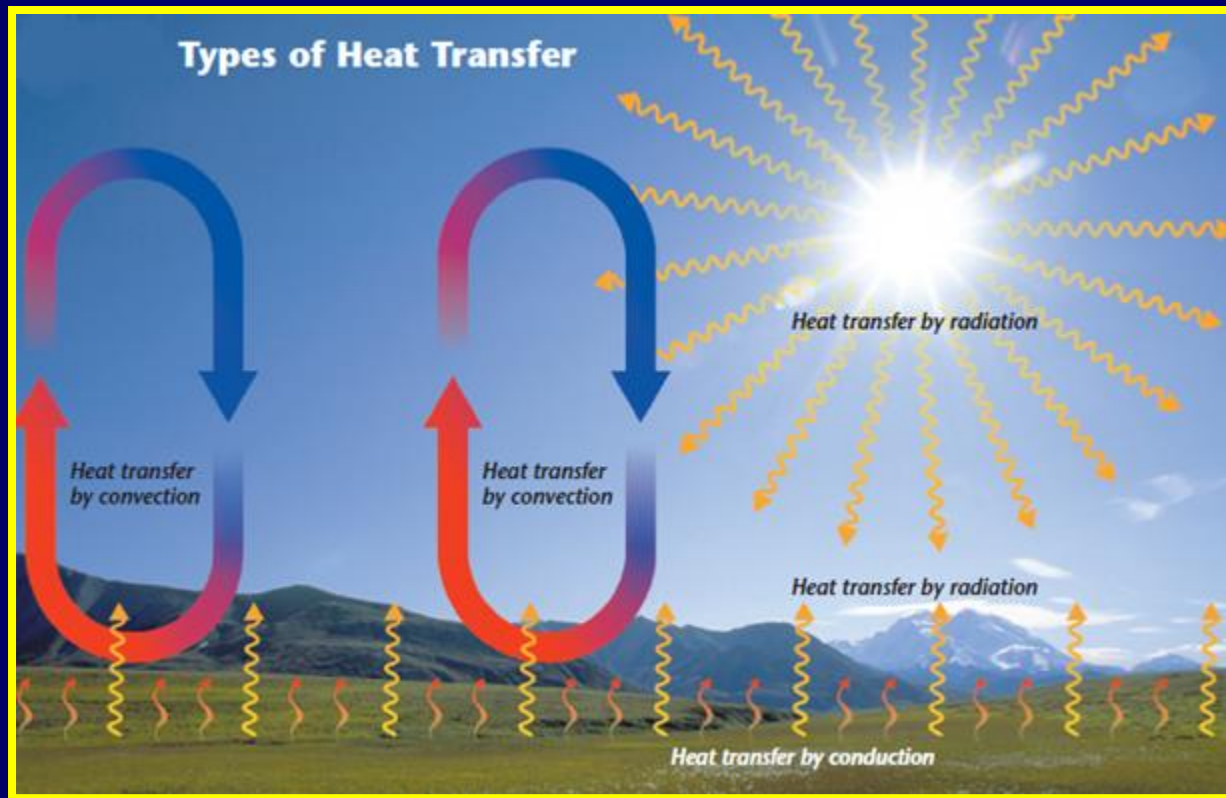
# I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can explain how heat is transferred through radiation, conduction, and convection.
- I can list four different types of air masses and describe their characteristics.
- I can distinguish describe the weather associated with cold, warm, stationary, and occluded fronts.

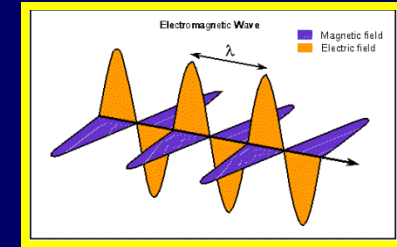
# Solar Fundamentals

The Sun is the source of all energy in the atmosphere and is transferred throughout the atmosphere by radiation, conduction, and convection.



