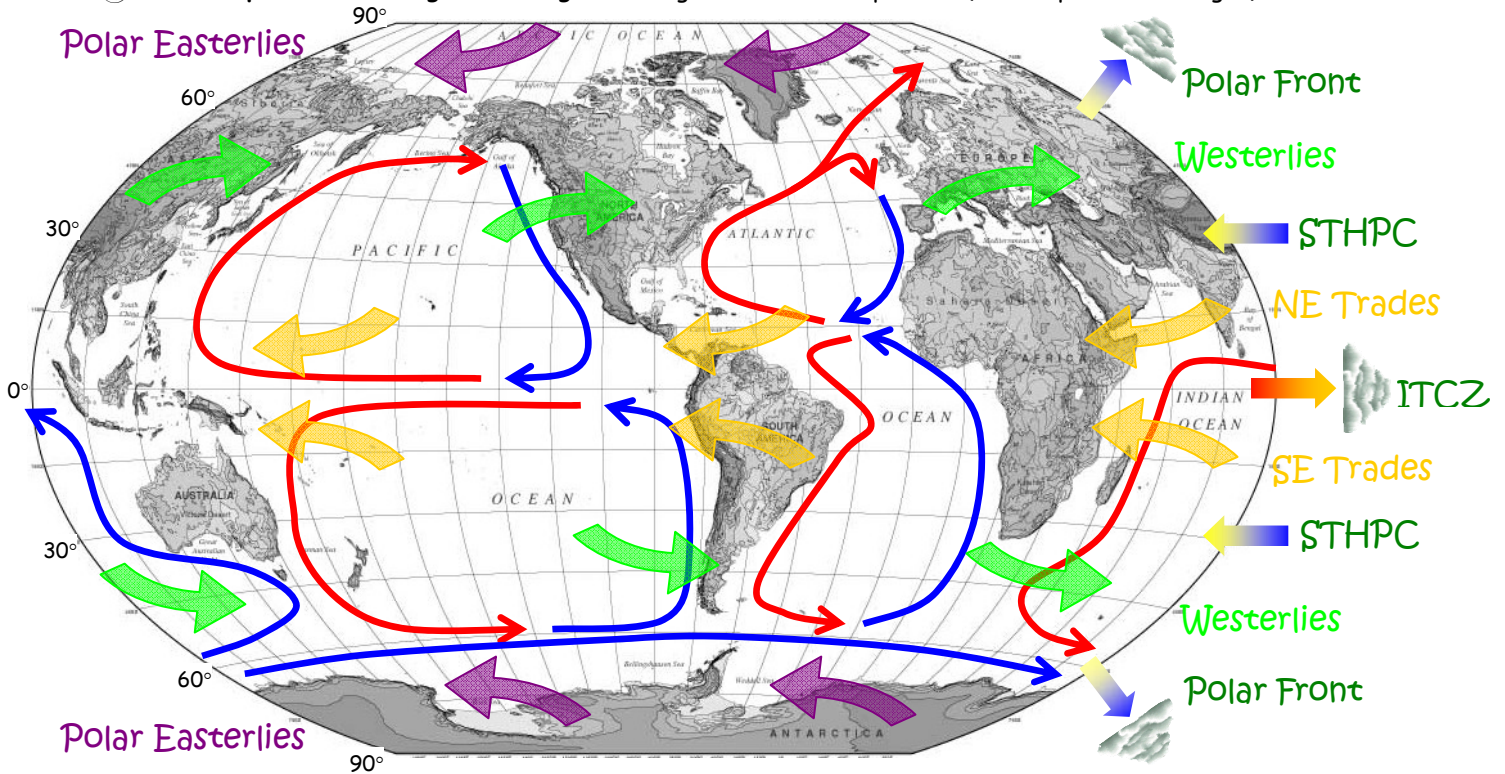


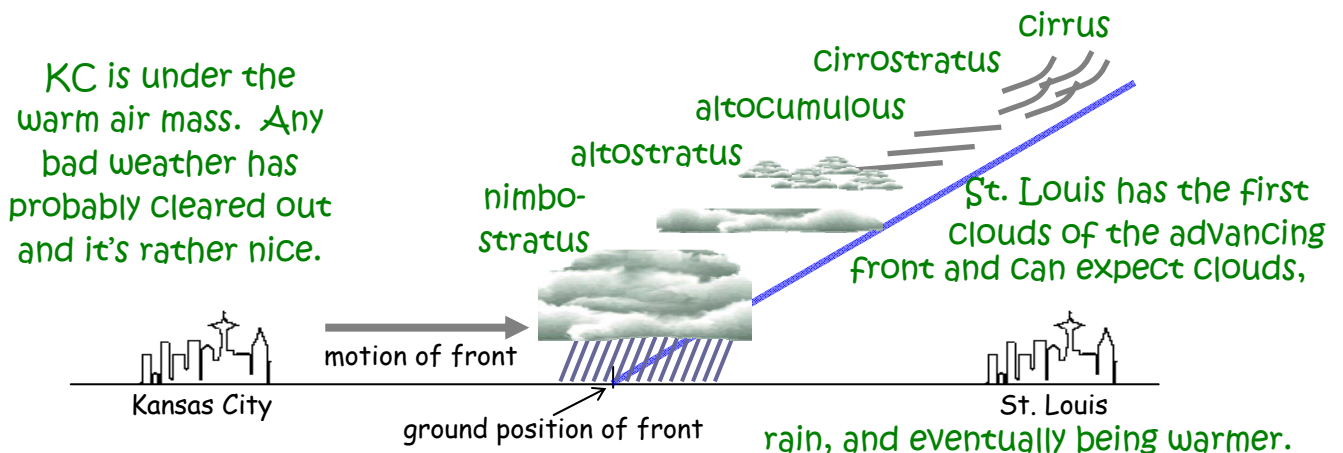
EXAM 2

1)¹⁸ On the map below,

- 🌐 draw the **major ocean currents** (the gyres) with one color for warm and a different color for cold,
- 🌐 indicate **directions of prevailing winds** and **positions of the ITCZ, STHPC's and polar fronts** for an equinox.
- 🌐 show the **pattern of rising and falling air** that gives rise to this pattern (in the space on the right).



2)⁸ A warm front is moving from Kansas City toward St. Louis. Draw the front, with the appropriate shape and cloud formation at the position of the short line between the cities. Describe the weather conditions at both cities and how the conditions will change at Chicago when the front passes.



3)² A wind that blows at constant speed parallel to iso-bars is a

- a) geostrophic wind.
- b) cyclonic wind.
- c) gradient wind.
- d) passing wind.

4)² Altostratus clouds

- a) are found low in the atmosphere
- b) are found high in the atmosphere
- c) are "layers" of cloud
- d) are rain clouds

5)² The clouds first to signal an oncoming warm front are

- a) cumulus
- b) cumulonimbus
- c) cirrus
- d) altostratus

6)² In the Southern hemisphere, the deflection of moving objects is directed

- a) toward their left
- b) toward their right
- c) upward
- d) downward

7)² If you stand on Park St. with the wind at your back, the low pressure system is

- a) in front of you
- b) behind you
- c) to your left
- d) to your right

8)² In the Hadley Cell model of atmospheric circulation, low pressure regions should be found

- a) near the equator and poles.
- b) near the equator and 60° latitude.
- c) near 30° latitude and 60° latitude.
- d) near 30° latitude and the poles.

9)² Which stage of midlatitude cyclones involves a cold front that has partially closed in on a warm front ?

- a) cyclogenesis stage
- b) open stage
- c) occluded stage
- d) dissipation stage

10)² The North Atlantic gyre

- a) cools the east coast of the US.
- b) warms western Europe
- b) is driven by upwelling of deep Antarctic bottom water.
- c) is a seagull rookery near Greenland.

