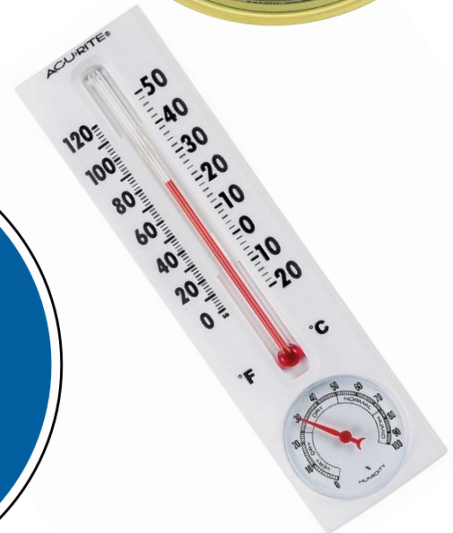
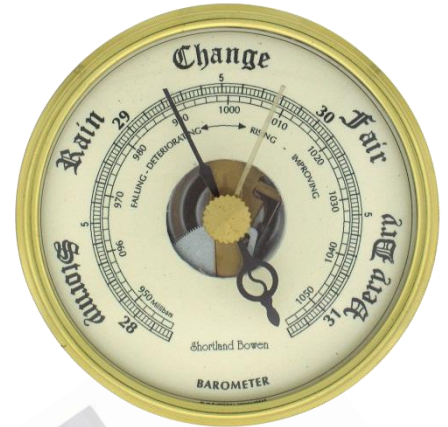
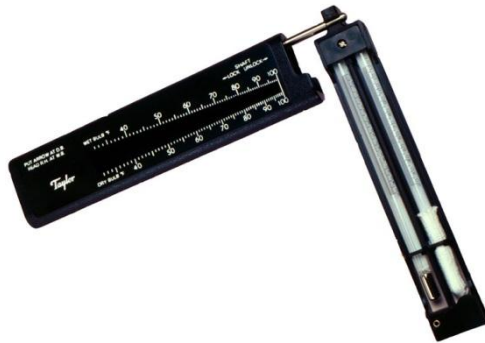
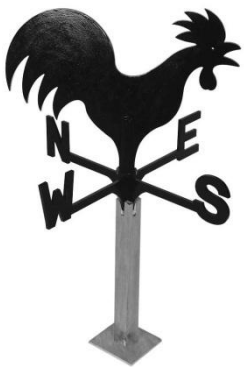


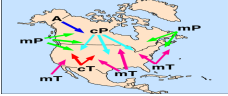
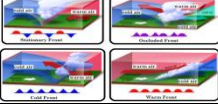






6-4.4/6-4.5/6-1.1

WEATHER STUDENT PACKET

- AIR MASSES & FRONTS
- AIR PRESSURE
- STORMS
- WEATHER TOOLS



Vocabulary 6-4.4 Summarize the relationship of the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including thunderstorms, hurricanes, and tornadoes) and other weather conditions.

Weather	Condition of the earth's atmosphere at any time.
Air masses 	Huge bodies of air with the same moisture and temperature throughout that are formed over water or land in tropical or polar regions. Because the focus is on the movement of air masses, temperature and humidity conditions (for example, warm or cold air, humid or dry air) within the air masses as they form is important to resulting weather conditions when air masses move.
Fronts 	As these air masses 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.
Cold front 	Forms when a cold air mass pushes under a warm air mass , forcing the warm air to rise. Weather associated: thunderstorms and tornadoes. Thunderheads can form as the moisture in the warm air mass rises, cools, and condenses. As the front moves through, cool, fair weather is likely to follow.
Warm front 	Forms when a moist, warm air mass slides up and over a cold air mass. Weather associated: brings gentle rain or light snow, followed by warmer, milder weather. As the warm air mass rises, it condenses into a broad area of clouds. A warm front brings gentle rain or light snow, followed by warmer, milder weather
Stationary front 	Forms when warm and cold air meet and neither air mass has the force to move the other. They remain stationary , or "standing still." Weather associated: Where the warm and cold air meet, clouds and fog form, and it may rain or snow. Can bring many days of clouds and precipitation. Where the warm and cold air meet, clouds and fog form, and it may rain or snow. Can bring many days of clouds and precipitation.
Occluded front "C W C" 	Forms when a warm air mass gets caught between two cold air masses. The warm air mass rises as the cool air masses push and meet in the middle. Weather associated: long periods of precipitation. The temperature drops as the warm air mass is occluded, or "cut off," from the ground and pushed upward. Can bring strong winds and heavy precipitation.
Air pressure	The force that air has on a surface. Warm air rising or cold air sinking combined with the spinning of Earth causes the air to spin forming high and low pressure regions.
High pressure "H"	Usually signal more fair weather with winds circulating around the system in a clockwise direction. "HIGH, HIGH, Happy, Happy, LOW, LOW, sad, bad."
Low pressure "L"	Has counter clockwise circulating winds often result in rainy and/or stormy weather conditions . . . "HIGH, HIGH, Happy, Happy, LOW, LOW, sad, bad."
Barometer	is an instrument used to measure air pressure measured in inches of Mercury (in Hg) or in millibars (mbar)
Thunderstorm	A 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.
Tornado 	A rapidly whirling, funnel-shaped cloud, that reaches down from a storm cloud; the very low pressure and strong winds can cause great damage to people and property; are likely to form within the frontal regions where strong thunderstorms are also present.
Hurricane 	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. Hurricanes form when the temperature of the water is 80°degrees F or 26.7° degrees Celcius. (*Remember that 80°F is the magic number!)

WARM UPS- Week of

AIR MASSES, FRONTS, AND BAROMETRIC PRESSURE

Warm Up- FRONTS

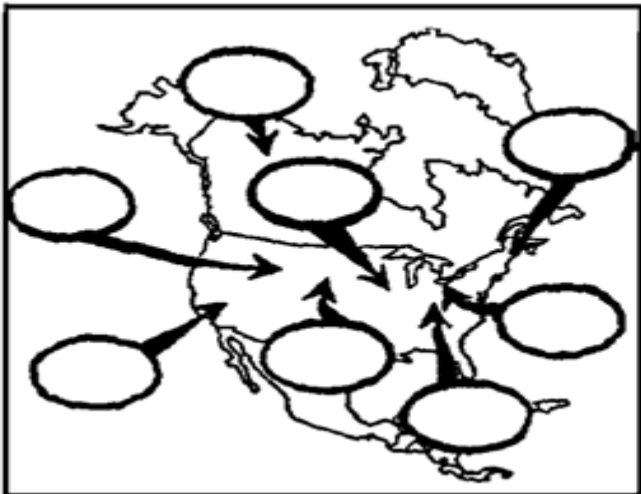
1. _____ area in which two types of air masses meet
2. _____ area where warm moist air slides up and over a cold mass
3. _____ area where cold air mass pushes under a warm air mass
4. _____ area where warm air is caught between two colder
5. _____ warm air meets cool air and the masses do not have enough force to overcome one another.



