Weather

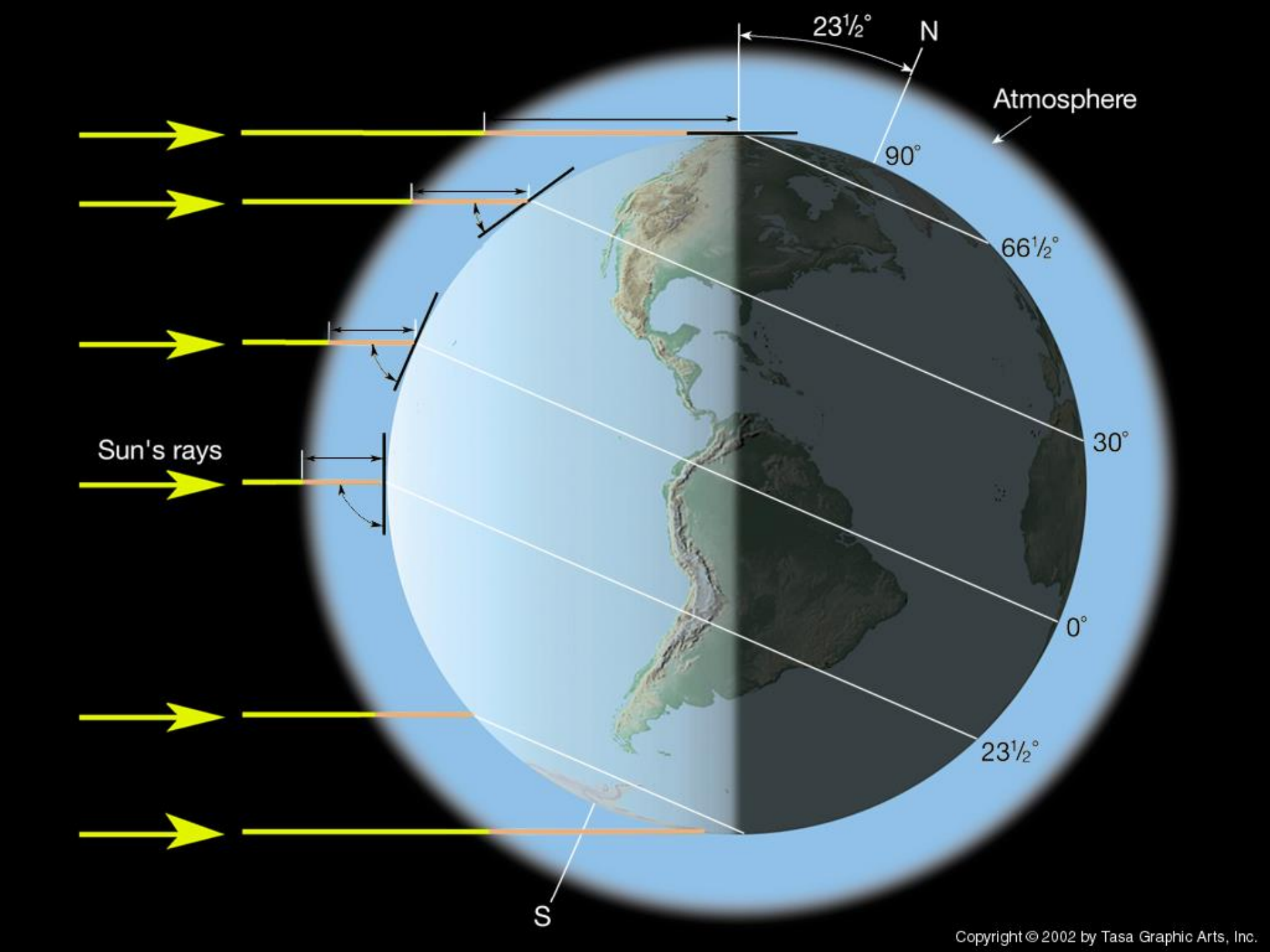
What is Weather???

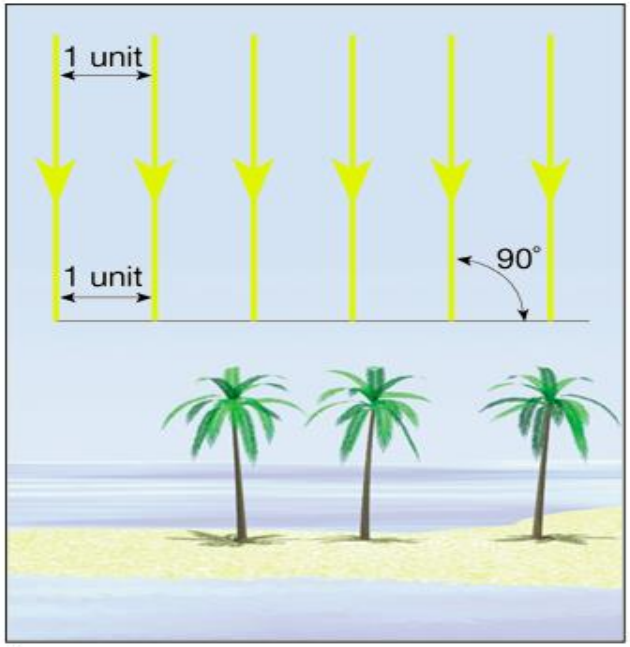
The state of the variables of the atmosphere at any given location for a short period of time.

What causes weather?

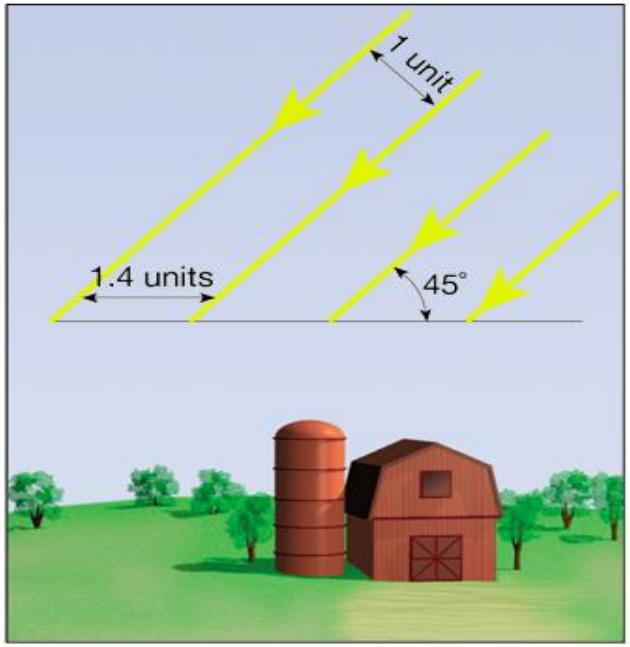
Weather is caused by differential heating of the Earth

- The equator receives more insolation than the poles
- Convection Cells Transfer heat within the atmosphere.

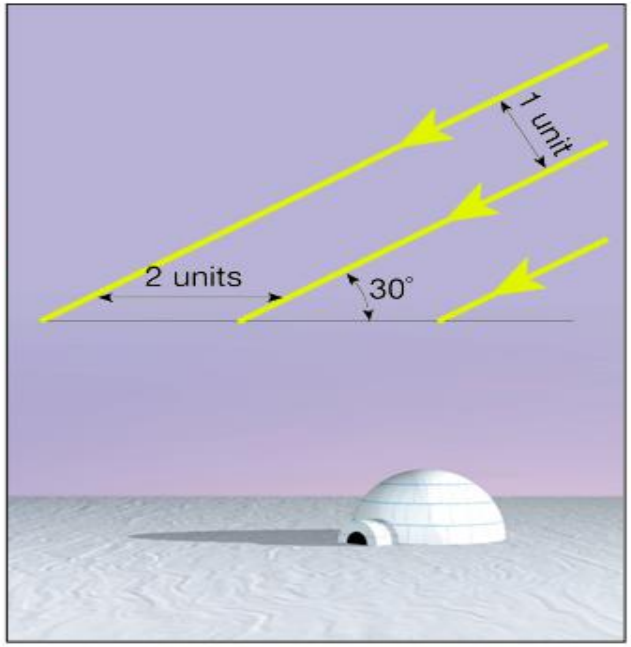




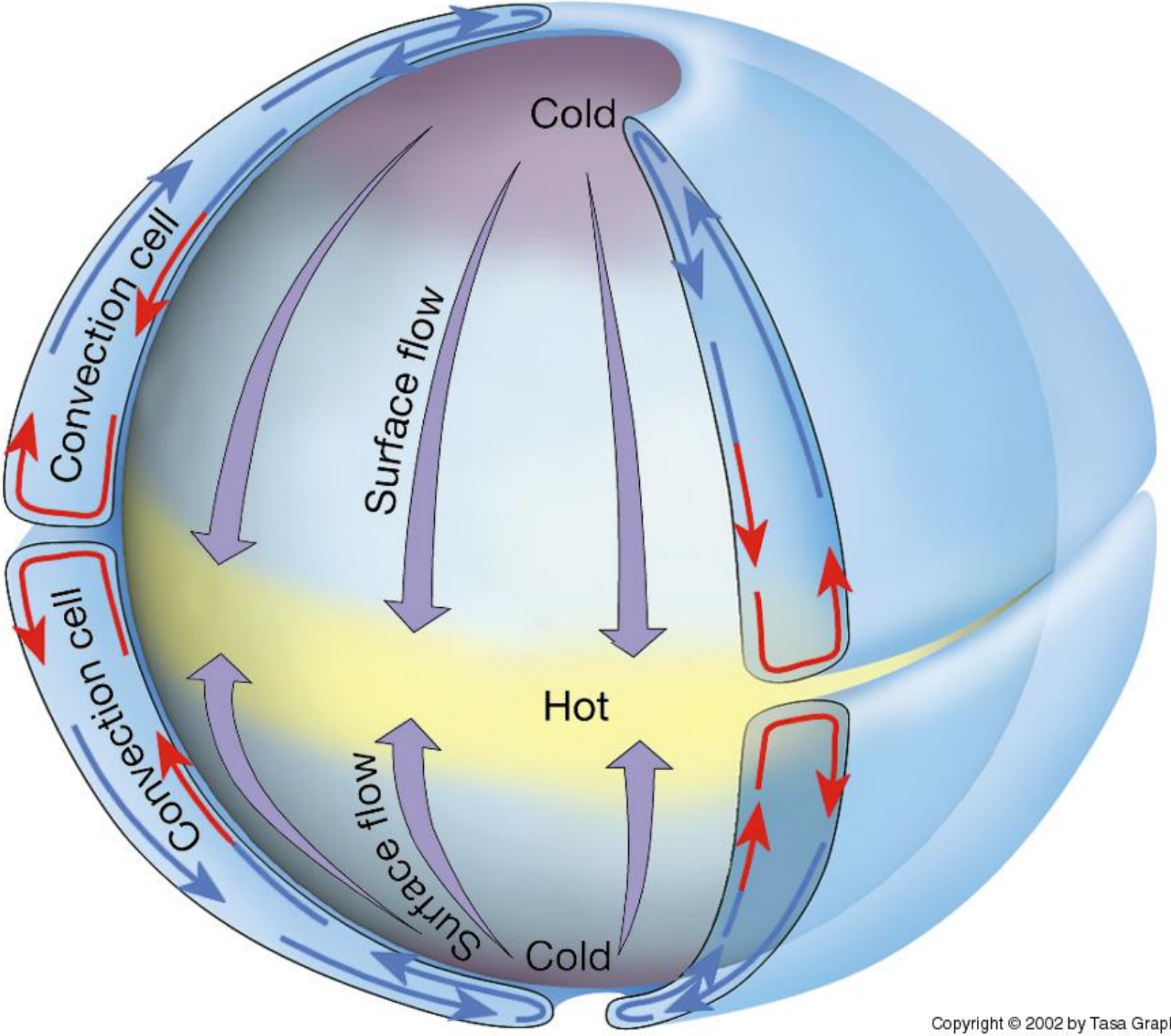
A.



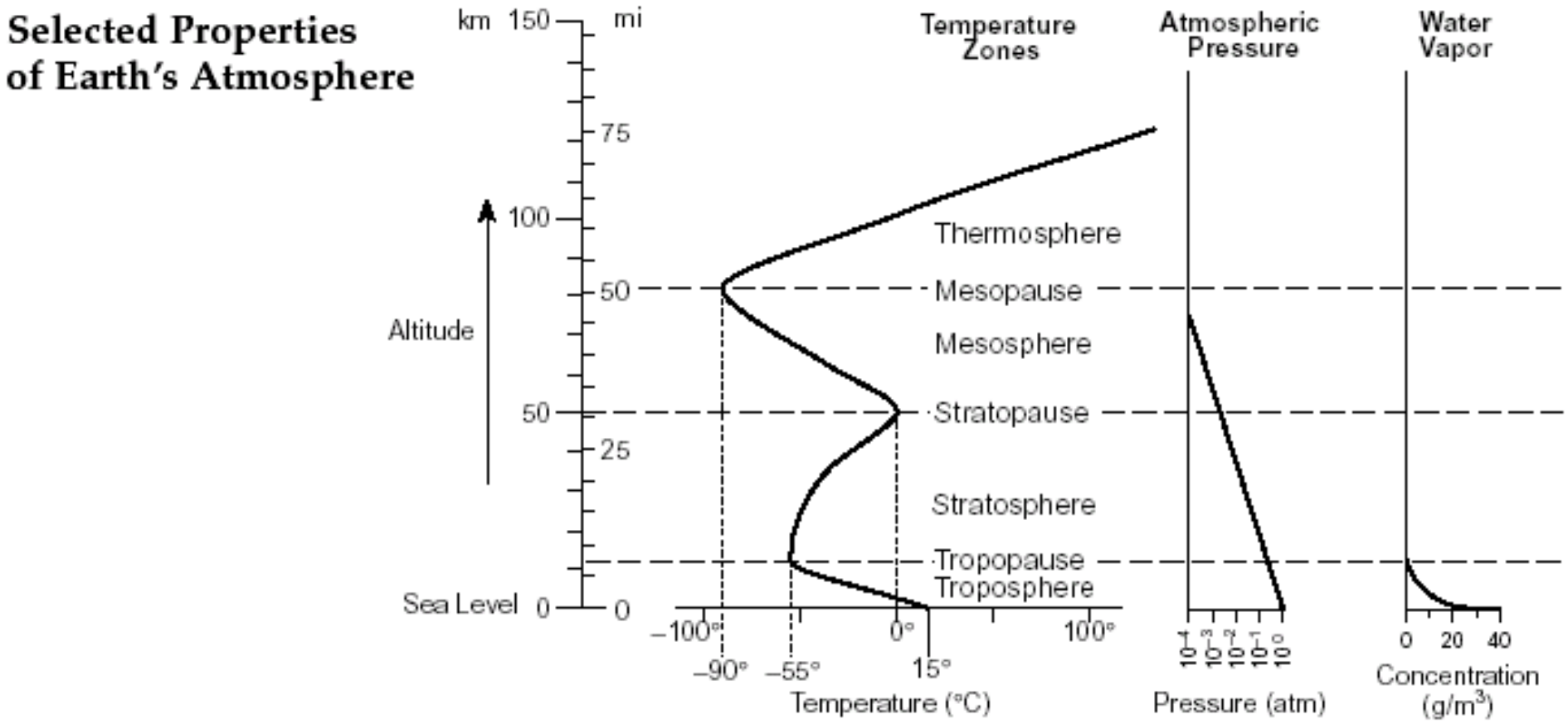
B.

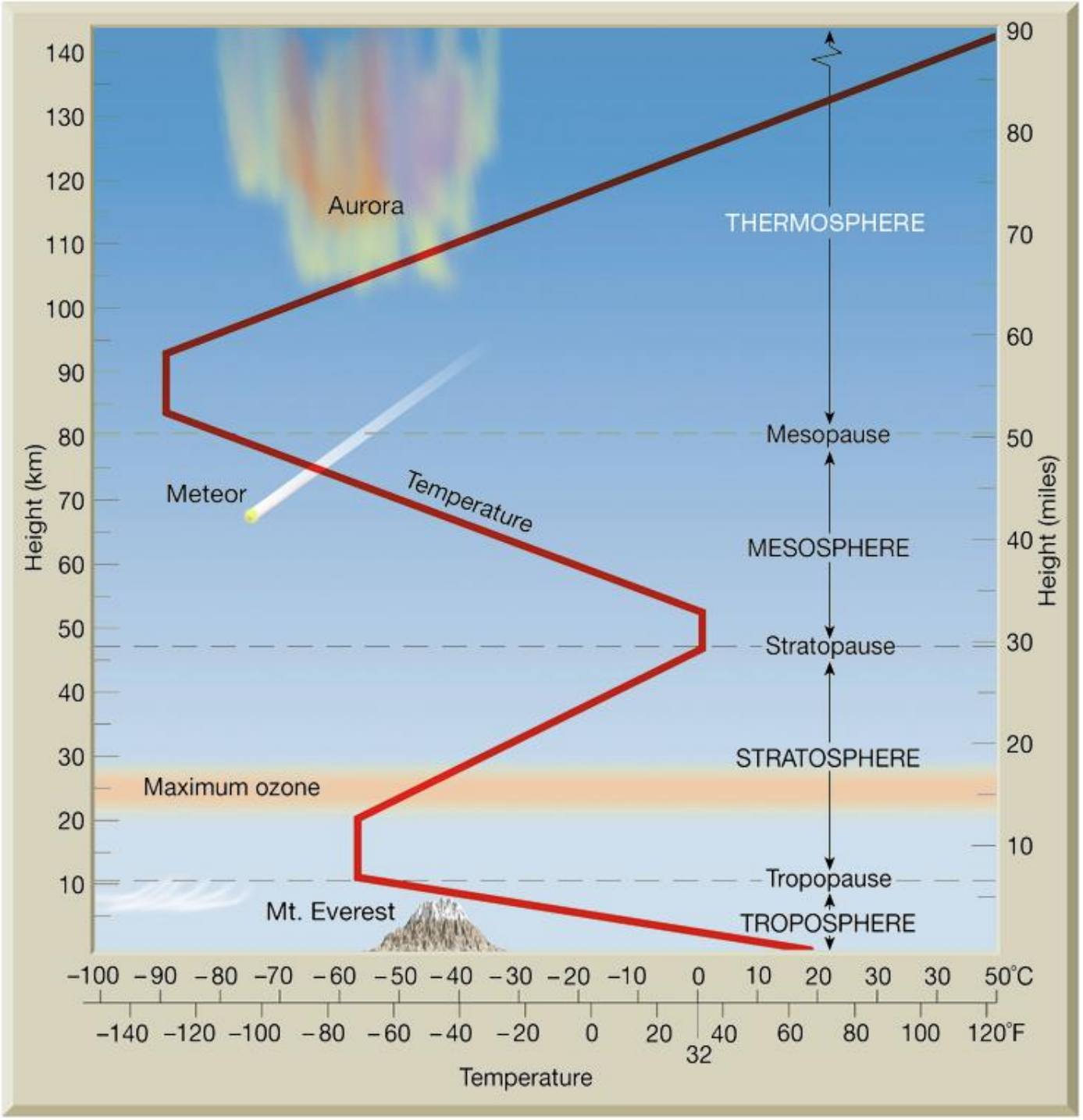


C.

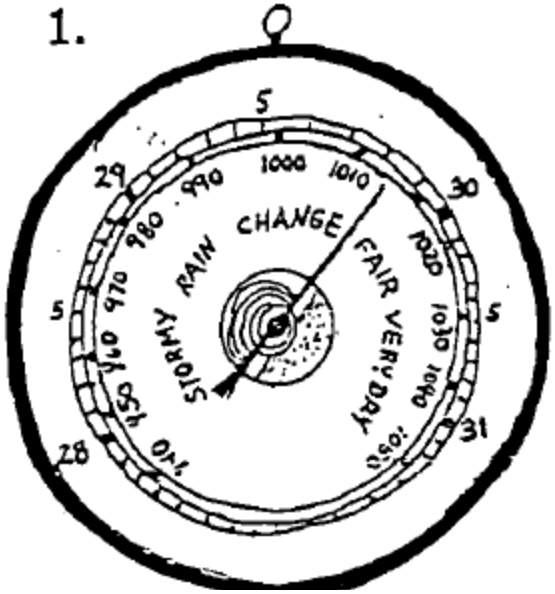


The layers of the Atmosphere (pg 14 in reference table)

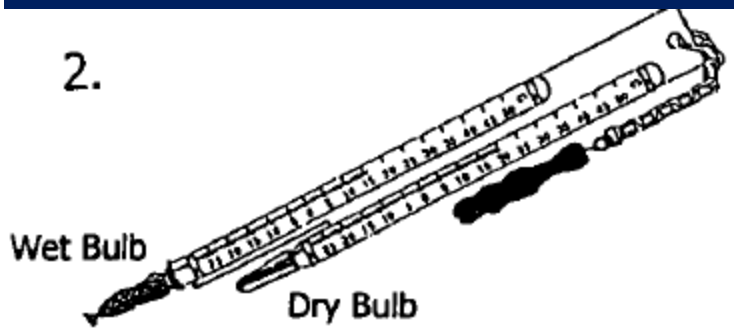




Complete page 3 and 4 in packet

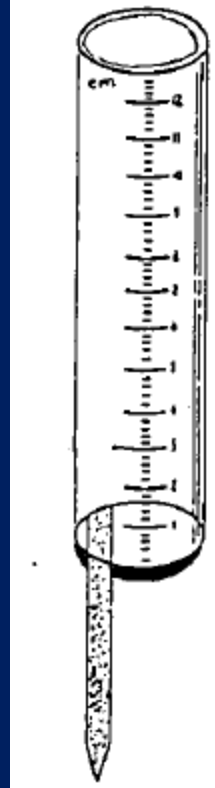


BAROMETER
AIR PRESSURE

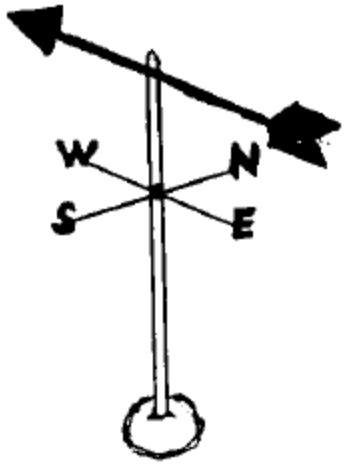


PSYCHROMETER
HUMIDITY

ANEMOMETERS
WIND SPEED



RAIN GAUGE
RAINFALL



WIND VANES
WIND DIRECTION

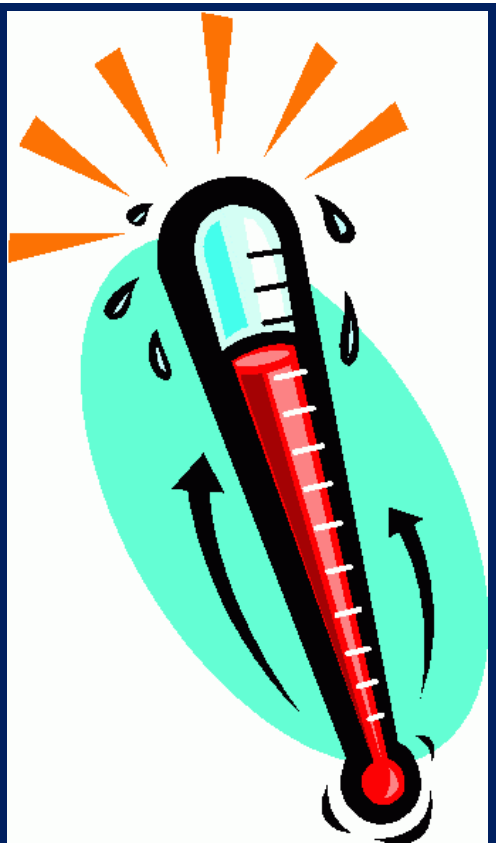
THERMOMETERS
TEMPERATURE

Weather Variables

1. Temperature - the measure of the average kinetic energy

- how fast the molecules move

The instrument used to measure temperature: Thermometer

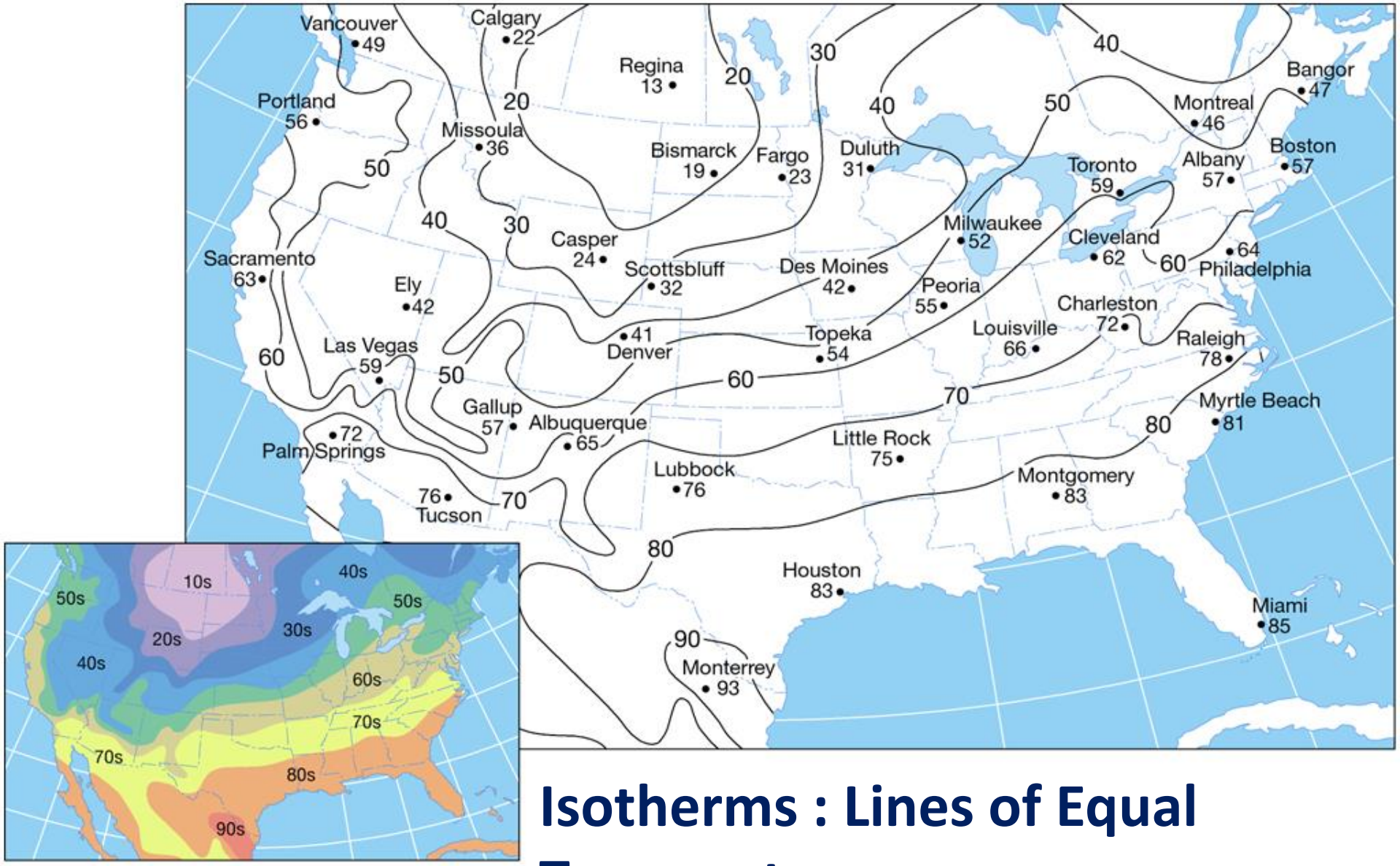


Measured in . . . ° F — Fahrenheit

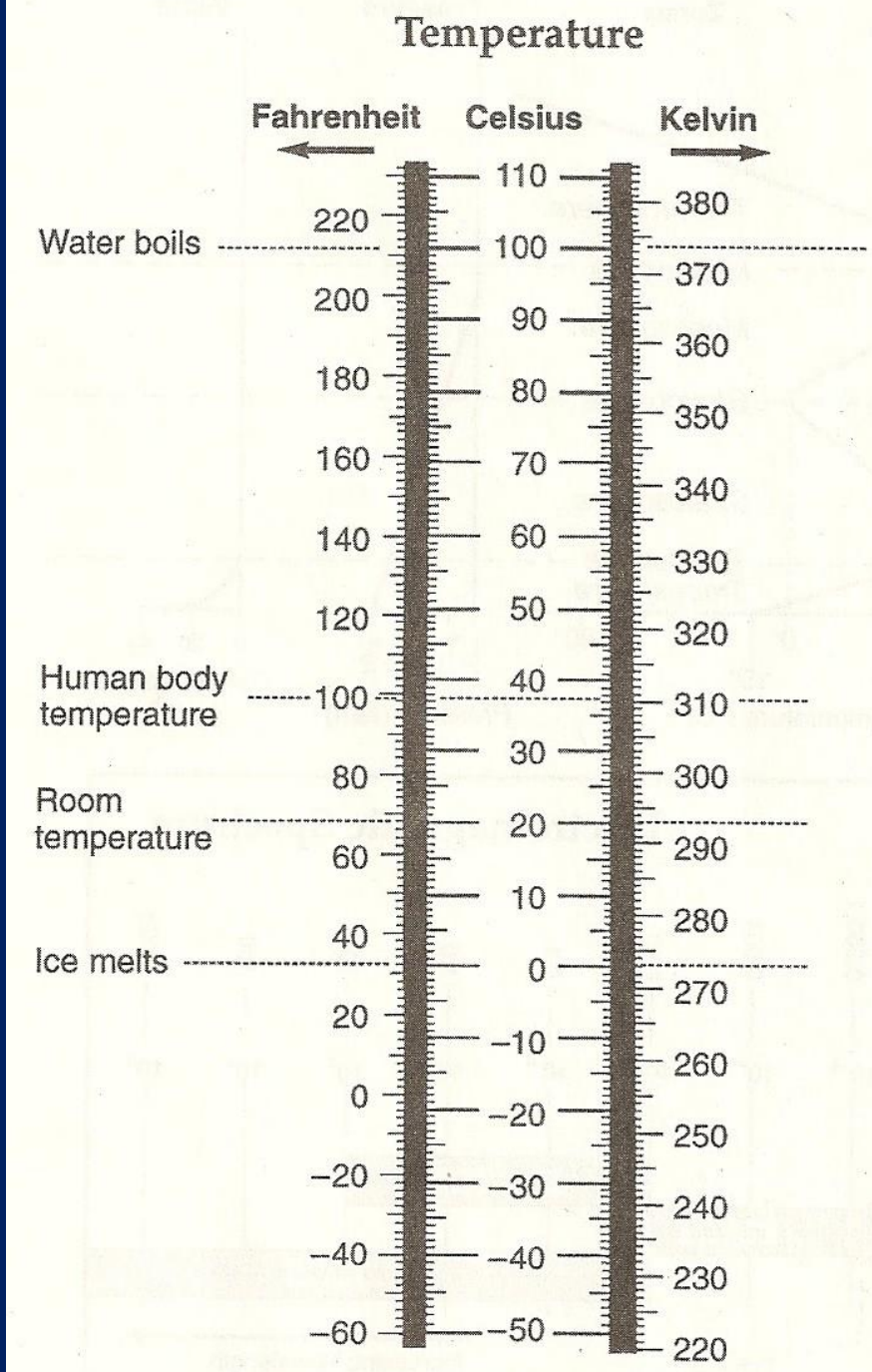
° C — Celsius

° K — Kelvin

Shown on a weather map with isotherms - Lines that connect places of equal temperature.