11)² The Coriolis force is sometimes called an "apparent force" because

- a) it is only observed in the Northern hemisphere
- b) many people don't fully understand it
- c) it is due to differences in frames of reference
- d) it was invented by somebody's parent

12)² The Horse Latitudes are the result of

- a) the ITCZ.
- b) the STHPC.
- c) the Westerlies.
- d) the polar front jet stream.

13)² Which of the following is considered to be standard sea level atmospheric pressure

- a) 1020 millibars (or hPa)
- b) 1013 millibars (or hPa)
- c) 1004 millibars (or hPa)
- d) none of the above

14)² In the Open Stage of a mid-latitude cycle, generally

- a) the warm front is advancing on the cold front
- b) the cold front is advancing on the warm front
- c) the fronts maintain relative positions
- d) none of the above.

15)² The dry adiabatic lapse rate is

- a) also called the environmental lapse rate
- b) the slowing rate of a cold front
- c) ALWAYS 5 C°/km
- d) none of the above

MUTTS

BY PATRICK M'DONNELL



16)² A sea breeze

- a) blows from land to sea during the day.
- b) blows from land to sea during the night.
- c) blows from sea to land during the day.
- d) blows from sea to land during the night.

17)² The principal air masses surrounding North America are

- a) shifted southwards in summer compared to winter
- b) reflective of the regional physical attributes**
- c) always conditionally unstable
- d) always stable over the oceans

18)² An occluded front

- a) occurs when a cold front overtakes a warm front
- b) is common in the mature stage of a mid-latitude cyclone
- c) results in warm air trapped over cold air
- d) all of the above**

19)² Atmospheric pressure is

- a) a result of wind velocity
- b) the weight of atmosphere above a point**
- c) increasing with altitude
- d) none of the above

20)² Which of the following are properties of the Coriolis force in the northern hemisphere?

- a) It is stronger when the winds are stronger.**
- b) It is strongest close to the north pole.
- c) It acts parallel to the wind.
- d) It reduces the strength of the wind.

21)² Strong diurnal temperature cycles may be caused by

- a) high atmospheric moisture content and clear skies
- b) low atmospheric moisture content and clear skies**
- c) low atmospheric moisture content and cloudy skies
- d) high atmospheric moisture content and cloudy skies

22)² In an adiabatic process,

- a) the temperature of an air parcel cannot change
- b) an air parcel can expand but it can never contract
- c) no heat is exchanged between an air parcel and its surrounding environment**
- d) the temperature always drops

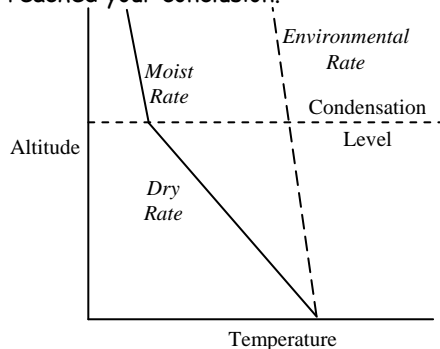
23)² When air is released from a bicycle tire, the valve gets quite cold. This is an example of

- a) cooling due to adiabatic compression
- b) cooling due to the solute effect
- c) cooling due to the curvature effect
- d) cooling due to adiabatic expansion**

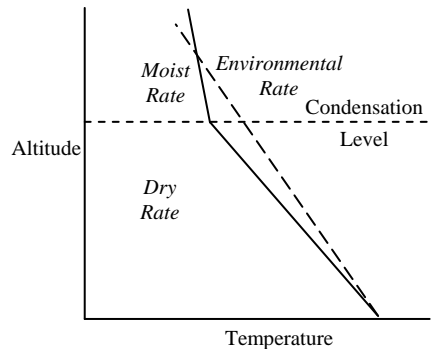
24)² An anticyclone is another name for

- a) high pressure systems**
- b) low pressure systems
- c) geostrophic winds
- d) Coriolis deflection

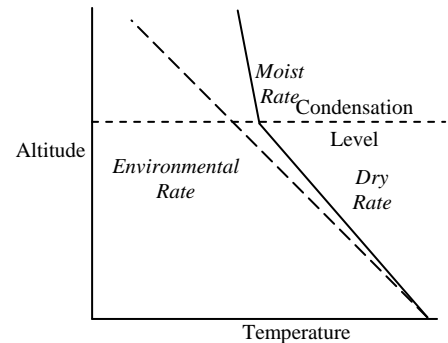
25)⁹ For the following diagrams, state whether the air is stable, unstable, or conditionally stable and explain how you reached your conclusion.