Warm Up- AIR MASSES

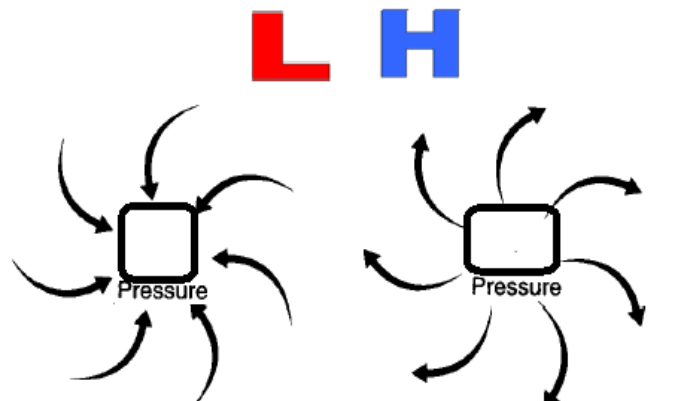
Label the Air Masses and think of a clever trick to remember them.

Trick: _____



Warm Up- PRESSURE

Place an "L" or an "H" in the center of the swirling arrows that explains that pressure system.



Winds around _____ pressure systems spiral inward counterclockwise. Winds around _____ pressure systems spiral outward clockwise for the

AIR MASSES INFO AND PRACTICE

Air Masses in North America

Air masses are

(define) _____ that are formed over water or land in tropical or polar regions. Because the focus is on the movement of air masses, temperature and humidity conditions (for example, warm or cold air, humid or dry air) within the air masses as they form is important to resulting weather conditions when air masses move.

Arctic-

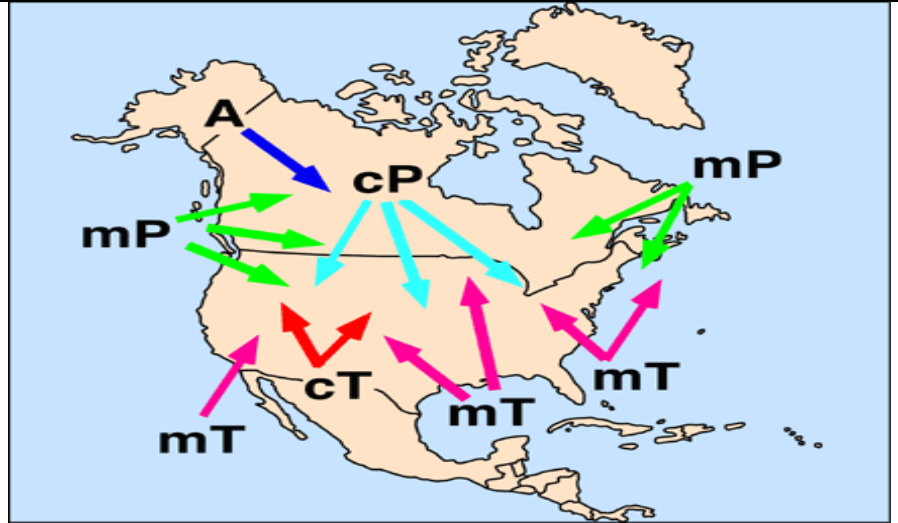
Continental Polar-

Maritime Polar-

Continental Tropical-

Maritime Tropical-

*They are in lowercase and uppercase, so that you don't confuse them with Central Time (CT) and Mountain time (MT).



Tricks to remember these:

continental air – c (dry because _____)

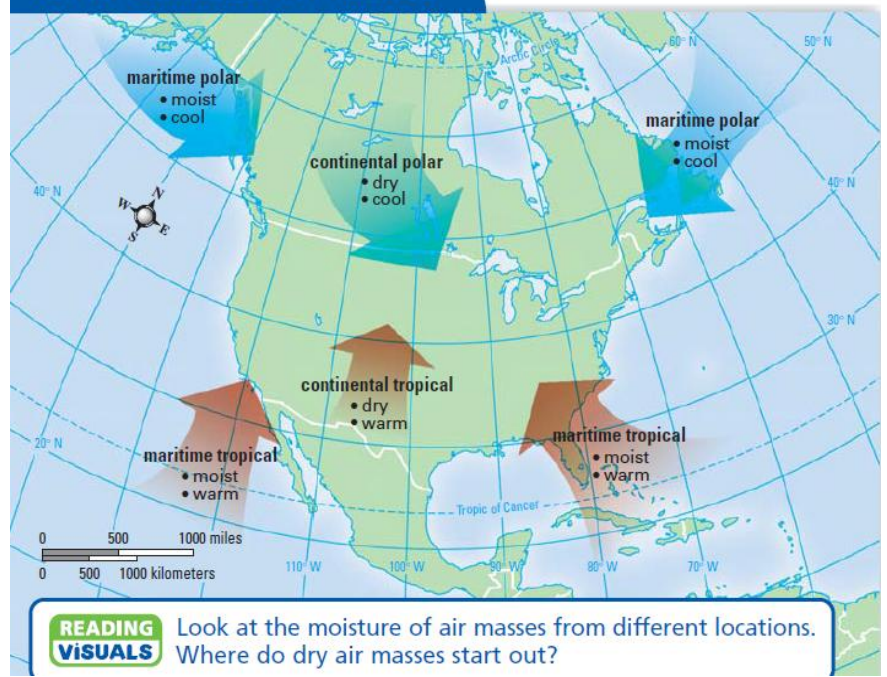
maritime air – m (“m” for moist because _____)

Tropical air – T (tropical because it is _____)

Polar air – P (Polar because it is _____)