Isotherms : Lines of Equal Temperature


Temperature
Fahrenheit
Celsius
Kelvin
Water boils
Human body temperature
Room temperature
Ice melts
220
200
180
160
140
120
100
80
60
40
20
0
−20
−40
−60
110
100
90
80
70
60
50
40
30
20
10
0
−10
−20
−30
−40
−50
380
370
360
350
340
330
320
310
300
290
280
270
260
250
240
230
220

ESRT page 13

Convert the temperatures below by using the conversion chart in the Earth Science Reference Tables, page 13.

Fahrenheit	Celsius	Kelvin
20		
	70	
		260
	40	
60		
		290
	-40	
		240
75		
	50	

Find the following temperatures:

	Fahrenheit	Celsius	Kelvin
Water boils			
Water freezes			
Body temperature			
Room temperature			

Use ESRT page 13

Weather Variables

Air Pressure:

2. Air pressure - the weight of Earth's atmosphere - changes depending on the temperature

Instrument used to measure pressure: barometer

Measured in . . . inches and milibars

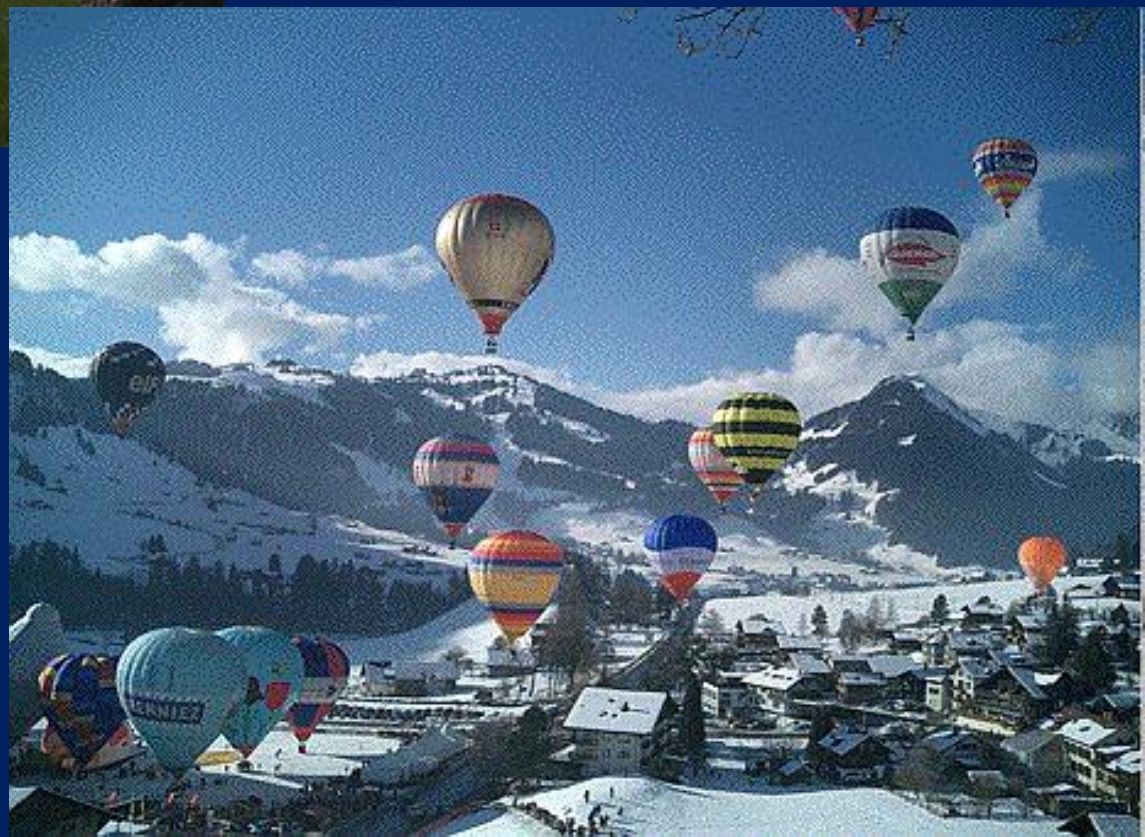
Shown on a weather map with Isobars . Lines that connect places of equal barometric pressure

Watch out for falling barometers

Factors Affecting Air Pressure?

1) Temperature:

As temp inc. air expands and its density and pressure dec.



Factors Affecting Air Pressure?

1) Temperature:

As temp inc. air expands and its density and pressure dec.

2) Water Vapor (Humidity):

As humidity increases air pressure decreases

Factors Affecting Air Pressure?

1) Temperature:

As temp inc. air expands and its density and pressure dec.

2) Water Vapor (Humidity):

As humidity increases air pressure decreases

3) Altitude

As altitude increases air pressure decreases

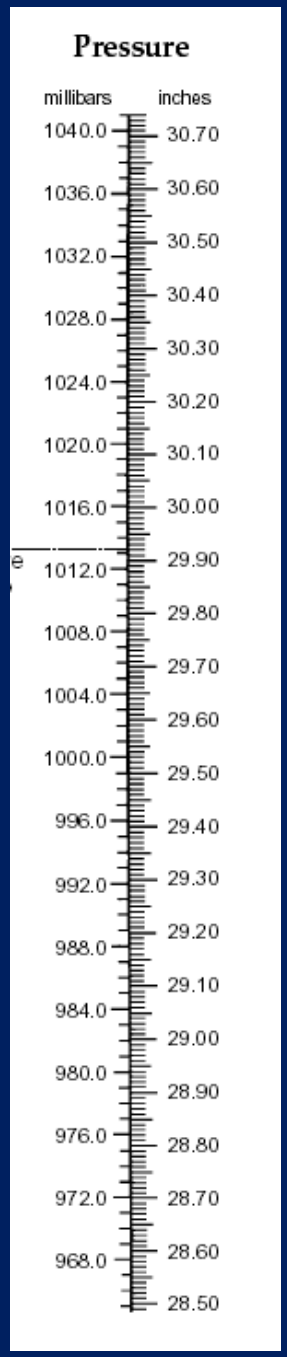
Units of Air Pressure:

1) Millibars
2) Inches of Mercury

Convert Millibars to Inches using the Reference Table

PG 13 in Reference table

mb	Inches of Mercury
1007	**29.73**
997	29.44
1022	**30.18**
994	29.35



Using the Pressure Conversion Chart in the Earth Science Reference Tables page _____ , complete the tables below.

Inches	Millibars
29.06	
29.94	
30.50	
29.44	

Millibars	Inches
1011.0	
1021.0	
1035.0	
991.0	

Normal pressure at sea level is ____ atmosphere and is equal to . . .

_____ millibars and _____ inches

Pressure and Wind

What instrument is used to measure wind speed? Anemometer Air pressure? Barometer

How are winds named?

From the direction they come from

What causes wind?

Winds are caused by differences in air pressure.

Wind Direction

Wind is named from the direction it comes from.

Name the wind

N

S

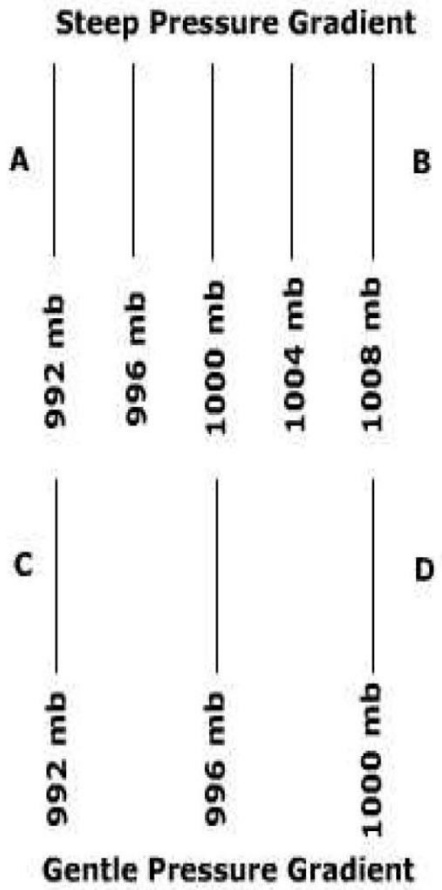
South Wind

NW

SE

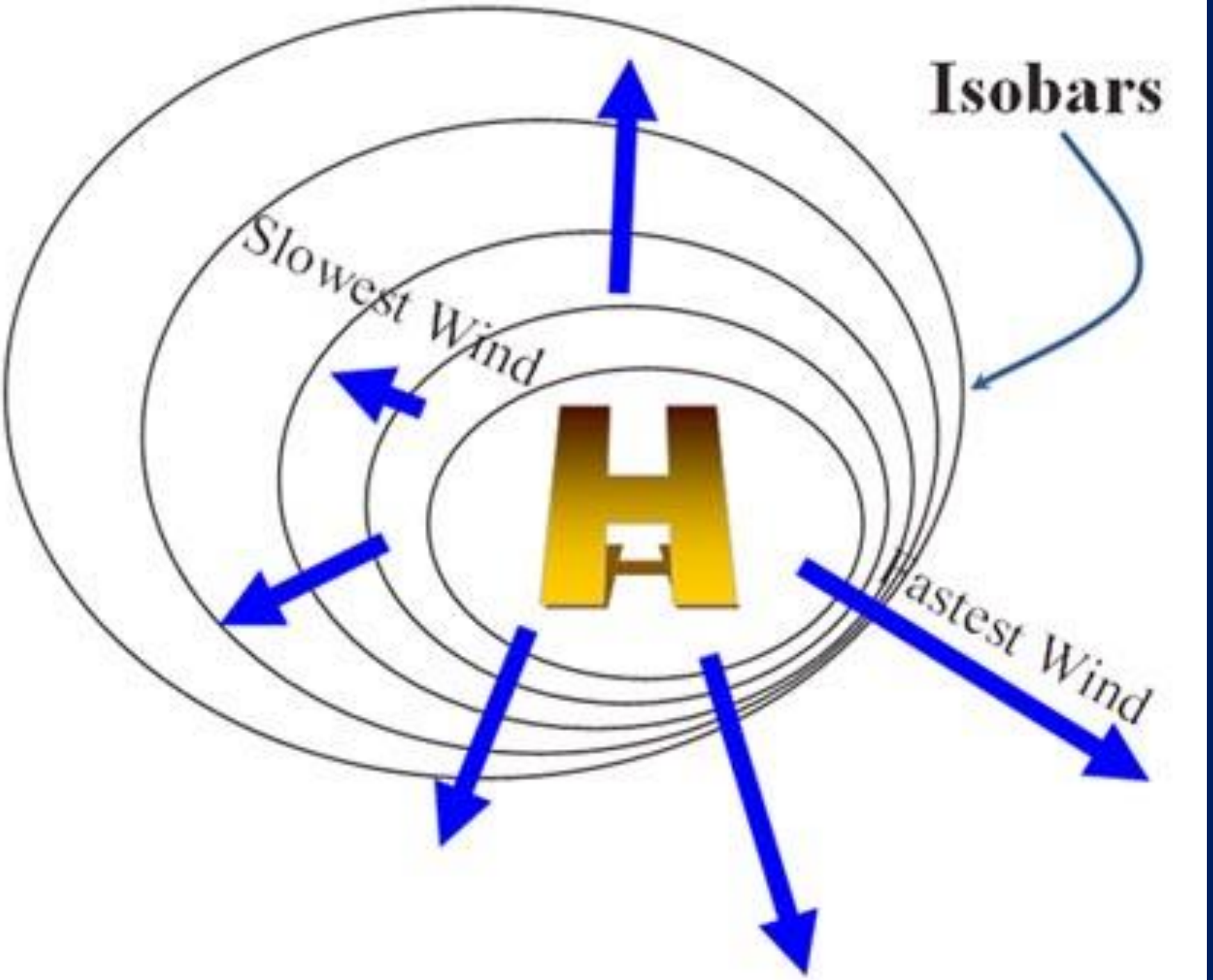
North West Wind

Which pressure gradient would result in greater wind velocity?



Between A and B

The closer together the isobars the faster the wind speed.

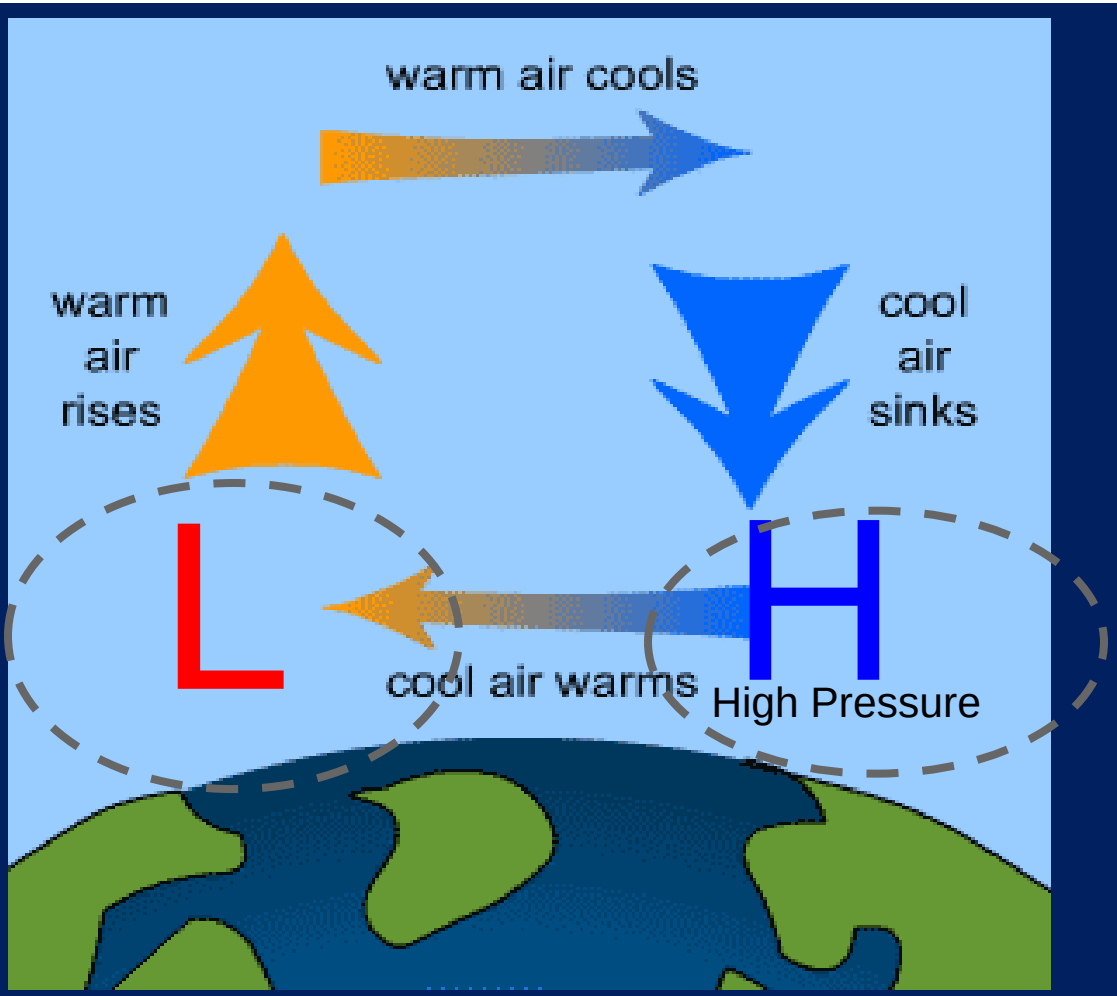

Isobars
Slowest Wind
astest Wind

Review

Convert the following measurements using the chart on page 13 of the ESRTs.

mb	Inches of Mercury
1007	
	29.44
1022	
	29.35

Wind blows from areas of **High Pressure** to areas of **Low Pressure**.



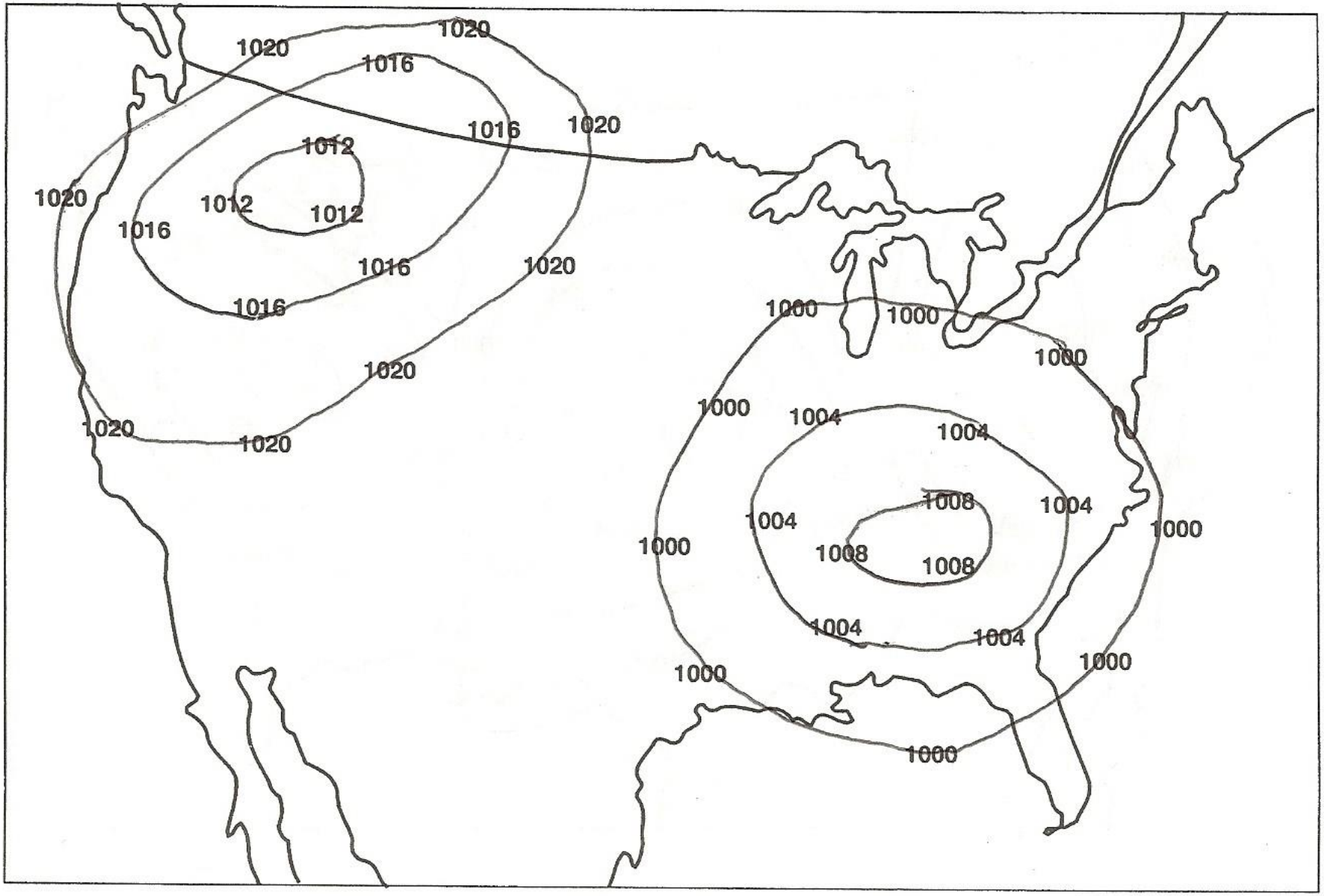
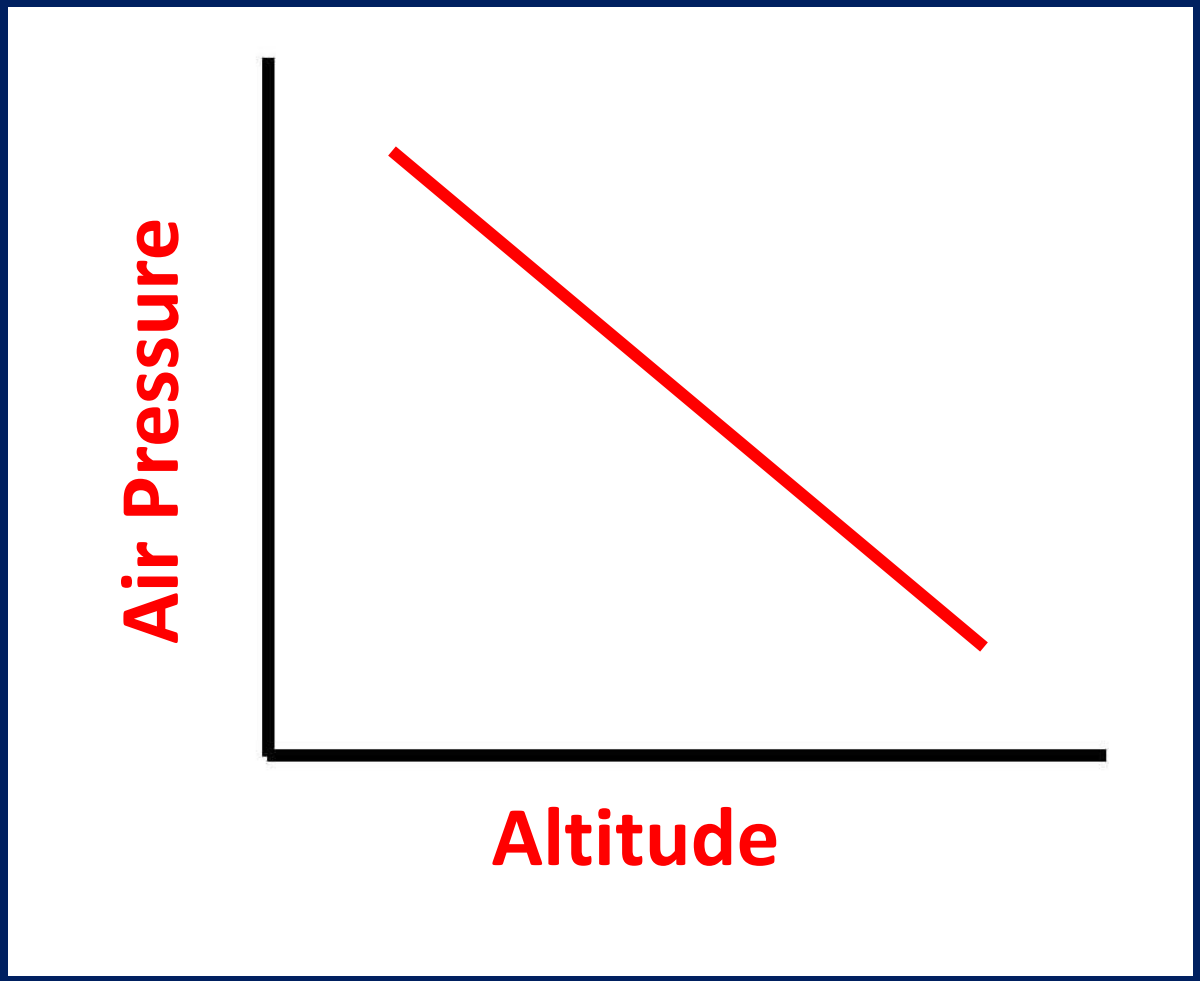
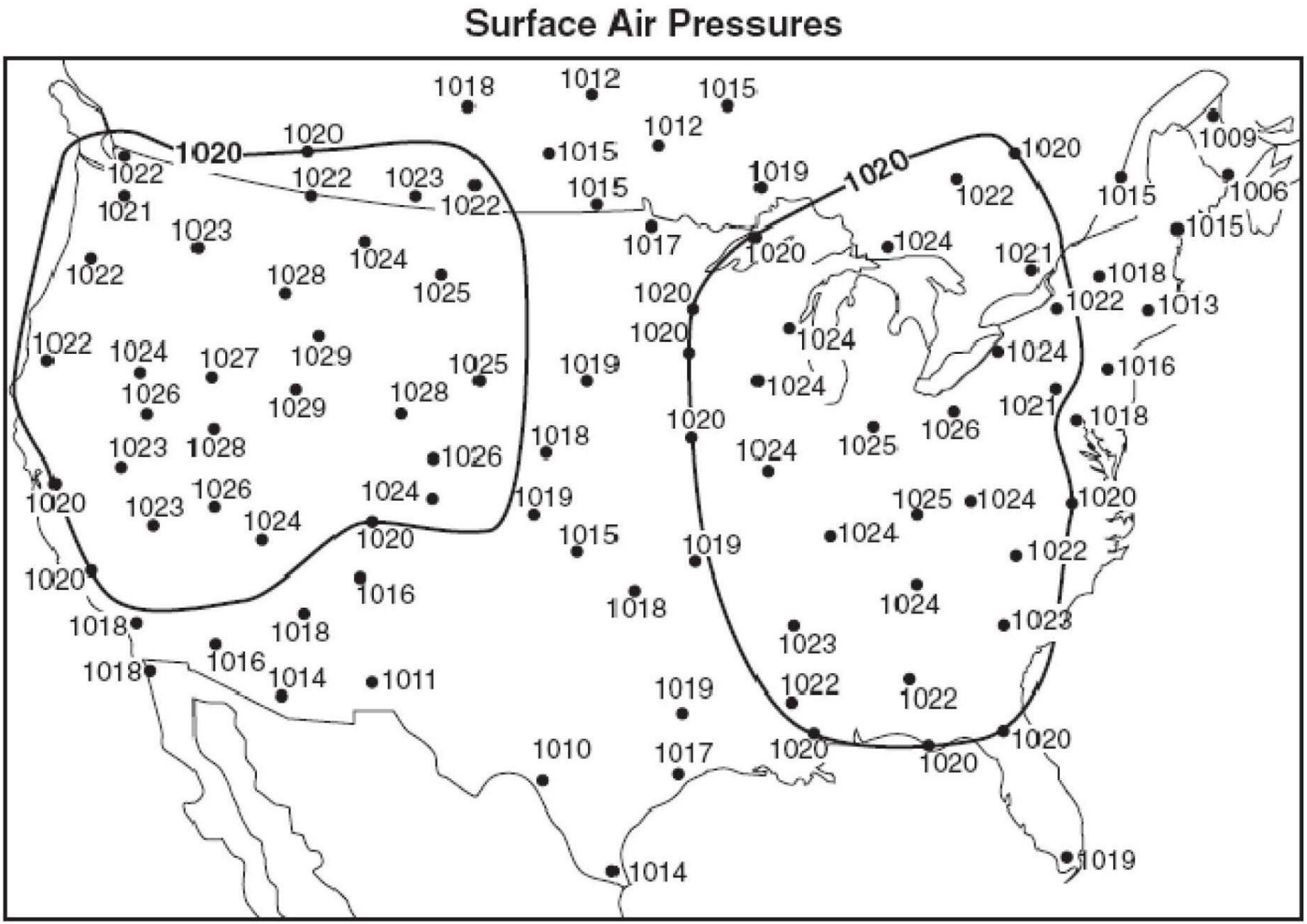