# Radiation

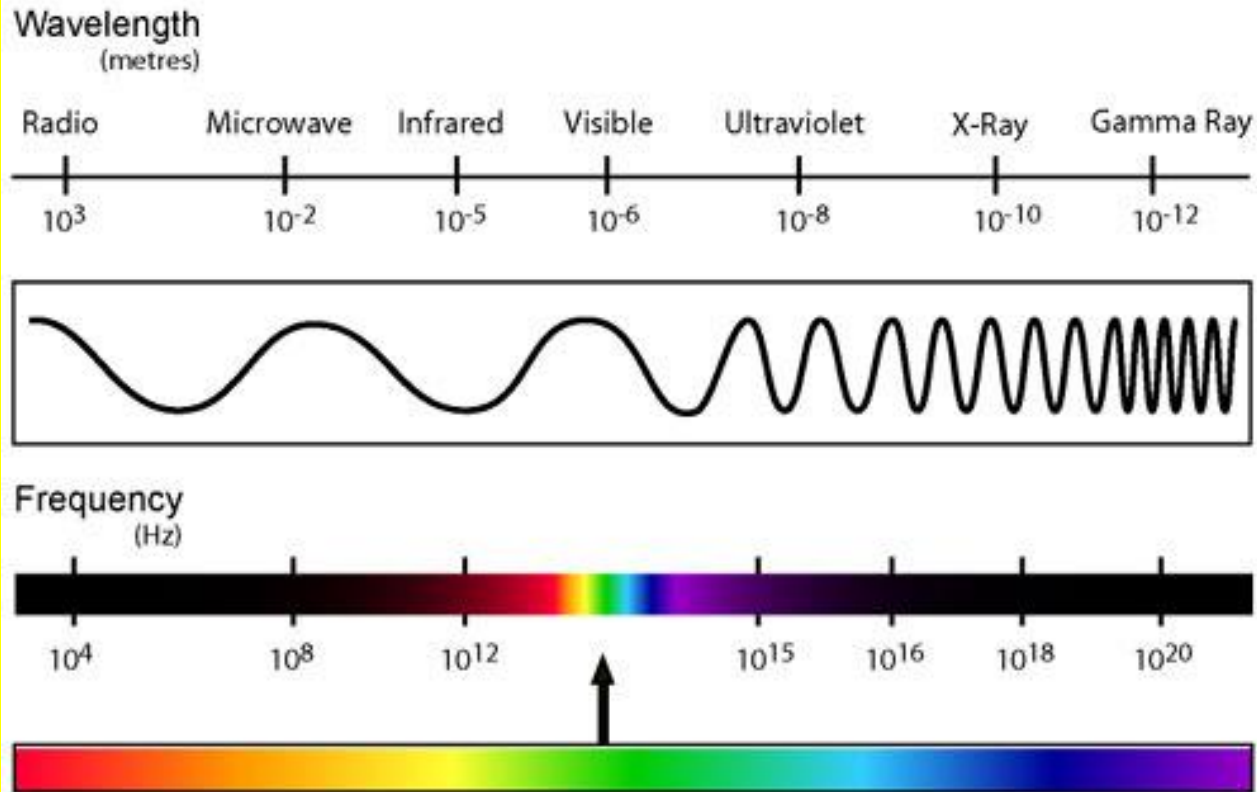
Radiation is the transfer of energy through electromagnetic waves