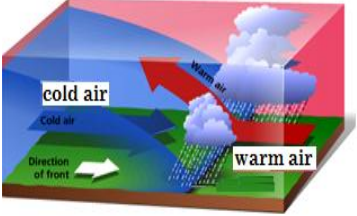
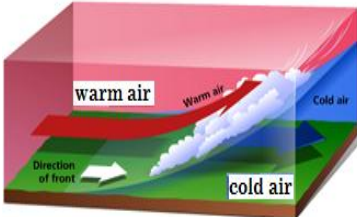
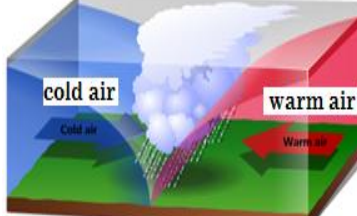

Arctic air – A (because it is _____)

North American Air Masses



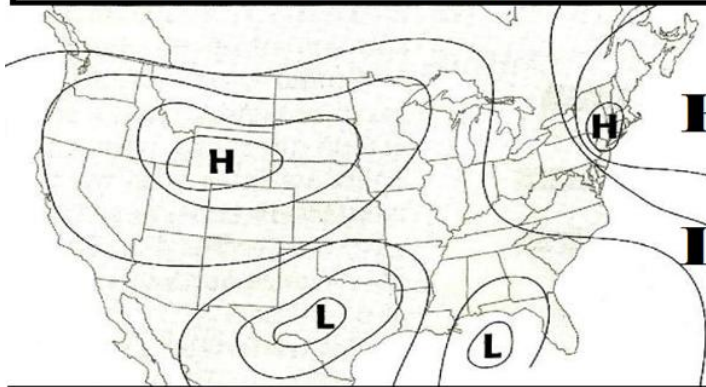
FRONTS

Types of Fronts

Draw Symbol	Definition	Weather Associated	Which way it is moving	Picture
Cold		Thunderheads can form as the moisture in the warm air mass _____, _____, and _____. As the front moves through, cool, _____ is likely to follow.		
Warm		As the warm air mass _____, it condenses into a broad area of clouds. A warm front brings gentle _____ or light _____, followed by _____, milder weather		
Stationary		Where the warm and cold air _____, clouds and fog form, and it may rain or snow. Can bring many days of _____ and _____.		
Occluded		The temperature _____ as the warm air mass is occluded, or "_____" from the ground and pushed upward. Can bring _____ and heavy _____.		

HIGH AND LOW PRESSURE SYSTEMS

Air Pressure and Wind



H = high pressure

L = low pressure

High/Low Pressure Systems Warm air rising or cold air sinking combined with the spinning of Earth causes the air to spin forming high and low pressure regions.

_____ pressure systems usually signal more fair weather with winds circulating around the system in a clockwise direction.

- _____ pressure systems with counterclockwise circulating winds

How does air pressure affect weather?

often result in rainy and/or stormy weather conditions.

A **barometer** is an instrument used to measure _____ measured in _____ of Mercury (in Hg) or in _____ (mb Hg).

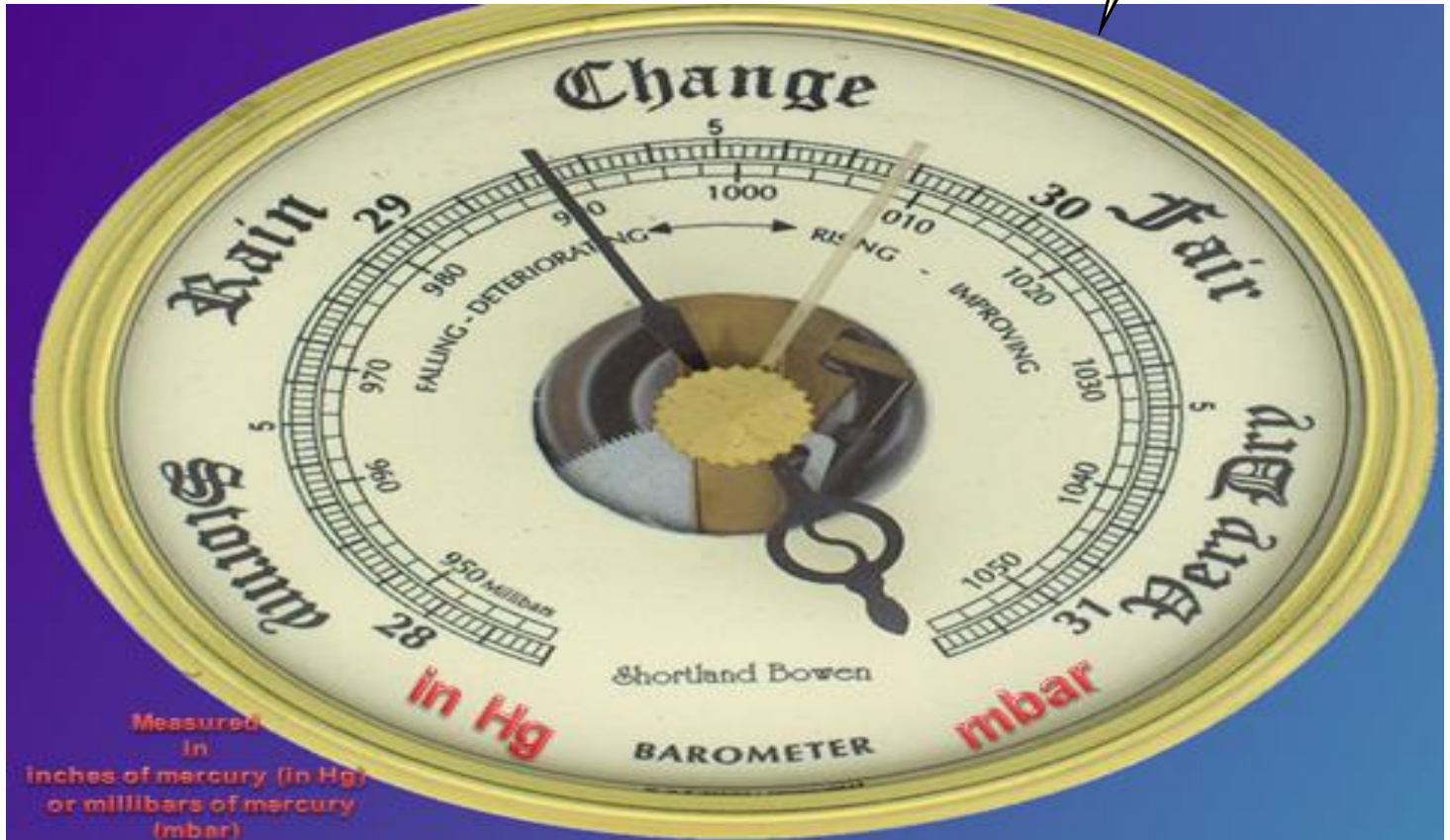
Barometer Reading	What does it look like outside?	What weather does it bring?
<p>Rising barometer- _____ in air pressure.</p> <p>(_____ Pressure)</p>	<p>_____, dry air is sinking.</p> <p>Warm Air Rises & Cold Air Sinks Convection</p>	
<p>Falling barometer- _____ in air pressure</p> <p>(_____ Pressure)</p>	<p>_____ air is rising.</p> <p>Warm Air Rises & Cold Air Sinks Convection</p>	