1020
1020
1016
1016
1020
1012
1020
1012
1012
1016
1016
1020
1016
1020
1020
1020
1000
1000
1000
1000
1004
1004
1008
1004
1004
1000
1000
1008
1008
1004
1004
1000
1000
1000

Figure D

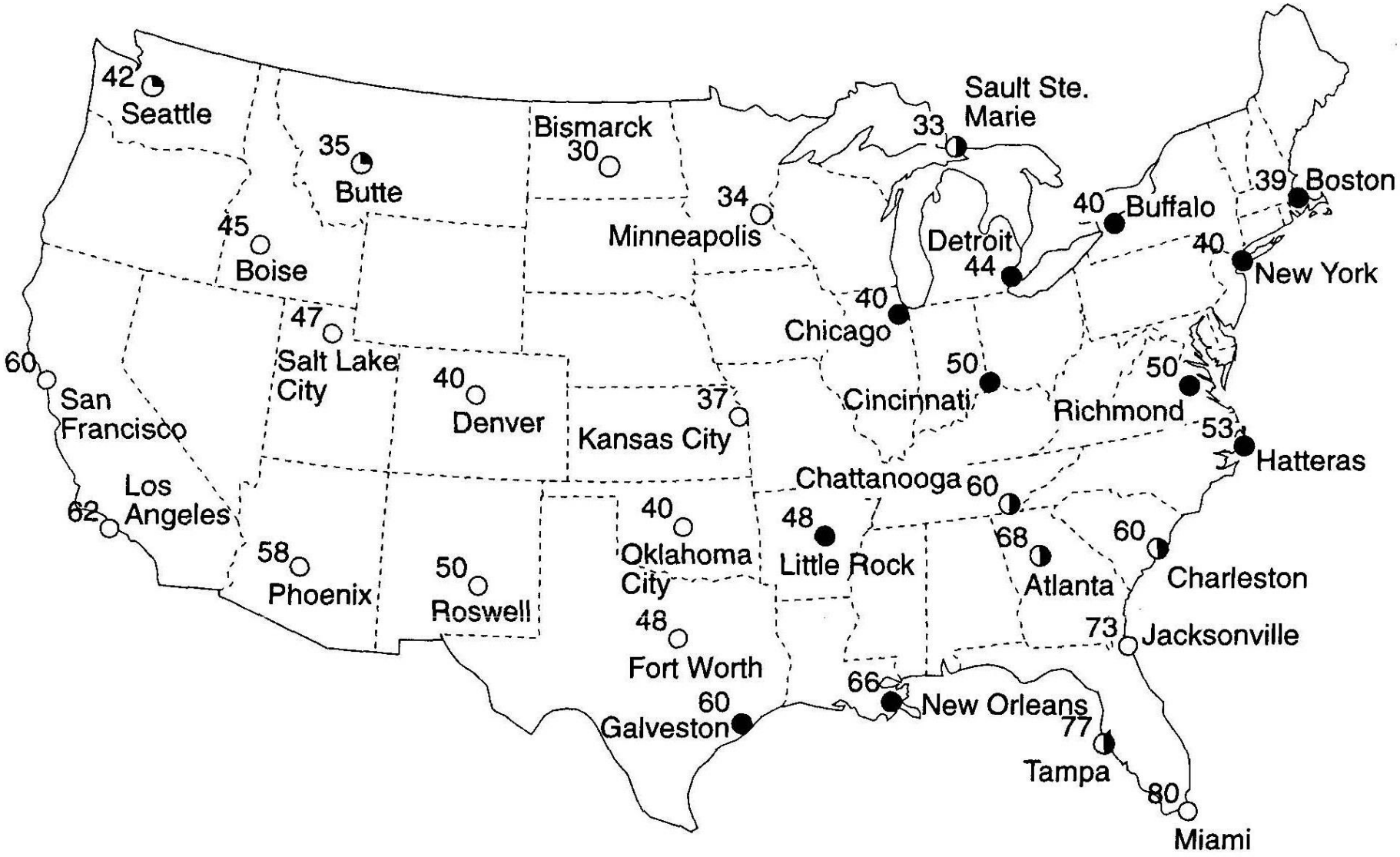
Draw the relationship between air pressure and altitude.



Draw the 1024 and 1028 isobar on the map below.



Draw the 30, 40,50 and 60 isotherm on the map below.

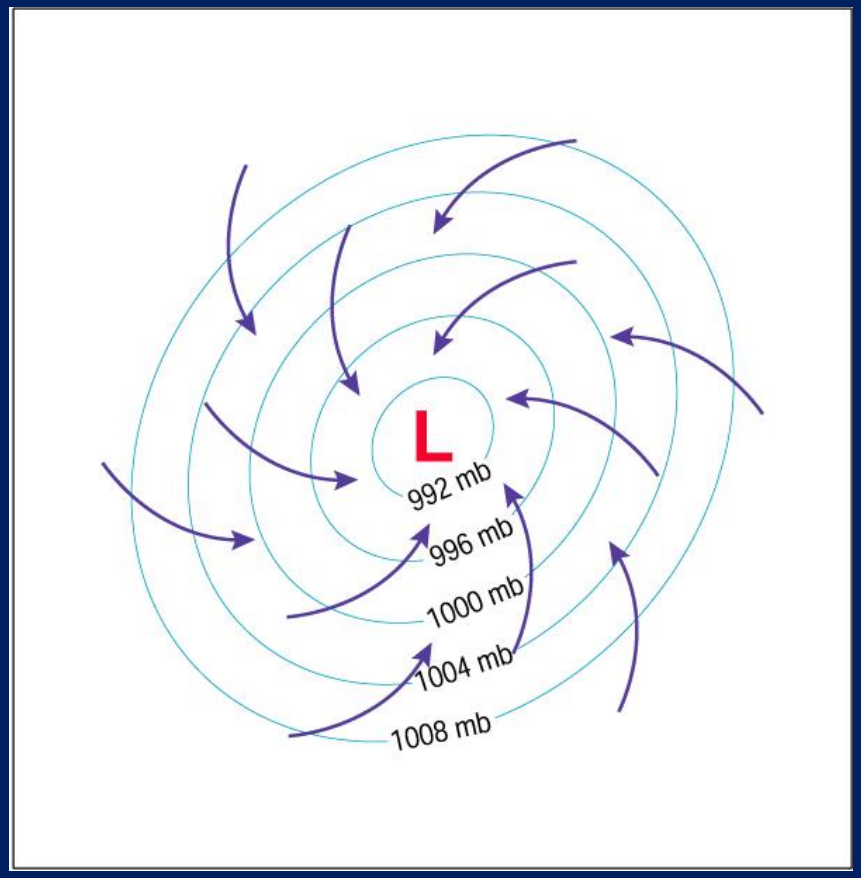


Students complete Drawing Isotherm Lab

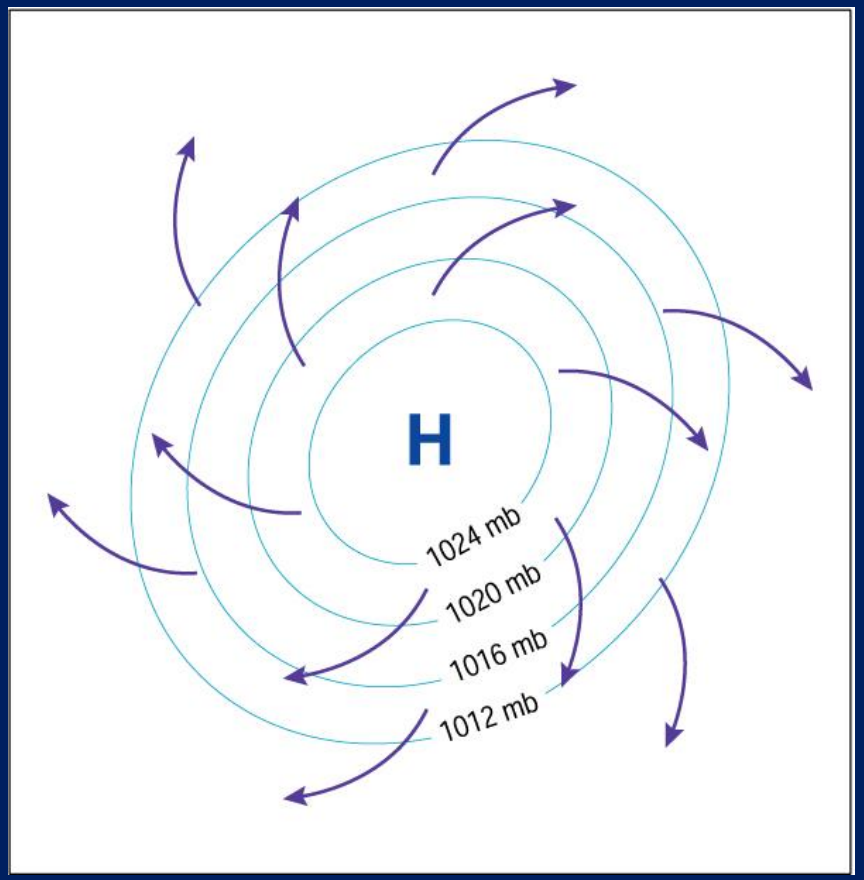
In a high pressure area,
air will (rise, sink)
because the air is
(less, more) dense.
This is because the air is
(cold, warm)
and (rises, sinks).
Therefore, clouds CANNOT form.

In a low pressure area, air will (rise, sink) because the air is (less, more) dense. This is because the air is (cold, warm) and (rises, sinks). Therefore, clouds are LIKELY to form.

Correctly draw the direction of wind flow around both a high and a low pressure area in the NORTHERN HEMISPHERE.

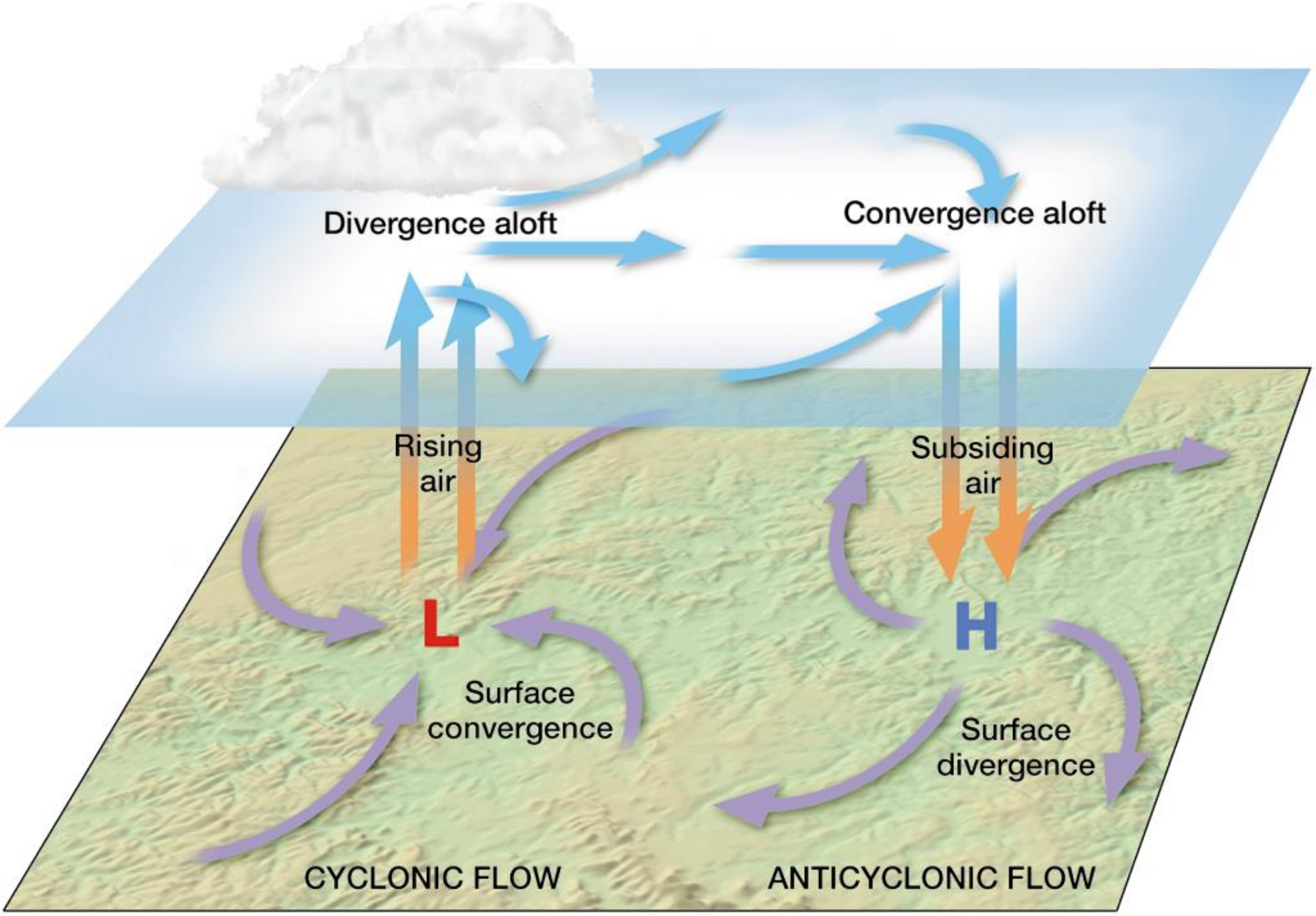


In and to the **Left**
(Cyclone)
(Counterclockwise)



Out and to the **Right**
(Anticyclone)
(Clockwise)

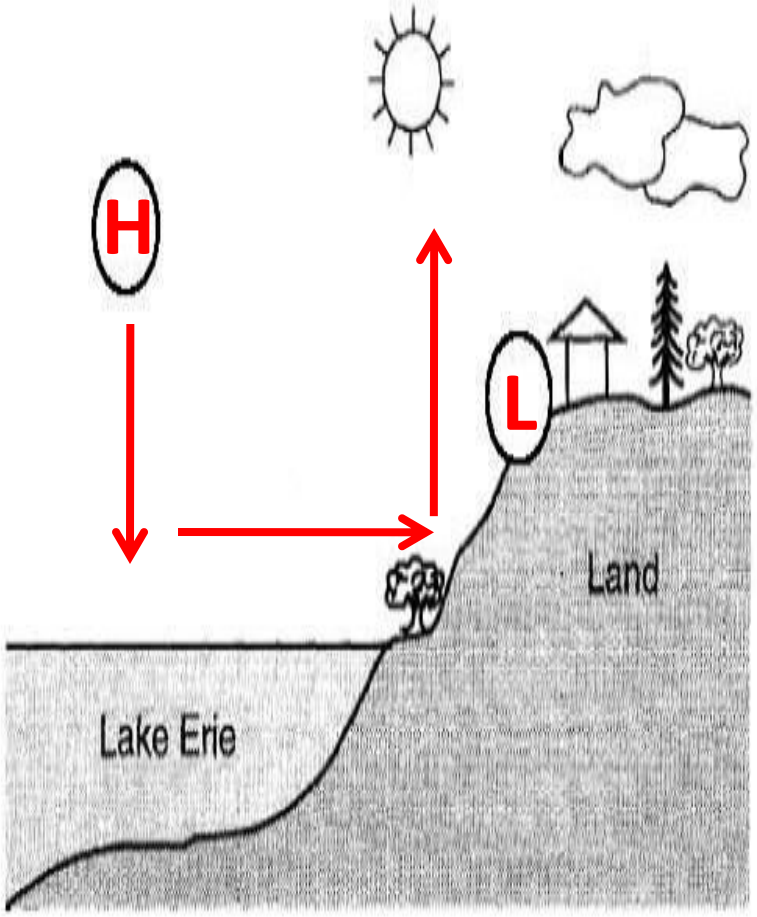
	low pressure	high pressure
warm or cold air	warm	cold
air rising or sinking	rising	sinking
clouds or no clouds	clouds	no clouds
clockwise or counterclockwise wind direction	counter clockwise	clockwise
winds toward or away from the center	toward	away



On the diagrams below, label which one represents a land breeze and which represents a sea breeze. Correctly label on each diagram where the high and low pressure areas would be found.

Sea Breeze

Water heats up slower than land
- high specific heat
- cooler temperatures
- air sinks



Land heats up faster than water
- low specific heat
- warmer temperatures
- air rises

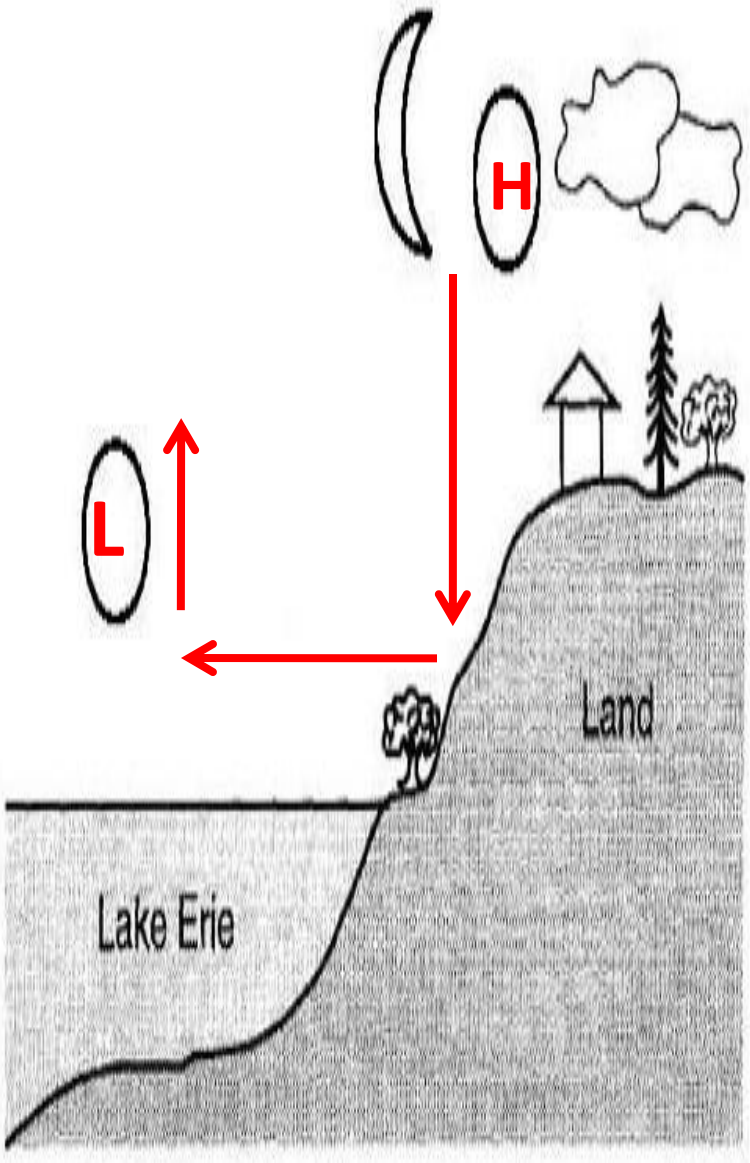
HIGH Pressure

Low Pressure

Land Breeze

Water cools down slower than land (stays warmer)
- high specific heat
- warmer temperatures at night
- air rises

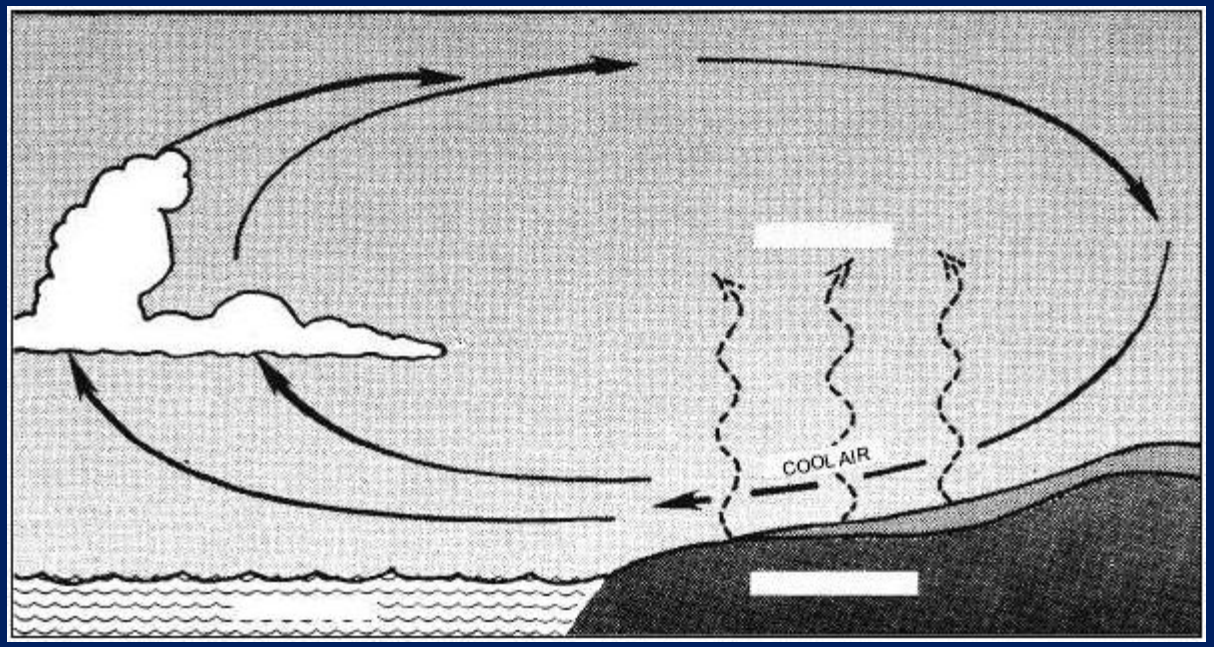
Low Pressure



Land cools down faster than water
- low specific heat
- cooler temperatures at night
- air sinks

High Pressure

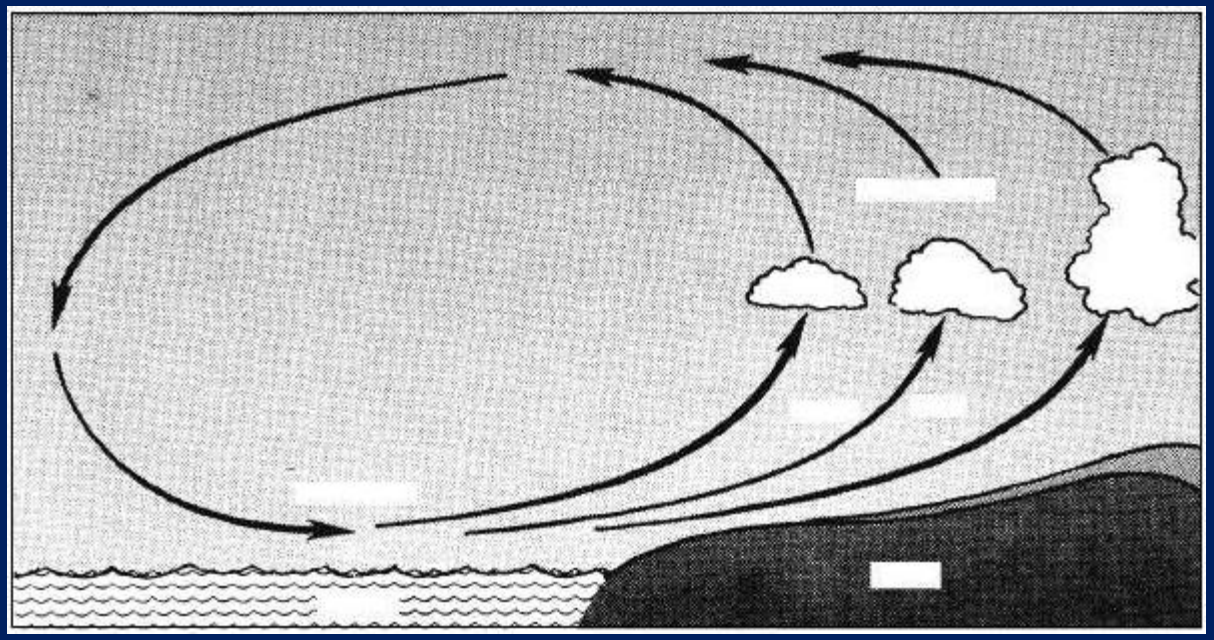
On the diagrams below, label which one represents a land breeze and which represents a sea breeze. Correctly label on each diagram where the high and low pressure areas would be found.



Land Breeze (night time)

L H

On the diagrams below, label which one represents a land breeze and which represents a sea breeze. Correctly label on each diagram where the high and low pressure areas would be found.

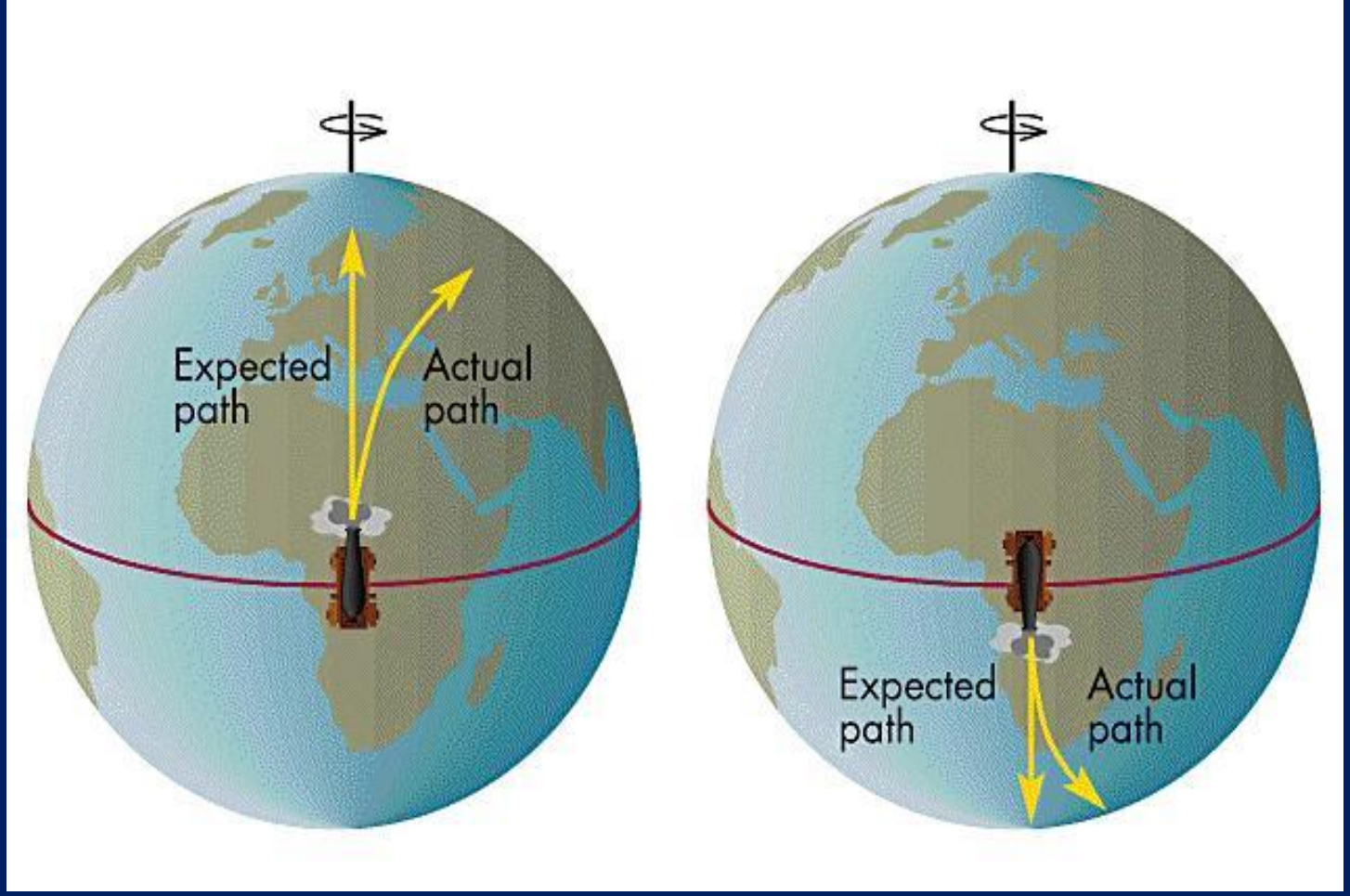


Sea Breeze (daytime)

H L

Coriolis Effect – The deflection of winds and ocean currents caused by the rotation of Earth.