Long Wavelengths

Short Wavelengths

THE ELECTRO MAGNETIC SPECTRUM

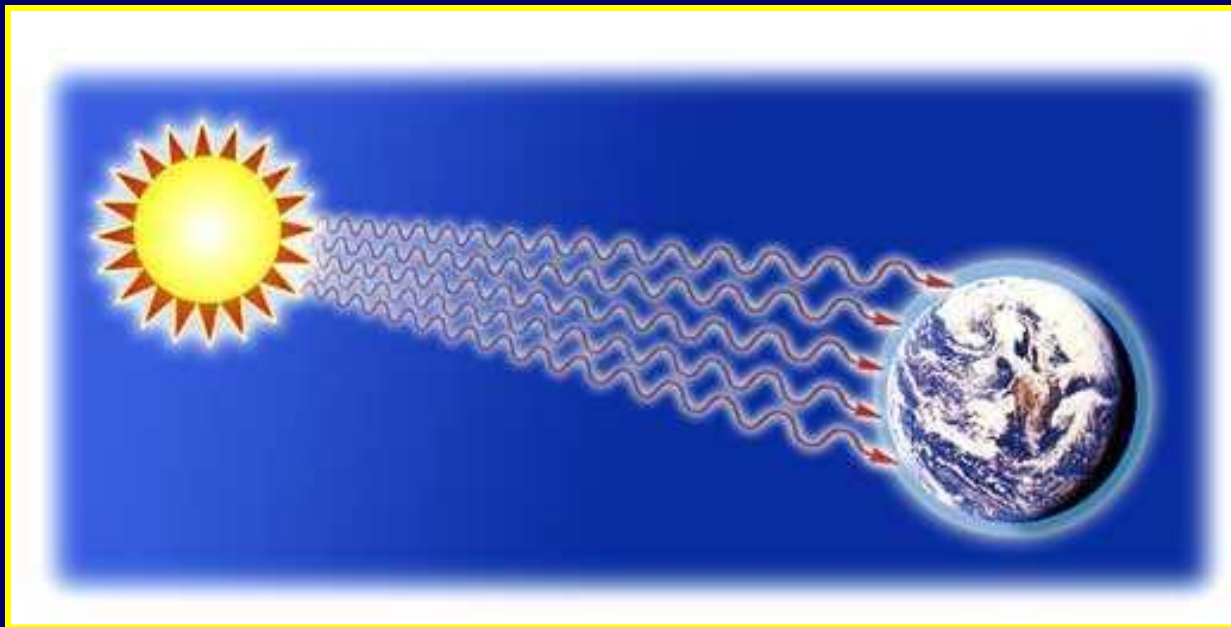


Low Frequency

High Frequency

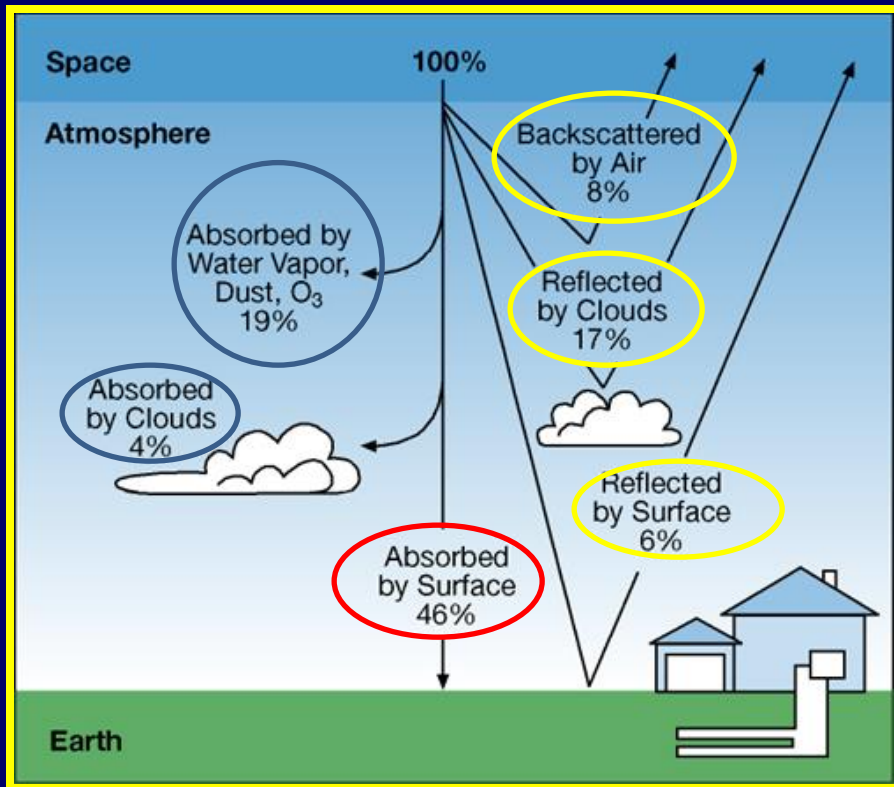
# Radiant Energy

Radiant energy, specifically light and heat energy, is transferred from the Sun to Earth in the form of electromagnetic waves.



# Radiation

As radiation enters Earth's atmosphere, about 25% of the energy is absorbed by the clouds and gas molecules in the atmosphere. ●

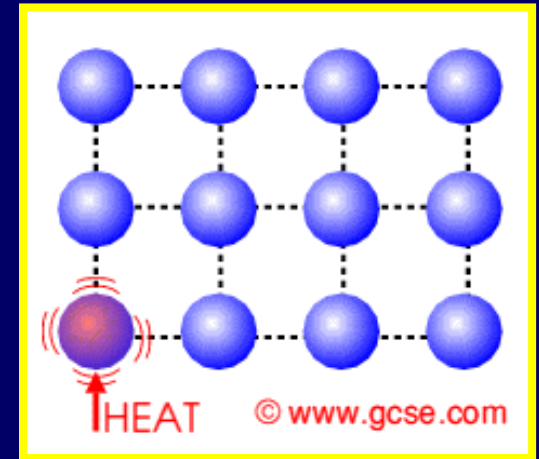


Another 25% is reflected back out into space. ●

About 50% of solar radiation is absorbed by Earth's surface. ●

# Conduction

Conduction is the transfer of energy when molecules come in contact and collide.

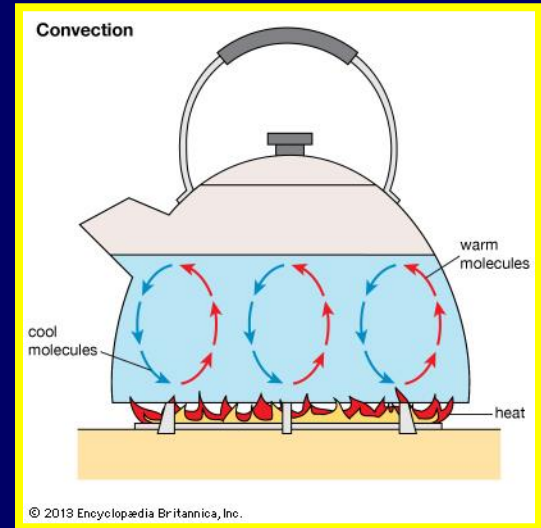


Once radiant energy strikes Earth's surface, heat energy is transferred across the ground surface and into the above air molecules through conduction.