Since both adiabatic lapse rates are less than the environmental lapse rates, a rising parcel will remain cooler than its surroundings so it is **ABSOLUTELY STABLE** air.



The dry adiabatic lapse rates are less than the environmental lapse rates, but the moist rate is greater. A moist parcel forced to lift will be warmer than its surroundings so this is **CONDITIONALLY STABLE** air.



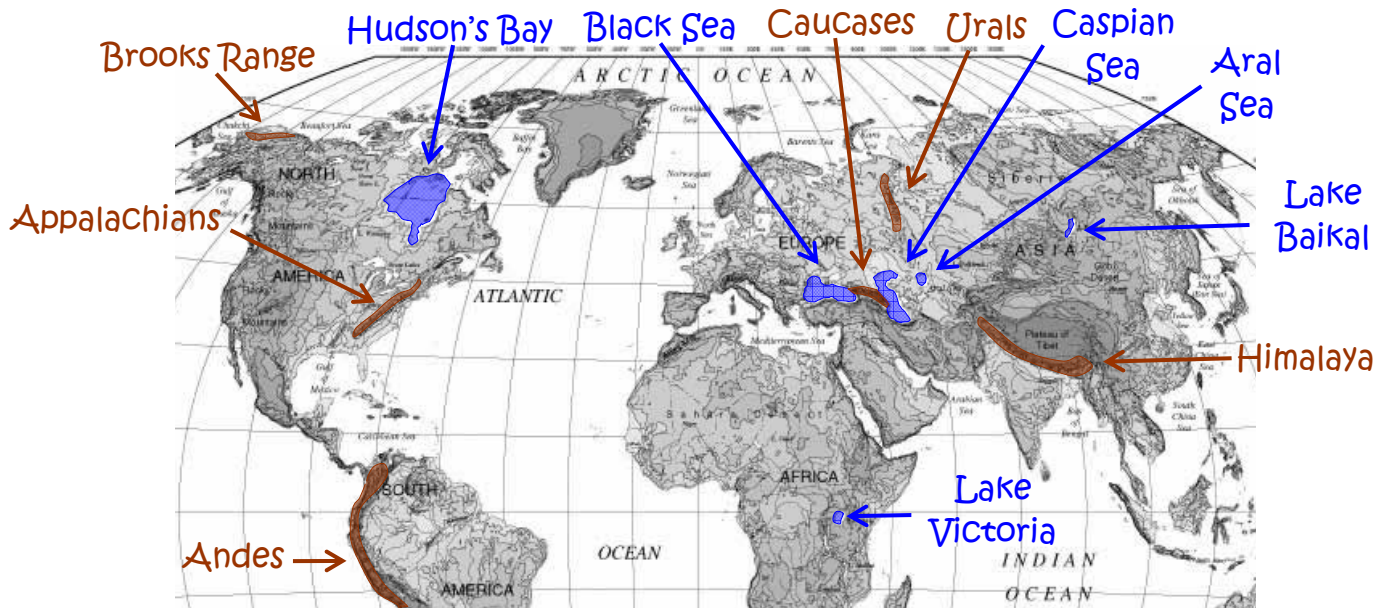
Since both adiabatic lapse rates are greater than the environmental lapse rates, a rising parcel will always be warmer than its surroundings so it is **ABSOLUTELY UNSTABLE** air.

