MiSP Weather Data Worksheet #2 L1

Name _____   Date _____

TEMPERATURE, PRESSURE, DENSITY — WHAT HAPPENS AS YOU GO UP?

Introduction:

Our planet is surrounded by a sea of air that is separated into layers. This worksheet is focused on the troposphere, which is the lowest layer of air and the part of the atmosphere where weather occurs.

Problem:

What happens to air pressure, temperature, and air density as altitude increases from sea level (0') to 16,000'?

Procedures:

Review the data below from http://www.engineeringtoolbox.com/air-altitude-temperature-d_461.html. Note:

- *1 ft (foot) = 0.3048 m*
- *1 in (inch) mercury (Hg) = 3,376.8 N/m^2 (Pa)= 0.49 lb/in^2 (psi) = 12.8 in water*
- *T(°C) = 5/9[T(°F) - 32]*
- *Density is listed as a percent of the density of air at sea level.*

Graph the data:

Graph the data on the third page for altitude (feet) and temperature (°F), pressure (inches Hg), and density (%). All will be on the same graph.

- Label the *x*-axis with altitude (thousand feet).
- Label the *y*-axis with temperature (°F), pressure (inches Hg), and density (%).
- Use the same number line for all three measurements on the *y*-axis. Number the *y*-axis from 0 to 120. Use an appropriate scale.
- Plot the three sets of data points with three different color pencils.
- Connect the data points.
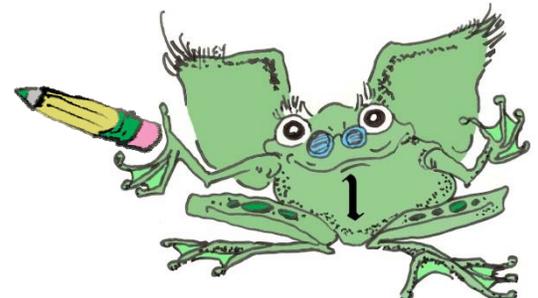
Altitude (thousand feet)	Pressure (in. Hg)	Temp. (F)	Density (%)
sea level 0	29.92	59.0	100
2	27.82	51.9	94.3
4	25.84	44.7	88.8
6	23.98	37.6	83.6
8	22.22	30.5	78.6
10	20.57	23.3	73.8
12	19.02	16.2	69.3
14	17.57	9.1	65.0
16	16.21	1.9	60.9
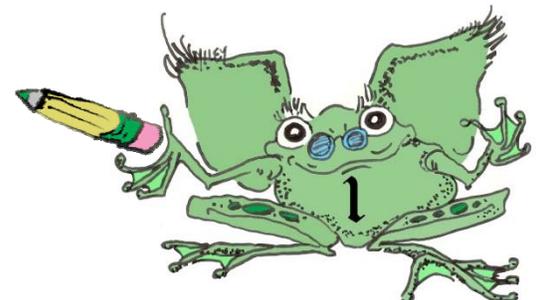
Discussion Questions:

1a. What happens to each of the following as altitude increases?

Temperature _____

Air pressure _____

Density _____

1b. Explain why each of the changes you listed in 1a happens (you may need help from textbook materials, other resources, or your teacher):

-Temperature (this one is a special challenge; doesn't warm air rise?)

_____

_____

_____

-Air pressure:_____

_____

_____

_____

-Density: _____

_____

_____

_____

2. Use the graph to find the following measurements at 11 thousand feet:

Temperature _____

Air pressure _____

Density _____