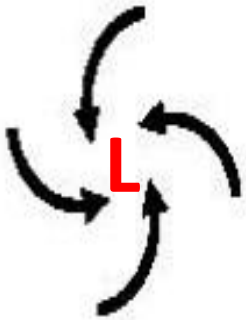
Deflection is to the right in the Northern Hemisphere, and to the left in the Southern Hemisphere



In the northern hemisphere the curve is to the right.

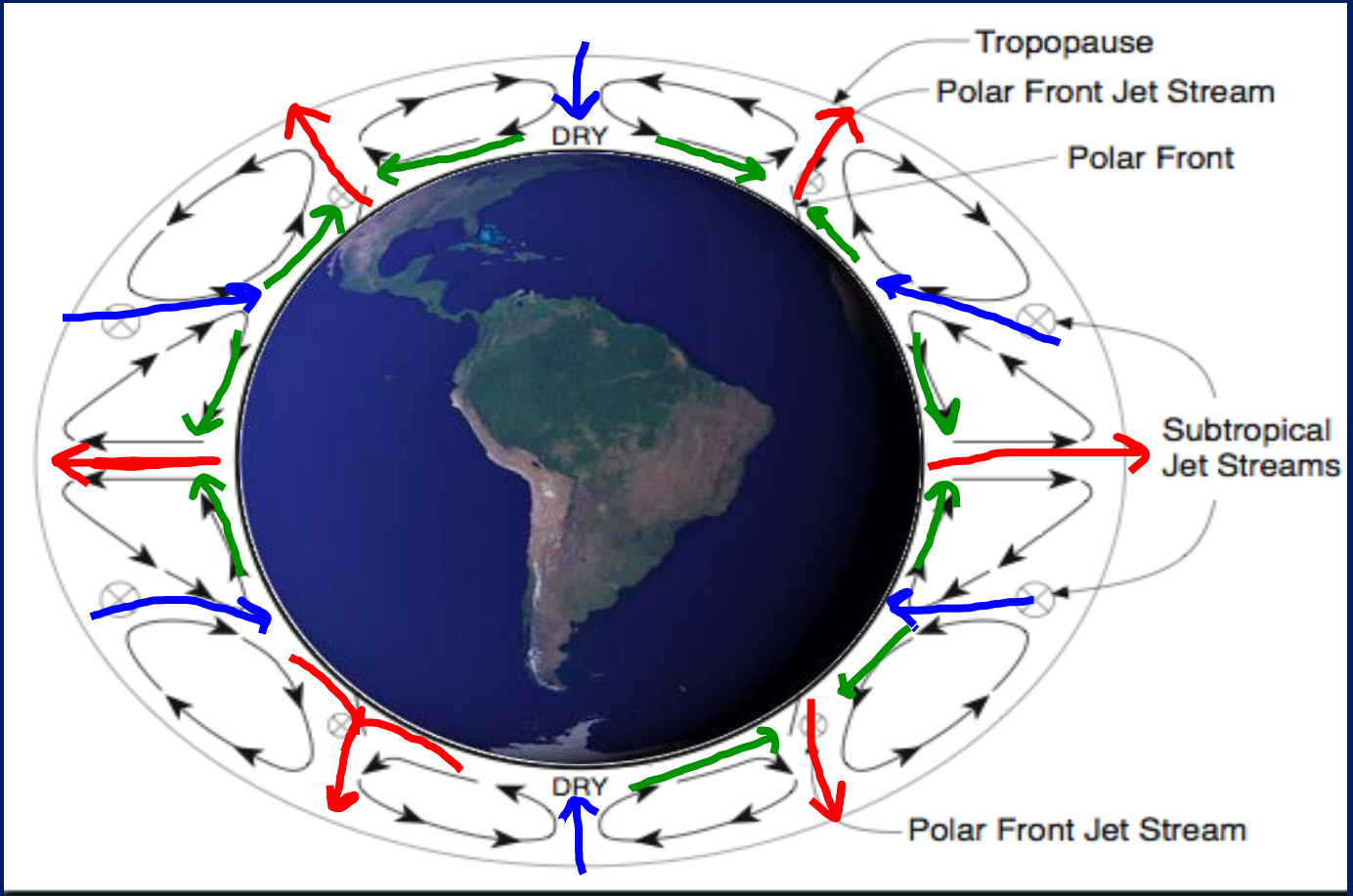
In the southern hemisphere the curve is to the left.

Weather Factors Associated with Different Pressure Areas

High Pressure	Wind blows →	*Low Pressure*
Cool / cold air		Air rises
Air sinks / goes down		Air moves inward
Air moves outward		Warm air
Clockwise		Counter Clockwise
		
No clouds		Clouds
No precipitation		Precipitation likely

Global Wind Currents

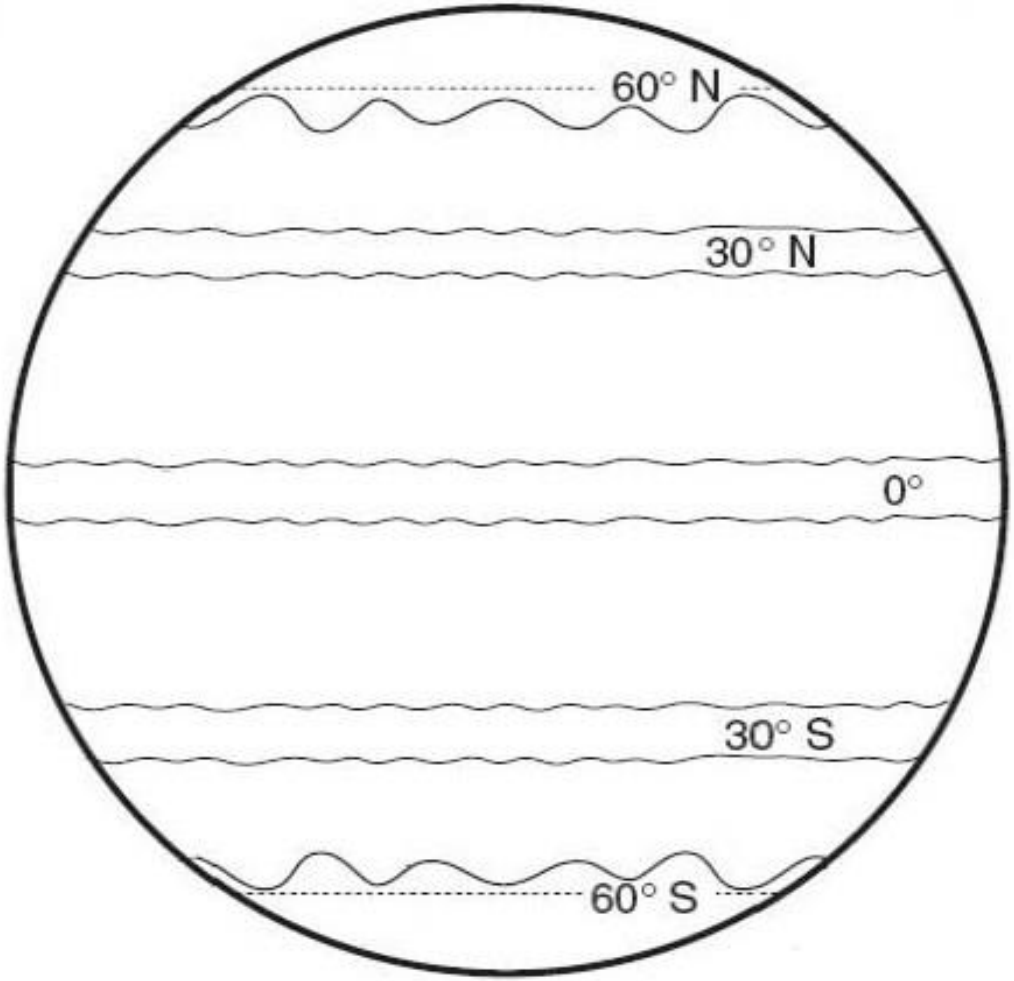
Air rises and sinks

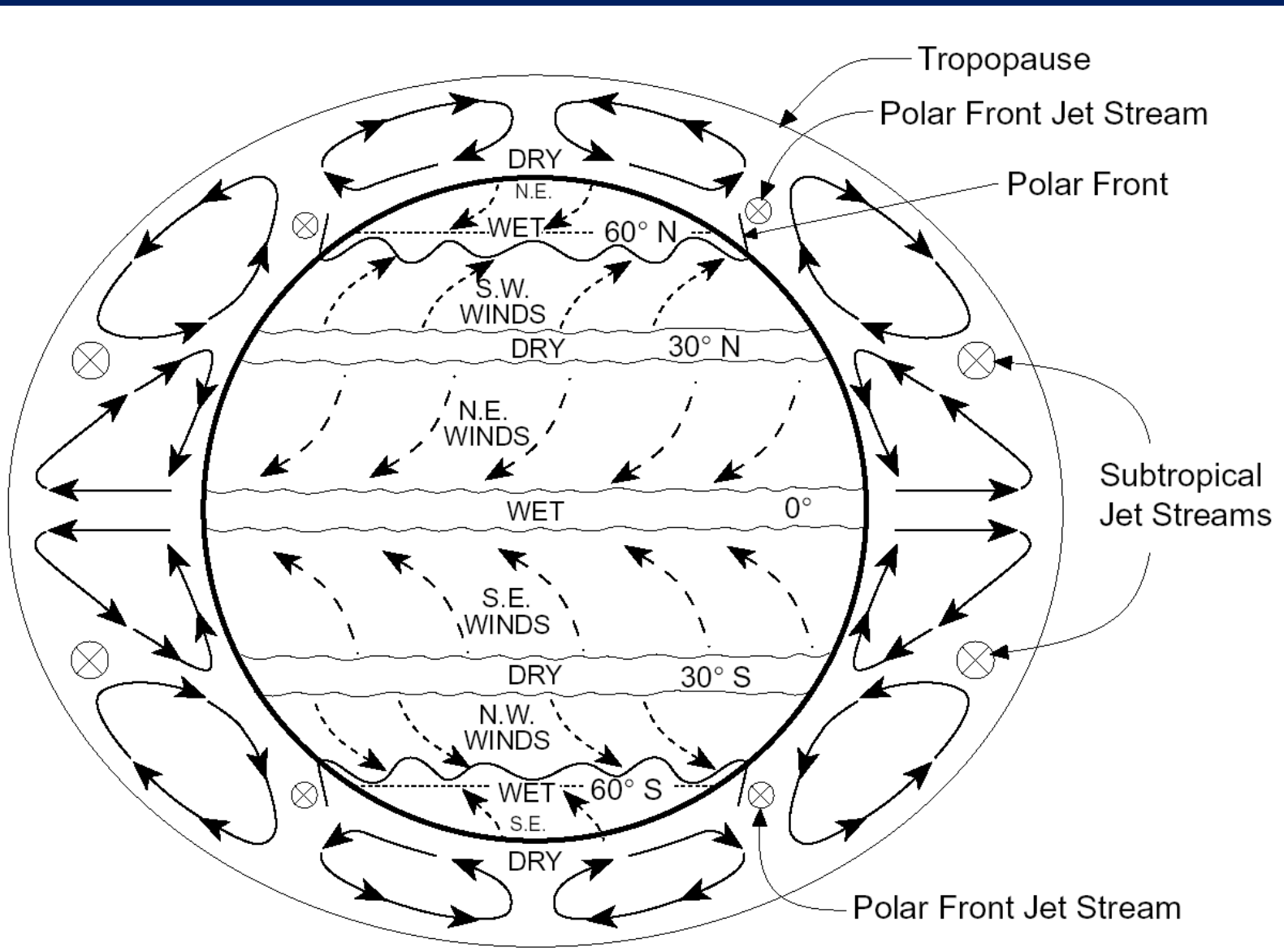


Planetary winds: ESRT pg 14

Fill in the diagram to the right.

- Draw the wind arrows illustrating the direction and deflection.
- Label the areas that would be wet or dry.
- Label the areas that would be high pressure or low pressure.

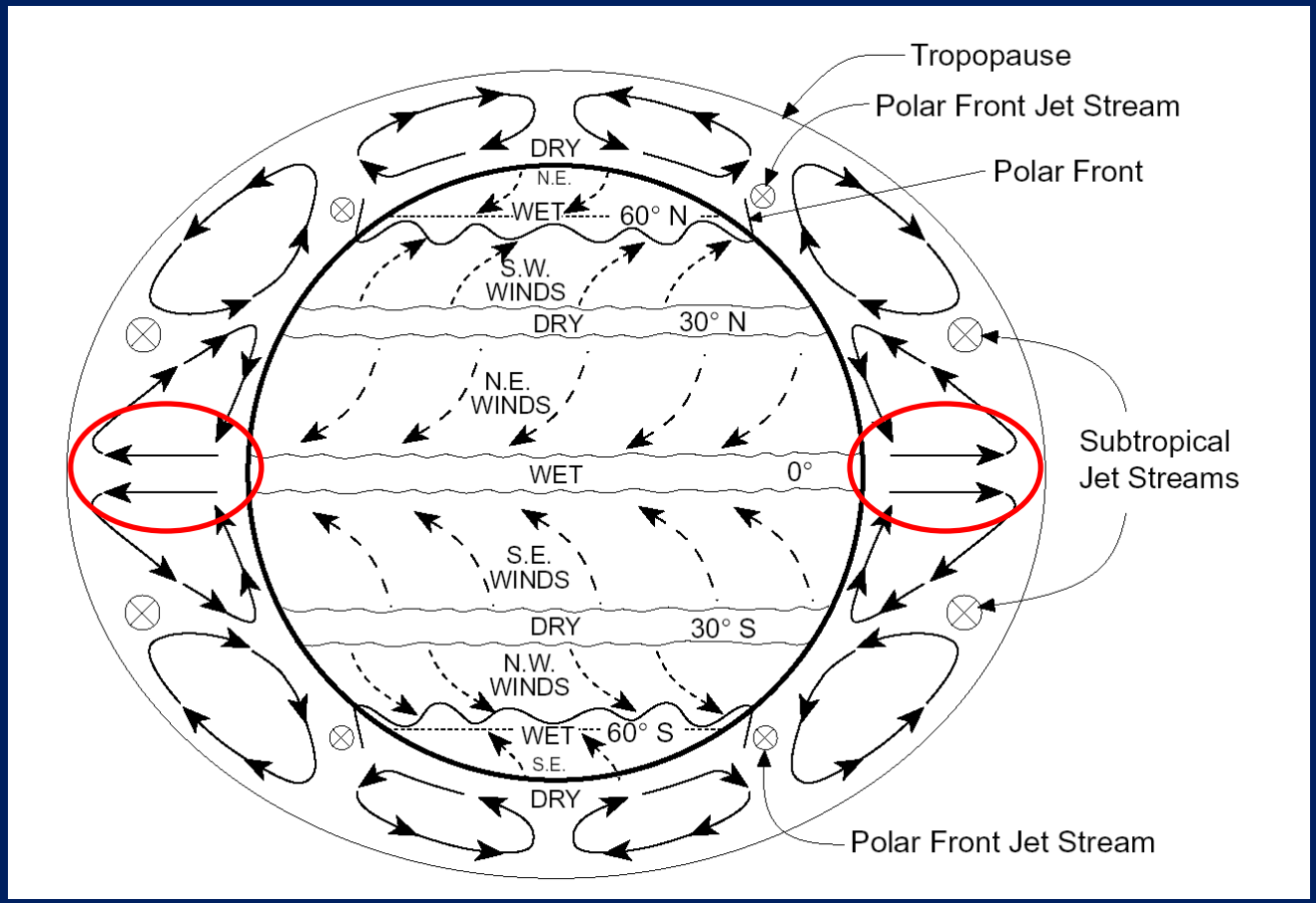



Tropopause
Polar Front Jet Stream
Polar Front
DRY
N.E.
WET
60° N
S.W.
WINDS
DRY
30° N
N.E.
WINDS
Subtropical
Jet Streams
WET
0°
S.E.
WINDS
DRY
30° S
N.W.
WINDS
WET
60° S
S.E.
DRY
Polar Front Jet Stream

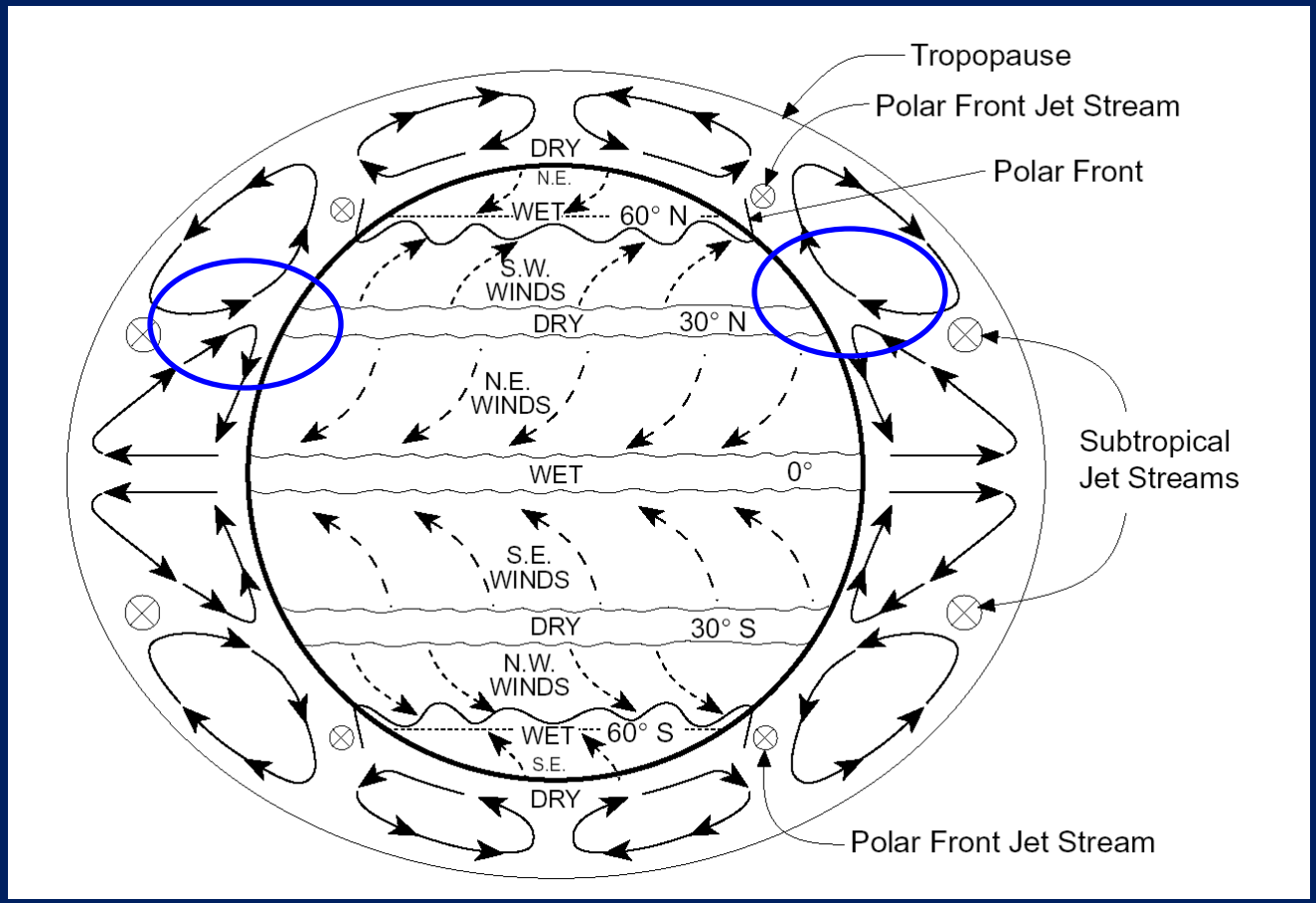
Using the chart on page 14, state the prevailing wind direction for each latitude below:

45°N	southwest
45°S	northwest
75°N	northeast
20°N	northeast

Is air rising or sinking at the equator?



Is air rising or sinking at 30°N?



- Complete page 11 in packet

Atmospheric Moisture

What is moisture in the atmosphere?

Water Vapor: Gaseous water in the atmosphere

Humidity:

Water Vapor of the atmosphere

Relative Humidity a ratio between the amount of moisture is in the atmosphere and how much moisture the atmosphere can hold.

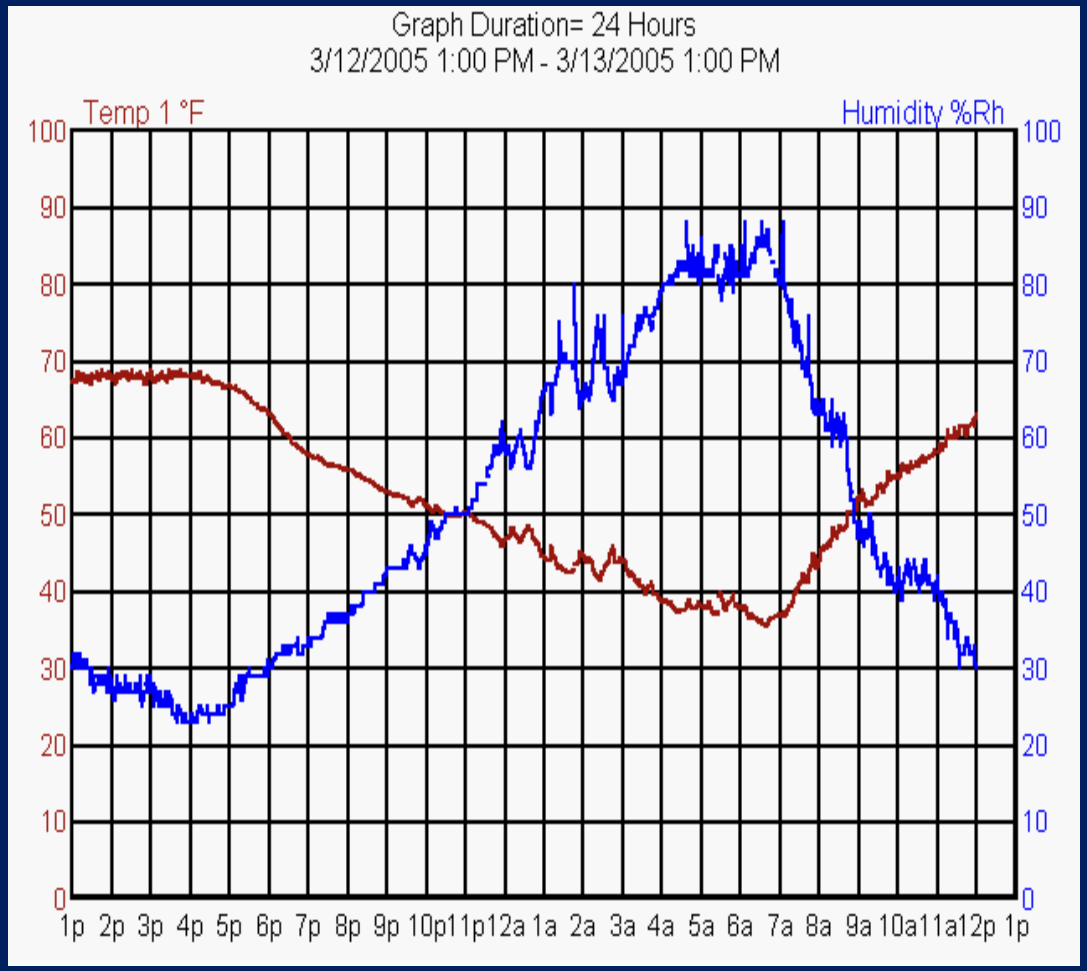
measured in %

When the air is holding as much water vapor as it can, the air is saturated

When the air is saturated, the relative humidity is 100 % = Precipitation

Temperature & Relative Humidity the warmer the temperature is the more moisture it can hold

Relative Humidity vs Air Temperature



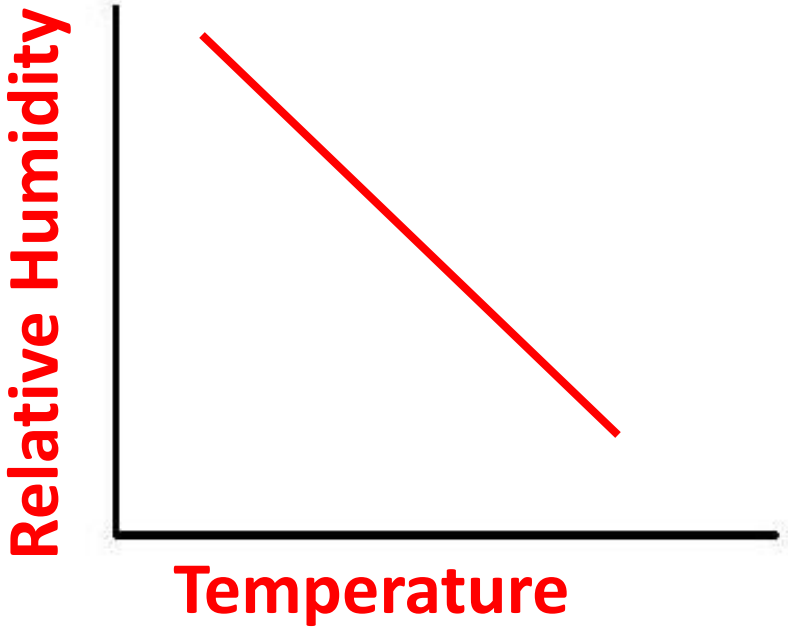
Indirect Relationship

as temp increases RH decreases

State the relationship between temperature and relative humidity.

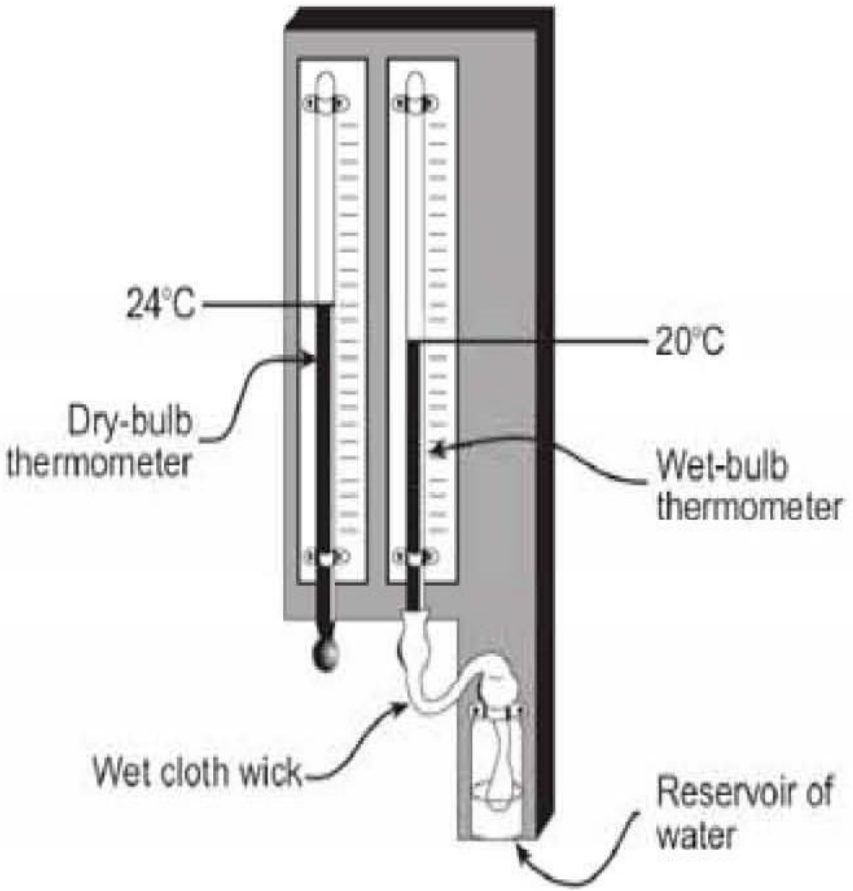
As temperature increases, relative humidity **decreases**

Draw the relationship on the graph to the right.