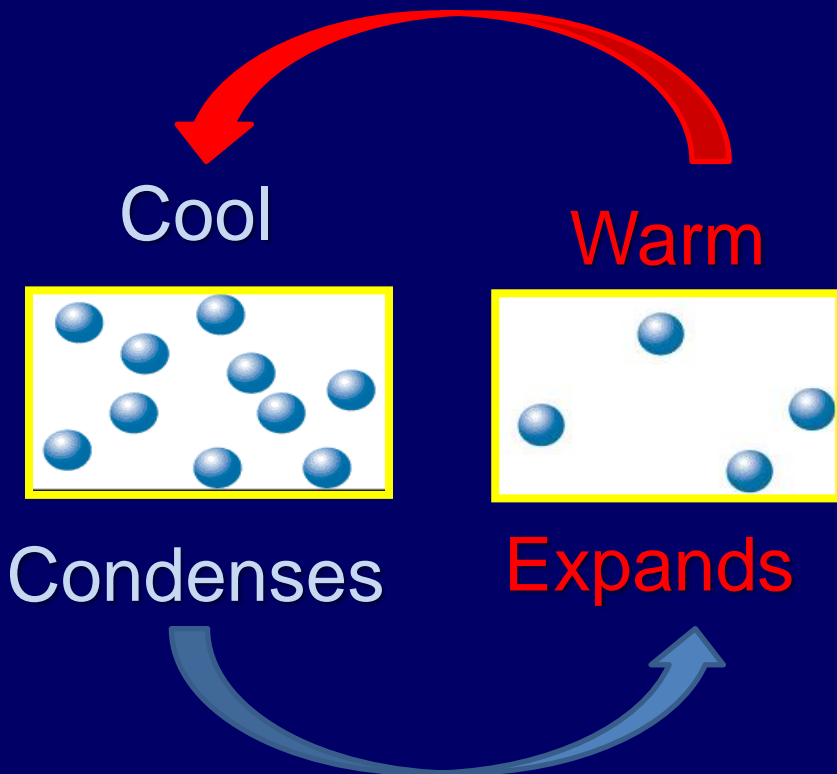
# Convection

Convection is the transfer of energy by the flow of a heated substance.



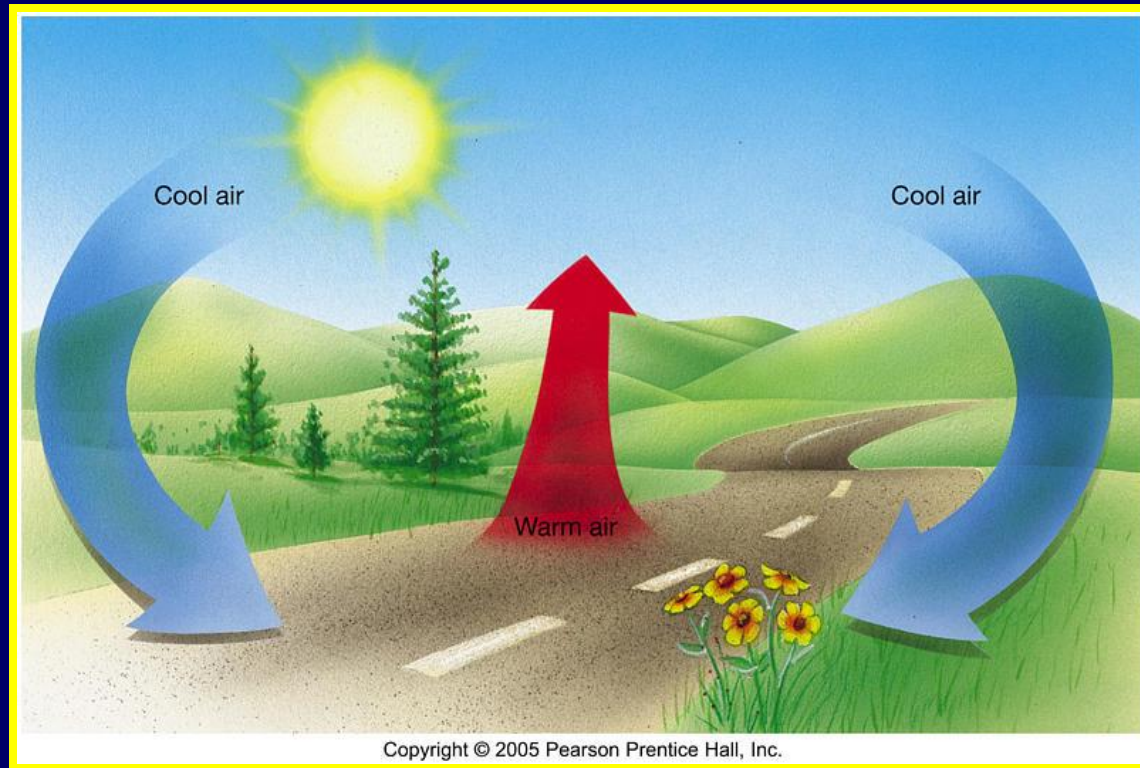
When air cools, the molecules condense and the air sinks.

When air warms up, the molecules expand and their air rises.



# Convection

Convection occurs in the atmosphere when the warm air, above the surface of Earth, rises, cools, and sinks creating convection currents.



# Air Mass

When warm air rises and remains over the same area for days or weeks, the result is a formation of an air mass.



An air mass is a large body of air that takes on the characteristics of the area over which it forms.



Air masses can form over both land and water.

# Maritime Air Mass

An air mass that forms over water will have a high water content and are called maritime air masses.



An air mass that forms over cold water is called a maritime polar air mass.

An air mass that forms over warm water is called a maritime tropical air mass.

# Continental Air Mass

An air mass that forms over land is called a continental air mass and tend be very dry.

