Activity #1

Concept: The warmer the air, the more water vapor it can hold.

Materials: daily weather graphs of data collected from the weather station

Procedure: Students will be provided 5 consecutive days' graphs obtained from the weather station, measuring temperature, wind chill, dew point, etc.. The teacher will then introduce the concept of "inverse relationship", and ask the students to analyze the graphs for any examples of such. The only pairing that should consistently occur would be that of temperature versus relative humidity, which students will likely discover. Ask the students to cut out this pair of graphs from all 5 days data, and align the temperature graph above the corresponding humidity graph so that "the mirror image" can be better perceived. From this data the students will be asked to infer the relationship between air temperature and relative humidity. This activity can either be done after said concept has already been introduced, so as to reinforce it. Or it can be conducted prior to teaching the concept, so as to encourage inquiry as to why this relationship exists.

Activity #2

Concept: Effect of the presence and location of high and low pressure systems on local wind direction.

Materials: The archived daily wind direction graphs and the surface weather maps which show location and movement of pressure systems.

Procedure: Students have already been taught that the wind blows clockwise out from a high pressure center, and counter-clockwise winds blow inward toward a low pressure center, (due to the Coriolis Effect). Issue them a variety of surface weather maps, and ask them to predict the predominant wind direction experienced at their weather station based on the location and type of pressure system present at the time the wind measurements were made. For example, south winds would occur when a low pressure system was advancing your way. Students then confirm their predictions with the concurrent weather pie charts. A variation of this activity would be to conduct it prior to teaching the concept and ask the students to infer the clockwise and counter-clockwise wind directions associated with high and low pressure systems respectively, after they have analyzed several surface maps and their associated wind direction pie charts.

Activity #3

Concept: effect of elevation on air temperature and rainfall.

Procedure: Prior to the lesson, the teacher selects a score or so of AZ cities, and classifies them into 5 elevation zones:

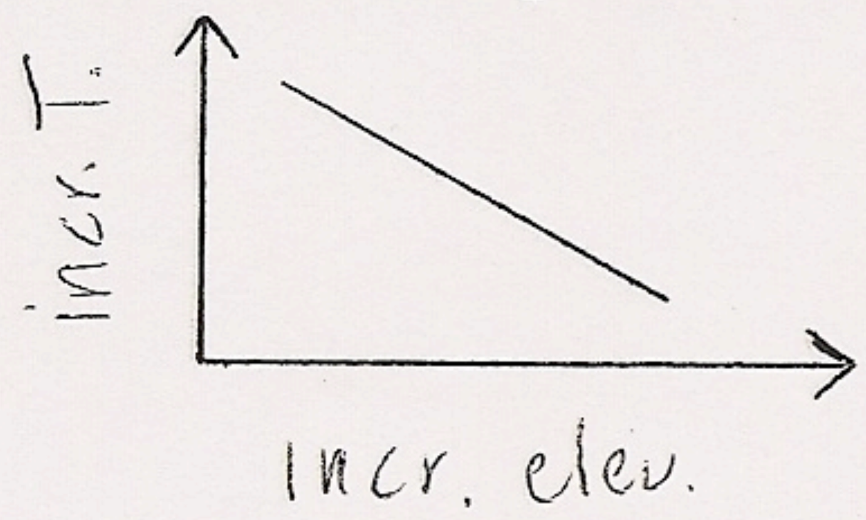
- Zone 1: 0 – 1,500 '
- Zone 2: 1,501' – 3,000'
- Zone 3: 3,001' – 4,500'
- Zone 4: 4,501' – 6,000'
- Zone 5: above 6,000'

The teams are each assigned a zone, and then contact, via the internet, schools in as many of their cities as possible, (data for cities not linked up to us can be obtained from www.weather.com). They collect the daytime temperature, say at noon, every day for a week. They consult state maps, or ask students at the respective schools, to determine the elevation of each city (school). They obtain the annual average precipitation for each city from a forthcoming handout, or from a websearch. They organize their data into a table, listing all the temperatures in each of the 5 zones. In this manner they see that higher elevation locations are cooler than their lower counterparts. Each team draws a map of AZ and color codes the 5 elevational zones. They denote the precipitation average under the city name, and thus students can also see the relationship between increasing rainfall with increasing elevation. Any deviations from expected patterns are teaching moments that launch further inquiry and discussion, i.e. Leupp is colder than Flagstaff due to colder air "draining" down the Little Colorado River valley from the Mogollon Rim, (is that right Mike??).

Supplemental Activity #1 (this is in the "armchair experiment " stage)

Concept: Elevation effects air pressure effects boiling point (bp)

Procedure: Instruct student teams to bring a beaker of water to a boil and record the temperature at which it is at full boil. They will notice their measurement is not the CORRECT ANSWER that their book says: 212 Fahrenheit/100 Celsius. If it could be arranged, ask other schools that you are linked up with to do the same experiment at the same time; certainly the same day. Record their elevation, boiling point, and air pressure, (yours too). If you can collect data from a variety of locations, then have the students plot the elevation versus boiling point on a graph, with the dependent variable, bp, on the y axis. Does your temperature line point to an eventual reading of 100 Celsius at sea level? It would be interesting to try this I think. If you had a vacuum you could extend the air pressure/boiling pt. relationship further by "boiling" water at room temperature, showing that it is easier for water to boil when there is less air pushing on it. The students understand WHY the temperature line goes down on their graph.



(another inverse relationship)

Cities

Rainfall in the Forest

Cities	Average Precipitation (inches)	Elevation (feet)
Ajo !	9.1	1,736
Alpine	20.73	8,000
Casa Grande	8.20	1,405
Clifton	12.54	3,465
Douglas	12.25	4,020
Flagstaff	20.23	6,993
Fredonia	9.9	4,675
Gila Bend	5.69	737
Globe	15.75	3,541
Grand Canyon	15.81	6,965
Holbrook	8.64	5,061
Jacob Lake	18.52	7,920
Kingman	10.63	3,345
McNary	24.70	7,320
Nogales	15.60	3,800
Parker	4.83	425
Payson	21.48	4.910
Phoenix	7.46	1,117
Pinedale	18.69	6,500
Safford	8.95	2,900
Sedona	17.12	4,223
Show Low	15.35	6,400
Springerville	12.11	6,964
Tombstone	13.79	4,610
Topock	4.8	450
Tuba City	6.83	5,936
Tucson	11.1	2,410
Wickenburg	10.99	2,070
Wickieup	10.79	2,125
Willcox	11.76	4,200
Williams	21.88	6,750
Winslow	7.34	4,880
Yuma	3.38	138

SOURCES: Mammal Maps - Recent Mammals of Arizona, Lendal Cockrum, U.of A. Press; Vegetative Map - Agric. Experiment Station, U.of A., Tucson 85721; Bulletin A-45 (Map); Geology maps - Bureau of Geology and Mineral Technology, 845 N. Park Ave., Tucson, 85719
Soil Maps - Soils, Water and Engineering, U of A, Tucson, 85721