BAROMETER INFO AND PRACTICE

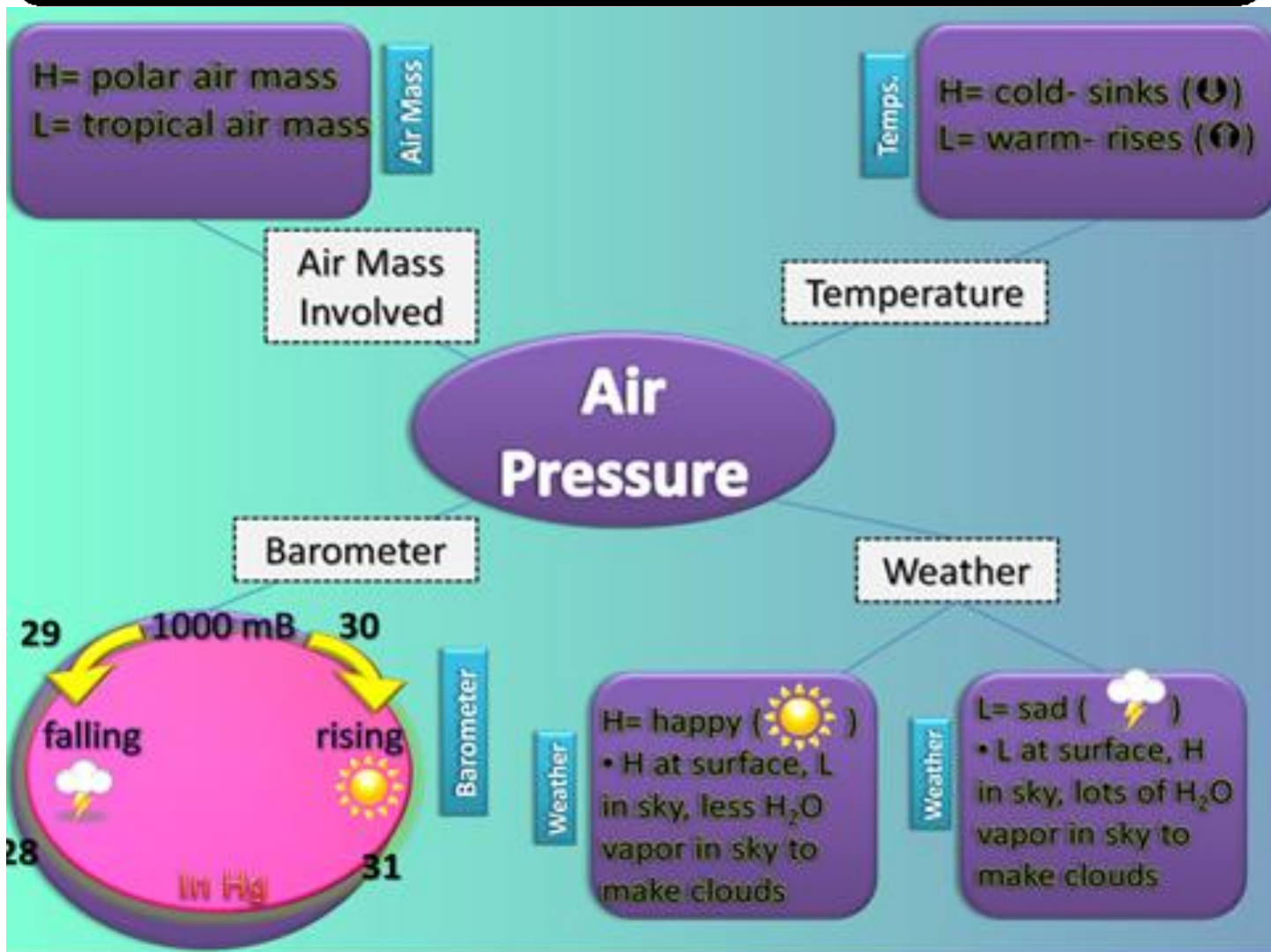
Ways to remember how a barometer works: Think of Dr. Phil, the psychologist on T.V. He works with people who are **LOW** and depressed. That is how he makes his money. He helps people through the *storms* and *cloudy weather* in their lives. When they are **HIGH** on life and *happy*, he doesn't have to help them or make any money from them.




High High Happy
Happy
Low Low, Sad Bad



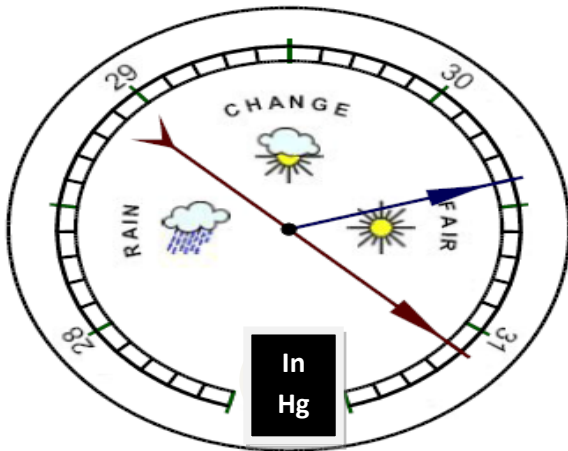
Barometer Reading	High or Low Pressure? (write H or L)	Stormy Chance of Rain Sunny? (draw pictures to show the weather chance)
950		
1050		
1030		
970		
999		
1014		