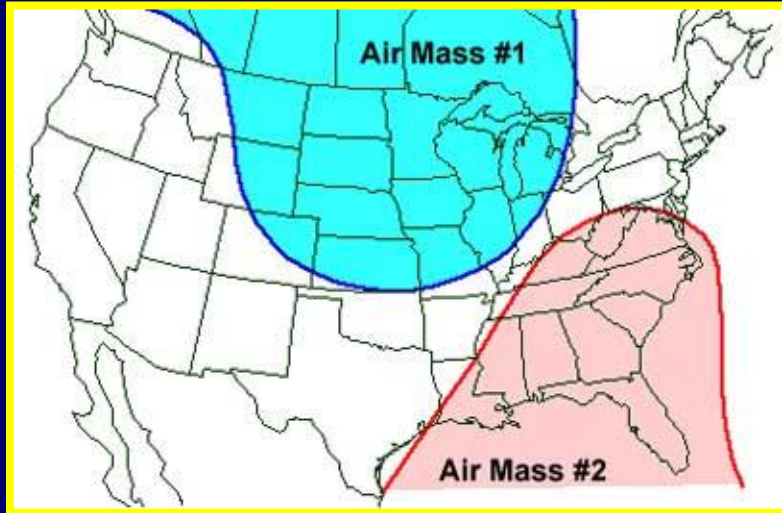


An air mass that forms over cold land is called a continental polar air mass.

An air mass that forms over warm land is called a continental tropical air mass.

# Fronts

Air masses do not stay in one place indefinitely.



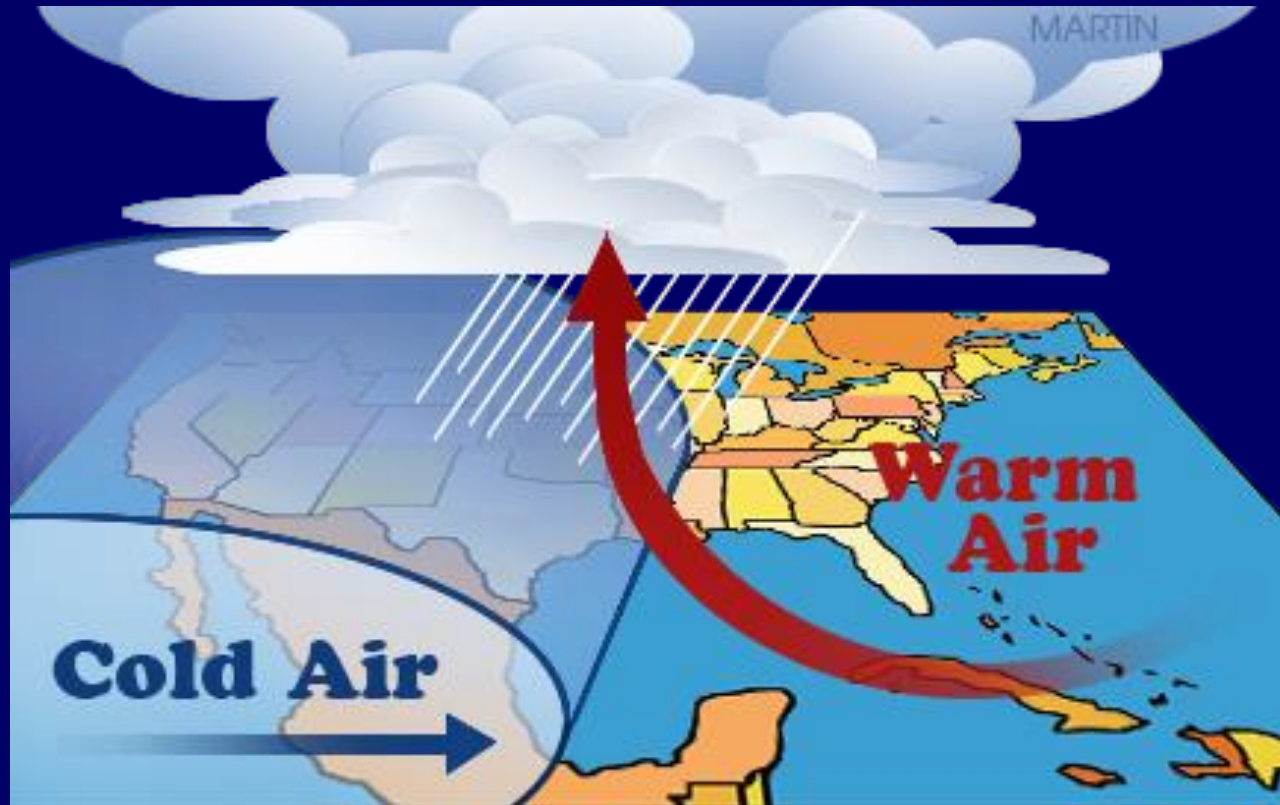
Eventually they move and encounter other air masses.

When two different air masses interact, it is called a front.