26)¹² On the portion of the world map below, indicate the positions of following using a colored pencil:

a)⁶ Mountains ranges: Himalayan , Ural Mountains, Caucasus , Brooks Range, Andes, Appalachians

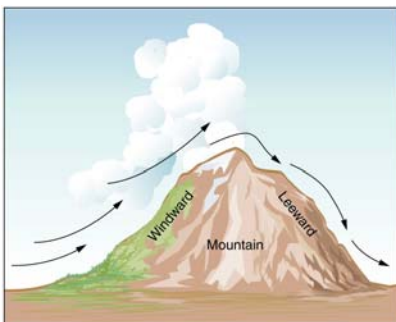
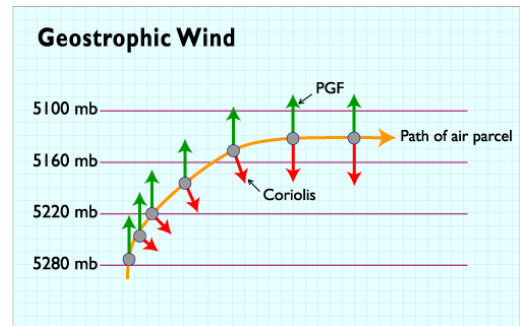
b)⁶ Water Bodies: Hudson's Bay, Caspian Sea, Black Sea, Aral Sea, Lake Baikal, Lake Victoria

Write labels off the map and indicate the features with arrows.



27)⁶ Use the diagram to explain why the winds tend to be parallel to isobars aloft. Also explain why winds at the surface tend to cross isobars to blow from high pressure to low.

The pressure gradient force (PGF) initially starts the wind moving from high to low pressure (bottom to top in the diagram). As the wind begins, the Coriolis force kicks in to deflect the wind to its own right. The deflected wind is further deflected to its right until the Coriolis force is opposite the PGF and the wind is parallel to the isobars. This only happens aloft. At the surface, friction slows the wind, reducing the Coriolis force so it never quite balances the PGF, allowing wind to blow outward from a high and inward toward a low.



28)⁶ Using your knowledge of adiabatic lapse rates, explain how air temperatures on the leeward side of the mountain may be generally higher than those on the windward side.

The wind coming up-slope on the left is quite moist, perhaps off an ocean or lake. As it rises, it cools at the slowish DAR as its moisture condenses out, perhaps creating rain. On the leeward side, the air that has now lost its moisture descends and warms at the faster DAR. By the time it gets down to low elevation it is both dryer and warmer than it

was at the same elevation on the windward side. This heating and drying create the mountain rain shadow effect and can be seen very dramatically in Washington and Oregon.

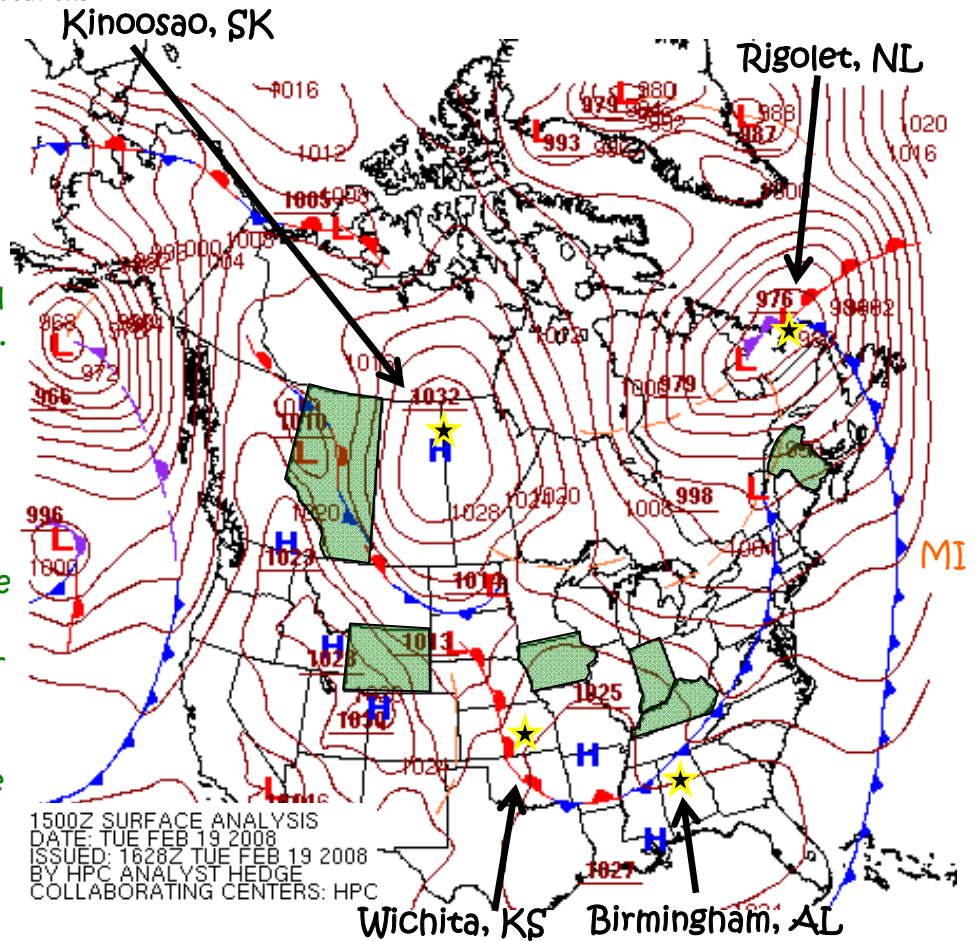
29)¹² For the following weather map, provide a synopsis of current weather (clouds, wind, pressure, precipitation, and possible changes) for the following locations:

a) Kinoosao, Saskatchewan

Under very high pressure at 1032 hPa. It's probably quite cold and clear with no wind. No changes in sight with a stationary front to the west. Typical February in Saskatchewan. See you on the ice!

b) Wichita, Kansas

The lack of isobars indicates little wind. A warm front is moving in from the west. There are probably high to middle clouds over Wichita and lower clouds moving in with the front. As it passes it will likely be cloudy and possibly rain.



c) Birmingham, Alabama

A cold front is just about to pass through Birmingham which should bring temperatures down. The high to the northwest may move in, bring winds out of the north, so it could be a bit biting. The pressure won't be changing much so the wind shouldn't be strong. The cold front doesn't have an associated low pressure system, so there may not be much action as the front actually passes.

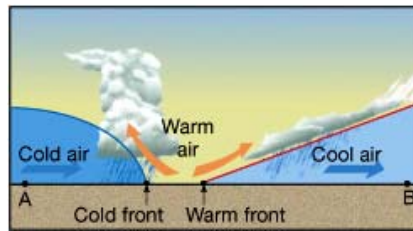
d) Rigolet, Newfoundland Labrador

Ucky. Under a low of 976 hPa and very near the occluded front. It's probably raining or snowing and was windy as the front moved in due to the close isobars. As the low moves out, the winds should be out of the southwest then veer to the northwest.

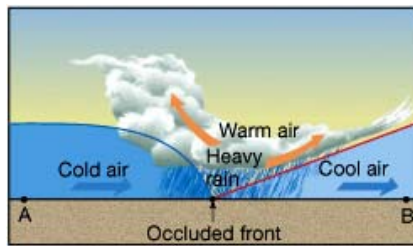
30)⁵ On the map above, shade in and label the states of Wyoming, Iowa, Kentucky and Indiana and the provinces of Alberta and New Brunswick.

31)¹² For each diagram to the right, draw the cross sectional view of the atmosphere between points A and B. Explain what weather can be expected by observers at A and B and between them (in the middle of the line).

- A – Front has passed cold, dry air dominates, sunny days and cool nights.
- B – Seeing first cirrus clouds coolish, S to SE winds
- Between – warmish, Tstorms coming.



- A – Front has passed cold, dry air dominates, sunny days and cool nights.
- B – Seeing first cirrus clouds coolish, S to SE winds
- Between – heavy rain as warm, moist air is forced aloft.



- A – Front has passed cold, dry air dominates, sunny days and cool nights.
- B – Coolish, S to SE winds, front may or may not arrive to bring rain.
- Between – light rain as warm air aloft has lost most of its moisture.