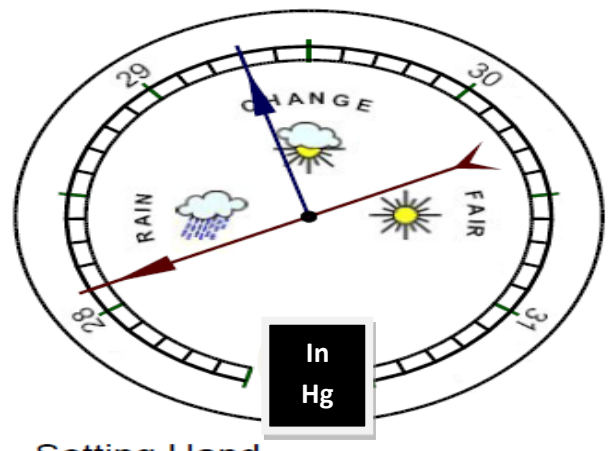
PRESSURE PRACTICE

Date: _____ BK: _____

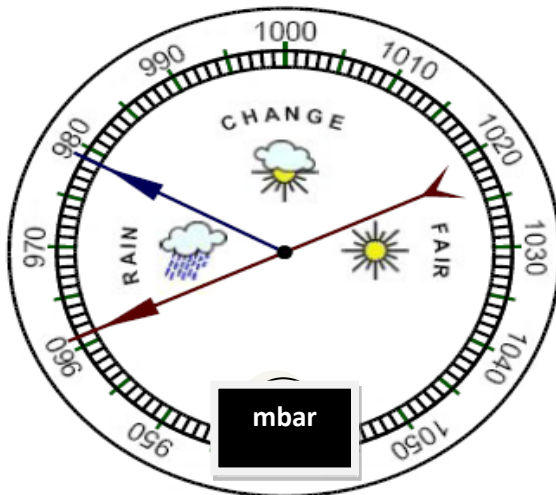
Reading a Barometer Name: _____



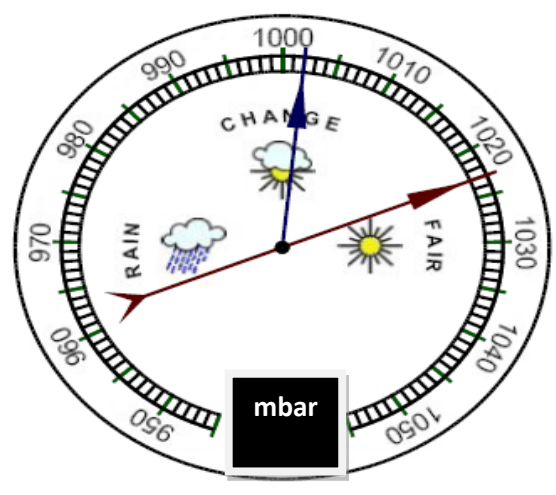
Setting Hand _____
 Measuring Hand _____
 Pressure is _____



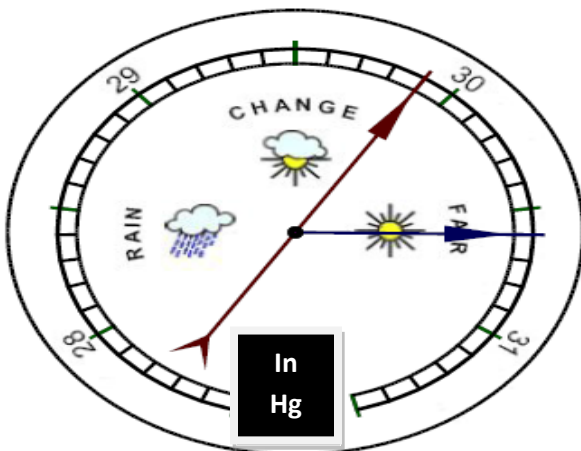
Setting Hand _____
 Measuring Hand _____
 Pressure is _____



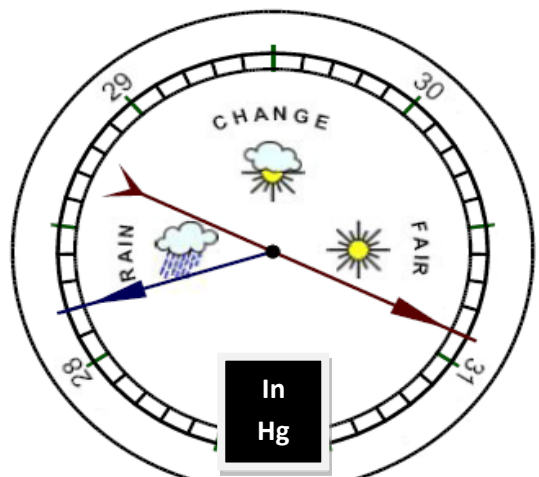
Setting Hand _____
 Measuring Hand _____
 Pressure is _____



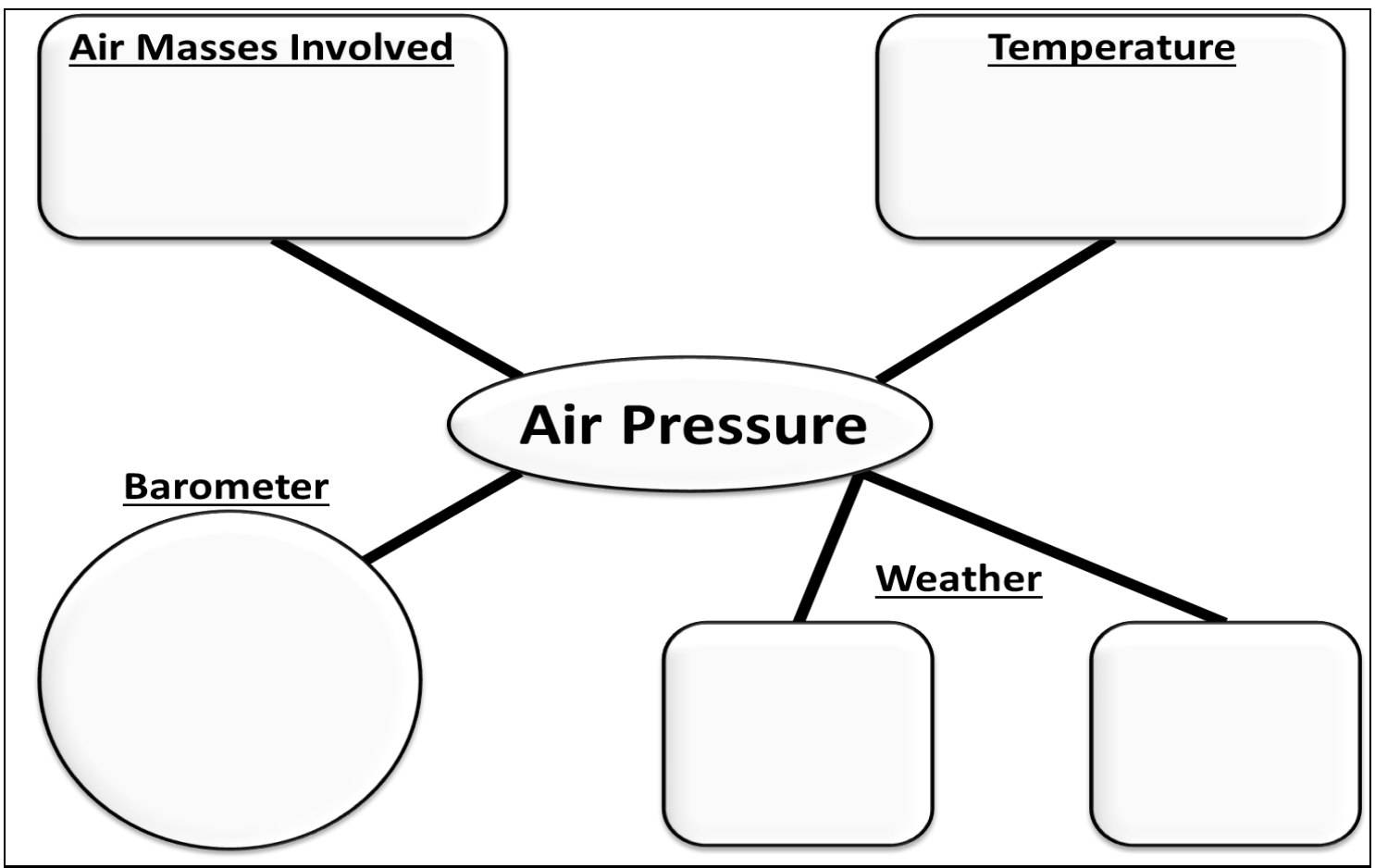
Setting Hand _____
 Measuring Hand _____
 Pressure is _____