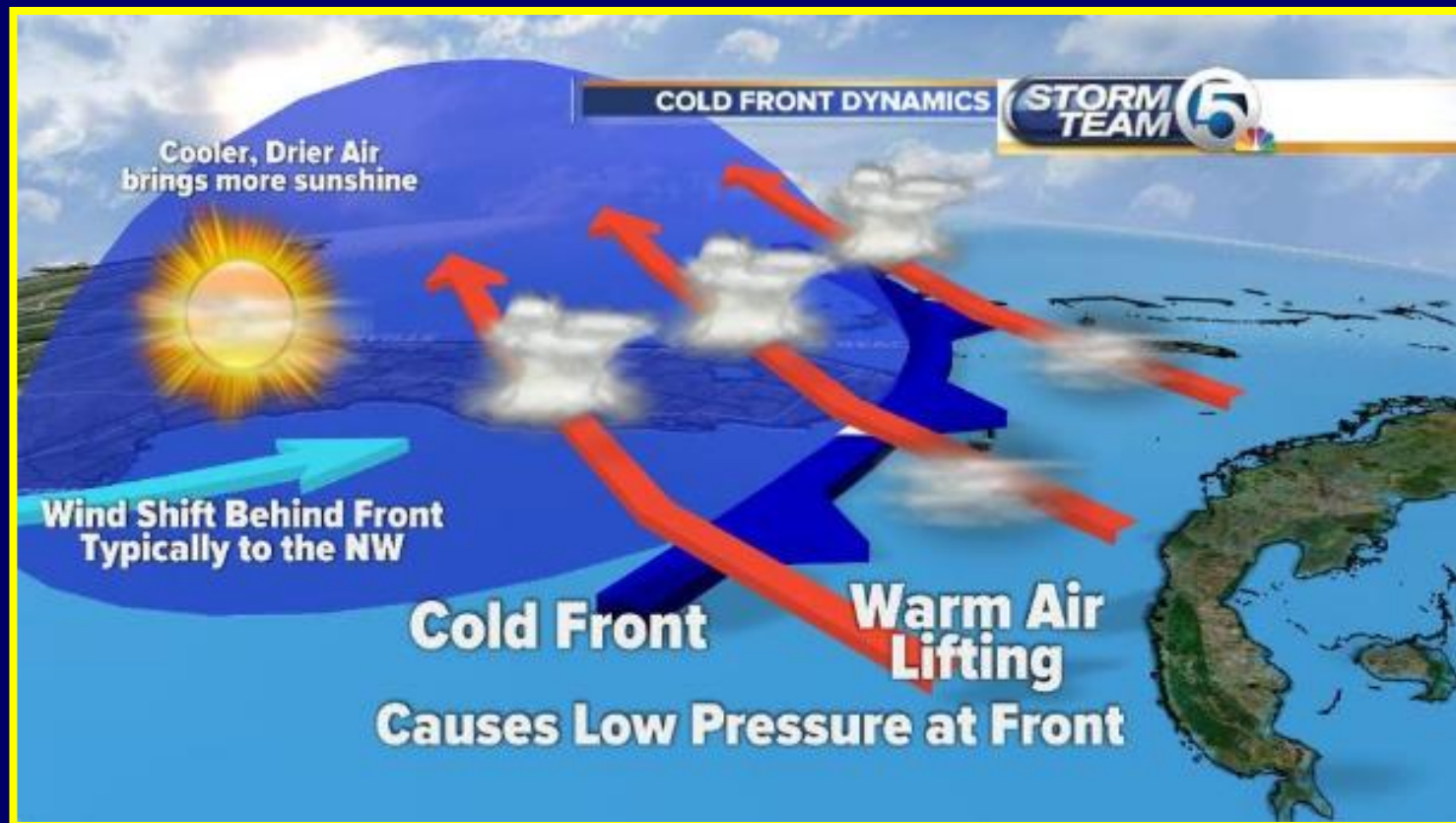
# Cold Front

In a cold front, cold, dense air forces warm air upwards where it cools and condenses.



# Cold Front – Rain & Thunderstorms

At the frontal boundary, the water vapor in the rising warm air condenses into clouds, rain, and thunderstorms.





# Cold Front

Cold fronts are represented on maps as a solid blue line with blue triangles that point in the direction of the front's motion.



# Warm Front

In a warm front, advancing warm, moist air from the southwest displaces cold air.



# Warm Front

At the frontal boundary there is usually extensive cloudiness and gentle rains, followed by prompt clearing and warming as the front passes.



