Atmospheric Science 101, Spring 2003
Review Sheet for Midterm 2

1. **Review Course Notes**, **Homeworks and Solutions**, as well as **Section Materials**!

2. Match the wind flow to the feature (in the Northern Hemisphere):

___ Upper-level trough   a. anticyclonic(clockwise)
___ Upper-level ridge   b. converging and cyclonic(counterclockwise)
___ Surface Low Pressure   c. cyclonic
___ Surface High Pressure   d. diverging and anticyclonic

3. Based on the terms listed below and their definitions answer the following question:

Temperature
Dew Point Temperature
Relative Humidity
Vapor pressure
Saturation vapor pressure

    a. Which of these quantities indicates how much water vapor is in the air

    b. What does it mean for air to be saturated?

    c. What does the saturation vapor pressure tell us? And what is it dependent on?

    d. What can we say about the relative humidity and/or saturation of an air parcel that has reached its dew point temperature?

    e. If two air parcels at different temperatures have the same actual vapor pressure, what can be said about the dew point temperature of those parcels? What can you say about the relative humidity of those parcels?

    f. Name two ways you can change the relative humidity of an air parcel.

4. A saturated air parcel cools at the _____ adiabatic lapse rate which is ____°C/km. An unsaturated air parcel cools at the _____adiabatic lapse rate which is____°C/km.

   Describe why these lapse rates are different.

5. Define and give an example of each fog type:

   a. Steam fog

   b. Radiation fog

   c. Upslope fog

   d. Advection fog

6. Describe what happens to a storm system as it progresses across a mountain range such as the Rockies. Does the cyclonic circulation in the storm strengthen/weaken as it moves over the mountains? Does the cyclonic circulation in the storm strengthen/weaken as it moves into the lee of the mountains? What is responsible for the changes in storm intensity?

7. What are cloud condensation nuclei, and what is their role in the formation of clouds? What served as CCN in the 'cloud in the bottle' demonstration done in section? Give two examples of naturally occurring CCN.

8. Describe how the separation of charge within a thunderstorm develops.

9. Describe the growth of precipitation in warm clouds and cold clouds (i.e. the processes of Collision-Coalescence in warm clouds, and the Bergeron process in cold clouds).

10. How is the stability of a layer of the atmosphere determined? What is the difference between absolutely stable, absolutely unstable, and conditionally unstable?

11. Describe the differences between clouds formed in an absolutely stable environment versus those clouds formed in a conditionally unstable environment.

12. Clouds are categorized by their level in the atmosphere, as well as their shape or characteristic weather. List the various types of cloud categories and names associated with each, as well as the height criteria used for naming them.

13. When identifying surface fronts on a surface map, what features would you look for in the case of a warm front, in the case of a cold front, or an occluded front? Draw vertical cross-sections of each case. What are the similarities and differences between a cold and warm front? Why do we see increased cloud cover and precipitation along a frontal boundary?

14. Describe the major characteristics of an El Nino event. How does El-Nino influence the weather in the Pacific Northwest?

15. Name and describe the three stages of the life of an air-mass thunderstorm.

16. Describe the differences and/or similarities between the following pairs of terms:

a.   freezing rain and sleet

b.   graupel and hail

c.   virga and fall streaks

17. Precipitation radars can sometimes be used to determine the profile of wind with height, but at other times cannot. Based on how precipitation radars function, what limits their ability to produce wind profiles? During the times when the precipitation radar cannot produce a wind profile, describe an alternative way to obtain wind profile data.

18. How would a drought in the Pacific Northwest be reflected in the snow pack atop local mountains? What would be some of the implications of such a change in snow pack?

19. Before entering a forecast in the 101 forecasting competition you may choose to look at a forecast map from an atmospheric model. The first step in producing these types of maps is the acquisition of data. Describe some of the ways that this data is collected; include examples of data collected at the surface and at upper-levels.

20. How is the accuracy of forecast weather maps determined? How has our ability to forecast weather changed over the last 2 decades?

21. List the following atmospheric variables from 1(most predictable) to 4(least predictable).

    a. Pressure
    b. Precipitation
    c. Temperature
    d. Wind