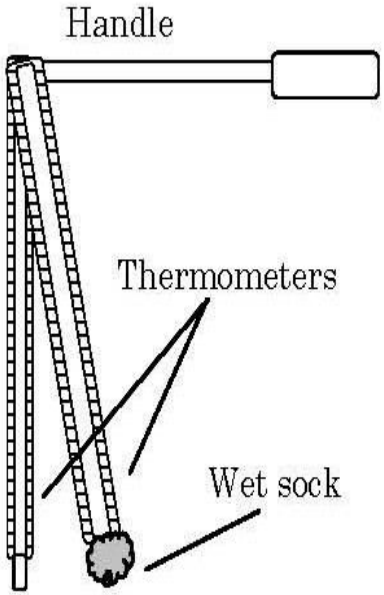


Instruments used to determine relative humidity:

Hygrometer



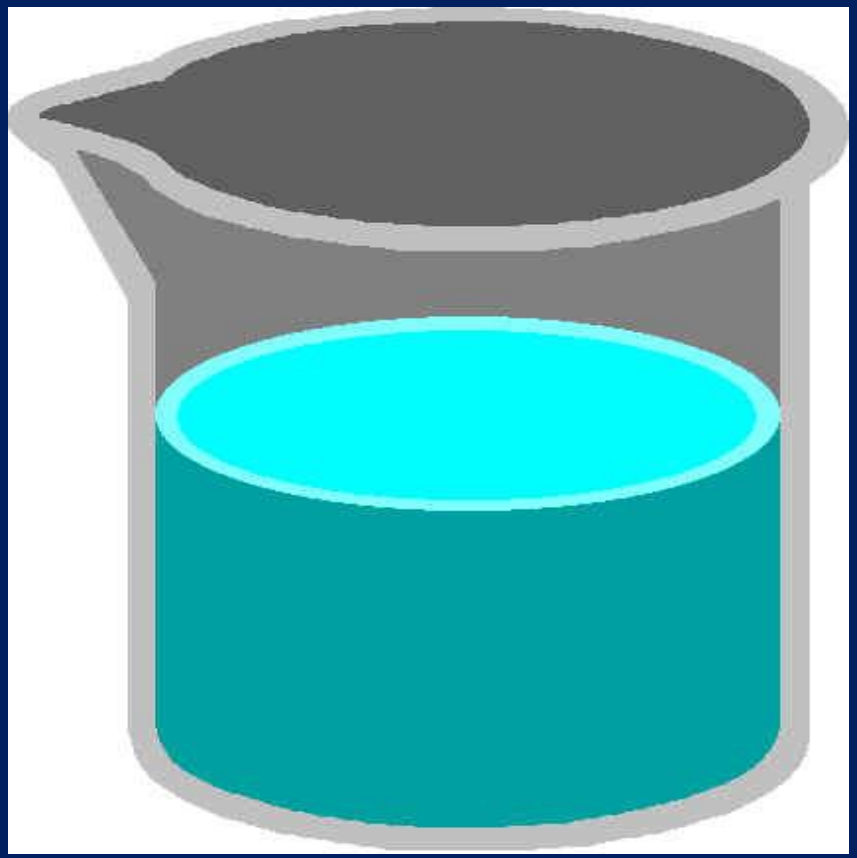
Sling psychrometer



Dew point Temperature

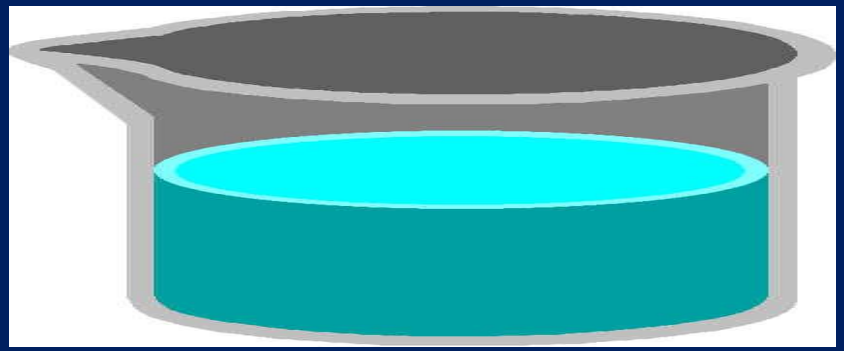
- The temperature in which the air is saturated.

- 100% relative humidity



When the container is "full" it is saturated

Saturated Air has reached the dew point



Warm Air

Cold Air

Determining Relative Humidity and Dew point Temperatures

Dry bulb – air temperature

Wet bulb – temperature an air parcel cooled by evaporation of water (wet cloth)

When given the wet bulb and dry bulb temperatures, you can determine the dew point temperature and relative humidity by following the directions below.

Use the Dew point Temperature and Relative Humidity charts in the Earth Science Reference Tables on page 12.

Relative Humidity (%)

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (C°)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
–20	100	28														
–18	100	40														
–16	100	48														
–14	100	55	11													
–12	100	61	23													
–10	100	66	33													
–8	100	71	41	13												
–6	100	73	48	20												
–4	100	77	54	32	11											
–2	100	79	58	37	20	1										
0	100	81	63	45	28	11										
2	100	83	67	51	36	20	6									
4	100	85	70	56	42	27	14									
6	100	86	72	59	46	35	22	10								
8	100	87	74	62	51	39	28	17	6							
10	100	88	76	65	54	43	33	24	13	4						
12	100	88	78	67	57	48	38	28	19	10	2					
14	100	89	79	69	60	50	41	33	25	16	8	1				
16	100	90	80	71	62	54	45	37	29	21	14	7	1			
18	100	91	81	72	64	56	48	40	33	26	19	12	6			
20	100	91	82	74	66	58	51	44	36	30	23	17	11	5		
22	100	92	83	75	68	60	53	46	40	33	27	21	15	10	4	
24	100	92	84	76	69	62	55	49	42	36	30	25	20	14	9	4
26	100	92	85	77	70	64	57	51	45	39	34	28	23	18	13	9
28	100	93	86	78	71	65	59	53	47	42	36	31	26	21	17	12
30	100	93	86	79	72	66	61	55	49	44	39	34	29	25	20	16

Dewpoint Temperatures (°C)

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (C°)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
–20	–20	–33														
–18	–18	–28														
–16	–16	–24														
–14	–14	–21	–36													
–12	–12	–18	–28													
–10	–10	–14	–22													
–8	–8	–12	–18	–29												
–6	–6	–10	–14	–22												
–4	–4	–7	–12	–17	–29											
–2	–2	–5	–8	–13	–20											
0	0	–3	–6	–9	–15	–24										
2	2	–1	–3	–6	–11	–17										
4	4	1	–1	–4	–7	–11	–19									
6	6	4	1	–1	–4	–7	–13	–21								
8	8	6	3	1	–2	–5	–9	–14								
10	10	8	6	4	1	–2	–5	–9	–14	–28						
12	12	10	8	6	4	1	–2	–5	–9	–16						
14	14	12	11	9	6	4	1	–2	–5	–10	–17					
16	16	14	13	11	9	7	4	1	–1	–6	–10	–17				
18	18	16	15	13	11	9	7	4	2	–2	–5	–10	–19			
20	20	19	17	15	14	12	10	7	4	2	–2	–5	–10	–19		
22	22	21	19	17	16	14	12	10	8	5	3	–1	–5	–10	–19	
24	24	23	21	20	18	16	14	12	10	8	6	2	–1	–5	–10	–18
26	26	25	23	22	20	18	17	15	13	11	9	6	3	0	–4	–9
28	28	27	25	24	22	21	19	17	16	14	11	9	7	4	1	–3
30	30	29	27	26	24	23	21	19	18	16	14	12	10	8	5	1

Example 1: If the dry bulb temperature is 20°C and the wet bulb is 15°C, find the dew point temperature and the relative humidity.

Dew point:

Determine the difference between dry bulb and wet bulb.

Dry bulb _____

Wet bulb _____

Difference _____

Using the Dew point Temperature chart, find the dry bulb temperature on the dew point chart (left side) and the difference between the wet bulb and dry bulb temperatures (top).

- Match these places within the chart. What is the Dew point Temperature? _____ °C

Relative Humidity:

Same as dew point, except use the Relative Humidity chart. Find the dry bulb temperature on the relative humidity chart (left side) and the difference between the wet bulb and dry bulb temperatures (top).

- Match these places within the chart. What is the Relative Humidity? _____ %

Example 2: Find the relative humidity and dew point temperature when the dry bulb temperature is 14°C and the wet bulb temperature is 9°C.

Dry bulb _____

Wet bulb _____

Difference _____

What is the Dew point Temperature? _____ °C

What is the Relative Humidity? _____ %

Relative Humidity (%)

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (C°)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
–20	100	28														
–18	100	40														
–16	100	48														
–14	100	55	11													
–12	100	61	23													
–10	100	66	33													
–8	100	71	41	13												
–6	100	73	48	20												
–4	100	77	54	32	11											
–2	100	79	58	37	20	1										
0	100	81	63	45	28	11										
2	100	83	67	51	36	20	6									
4	100	85	70	56	42	27	14									
6	100	86	72	59	46	35	22	10								
8	100	87	74	62	51	39	28	17	6							
10	100	88	76	65	54	43	33	24	13	4						
12	100	88	78	67	57	48	38	28	19	10	2					
14	100	89	79	69	60	50	41	33	25	16	8	1				
16	100	90	80	71	62	54	45	37	29	21	14	7	1			
18	100	91	81	72	64	56	48	40	33	26	19	12	6			
20	100	91	82	74	66	58	51	44	36	30	23	17	11	5		
22	100	92	83	75	68	60	53	46	40	33	27	21	15	10	4	
24	100	92	84	76	69	62	55	49	42	36	30	25	20	14	9	4
26	100	92	85	77	70	64	57	51	45	39	34	28	23	18	13	9
28	100	93	86	78	71	65	59	53	47	42	36	31	26	21	17	12
30	100	93	86	79	72	66	61	55	49	44	39	34	29	25	20	16

Dewpoint Temperatures (°C)

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (C°)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
–20	–20	–33														
–18	–18	–28														
–16	–16	–24														
–14	–14	–21	–36													
–12	–12	–18	–28													
–10	–10	–14	–22													
–8	–8	–12	–18	–29												
–6	–6	–10	–14	–22												
–4	–4	–7	–12	–17	–29											
–2	–2	–5	–8	–13	–20											
0	0	–3	–6	–9	–15	–24										
2	2	–1	–3	–6	–11	–17										
4	4	1	–1	–4	–7	–11	–19									
6	6	4	1	–1	–4	–7	–13	–21								
8	8	6	3	1	–2	–5	–9	–14								
10	10	8	6	4	1	–2	–5	–9	–14	–28						
12	12	10	8	6	4	1	–2	–5	–9	–16						
14	14	12	11	9	6	4	1	–2	–5	–10	–17					
16	16	14	13	11	9	7	4	1	–1	–6	–10	–17				
18	18	16	15	13	11	9	7	4	2	–2	–5	–10	–19			
20	20	19	17	15	14	12	10	7	4	2	–2	–5	–10	–19		
22	22	21	19	17	16	14	12	10	8	5	3	–1	–5	–10	–19	
24	24	23	21	20	18	16	14	12	10	8	6	2	–1	–5	–10	–18
26	26	25	23	22	20	18	17	15	13	11	9	6	3	0	–4	–9
28	28	27	25	24	22	21	19	17	16	14	11	9	7	4	1	–3
30	30	29	27	26	24	23	21	19	18	16	14	12	10	8	5	1

Complete page 14 in packet

Cloud Formation

Condensation

Change of phase from water vapor to liquid water

Examples:

1) Water on cold glass of water

2) Water on a mirror after a shower

3) Fog, Clouds

Three things needed for Condensation to occur:

(1) **water vapor must be present**

(2) **air must be saturated (relative humidity 100%)**

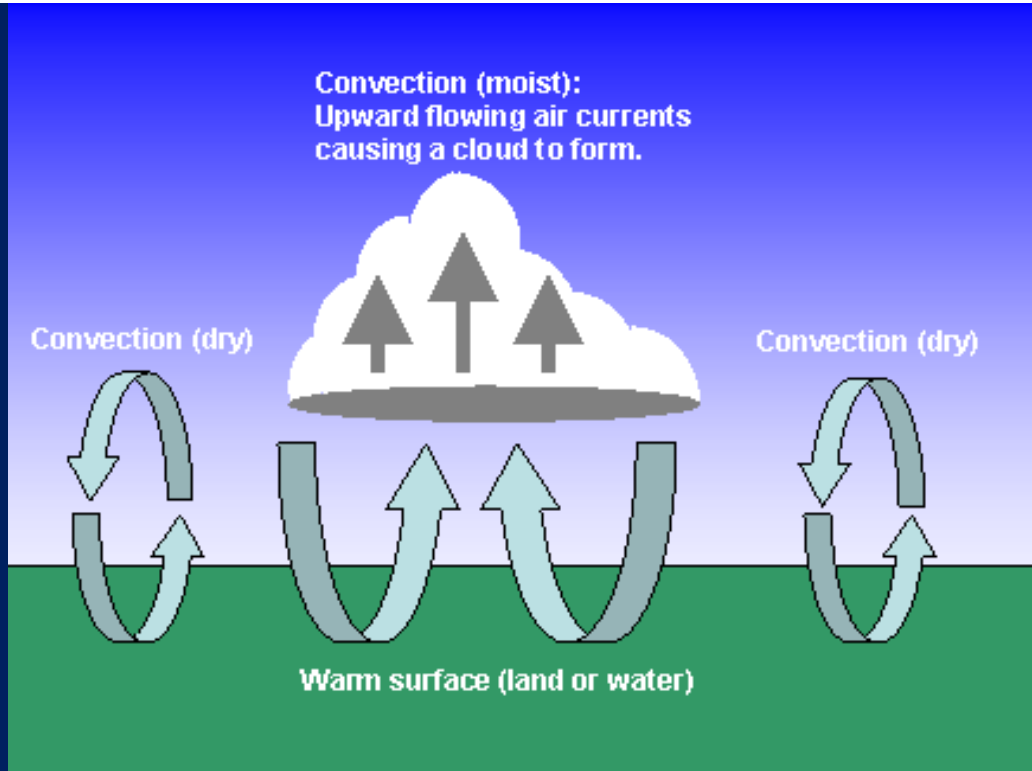
(3) **condensation nuclei - ex dust particles**

Density of Air:

- warm air rises because it is less dense
- cold air sinks because it is more dense

What is the called?

CONVECTION

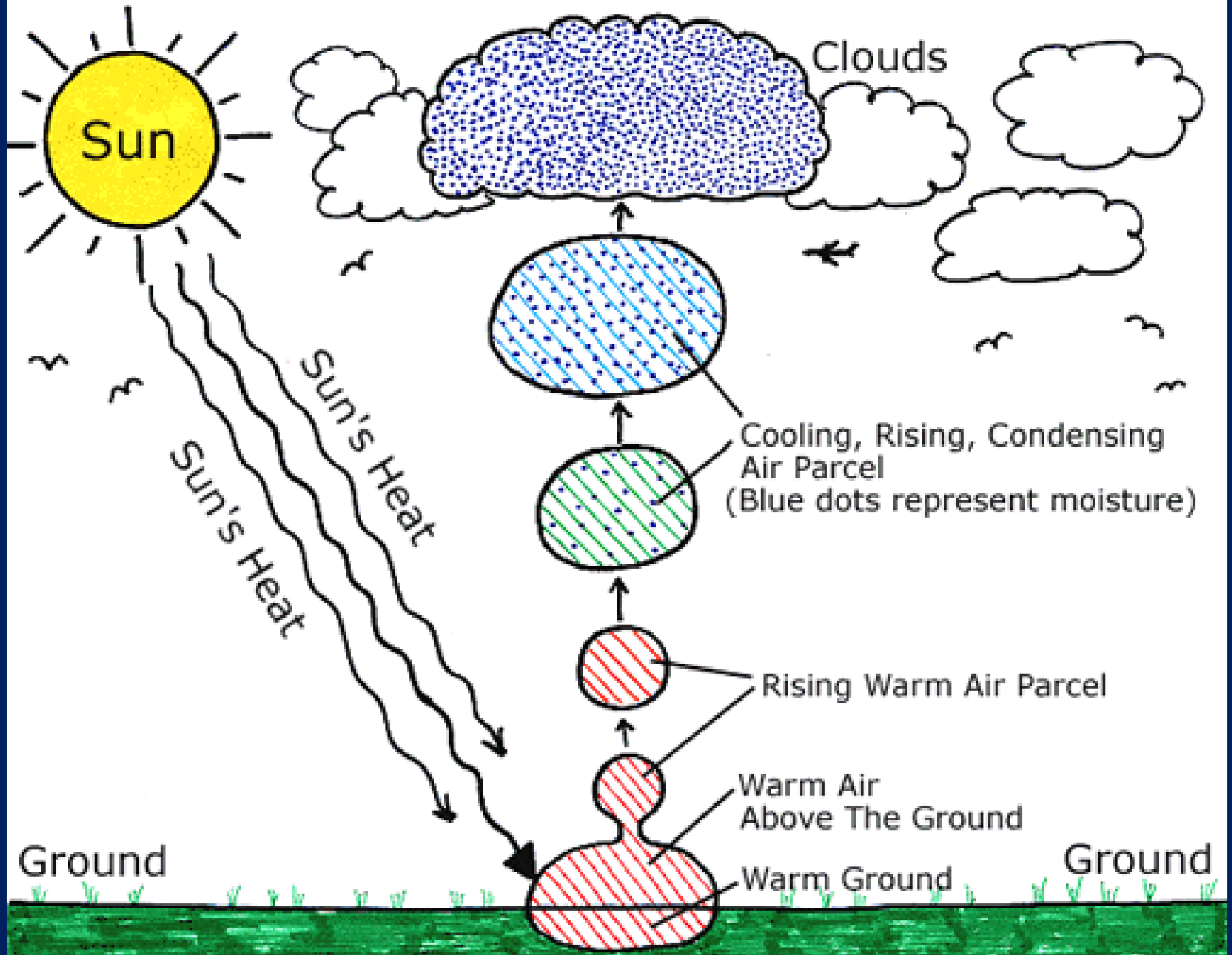


Formation of Clouds

5. Precipitates
4. Condenses (Clouds forum)
3. Cools
2. Expands
1. Warm Air Rises

http://www.wimp.com/giantcloud/

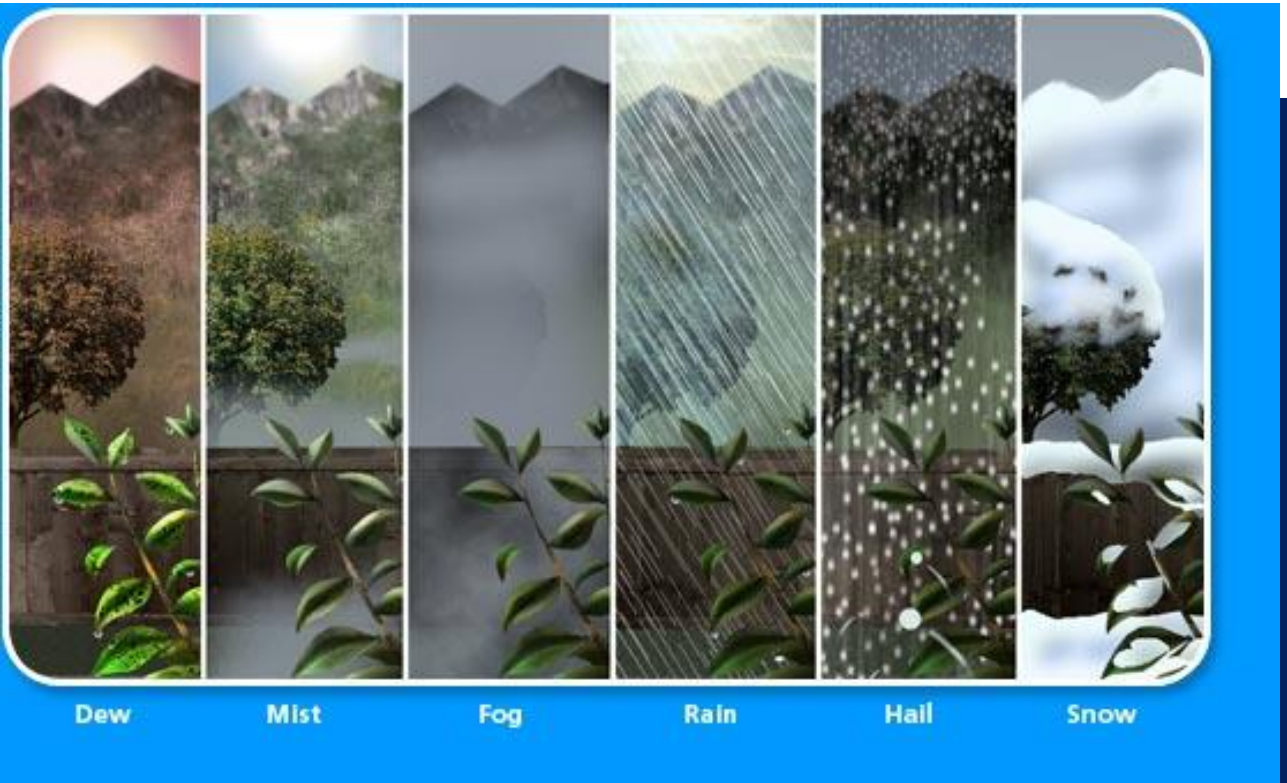
read up

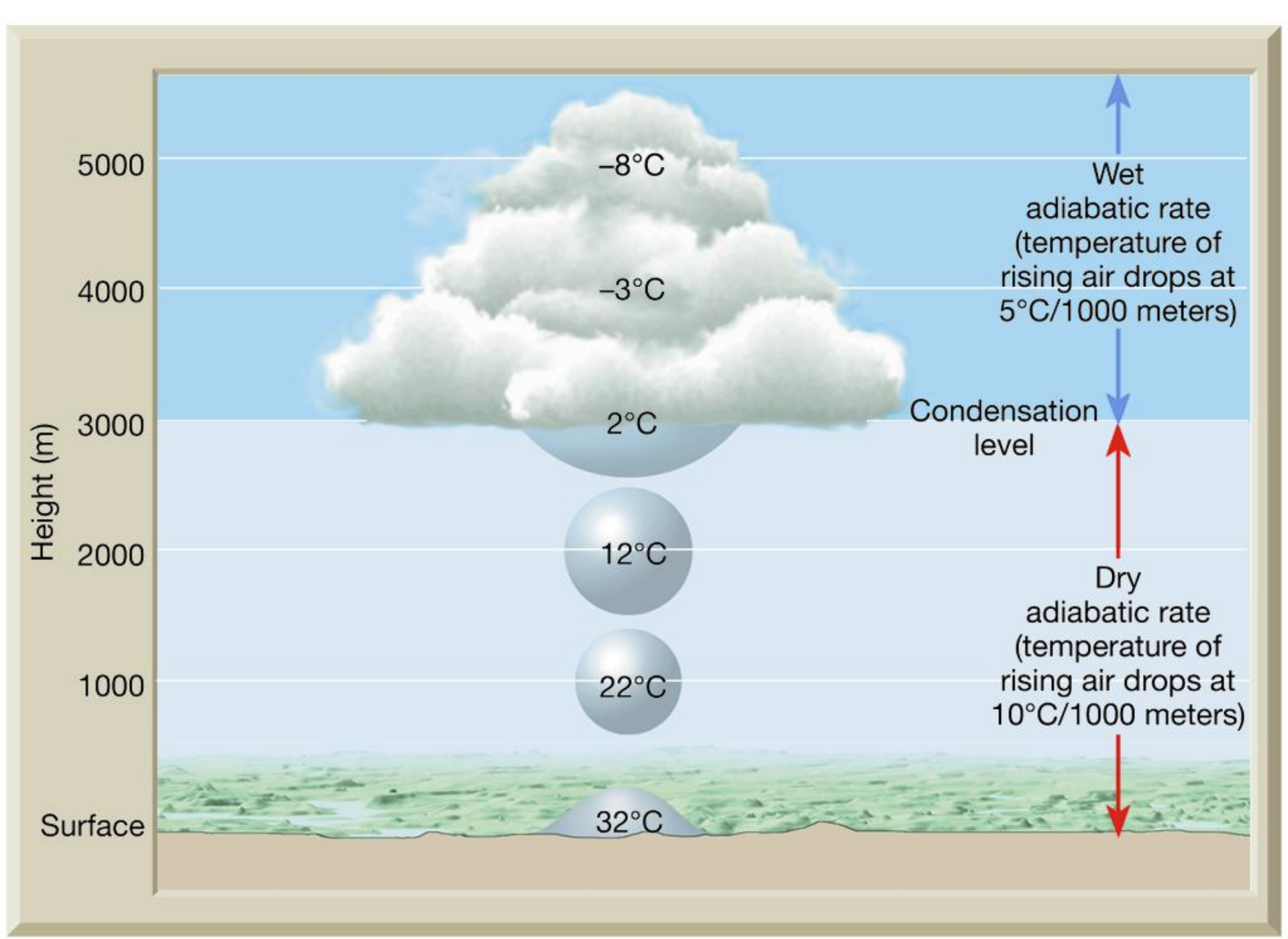

Sun
Clouds
Sun's Heat
Sun's Heat
Cooling, Rising, Condensing
Air Parcel
(Blue dots represent moisture)
Rising Warm Air Parcel
Warm Air
Above The Ground
Warm Ground
Ground
Ground

Precipitation – cloud particles too heavy to remain suspended in the air fall to Earth

Examples · include rain, hail, sleet, snow, freezing rain

What does precipitation do for the environment? Cleans the atmosphere





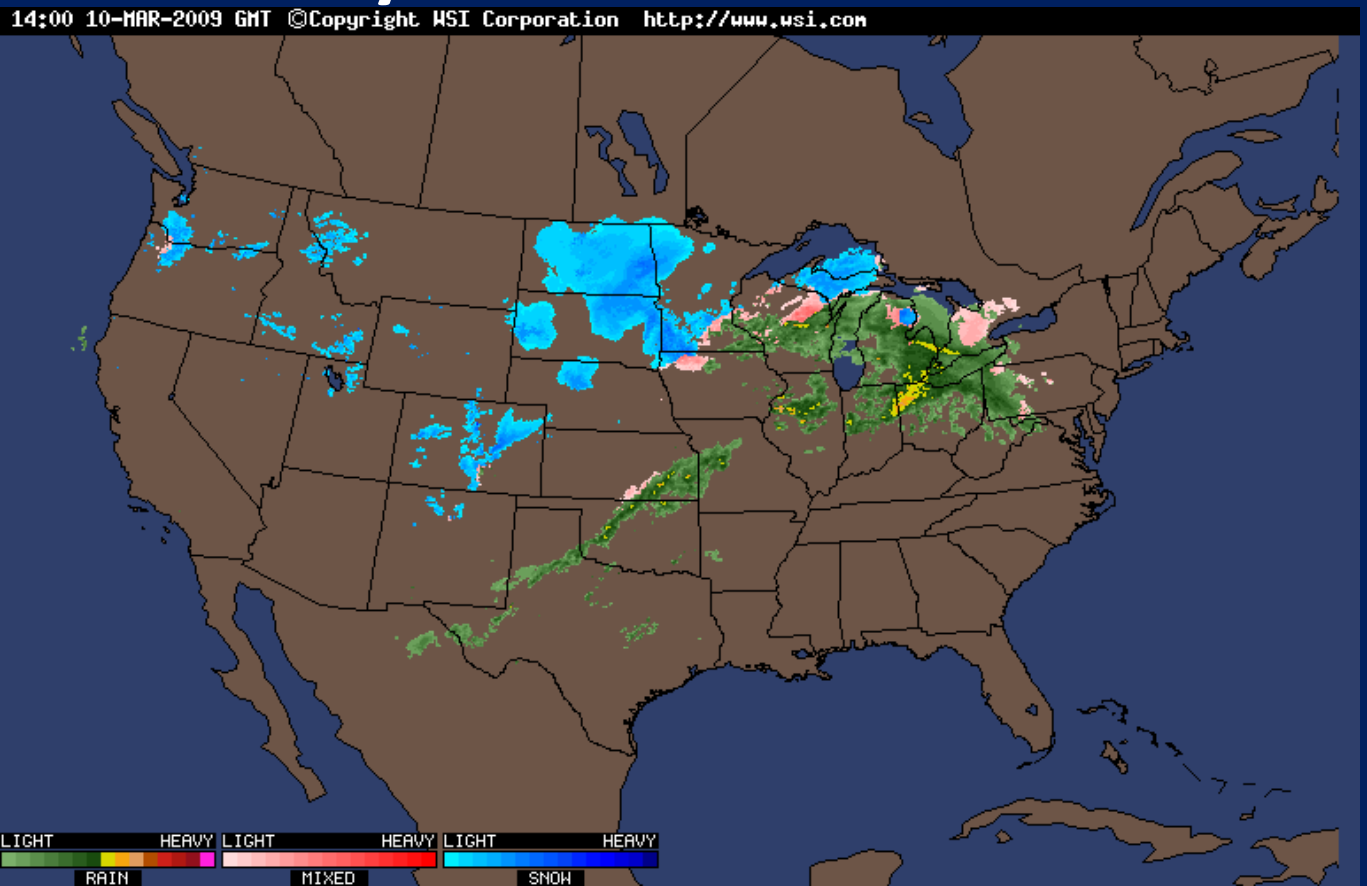
Students complete cloud in bottle lab

Weather

Where does the energy for weather originate?