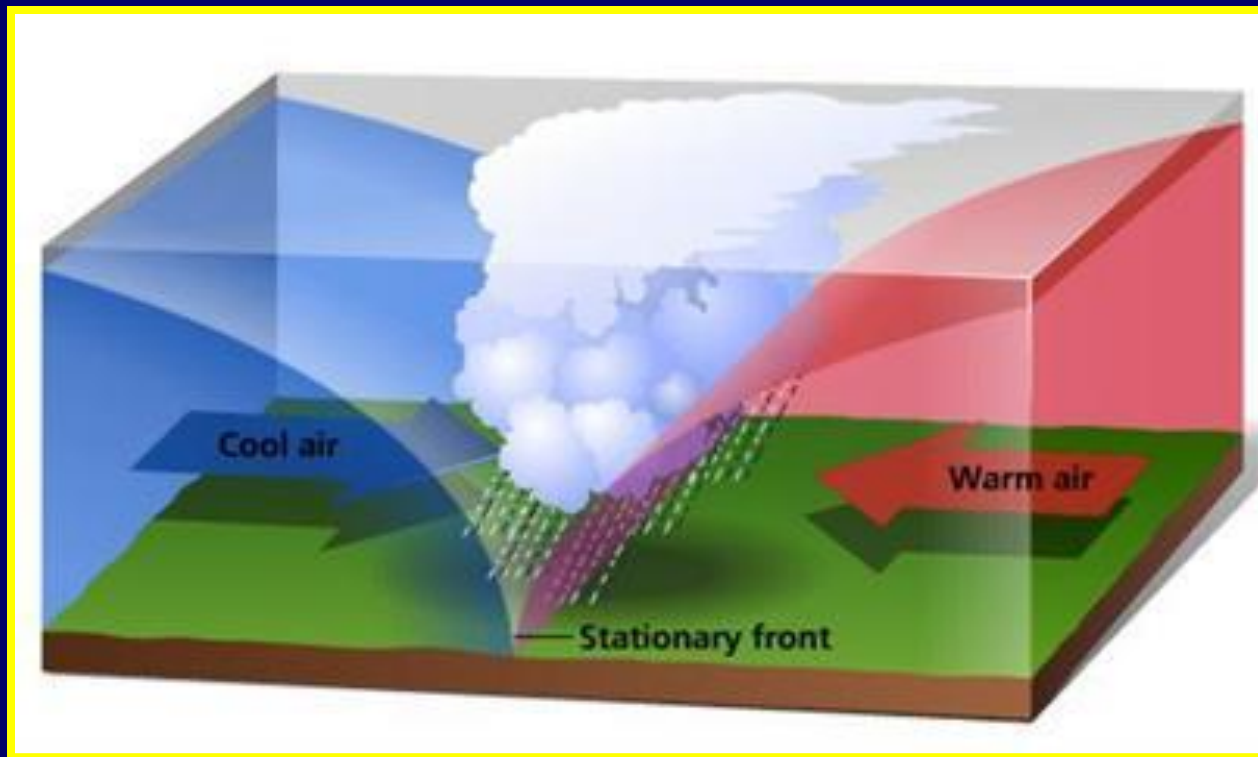
# Warm Front

Warm fronts appear on a map as red lines with red semicircles pointing toward the direction the front is moving.



# Stationary Front

A stationary front occurs when two air masses meet with neither one advancing into the other's territory.



# Stationary Front

Stationary fronts are associated with long continuous periods of rain.