Setting Hand _____
 Measuring Hand _____
 Pressure is _____



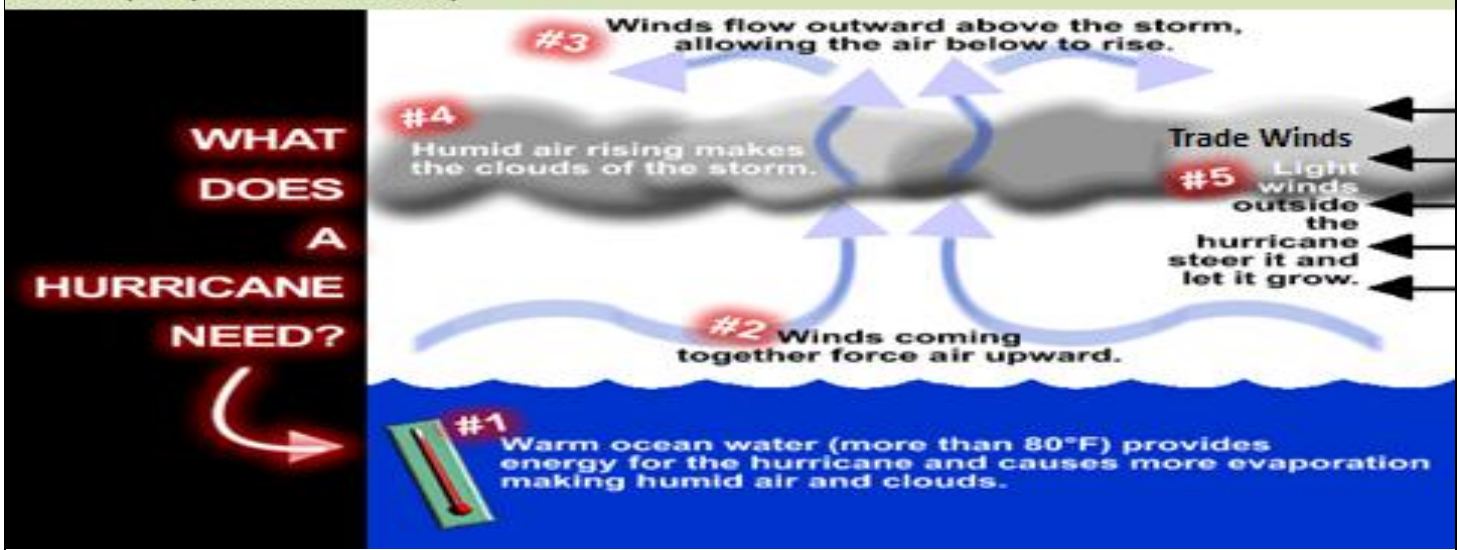
Setting Hand _____
 Measuring Hand _____
 Pressure is _____








UNDERSTANDING STORMS

How do hurricanes form?

Hurricanes only form over really warm ocean water of 80°F or warmer. The atmosphere (the air) must cool off very quickly the higher you go. Also, the wind must be blowing in the same direction and at the same speed to force air upward from the ocean surface. Winds flow outward above the storm allowing the air below to rise. Hurricanes typically form between 5 to 15 degrees latitude north and south of the equator. The [Coriolis Force](#) is needed to create the spin in the hurricane and it becomes too weak near the equator, so hurricanes can never form there. (Graphic Credit: UCAR)



	F-0: (Light Damage) Chimneys are damaged, tree branches are broken, shallow-rooted trees are toppled.
	F-1: (Moderate Damage) Roof surfaces are peeled off, windows are broken, some tree trunks are snapped, unanchored manufactured homes are overturned, attached garages may be destroyed.
	F-2: (Considerable Damage) Roof structures are damaged, manufactured homes are destroyed, debris becomes airborne (missiles are generated), large trees are snapped or uprooted.
	F-3: (Severe Damage) Roofs and some walls are torn from structures, some small buildings are destroyed, non-reinforced masonry buildings are destroyed, most trees in forest are uprooted.
	F-4: (Devastating Damage) Well-constructed houses are destroyed, some structures are lifted from foundations and blown some distance, cars are blown some distance, large debris becomes airborne.
	F-5: (Incredible Damage) Strong frame houses are lifted from foundations, reinforced concrete structures are damaged, automobile-sized debris becomes airborne, trees are completely debarked.

Tornado Intensities

The Fujita scale describes the strength of a tornado based on the damage it does. The scale is useful for classifying tornadoes even though it is not exact. For example, a tornado can strengthen and then weaken before it dies out. The wind speeds are estimates of the strongest winds near the ground. Most tornadoes are F0 or F1. One-quarter to one-third of tornadoes are F2 or F3. Only a few percent of tornadoes are F4 or F5.