Insolation from the Sun

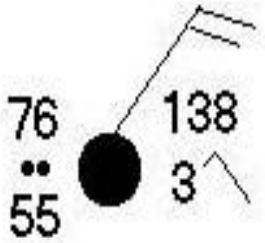
In the United States, the general direction that weather systems move is toward the EAST

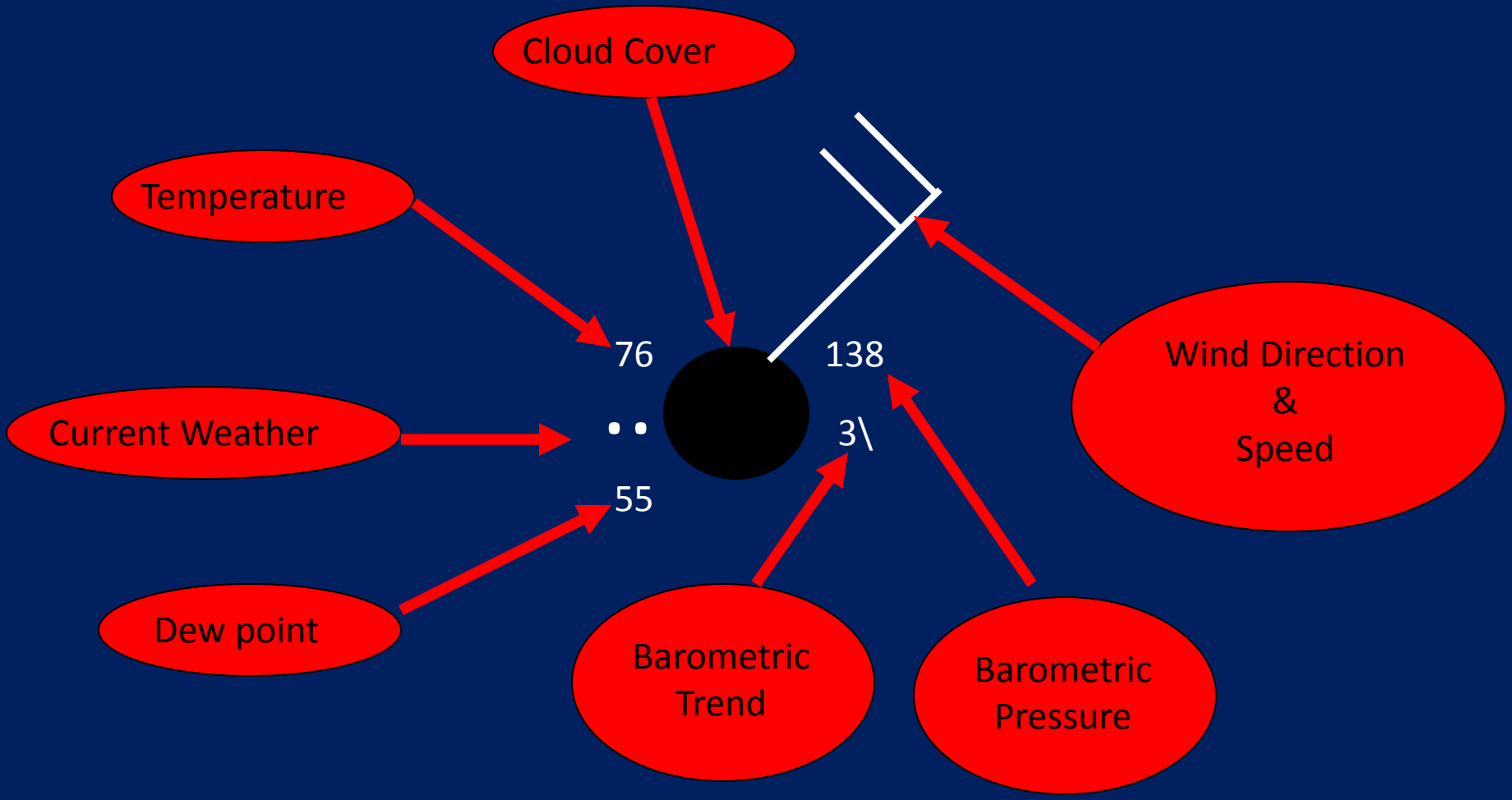


Station Models

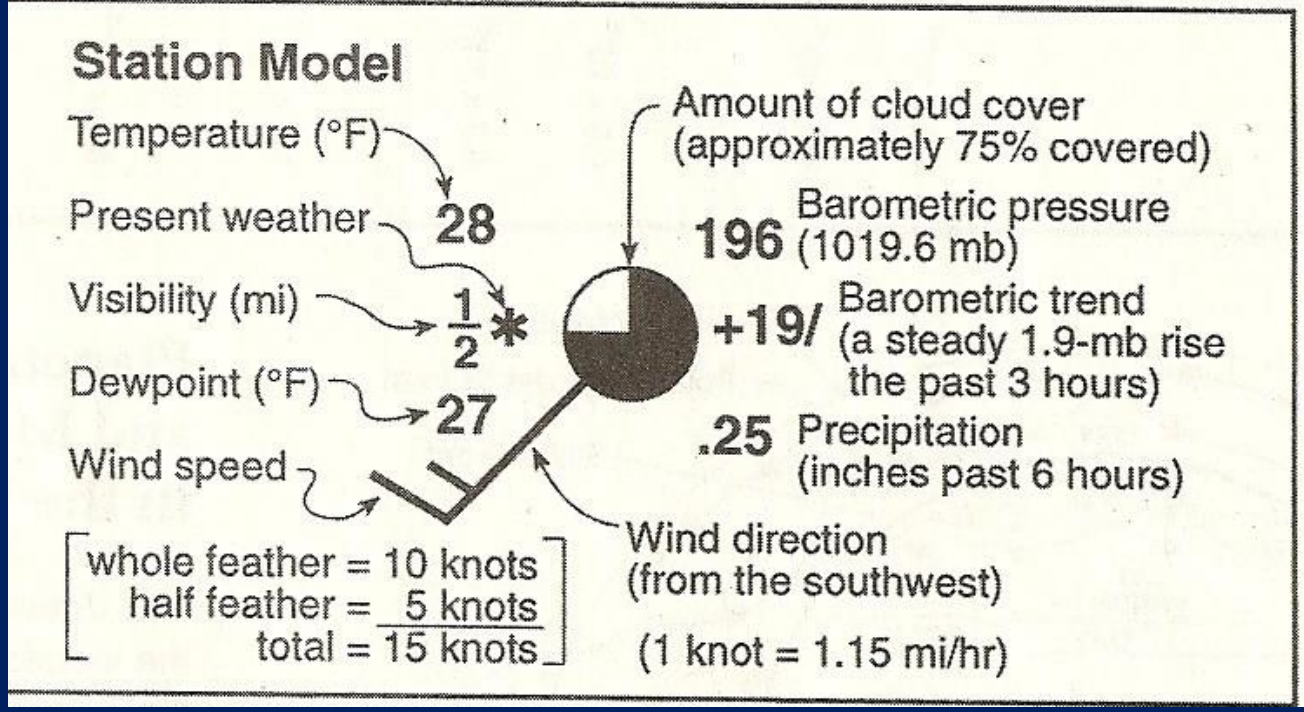
What page of the ESRTs has the key to decode the station model? 13

The temperature and dewpoint are measured in degrees F.




Cloud Cover
Temperature
76
138
Wind Direction
&
Speed
Current Weather
3\
55
Dew point
Barometric
Trend
Barometric
Pressure

Weather Map Symbols



Present Weather

Drizzle, Rain, Smog, Hail, Thunder-storms, Rain Showers

Snow, Sleet, Freezing Rain, Fog, Haze, Snow Showers

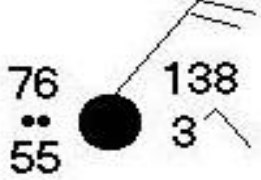
Air Masses

- cA continental arctic
- cP continental polar
- cT continental tropical
- mT maritime tropical
- mP maritime polar

Front Symbols

Cold, Warm, Stationary, Occluded

Hurricane

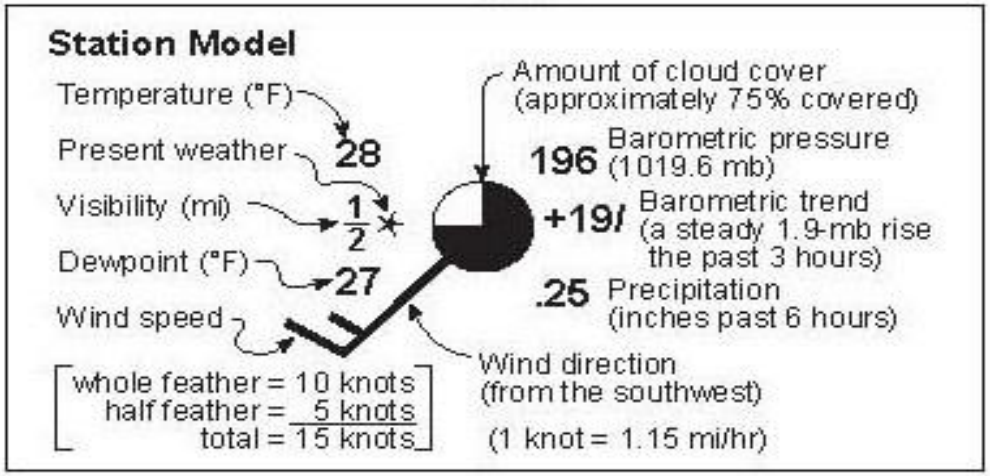


Using the station model above, fill in the chart below using the decoding information from the ESRTs:

Temperature	Dew Point	% Cloud Cover	Air Pressure	Barometric Trend	Wind Direction	Wind Speed
76° F	55° F	100%				

NOTES:

These numbers must be converted! Do NOT simply write the numbers above.



NOTES:

138

Add a decimal between the last two digits

13.8

Add a 9 or 10 in front

***Above 500 place a 9 in front**

***Below 500 place a 10 in front**

1013.8

Rise

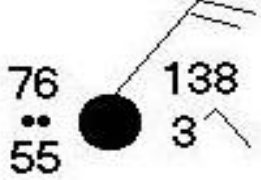
Fall

Steady

3  **=**

Add decimal in front of last number

0.3 rise then fall over last 3 hrs.



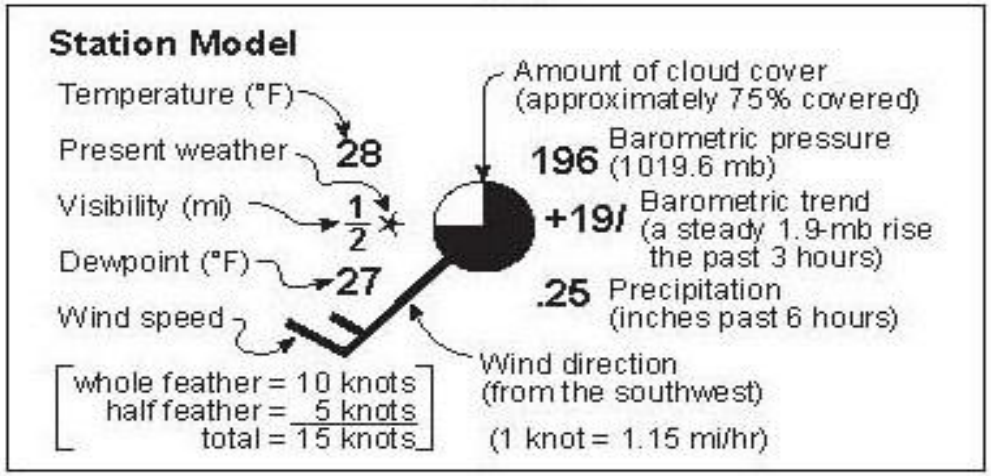
Using the station model above, fill in the chart below using the decoding information from the ESRTs:

Temperature	Dew Point	% Cloud Cover	Air Pressure	Barometric Trend	Wind Direction	Wind Speed
76° F	55° F	100%	1013.8	0.3	NE	20 Knots

Rise then fall

These numbers must be converted! Do NOT simply write the numbers above.

NOTES:



PRACTICE

Barometric Pressure

738

Add a decimal between the last two digits

73.8

Add a 9 or 10 in front

*Above 500 place a 9 in front

* Below 500 place a 10 in front

973.8

PRACTICE

Barometric Pressure

1013.8

Drop the 9 or 10 and the decimal point

1013.8 = 138

PRACTICE

Barometric Pressure

973.8

Drop the 9 or 10 and the decimal point

~~9~~73~~.~~8 = 738

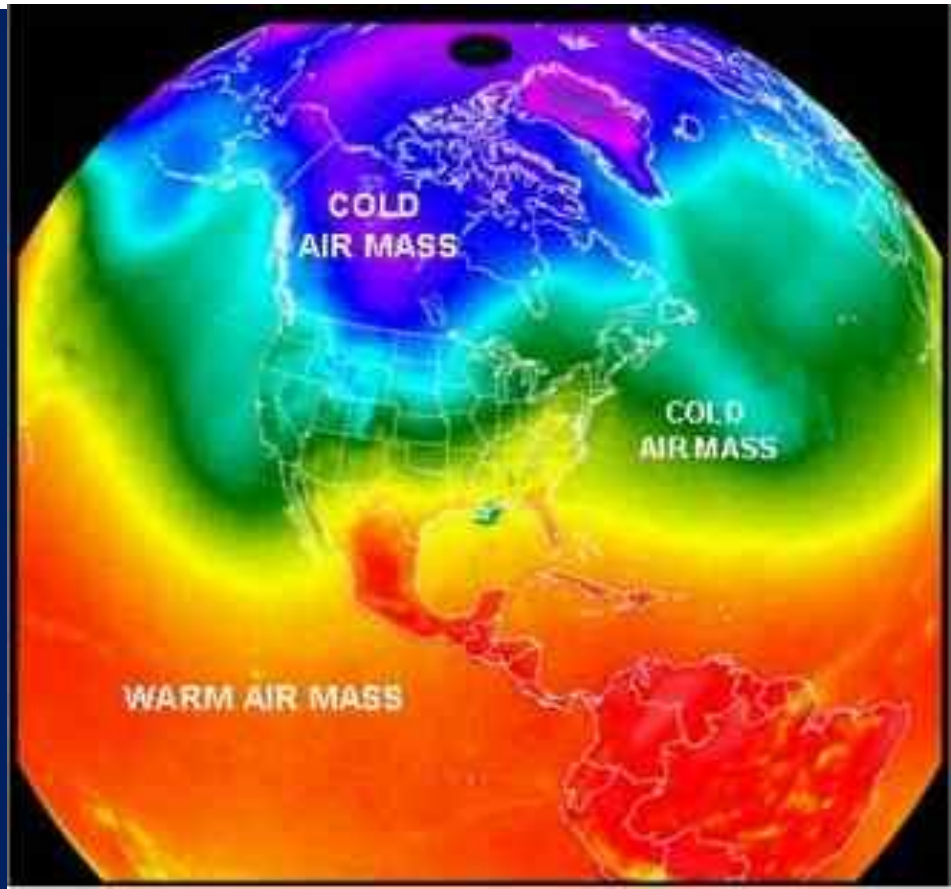
Complete packet page 17 - 18

Complete Station Model Lab

Air Masses

Large region of the atmosphere with uniform temperature and humidity

Air masses get their characteristics based on **where they form**.

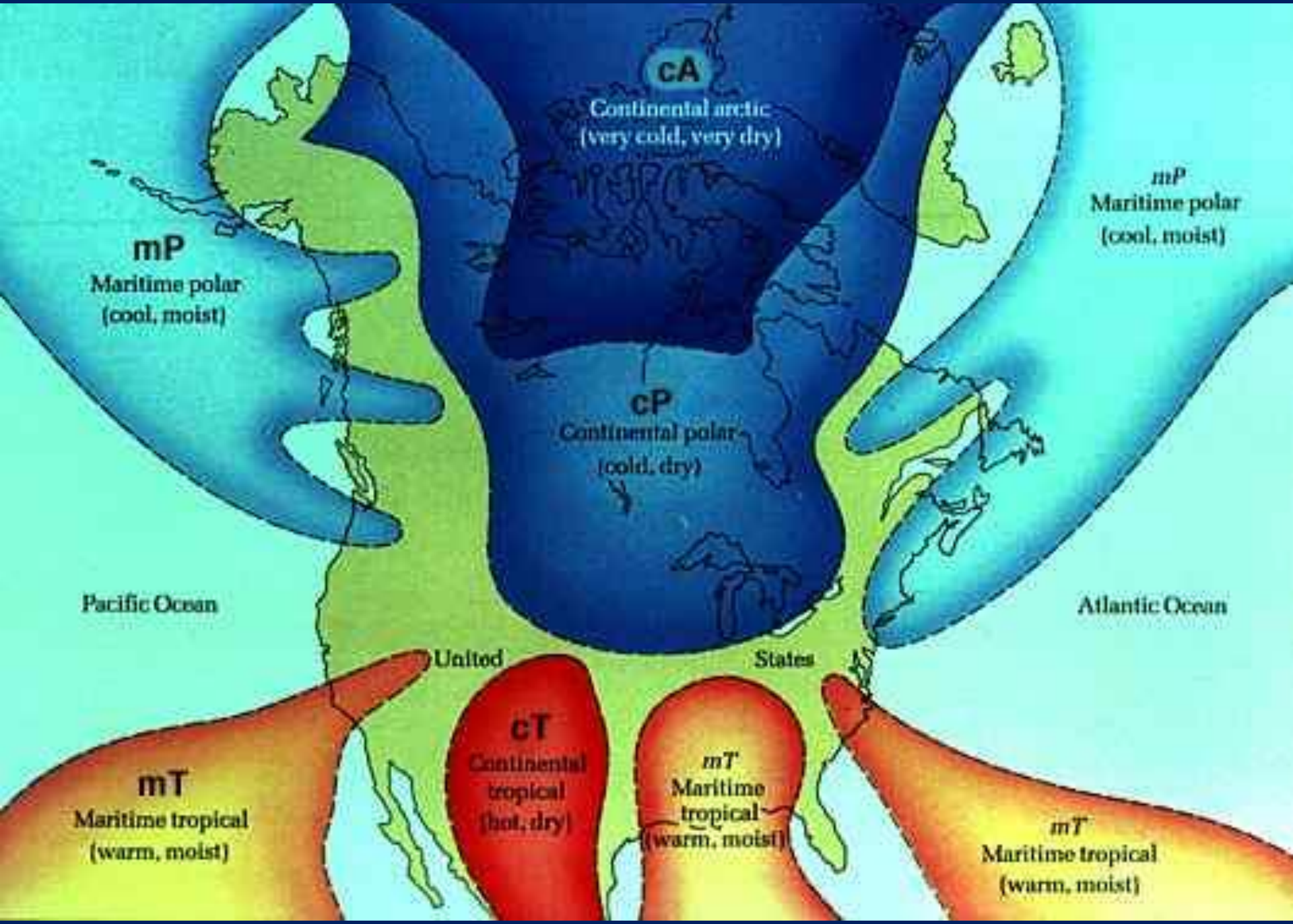


The abbreviations used to classify air masses use the following letters: c, m, T, P, and A. For each letter, describe its property:

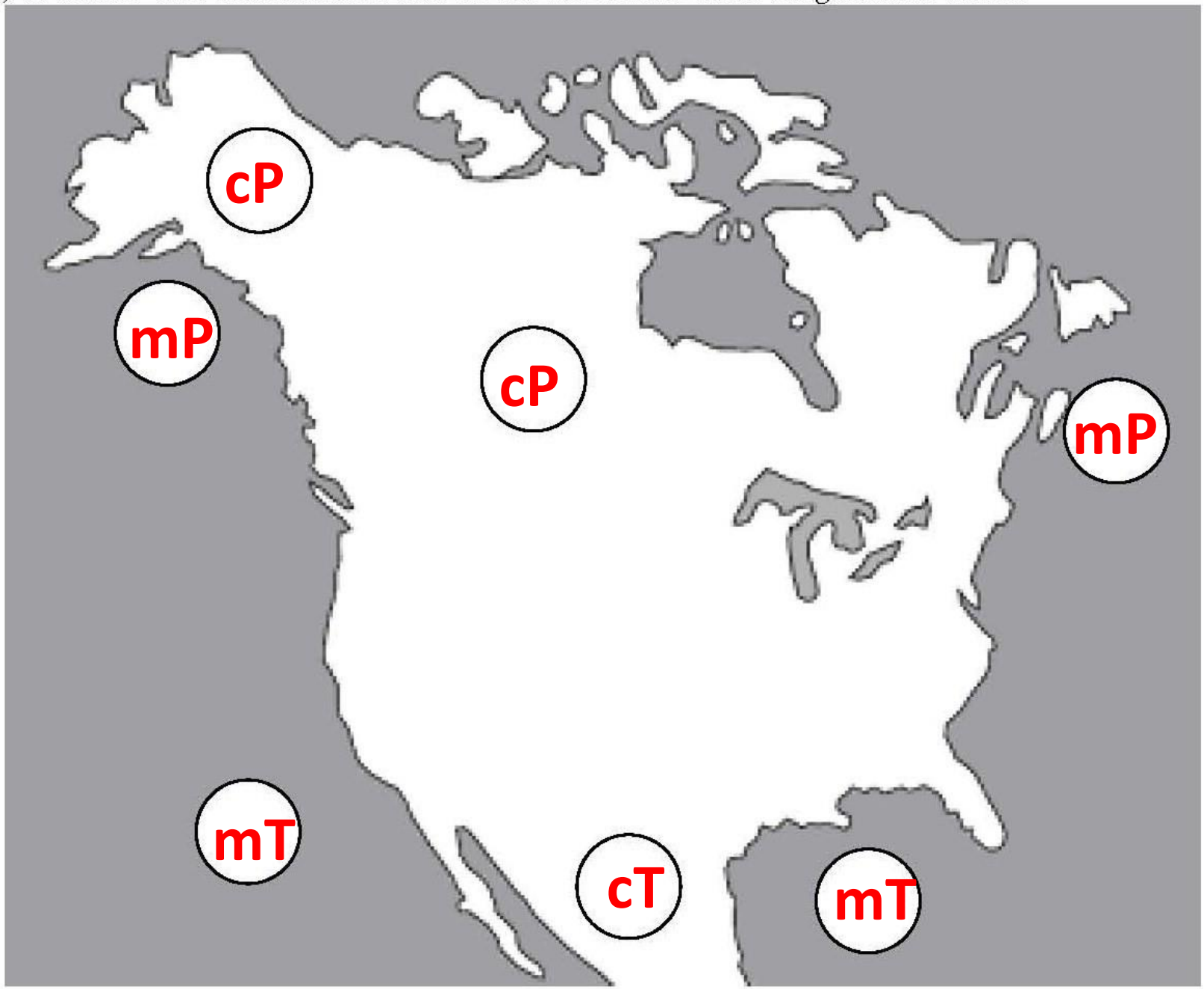
	Word	Means
c	continental	dry
m	maritime	moist
T	Tropical	warm
P	Polar	cold
A	Arctic	very cold

ESRT – pg 13

Symbol	Written form	Type of weather
cP	Continental Polar	Dry & Cold
cT	Continental Tropical	Dry & Warm
mP	Maritime Polar	Wet & Cold
mT	Maritime Tropical	Wet & Warm
cA	Continental Arctic	Dry & Very Cold


cA
Continental arctic
(very cold, very dry)
mP
Maritime polar
(cool, moist)
mP
Maritime polar
(cool, moist)
cP
Continental polar
(cold, dry)
Pacific Ocean
Atlantic Ocean
United
States
mT
Maritime tropical
(warm, moist)
cT
Continental
tropical
(hot, dry)
mT
Maritime
tropical
(warm, moist)
mT
Maritime tropical
(warm, moist)

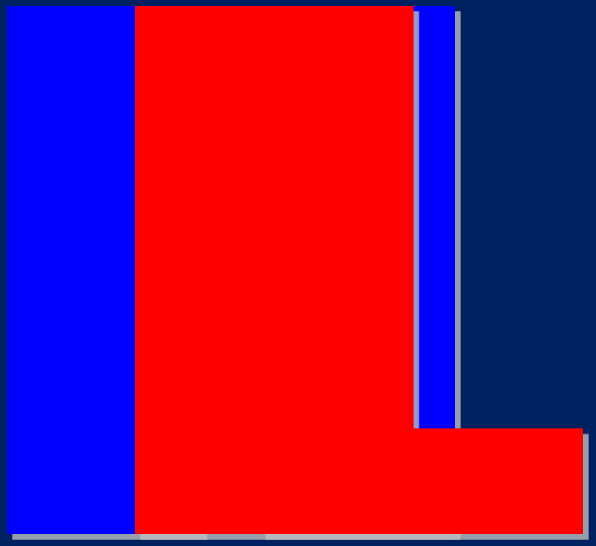
In the map below, write the correct abbreviation (cP, cT, mP, mT) in the corresponding location, to show the characteristics of an air mass that originated there



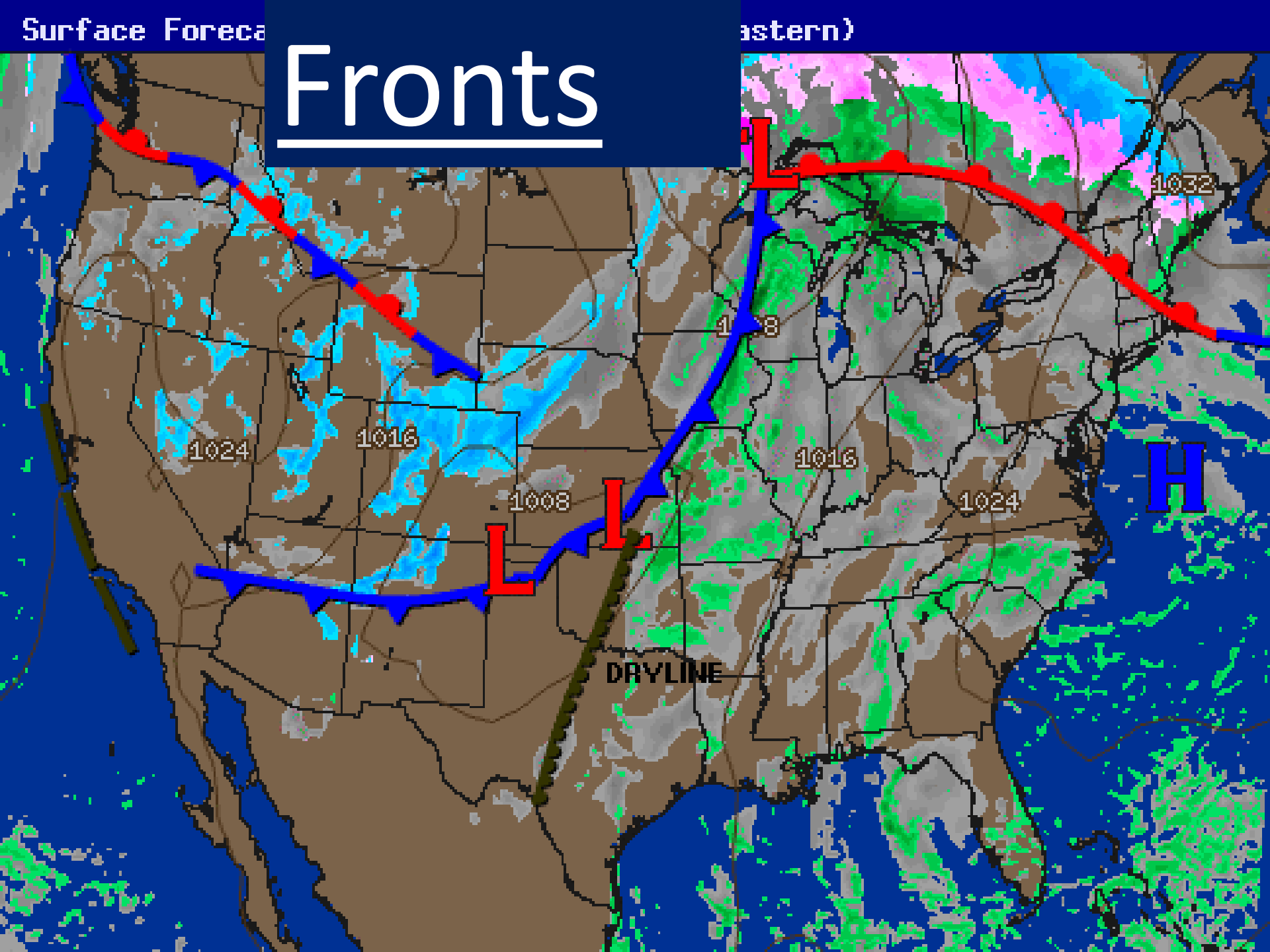
High or Low Pressure?

mT

cP



- Complete page 21 in packets


Surface Foreca
astern)
Fronts
L
1032
1024
1016
1008
1016
1024
L
L
H
DRYLINE

Fact(s) to memorize: 25 - 30

Fronts

- the boundary between two air masses

- Where all precipitation occurs

Earth Science Reference Tables page **13**

Air Masses

cA continental arctic
cP continental polar
cT continental tropical
mT maritime tropical
mP maritime polar