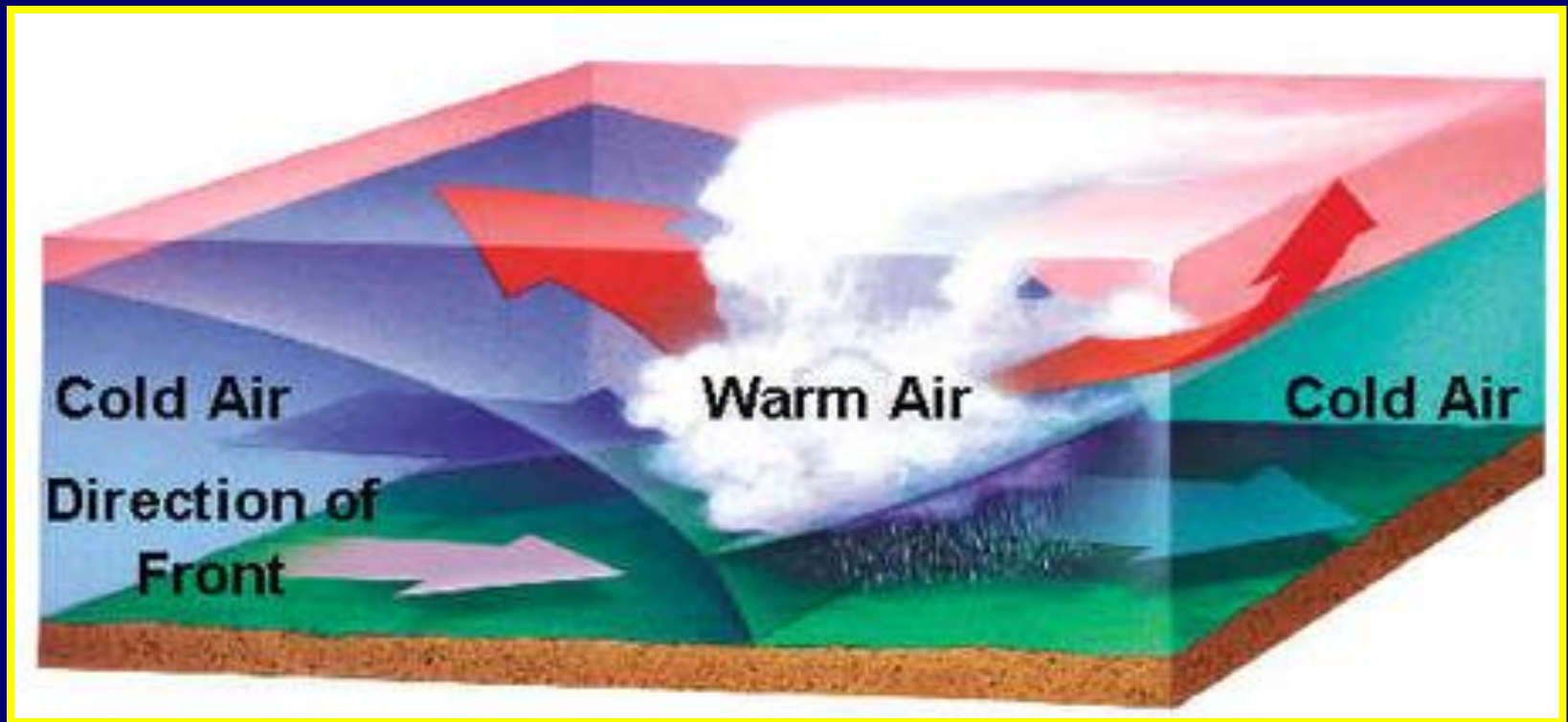
# Stationary Front

Stationary fronts are represented on a map by a combination of blue triangles and red semi-circles on opposite sides.



# Occluded Front

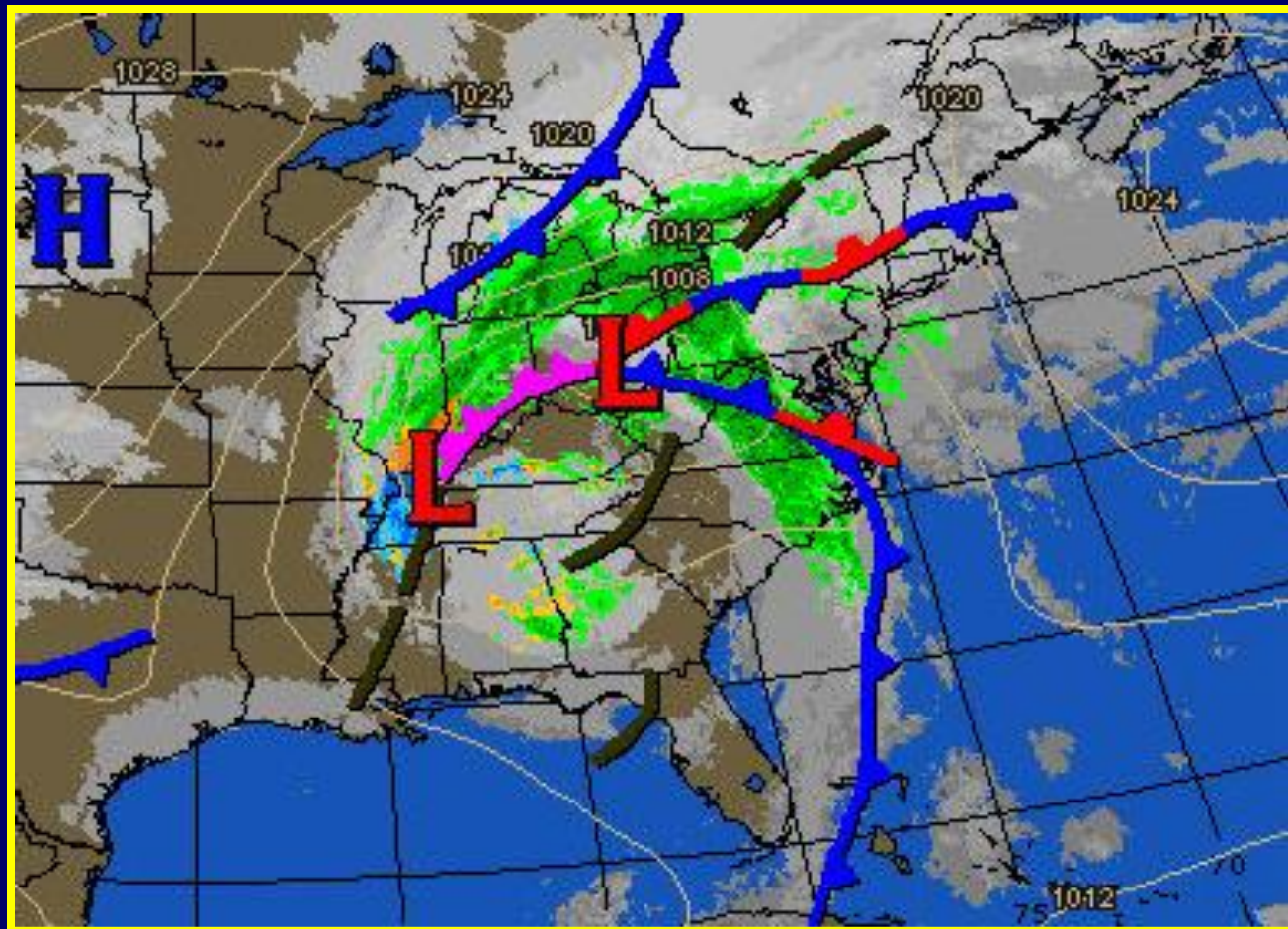
An occluded front occurs when a warm front becomes wedged between two cold fronts with the warm air being pushed upwards.





# Occluded Front

Occluded fronts are associated with rain and snow, followed by drier air.



# Occluded Front

Occluded fronts are represented on a map with alternating purple triangles and semi-circles on the same side.



# The End

