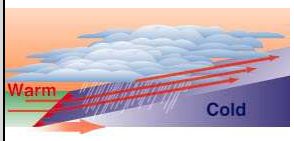
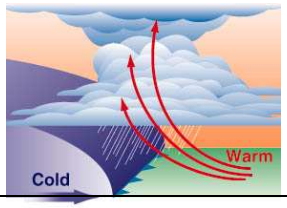
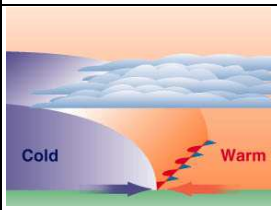
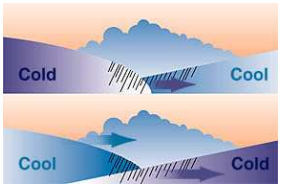
Fast Facts #8 Weather Conditions

Name_____ Block____

The interactions between **air masses, fronts**, and **pressure systems** result in various weather conditions.

Air masses are huge bodies of air, they are formed over **water** (humid) or **land** (dry) in **tropical** (warm) or **polar** (cold) regions. We talk about the movement of air masses, so the temperature and humidity conditions within the air masses are important because weather events happen when air masses move.

Fronts are air masses that move and collide with each other, **fronts** form at the **boundaries** between the air masses. Depending upon the air masses involved, a **warm** front, **cold** front, **stationary** front, or **occluded** front can develop.

Type of Front	Warm Front	Cold Front	Stationary Front	Occluded Front
Description	warm air mass that is moving **over** cold air mass	colder air mass that slides **under** a warm air mass	**neither** the cold air mass or warm air mass is moving at the frontal boundary	a warm air mass is caught between two cooler air masses and is pushed upward
Weather as the front passes	long periods of **precipitation** and **warmer** temperatures	**thunderstorms** and sometimes **tornadoes** and **cooler** temperatures	long periods of **precipitation**	long periods of **precipitation**
Diagram				
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High Pressure Systems and Low Pressure Systems form when warm air rising or cold air sinking combined with the spinning of Earth causes the air to spin forming high and low pressure regions.

Type of System	High Pressure Systems	Low Pressure Systems
Weather	**fair** weather (pressure is high and dry)	**rainy** and/or **stormy** weather conditions (pressure is low and brings rain or snow)
Circulation	winds circulate **clockwise**	**counterclockwise** circulating winds

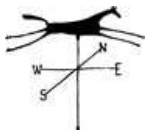
Storms are **severe** weather conditions which occur when **pressure differences cause fast air movement**. Conditions that bring one kind of storm can also cause other kinds of storms in the same area.

Type of Storm	Thunderstorm	Tornado	Hurricane
Description	storm with **thunder**, **lightning**, **heavy rains** and **strong winds**, form within large **cumulonimbus** clouds, usually form along **a cold front** but can form within an air mass	rapidly whirling, **funnel-shaped** clouds that reaches down from a storm cloud, the **very low pressure** and **strong winds** can cause great damage to people and property, form within the fronts where there are strong thunderstorms	a **low** pressure **tropical** storm that forms over **warm ocean water**; winds form a spinning circular pattern around the center, or **eye**, of the storm; the lower the air pressure at the center, the faster the winds blow toward the center of the storm

Since **weather** is a condition of Earth's atmosphere at **any time**, weather conditions may include fair weather, showers or light rain, humid conditions, clear skies with cold conditions, days of clouds and precipitation, or others that do not necessarily involve storms.

Meteorologists make weather predictions/forecasts from data.

In order to understand the conditions in weather systems and to be able to make weather **forecasts** as precise as possible, weather **data** must be accurately gathered. The **instruments** below are used to gather data. The data must be collected on a **regular basis** over a **period of time** in order analyze and predict **patterns in weather conditions**.

Weather Instruments	Anemometer	Wind Vane (wind sock)	Thermometer	Sling Psychrometer	Barometer	Rain Gauge
Measures	**wind speed**	**wind direction**, the direction it comes from	**air temperature**	**relative humidity**	**air pressure**	amount of precipitation
Example						
Units of Measurement	mph (miles per hour)	north, south, east ,west	℃ or ℉	percent of water vapor in the air	inches or millibars of mercury	inches or centimeters

Weather maps can help predict weather by indicating high or low pressure systems (**isobars**), movement of air masses and fronts, or temperature ranges (**isotherms**). Station models can include information such as cloud cover, temperature, wind speed, wind direction and speed, precipitation, or barometric pressure.

Weather Map Information - Fill out the chart below using your Study Guide - Page 6

Precipitation	Heavy Fog	Hail	Rain	Shower	Heavy Freezing Rain	Snow
Symbol						

Cloud Cover %	0%	10%	25%	50%	75%	100%
Symbol						

Wind Speed	1-2	9-14	21-25	32-37	44-49	55-60	67-71
Symbol							

Satellite Images are used for seeing cloud patterns and movement (hurricane clouds and movement).
Radar images can be use to detect cloud cover, rainfall or storm location, intensity and movement, as well as the potential for severe weather and even tornadoes or hurricanes.

Warm air near the surface of the earth **rises** and then **cools**; this is a **convection current**. There are three atmospheric convection areas in the northern hemisphere and three in the southern hemisphere. The areas in the northern hemisphere are:

- **Tropical Convection Region** – begins at the equator and extends about 30 degrees north latitude
- **Temperate Region** – extends from about 30 degrees to about 60 degrees north latitude
- **Polar Regions** – extends from about 60 degrees to the north pole (which is 90 degrees north latitude)

Convection on a global scale causes **global winds** which move weather systems and surface ocean currents.

- **Global Wind Belts** – weather systems move in certain directions because of the spinning of the earth
- **Land Breezes** (blow from the land to sea), **Sea Breezes** (blow from the sea to the land) – these are local winds
- **Surface Currents** of Earth's oceans circulate warm and cold ocean waters in convection patterns also influence weather and climates of nearby landmasses
- **Gulf Stream** is warm current water that effects the eastern Atlantic coastline

Climate Zones (tropical, temperate, and polar) exist because of unequal heating of Earth. Since temperature is a major factor in climate zones, climate is related to: convection regions, temperature differences, and warm and cold surface ocean currents.

Global Winds are found in each convection region. The winds appear to curve due to the spinning of the earth (**Coriollis effect**).

- **Trade Winds** blow from east to west in the tropical regions moving the warm tropical air in that climate zone
- **Prevailing Westerly Winds** blow from west to east in the temperate region.
- Changing seasons effect the temperate zone. This causes weather systems in the US to move west to east.
- Tropical Weather Systems like hurricanes move in the direction of the trade winds (east to west).
- The **Polar Winds** blow northeast to west moving cold polar air from the poles to the west.

The **Jet Stream** is a fast moving ribbon of air that moves around the globe of Earth.

It moves from west to east in the Northern Hemisphere (in the United States). It dips and bends and constantly changes position. Air masses and weather systems in its path are moved along by the fast moving air. **The polar jet stream** can bring cold air from the north. The **subtropical jet stream** can bring warm tropical conditions from the south.

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