ATMO 1300 Summer II 2016

Exam 1 Review Sheet

Answers will be discussed Tuesday during the review session, after lecture.

Info about the exam:

- 50 questions, each question is worth two points with some partial credit offered
- Questions will be short-answer, fill-in-the-blank, True/False, and multiple choice
- There may be some calculations (equations will be given, be able to choose the correct one), so a calculator will be helpful – ABSOLUTELY NO PHONES OR COMPUTERS
- Covers material in chapters 1-4, 6 of Ackerman and Knox plus anything on the slides from other chapters (ex: scattering, Ozone)
- Do NOT need to bring a scantron, but please bring a pencil. •

Section 1. Short answer

- 1. What are two "greenhouse" gases and why are they called that? Describe some of their sources/sinks. How would earth be different if these gases were not in our atmosphere?
- 2. What are the two ingredients needed for clouds to form in the atmosphere?
- 3. What is a temperature inversion and why does it occur in the stratosphere?
- 4. Why does pressure decrease with height through the entire atmosphere?
- 5. Describe what happens when a substance changes phase: Which changes require the substance to gain energy? If a substance gains energy what happens to the environment around it?
- 6. What are the 4 types of stability and how do the parcel temperatures compare to the environmental temperatures for each case?
- 7. Explain what happens to a dry parcel of air rising through the atmosphere. What if the parcel of air was moist instead of dry?
- 8. Describe what the temperature profile would look like for a (a) rain event (b) snow event (c) sleet event (d) freezing rain event
- 9. Define these terms: LCL and LFC. What are they? How are they different?
- 10. Briefly describe the 5 different types of energy transfer we discussed.
- 11. Briefly describe what happens to solar radiation reaching the Earth.
- 12. Describe typical wind flow around high/low pressure centers. What about around a trough or a ridge?

Section 2. Fill in the Blank

- and ______ are the most common gases in the atmosphere.
 ______, commonly found in the stratosphere, protects the surface from large amounts of UV radiation.
- 3. Warm air is _____ dense than cold air.
- stability is when a parcel is always cooler than the 4. environment.
- 5. The phase change from gas to solid is called
- 6. Orographic lifting occurs because of the interaction of air with

- 7. As the air temperature decreases, the likelihood of condensation occurring increases / decreases / stays the same.
- Latent Heat is energy released from ______ (hint: it's a phase change).
 The maximum intensity of the sun's radiation occurs when the solar zenith angle is
- 10. Salina, KS, (Latitude 38° N) always / never / sometimes experiences a 0° solar zenith angle.
- 11. Areas near large bodies of water often experience much smaller daily temperature ranges as compared to deserts because the ______ of water is much than that of land.
- 12. The temperature to which air must be cooled for saturation to occur is called the

_____·

- 13. The ______ cause different seasons.
 14. Clouds are excellent absorbers and emitters of ______ radiation.
 15. ______ energy is the energy of motion, while ______ energy is the energy due to an object's position.
- 16. ______clouds indicate a stable atmosphere, while ______ clouds indicate an unstable atmosphere.
- 17. In the Bergeron Wegener precipitation growth process, grow at the expense of
- 18. The four layers of the atmosphere from highest to lowest are _____, ______, _____,
- 19. The Pressure Gradient Force goes from ______ to _____ and is stronger for smaller/larger changes.
- 20. In the northern hemisphere, Coriolis deflects winds to the _____ and does/does not impact speeds. It is only important over ______ distances and ______ times.
- 21. Geostrophic wind balance is the balance between _____ and _____ forces. At the surface, must also be considered.

Section 3. Math.

- 1. You get inside your car on a hot summer day in Lubbock. The thermometer inside your car says the temperature is 109° F outside. What is that temperature in Celsius? How about Kelvin?
- 2. During the day the temperature on the surface of the moon can reach up to 224.33 °F (380 K). What is the wavelength of maximum emission of the moon's radiation? c =2898 µmK
- 3. The temperature on the surface of Mercury is 673 K. How much radiation is emitted by Mercury? $\sigma = 5.67 \times 10^{-8} \text{ W/m}^2 \text{ K}^4$
- 4. A particular air parcel at 16° C has a saturation vapor pressure of 18.972 mb and a relative humidity of 43%.
 - a. What is the vapor pressure of the air parcel?
 - b. What would happen to the relative humidity if the temperature of the parcel increased, but the moisture content stayed the same?
- 5. If the surface pressure at Lubbock is 900 mb and Lubbock is 1000 m above sea level. what would the sea level pressure be?