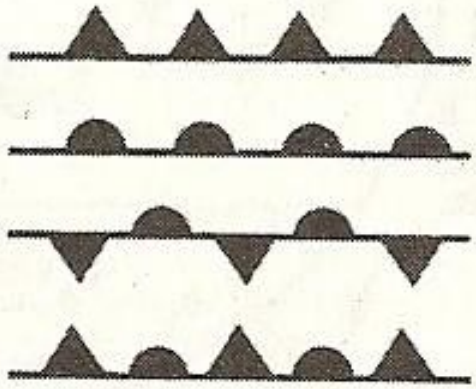
Front Symbols

Cold

Warm

Stationary

Occluded



Hurricane

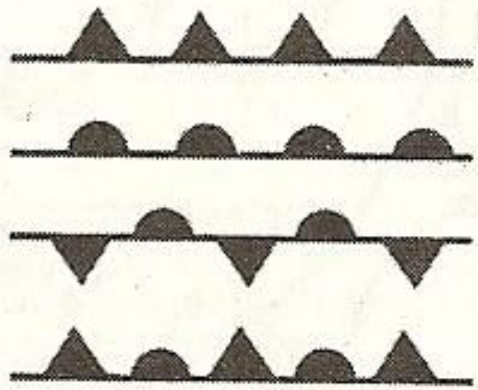
Reference Table pg 13

Air Masses

cA continental arctic
cP continental polar
cT continental tropical
mT maritime tropical
mP maritime polar

Front Symbols

Cold
Warm
Stationary
Occluded



Hurricane

Air Masses

cA continental arctic
cP continental polar
cT continental tropical
mT maritime tropical
mP maritime polar

Front Symbols

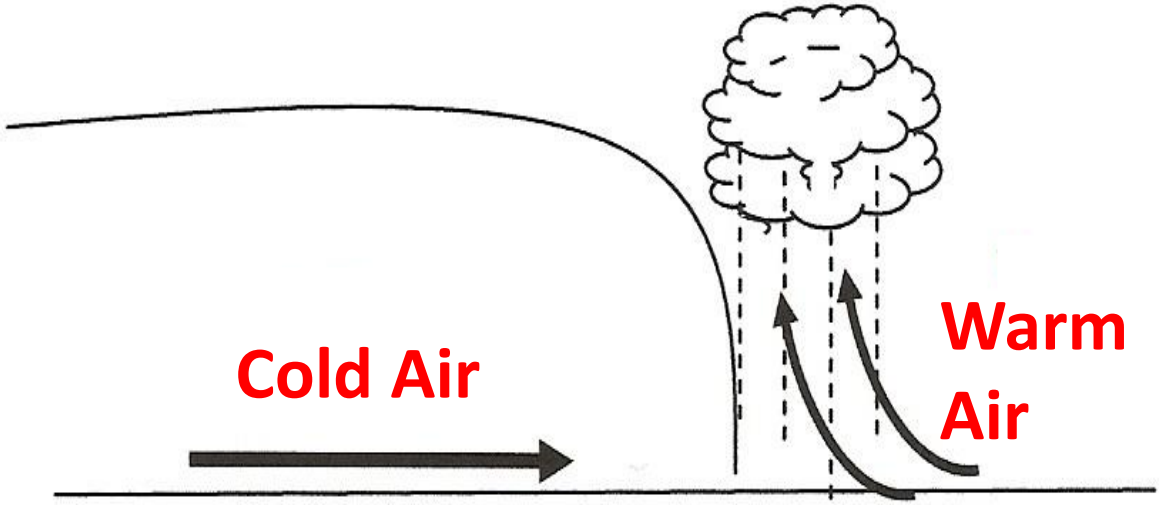
Cold 
Warm 
Stationary 
Occluded 

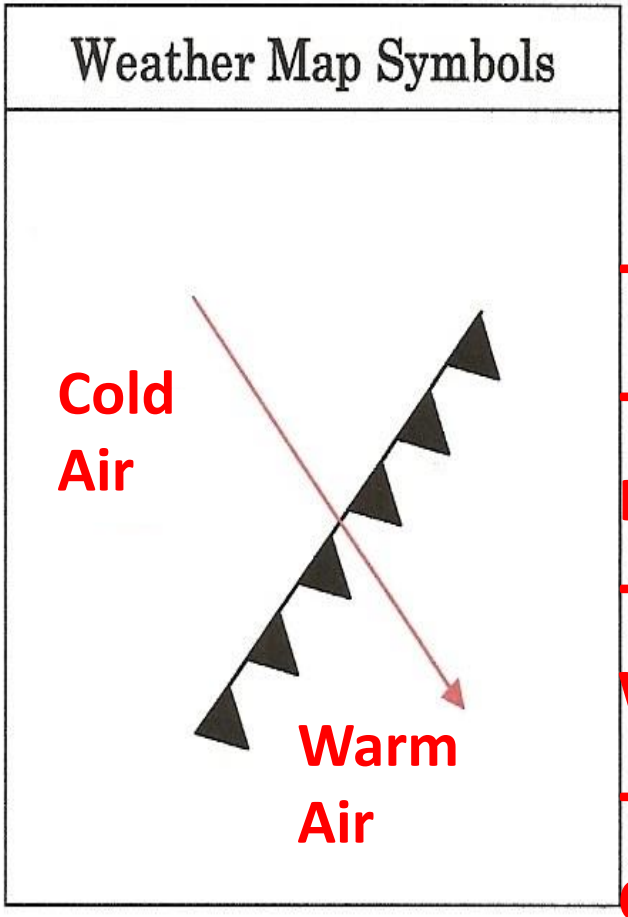
Hurricane

The Rule:

triangles and bumps always point in the direction the front is moving

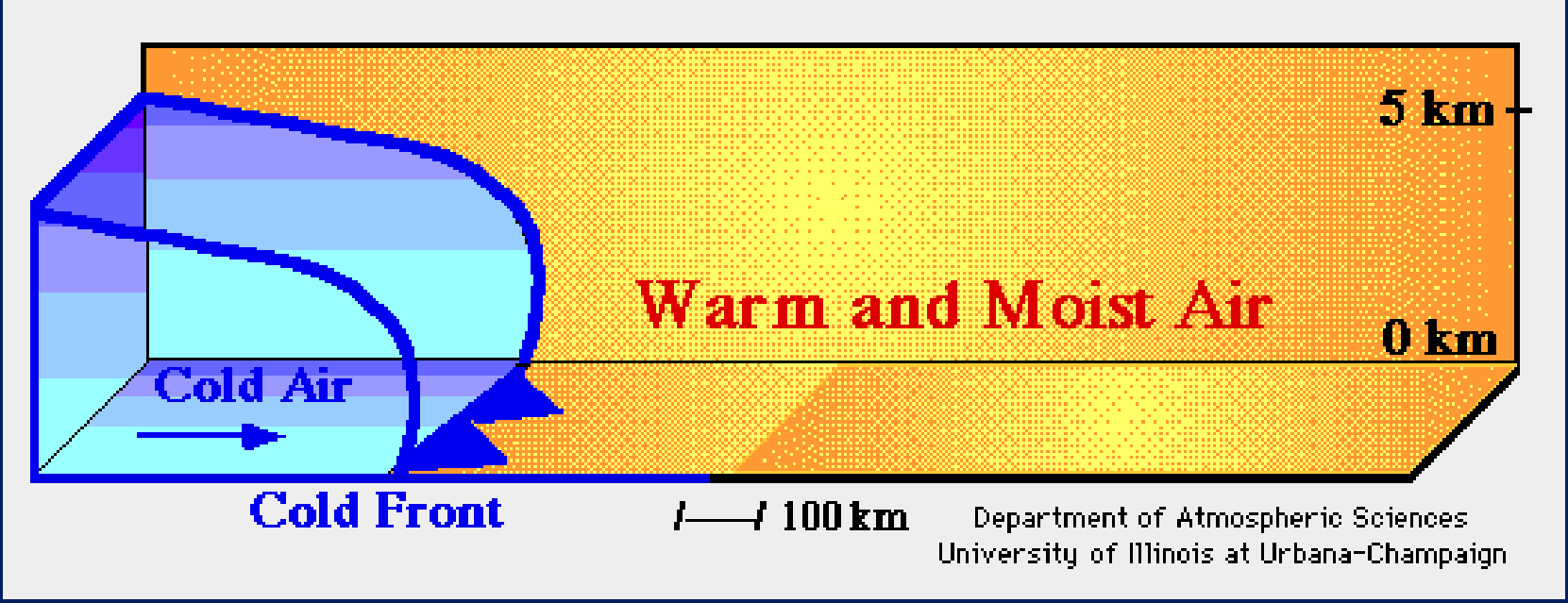
COLD FRONT:





- cold air is located behind the front
- cold air pushes the warm, moist air upward
- usually pass quickly with violent weather
- brings colder but clear weather conditions

Cold Fronts

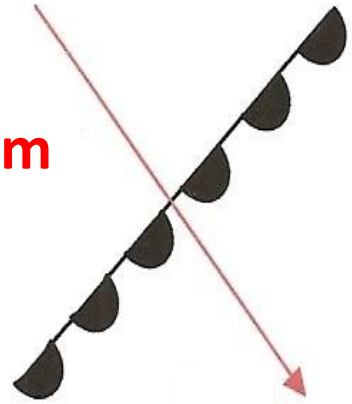


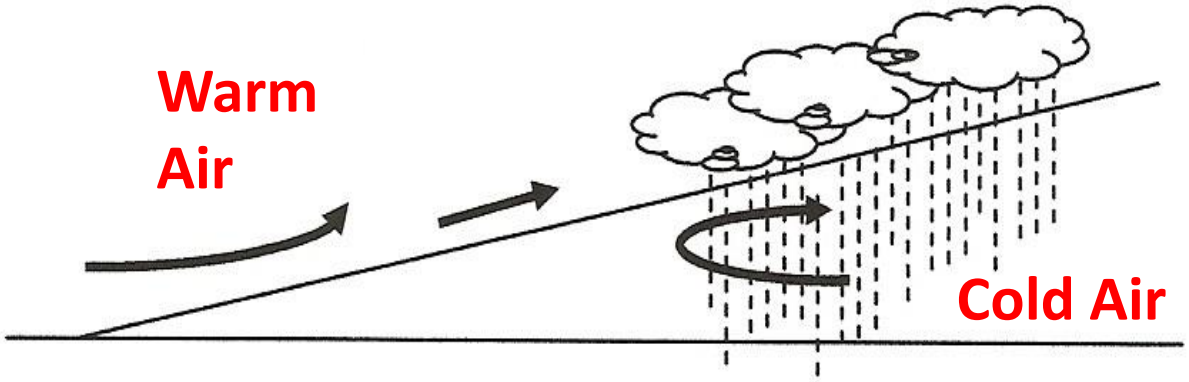
Animation #1

http://www.classzone.com/books/earth_science/terc/content/visualizations/es2002/es2002page01.cfm?chapter_no=20

WARM FRONT

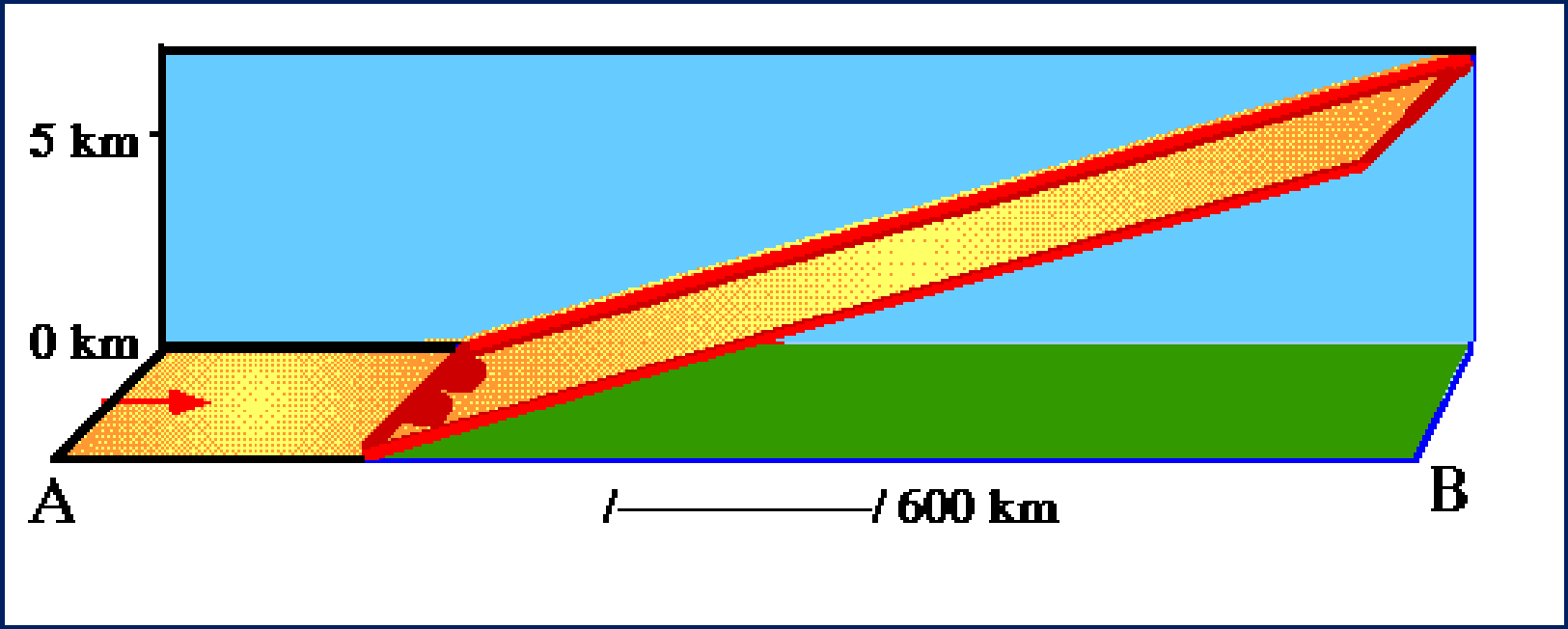
Weather Map Symbols





- warm air is located behind the front
- pass slowly, conditions are usually cloudy and rainy for several hours
- brings warmer but rainy weather conditions

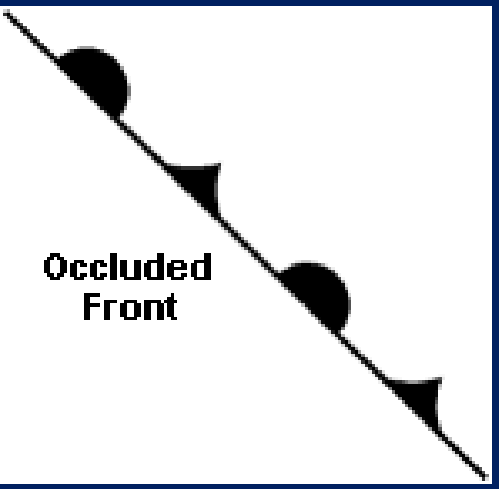
Warm Fronts



Animation #1

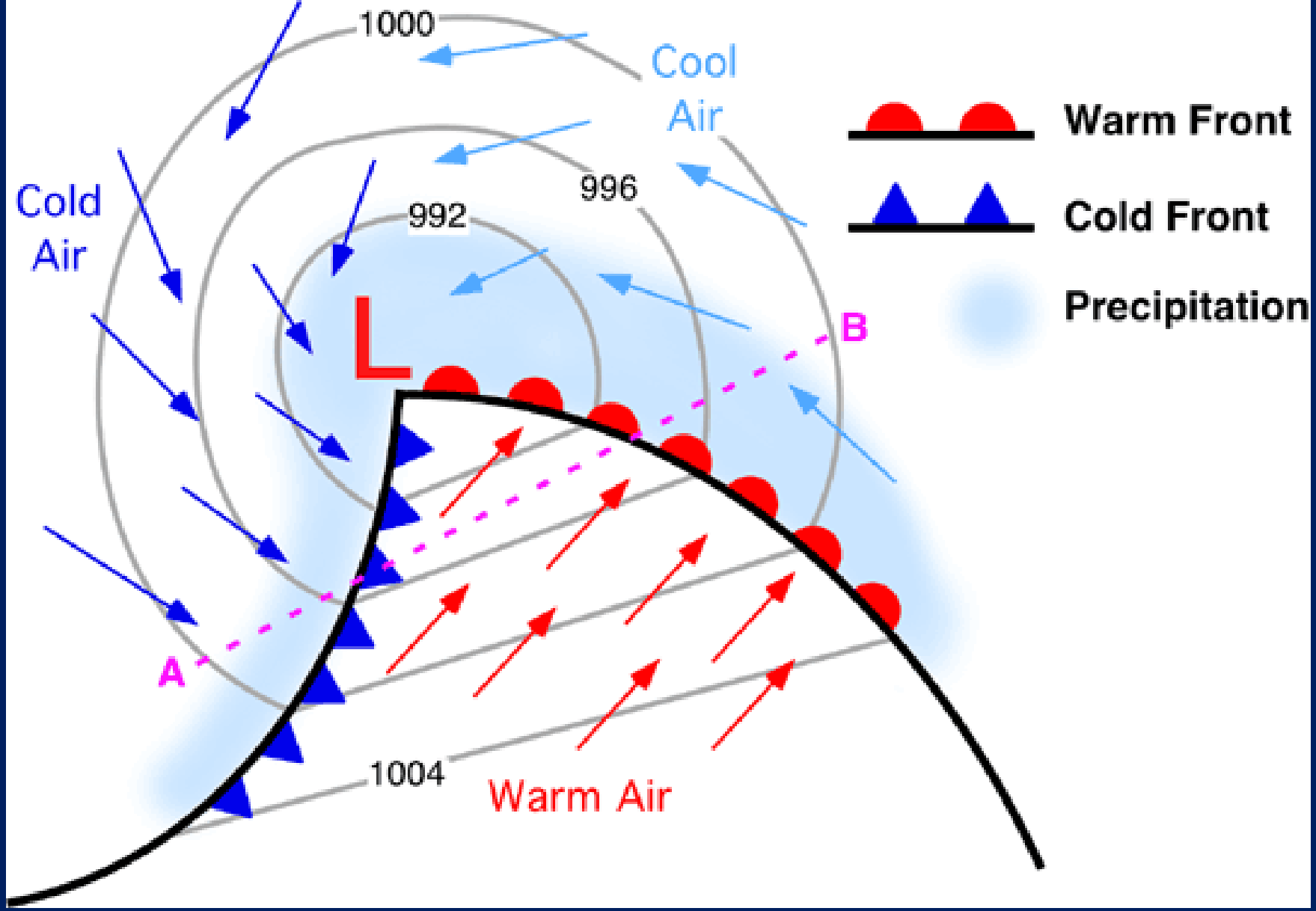
http://www.classzone.com/books/earth_science/terc/content/visualizations/es2002/es2002page01.cfm?chapter_no=20

Occluded Front



- Formed when cold front overtakes a warm front, lifting warm air mass off the ground.

- Forms mid-latitude cyclone



Animation

http://www.physicalgeography.net/fundamentals/7s.html

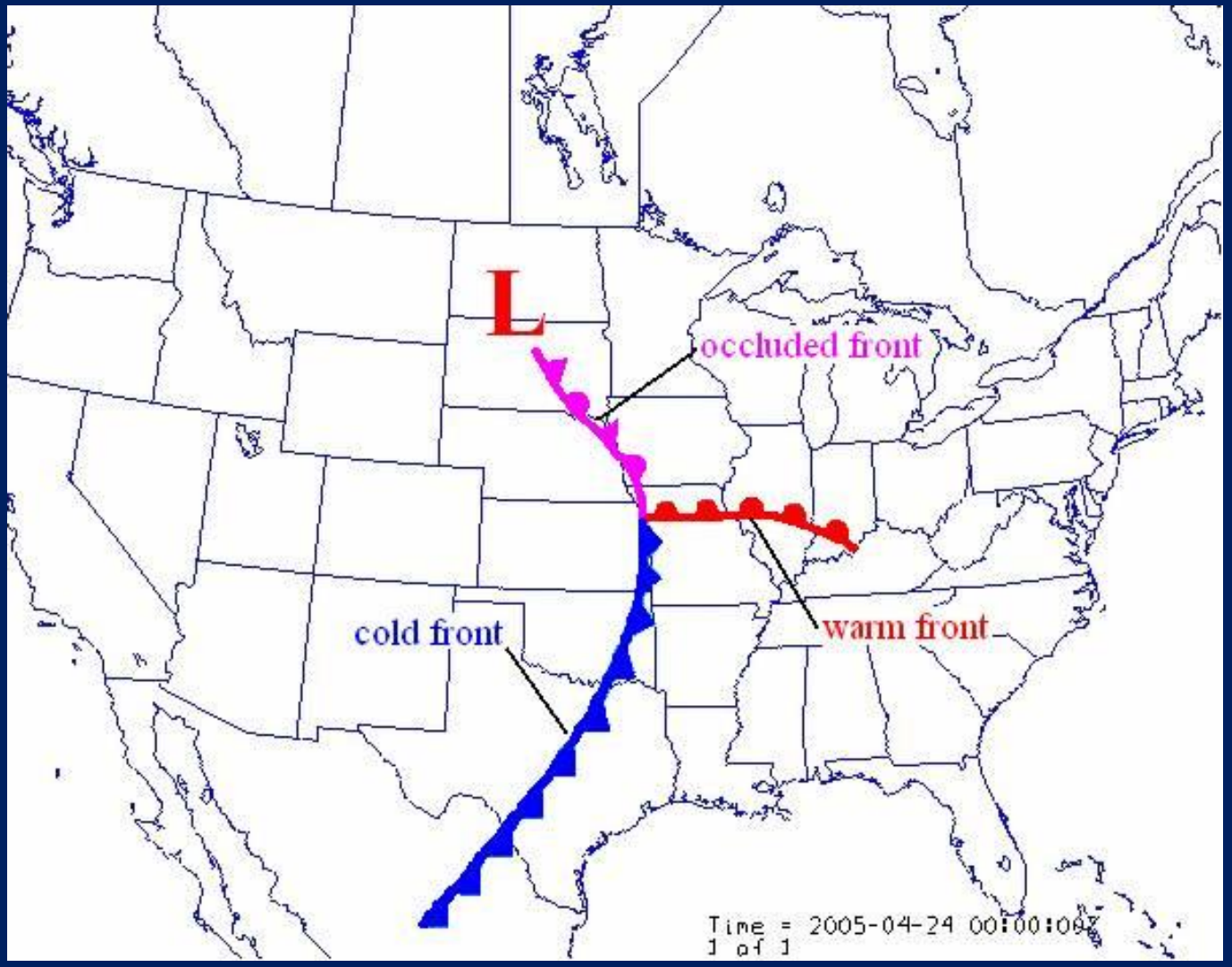
What direction to fronts (weather) travel across the United States?

Complete page 23 in packet.

Complete weather map lab activity.

Severe Weather

Mid-Latitude Cyclone



Mid-Latitude Cyclone

-Low Pressure System (Counterclockwise rotation, caused by Coriolis Effect)

- Occluded Front

-Affects Mid-Latitudes (United States)

- Dangerous because of T-Storms, Hail, Blizzards Tornadoes

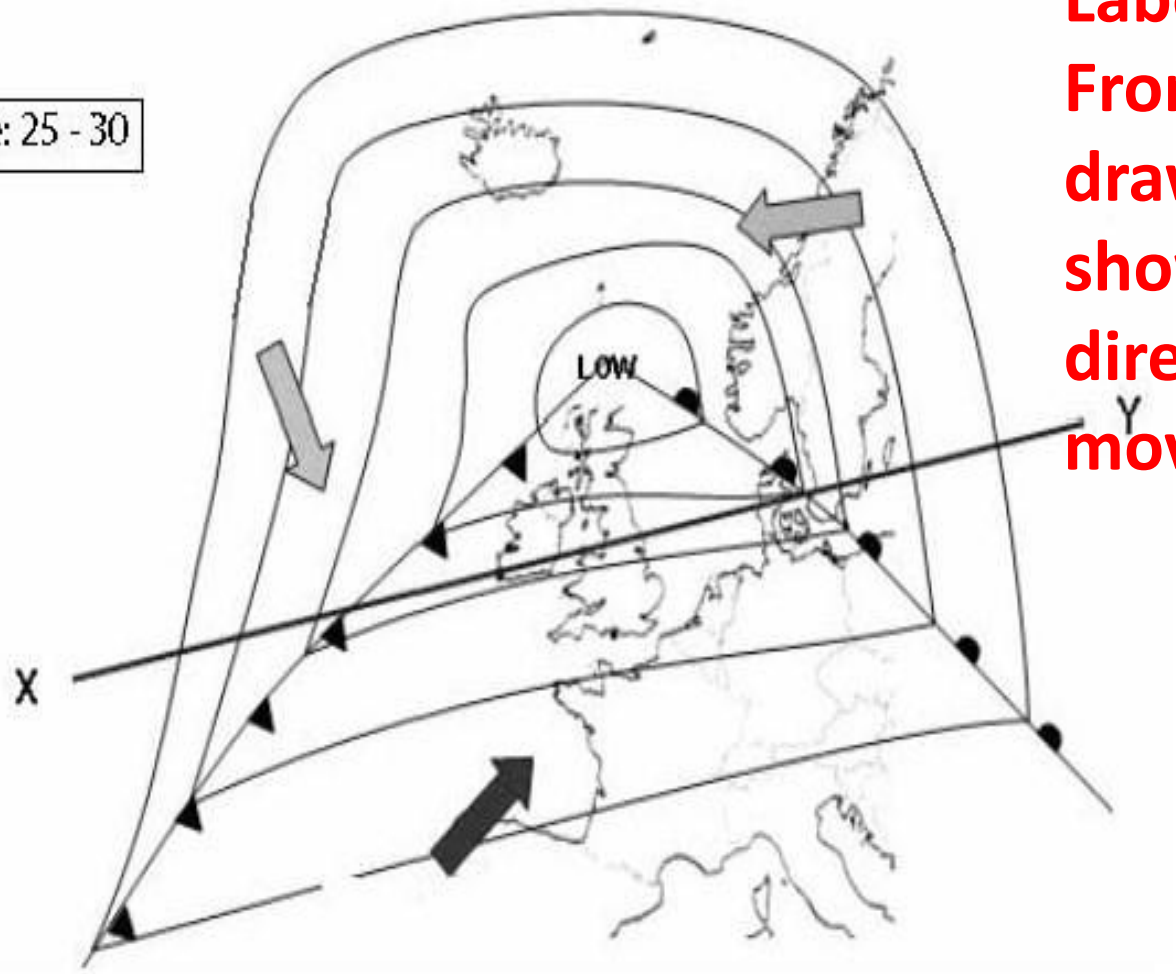
Hail

Blizzards

On the map below, label the warm and cold fronts.

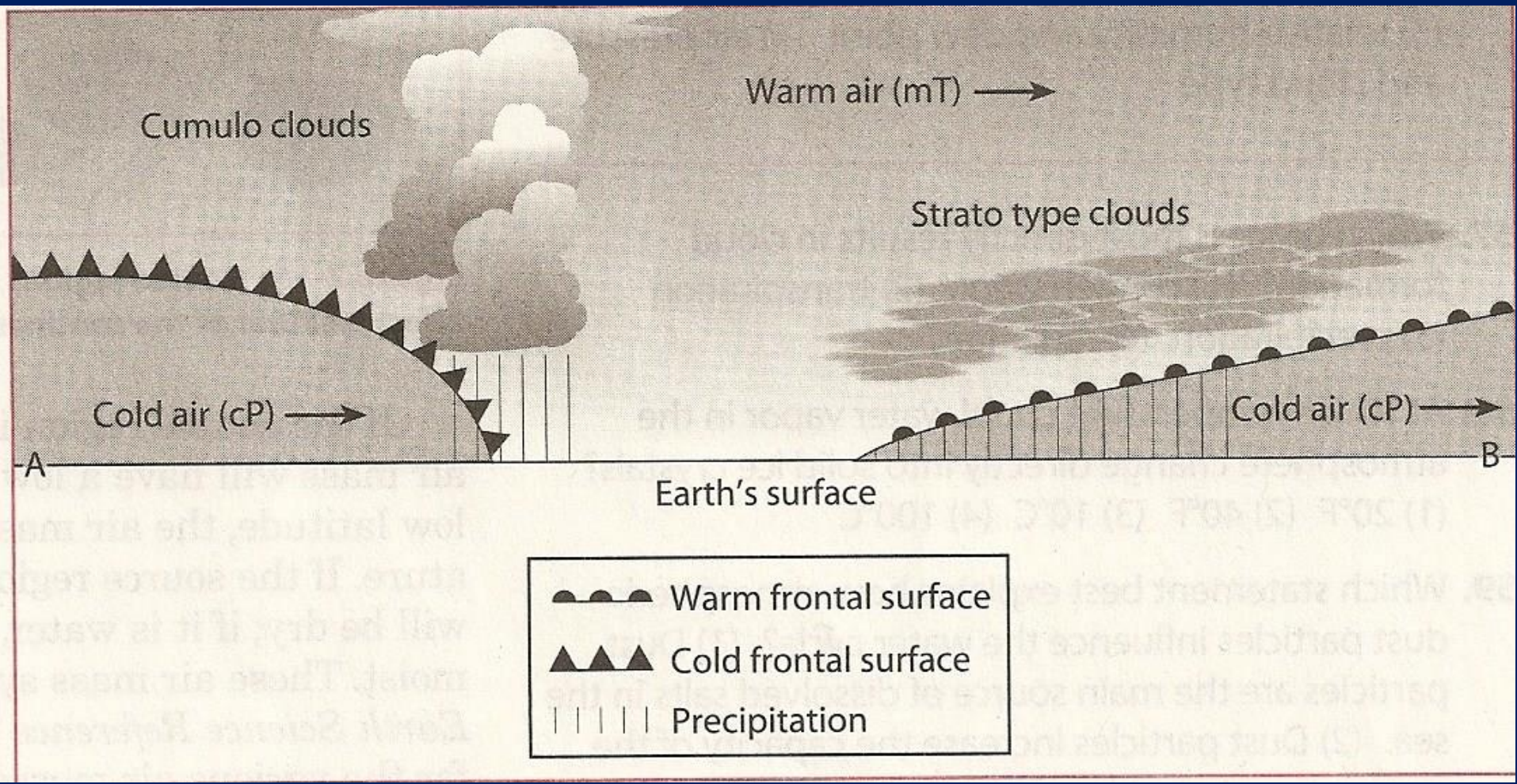
Additonally, write the abbreviations for the three air masses.