Fujita Scale for Tornadoes		
F-Scale	Wind Speed	Type of Damage
F0	64–116 km/h (40–72 mi/h)	Light Damage Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged
F1	117–180 km/h (73–112 mi/h)	Moderate Damage Surface peeled off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads
F2	181–253 km/h (113–157 mi/h)	Considerable Damage Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground
F3	254–332 km/h (158–206 mi/h)	Severe Damage Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown
F4	333–418 km/h (207–260 mi/h)	Devastating Damage Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated
F5	419–512 km/h (261–318 mi/h)	Incredible Damage Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur

Severe weather conditions called storms occur when pressure differences cause rapid air movement. Conditions that bring one kind of storm can also cause other kinds of storms in the same area.

- _____ is storm with thunder, lightning, heavy rains and strong winds; form within large _____ clouds; usually form along a _____ but can form within an air mass.
- _____ is a rapidly whirling, _____-shaped cloud that reaches down from a storm cloud; the very _____ pressure and strong winds can cause great damage to people and property; are likely to form within the _____ regions where strong thunderstorms are also present.
- _____ is a _____ 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. What is the magic temperature for the waters in order for these to occur? _____ °F or 26.7 °C.

Have you ever experienced a hurricane? If yes, explain.	Write two ways you would keep safe in a hurricane?
Yes or No (circle one)	1. 2.

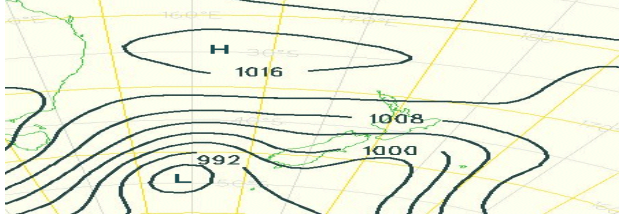
- **Other Weather Condition**
Since _____ is a condition of Earth's atmosphere at any time, weather conditions may include fair weather, showers or light rain, humid conditions, clear skies with cold conditions, days of clouds and precipitation, or others that do not necessarily involve storms.

Weather Tools Vocabulary

6-4.5 Use appropriate instruments and tools to collect weather data (including wind speed and direction, air temperature, humidity, and air pressure).

****6-1.1 Use appropriate tools and instruments (including a spring scale, beam balance, barometer, and sling psychrometer) safely and accurately when conducting a controlled scientific investigation.**

Isobars (Isobar Map below) - lines on a weather map that connect places with the same atmospheric pressure .

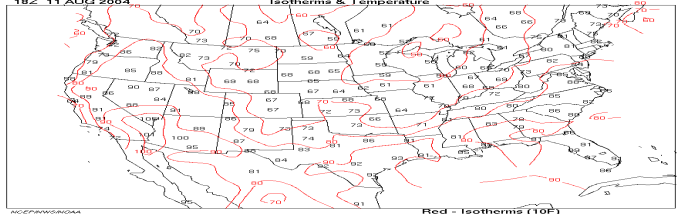


Barometer- instruments used to amount of air pressure.



The Isobar Map's data is collected by reading a barometer.

Isotherms (Isotherm Map below)- lines on a weather map that connect places with the same temperature.

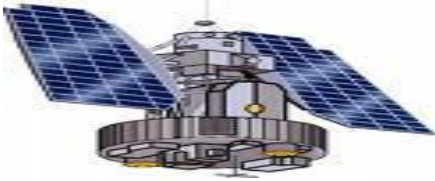


Thermometer-Instrument that measures temperature.



The Isotherm Map's data is collected by reading a thermometer.

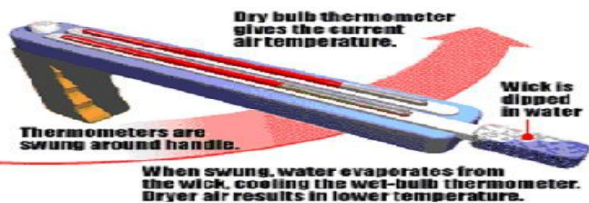
Satellite object that orbits earth and provides images of cloud patterns and movements.



Radar-instrument that sends radio signals that are reflected off objects, can be used to detect rainfall location, intensity, and movement as well as the potential for severe weather and even tornadoes.



Sling Pyschrometer- instrument with a wet-dry bulb that measures relative humidity.



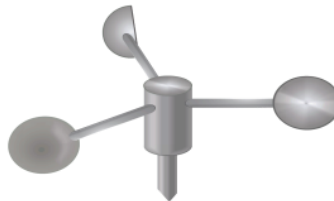
Humidity- the amount of water vapor in the air.

Relative Humidity- a measure of the amount of water vapor in the air compared with the amount of water vapor the air could hold at a certain temperature.

Wind Vane- instrument that determines wind direction.





Anemometer- instrument that measures wind speed.

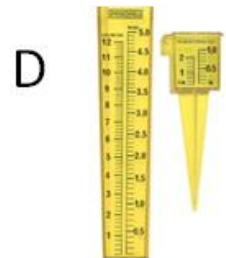
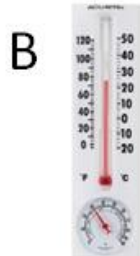


Weather Tool Activity

Weather Tools

- Resources: Weather Study Guide, pgs. 5 & 6
- Video, "Weather Instruments"

INSTRUMENT	DESCRIPTION	PICTURE (Write correct letter)
THERMOMETER		
	A tool used to measure wind direction.	
		
RAIN GAUGE		
	An instrument used to measure air pressure.	
		



Weather Tool Activity

Weather Tools

Warm Up- Weather Tools Day 1

Weather Tools

1. Unscramble the words.
2. Draw lines connecting the words to the matching pictures.
3. Draw lines connecting the pictures to the matching functions.

