

Skew $T - \ln P$
Exercises

NOTE: T = parcel temperature, T_d = parcel dew point temperature W = parcel mixing ratio
 θ = parcel potential temperature θ_e = parcel equivalent potential temperature

1. Use the skew- T chart to determine the potential temperature θ , to the nearest degree C, of a parcel

6 points

(a) at 400 mb and $T = -40$ °C. $\theta = \underline{\hspace{2cm}}$ °C

(b) at 700 mb and $T = 5$ °C. $\theta = \underline{\hspace{2cm}}$ °C

(c) at 500 mb and $T = -20$ °C. $\theta = \underline{\hspace{2cm}}$ °C

2. Use a skew- T chart to determine the equivalent potential temperature θ_e , to the nearest degree K, for each of the following:

6 points

(a) A parcel with $P = 1000$ mb, $T = 10$ °C, and $T_d = 5$ °C $\theta_e = \underline{\hspace{2cm}}$ °C

(b) A parcel with $P = 1000$ mb, $T = 20$ °C, and $T_d = 10$ °C $\theta_e = \underline{\hspace{2cm}}$ °C

(c) A parcel with $P = 1000$ mb, $T = 15$ °C, and $T_d = 15$ °C $\theta_e = \underline{\hspace{2cm}}$ °C

3. Suppose a parcel at the surface ($P = 1000$ mb) has a temperature of 25 °C and a dew point temperature of 0 °C. Determine its dew point temperature and mixing ratio if it is lifted to the

8 points

(a) 800 mb level $T_d = \underline{\hspace{2cm}}$ °C $W = \underline{\hspace{2cm}}$ g/kg

(b) 500 mb level $T_d = \underline{\hspace{2cm}}$ °C $W = \underline{\hspace{2cm}}$ g/kg

4. Suppose a parcel at the surface ($P = 1000$ mb) has a temperature of 30 °C and a dew point temperature of 5 °C. Determine its dew point temperature and mixing ratio if it is lifted to the

8 points

(a) 800 mb level $T_d = \underline{\hspace{2cm}}$ °C $W = \underline{\hspace{2cm}}$ g/kg

(b) 500 mb level $T_d = \underline{\hspace{2cm}}$ °C $W = \underline{\hspace{2cm}}$ g/kg

5. Plot the temperature and dew point on the chart using the sounding data handed out in class. The following pressure levels must be plotted: 980, 906.6, 850, 700, 608.8, 500, 400, 300, 250, 200, 150 mb. You may plot temperatures at other levels if you want, but you can answer the following questions without doing so. **Answer the following questions based on a surface (1000 mb) temperature of 30 °C and a dew point of 22 °C.**

6 points

6. Use your plot from Exercise 5 to determine the following:

6 points

(a) Determine the lifted condensation level (LCL) LCL = $\underline{\hspace{2cm}}$ mb

(b) Determine the level of free convection (LFC) LFC = $\underline{\hspace{2cm}}$ mb

(c) Determine the equilibrium level (EL) EL = $\underline{\hspace{2cm}}$ mb