Name _____ **Earth Science**

Lab 23: Weather Watch Analysis **Date** _____

Introduction: Weather records are interesting as a recollection of previous phenomena. They can also be used to draw inferences as to the cause of weather and hence to predict future changes. Although weather cannot be predicted with absolute accuracy, a probability of occurrence, based on percentages, can be established.

Objective: You will learn to determine a relationship between weather variables using contingency tables to analyze weather information plotted on graphs.

Vocabulary:

Contingency

Weather variable

Probability

Procedure: The weather conditions for a 30-day period are shown on the chart. You are to analyze the relationships between pairs of weather variables. These will be recorded in the data tables.

1. Record the relationship between temperature change and air pressure change on a daily basis. Look at the data for Day 1. What is happening to the temperature? What is happening to the air pressure? Since temperature is rising as pressure rises, place a tally mark in the appropriate quadrant of the data table (pressure rising, temp rising).

2. Move on to Day 2. What is happening to temperature? What is happening to pressure? The temperature is again rising. The pressure for the day is mostly decreasing. Place a tally mark in the appropriate quadrant of the data table (pressure falling, temp rising).

3. Repeat steps 1 & 2 for all 30 days for temperature and pressure.

4. Once data is tallied for the entire month, you may now determine the probability that one of the variables will respond to the other variable. Add the number of tally marks going **across** and place in the "total" column. This tells you how many days out of the month the temperature was *rising* regardless of what happened to the pressure. Do the same thing for the temperature *falling* data.

5. For the percentage of temperature rising, pressure rising quadrant, take the number of tally marks in that quadrant and divide by the "total" column. Multiply your decimal by 100 to get the percentage. Record that percentage in the quadrant line for percent.

6. Repeat steps 1-5 for each set of weather variable pairs in the data table.

Hypothetical example if you are unclear about the directions:

		Pressure change: Rising	Pressure change: Falling	Total
Temperature change	Rising	_____% IIII (4)	_____% IIIIIIIIIIIII (14)	18
	Falling	_____% IIIIIIIII (10)	_____% II (2)	12

Steps 1-3, tallies, have been completed and totaled.
Step 4; tallies going across have been added (4 + 14 = 18 total, 10 + 2 = 12 total)
Step 5 is for you to fill in; take 4 (rising, rising quadrant) and divide by 18 total days, times 100% to give the percentage of the time that rising pressure coincides with rising temperatures. Take 14 (pressure falling, temp rising), divide by 18 total days, times 100% for the percentage of the time that falling pressure coincides with rising temperatures. Repeat these steps for the falling temperature quadrants.

Discussion questions

1. What do you think is the least difference in percentage between two factors in order to say they have a strong connection? (Ex: If the pressure rises with rising temperature 51% of the time and with falling temperature 49% of the time, can you reliably say that rising pressure goes with rising temperatures?)

2. List the 6 changes in atmospheric variables that usually precede rain, as shown by the contingency tables.

3. What is the relationship between the following weather variables:
   a. Air pressure and temperature

   b. Air pressure and cloud cover

   c. Air pressure and wind direction

4. As the relative humidity increases, what change in dew point temperature can you predict?

5. As the difference between dew point temperature and air temperature *decreases*, what is the probability of precipitation?

6. How can contingency tables be used for predicting the weather?