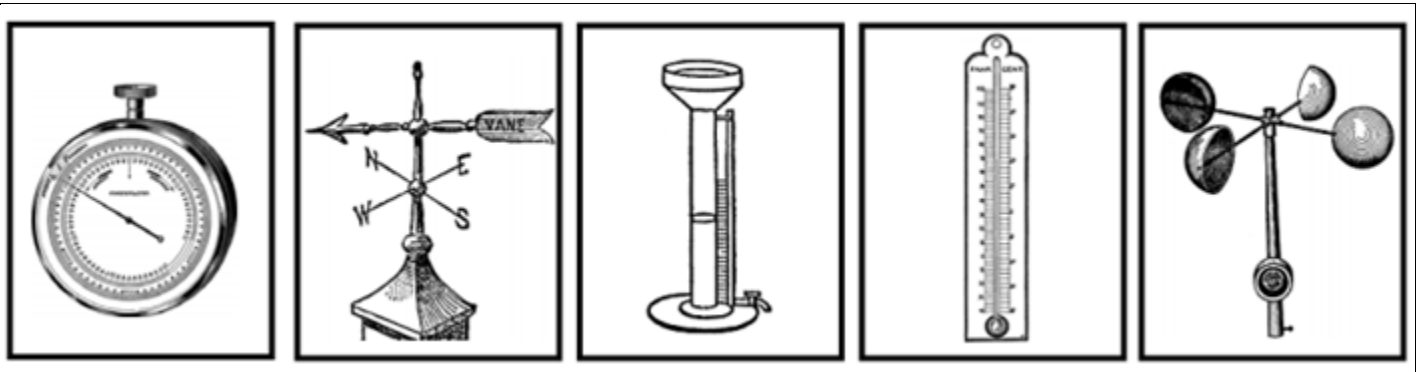
maemeonert

taewehr naev

rebamorte

temtemhreor

irna uggae



Measures
wind
speed

Measures
amount of
precipitation

Measures
air
temperature

Measures
air
pressure

Determines
wind
direction

Weather Tool Activity

Weather Instruments Worksheet

Name _____ Class _____

INSTRUMENTS:

Barometer
Wind Sock

Wind Vane
Anemometer

Thermometer
Weather Balloon

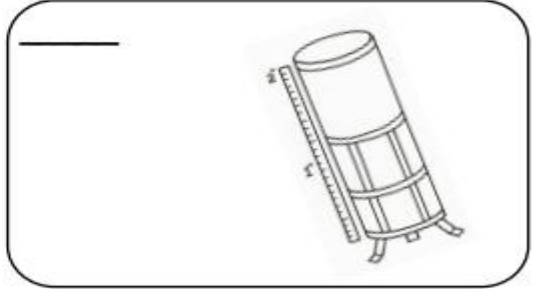
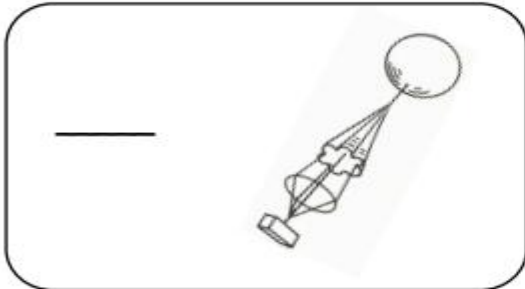
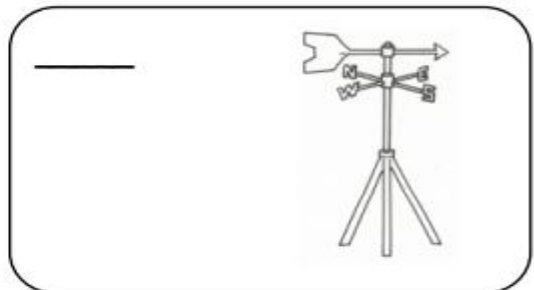
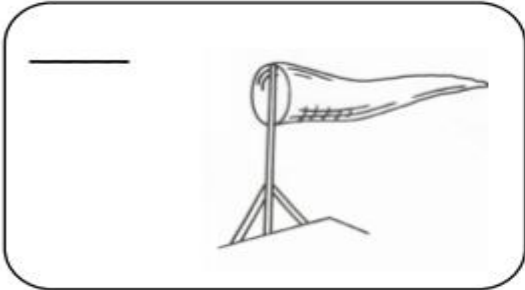
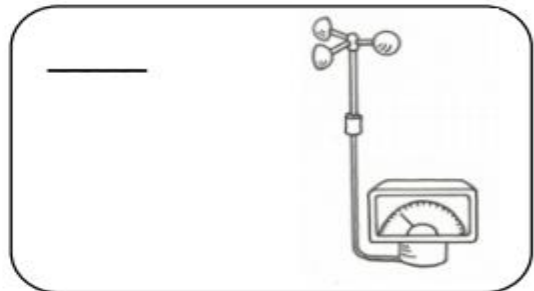
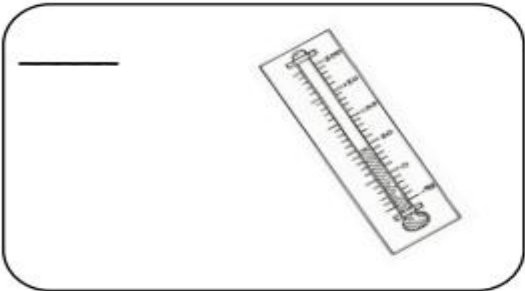
Rain Gauge
Sling Psychrometer

PURPOSE:

a. measures air pressure
d. measures wind speed
g. measures temperature

b. measures wind direction
e. measures wind direction at airports
h. measures temperature, air pressure, wind speed & direction

c. measures amount of rain
f. measures humidity



Weather Tool Activity

Go to: http://education.nationalgeographic.com/rcplayer/?/edu/get_activity_rc_xml/203.xml?ar_a=1

Name _____ Date _____

Instruments That Measure Weather

Directions: Cut apart each card. Match the description on each card to one of the illustrations of an instrument that measures weather. Draw the instrument on the back of the card from the website. You will have 9 in total when complete.

- Measures heat content of air
- Measures in Celsius or Fahrenheit
- Measurement usually taken 5 feet above ground in a shelter
- Liquid expands or contracts causing it to move up and down a tube

- Measures air pressure
- Weighs the amount of air in a specific place
- Usually measures between 28-31 inches of mercury
- A falling measurement usually means a storm is approaching

- Measures wind speed
- Measures how hard the wind is blowing
- Measured 33 feet above ground level on buildings or airports
- Several cups catch the wind and spin around a pole
- Measured by the number times it spins over a set period of time

- Measures rain or snow over a set period of time
- Measurement reported in inches
- Collecting during high winds can give incorrect readings
- Many different kinds

- Measures humidity
- Made of two thermometers—one with a wet cloth on the end
- If the difference in the thermometers is very large, there is little humidity

- Shows the direction the wind is blowing
- Does not work well with light winds



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