EAS 309/B3090
Exam 2 Study Guide
Oct 21, 2019

(1) If an unsaturated air parcel rises adiabatically and cools by 27K, without saturating, then how many km did it rise?

_____

(2) If an air parcel descends 5300m without gaining any moisture, and its initial temperature is 210K, what is its new temperature?

_____

(3) If an air parcel at 850 hPa has a temperature of 225 K, what temperature would it have if it descends adiabatically to the 1000 hPa pressure level?

_____

(4) If a layer between 850 hPa and 400 hPa is 6 km thick, then what is the mass-weighted vertical mean temperature of the layer (in K)?

_____

(5) If the observed water vapor pressure is 15 hPa, and the temperature is 283 K, then what is the Relative Humidity (RH)?

_____

(6) If an air parcel cools 15K while rising 2km but it reached saturation after the first 800m of rising, then what is the approximate saturated adiabatic (or pseudoadiabatic) lapse rate experienced by the air parcel?

_____

(7) If an air parcel has an LCL at 4km and we assume that its saturate lapse rate for between 4km and 6km is 6 K/km, then how much will the parcel cool if it is lifted from 2km to 6km?

(8) For the following schematic: is an air parcel at the big black dot stable or unstable to an downward displacement of 800 m?

_____

(9) Why?

_____

_____

(10)   What are the slanted solid lines in the schematic?

_____

TEMPERATURE (˚C)
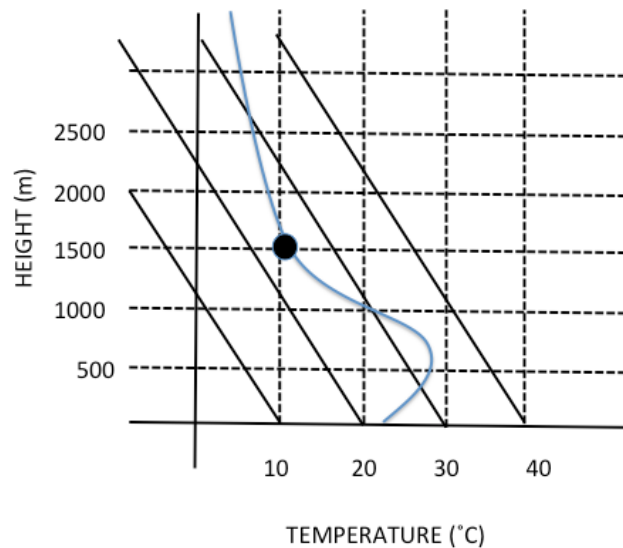
(11)   Under what condition is moist static energy (MSE) conserved while dry static energy (DSE) is not?

_____

(12)   What is the equation for MSE: _____

(13)   Explain why saturated air parcels cool at a lesser rate than dry air parcels.

_____

_____

_____

(14)   What variables remain constant during saturated adiabatic ascent?

(15)   Why is descending air almost always cloud free?

_____

_____

(16)   During _____ liquid water becomes water vapor and heat is
        _____. (0.5 pts each)

(17) What is the condition for potential temperature to be stable to dry motion?

        _____

(18)   Why is it simpler than the condition for regular temperature?

(19) What is the condition for regular temperature (T, not θ) to be neutral to dry motion.

(20)   Sketch the Clausius-Clapeyron relationship, include labels on your x and y axes and
        include units.