Fact(s) to memorize: 25 - 30



Label the Fronts and draw arrows to show their direction of movement.

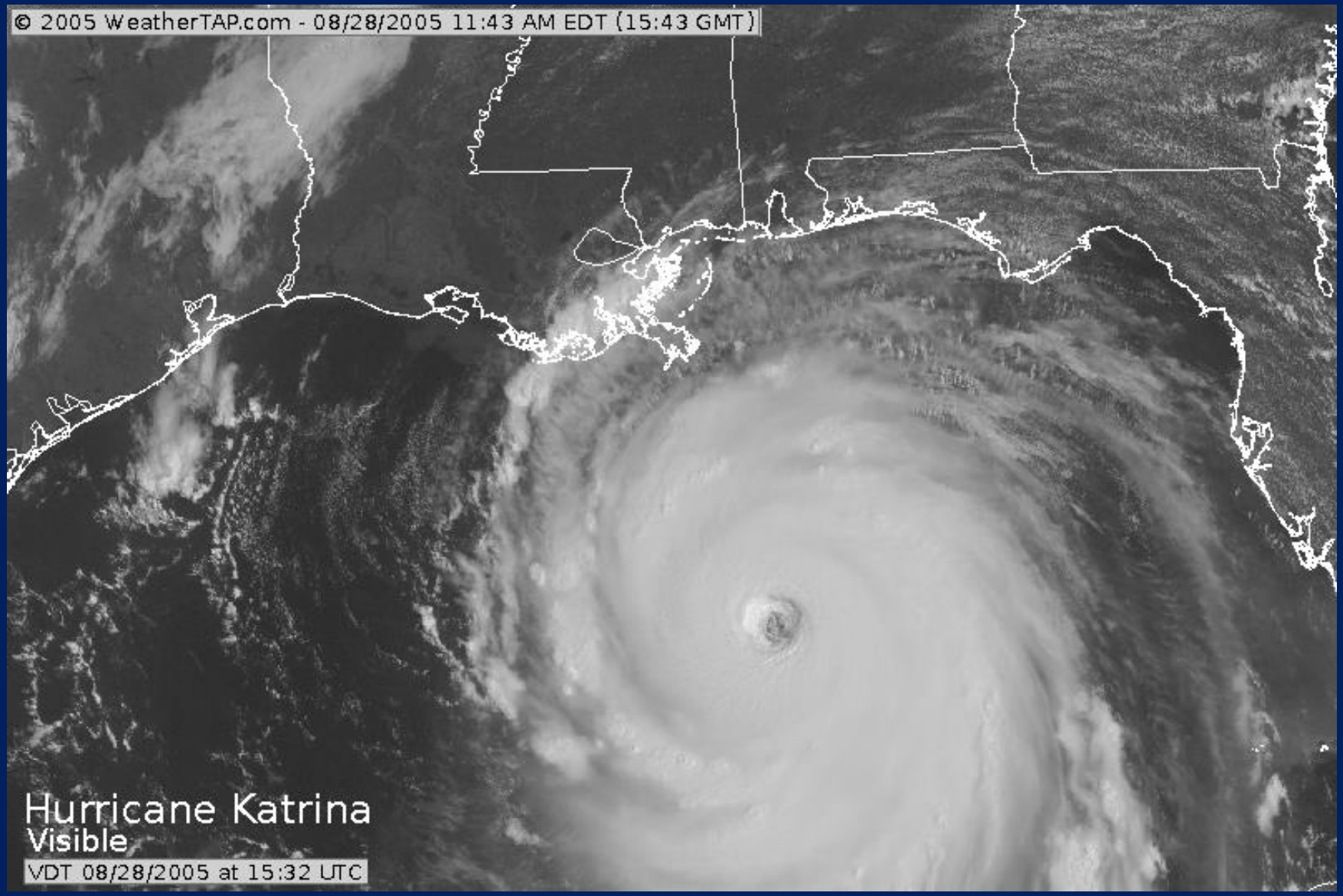
X Y


Warm air (mT)
Cumulo clouds
Strato type clouds
Cold air (cP)
Cold air (cP)
A
B
Earth's surface
Warm frontal surface
Cold frontal surface
Precipitation

Hazardous Weather and Safety

What two biggest examples of bad weather first come to mind?

Hurricanes


© 2005 WeatherTAP.com - 08/28/2005 11:43 AM EDT (15:43 GMT)
Hurricane Katrina
Visible
VDT 08/28/2005 at 15:32 UTC

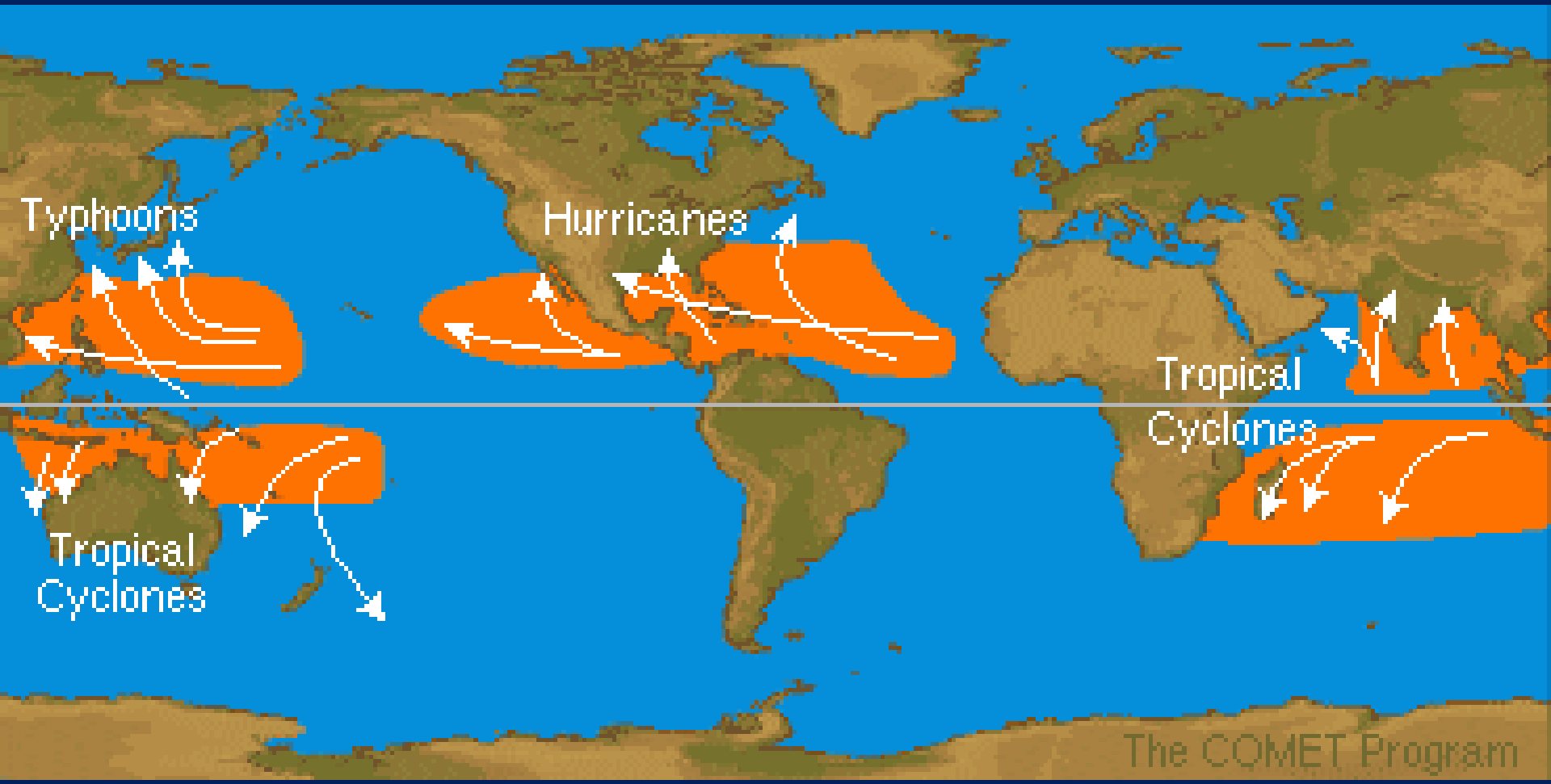
Tornado

Give two other names for hurricanes: Typhoons and Cyclones

Hurricanes are areas of intense LOW pressure. (H/L)

Which covers a greater geographic area? hurricanes or tornadoes

Hurricanes


Typhoons
Hurricanes
Tropical
Cyclones
Tropical
Cyclones
The COMET Program

Name two safety precautions to take for HURRICANES:

A. *Evacuate*, head for high ground

B. Cover / Board Up Windows

Name two safety precautions to take for TORNADOES:

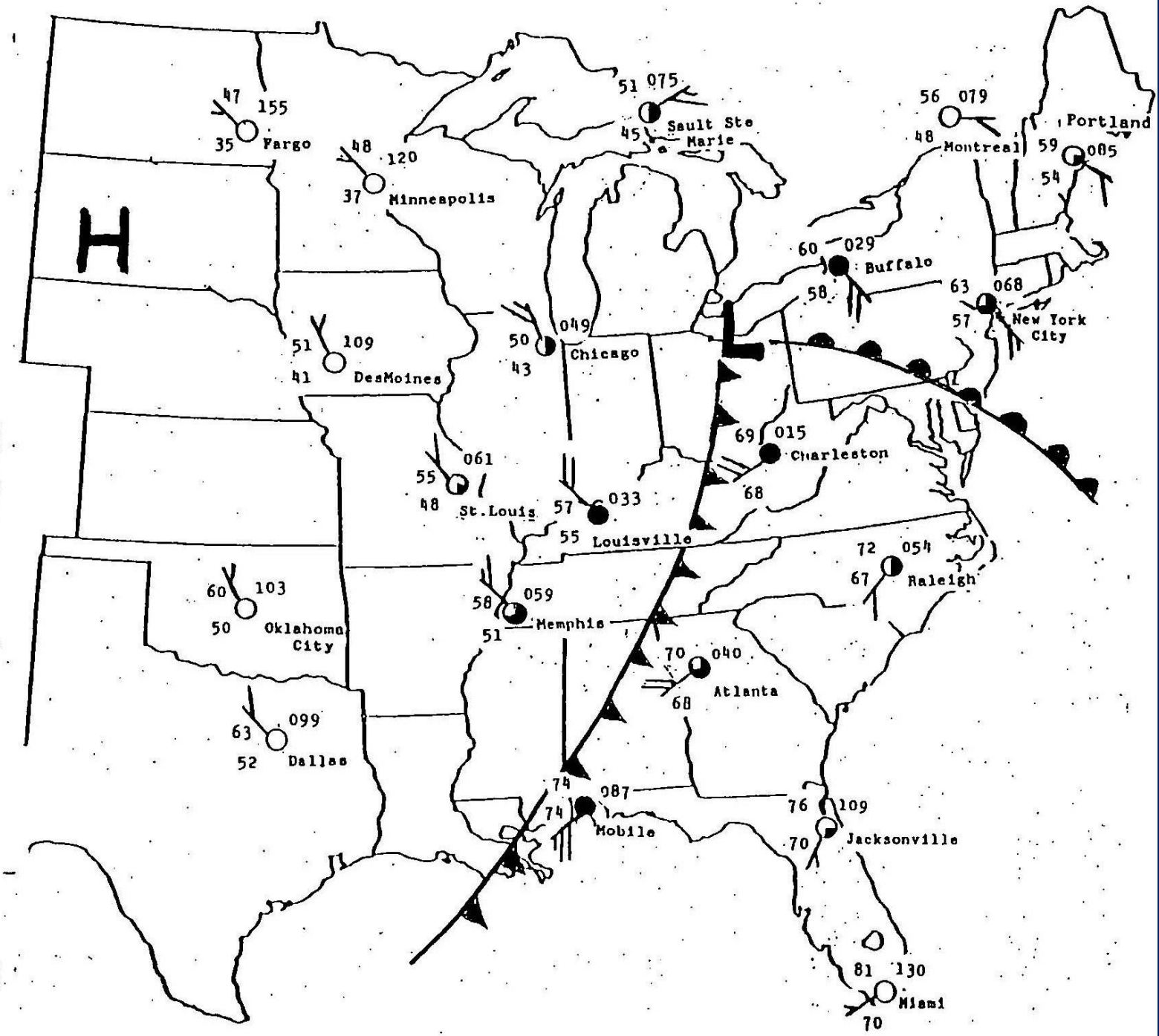
A. Head for strongest nearby structure

B. Get to the lowest possible level (Underground if possible)

Make sure you have emergency food and water

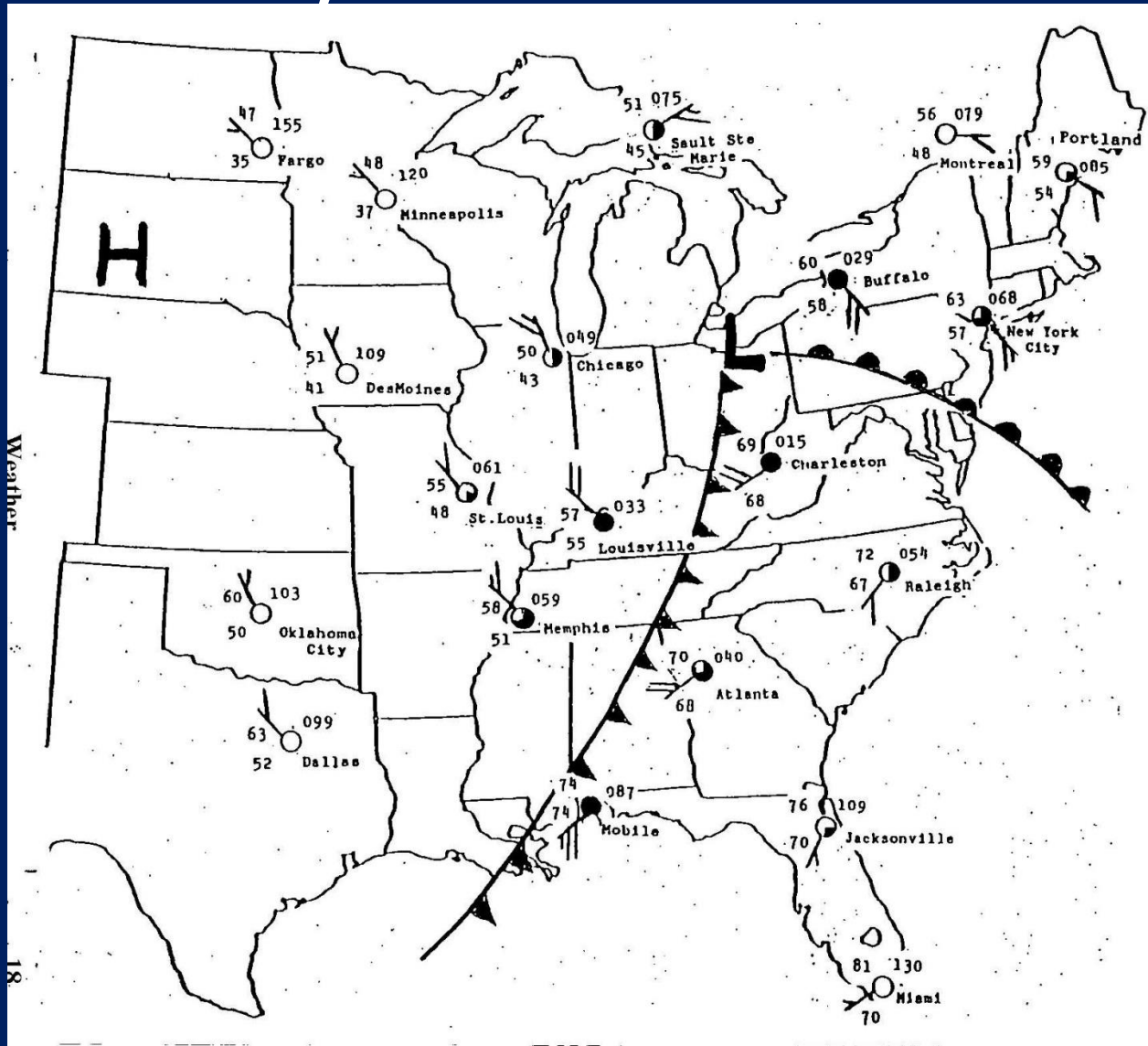
Tornado videos

http://www.ultimatechase.com/Tornado_Video.htm


H
47 155
35 Fargo
48 120
37 Minneapolis
51 075
45 Sault Ste Marie
56 079
48 Montreal
Portland
59 085
54
60 029
Buffalo
58
63 068
57 New York City
51 109
41 DesMoines
50 049
43 Chicago
69 015
Charleston
68
55 061
48 St.Louis
57 033
55 Louisville
72 054
67 Raleigh
60 103
50 Oklahoma City
58 059
51 Memphis
70 040
68 Atlanta
63 099
52 Dallas
74 087
74 Mobile
76 109
70 Jacksonville
81 130
Miami
70

Weather Map

1. Synoptic (a map that describes current weather and is.. . used for prediction)

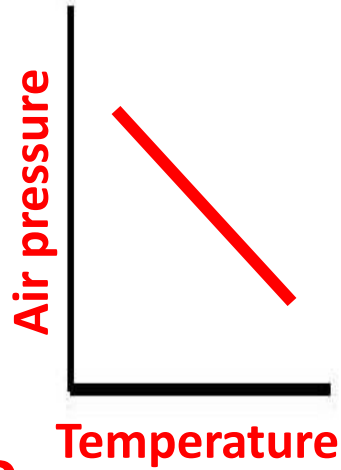


END

Weather Changes

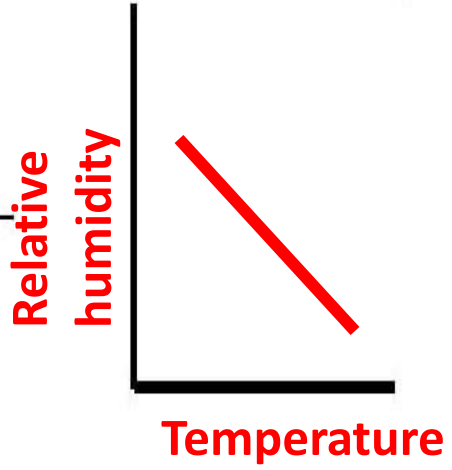
As temperature increases, air pressure **decreases**

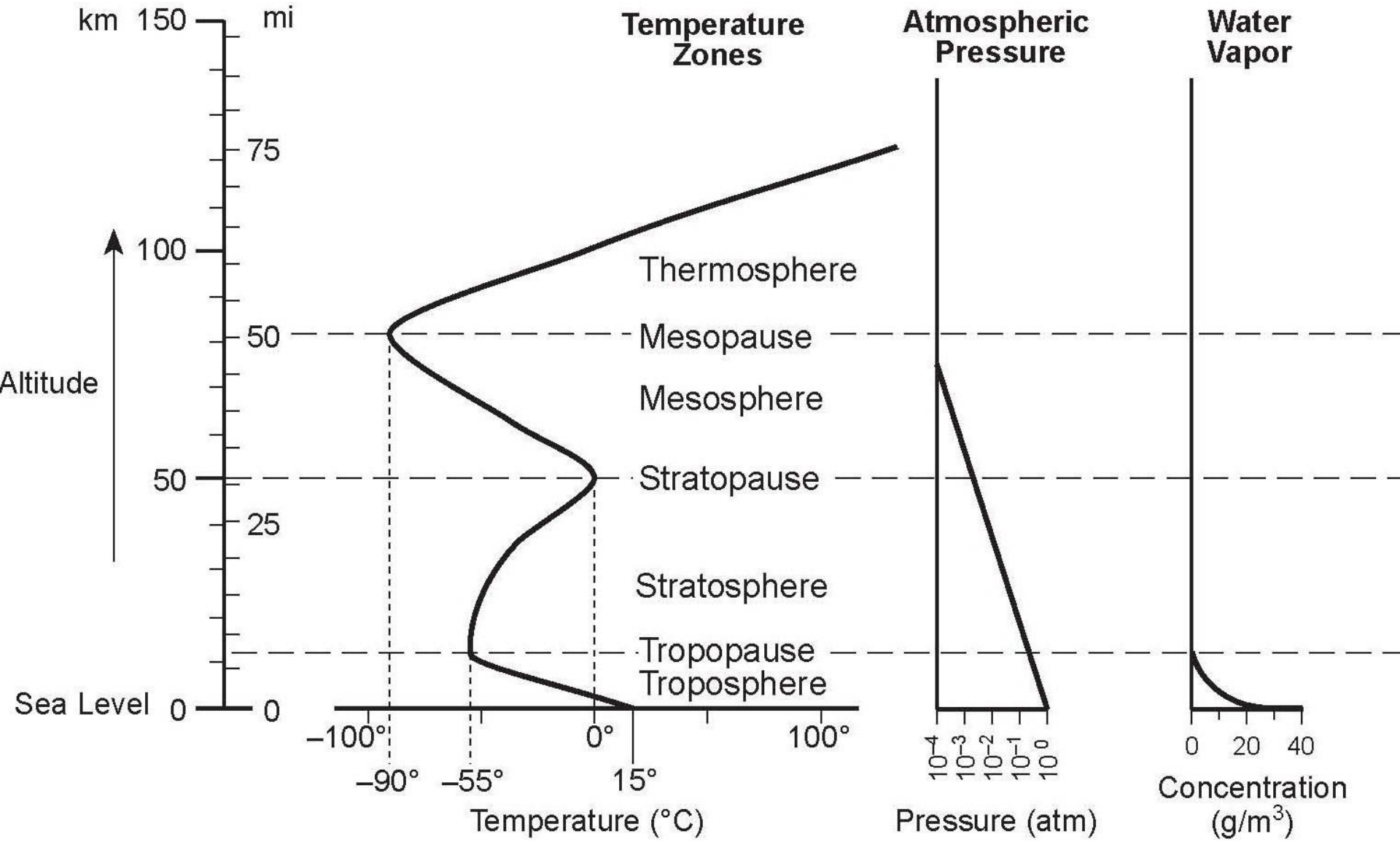
Reason: **Warm air rises because it is less dense. The warmer the air, the less the pressure**



As temperature increases, relative humidity **decreases**

Reason: **Warm air can hold more water vapor. Since the "capacity" increased, the relative humidity decreases.**



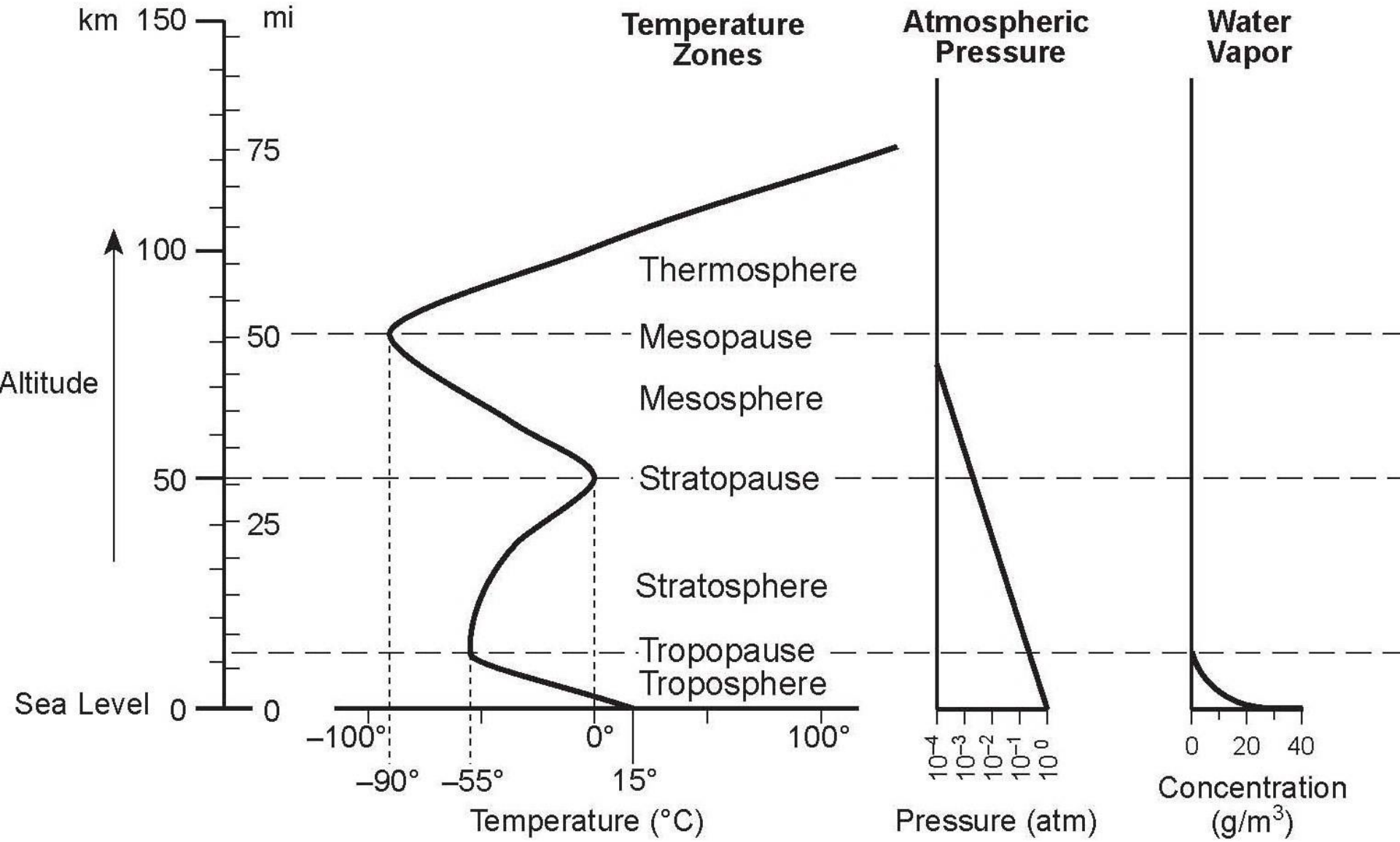

km 150
mi
75
100
50
Altitude
50
25
Sea Level 0
0
Temperature Zones
Thermosphere
Mesopause
Mesosphere
Stratopause
Stratosphere
Tropopause
Troposphere
–100°
0°
100°
–90°
–55°
15°
Temperature (°C)
Atmospheric Pressure
10^{-4} 10^{-3} 10^{-2} 10^{-1} 10^{0}
Pressure (atm)
Water Vapor
0 20 40
Concentration (g/m^3)

As altitude increases in the troposphere, temperature _____

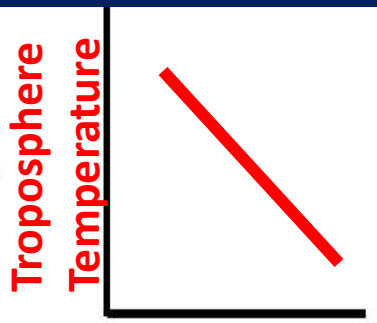
Reason:

As altitude increases, pressure _____

Reason:

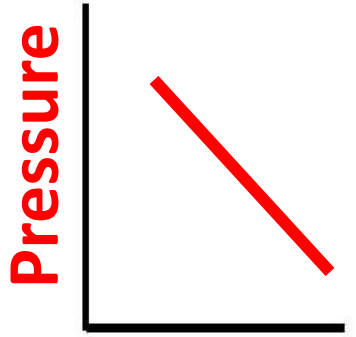

km 150
mi
75
100
50
Altitude
50
25
Sea Level 0
0
Temperature Zones
Thermosphere
Mesopause
Mesosphere
Stratopause
Stratosphere
Tropopause
Troposphere
–100°
0°
100°
–90°
–55°
15°
Temperature (°C)
Atmospheric Pressure
10^{-4} 10^{-3} 10^{-2} 10^{-1} 10^{0}
Pressure (atm)
Water Vapor
0 20 40
Concentration (g/m^3)

As altitude increases in the troposphere, temperature **decreases**



Reason: **ESRT pg 14 – Temperature chart**

As altitude increases, pressure **decreases**



Reason: **ESRT pg 14 – Temperature chart**