Name: _____ Period: _____

CH 18: RELATIVE HUMIDITY WORKSHEET

Relative humidity is the amount of moisture in the air compared to the amount of moisture that could be in the air at the existing temperature and barometric pressure. This is an example of the basics of the Gas Laws - PV=nRT. Barometric pressure generally changes very little during the day and can be considered a constant for purposes of this lesson. Temperature changes during the day and will figure greatly in this lesson.

The unit of measurement for relative humidity is percent (%). Therefore the relative humidity data that is part of the weather forecast is a calculated number used to give us an indication how saturated the air is. When the relative humidity is 100%, the air is saturated.

Procedure:

Observe the historical data for one day for your school site, and answer the questions below.

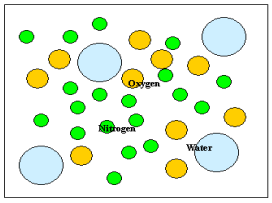
Time	Temp °F	Rel Humid %	Wind Direction & Speed mph	Rain (day) in	WChill/ HIndex °F	Bar. Press "Hg	Light %	Dew Point °F	Wet Bulb °F
Thursday, April 14, 2016									
00:00	42.1	77.9	E @ 1.5	0.00	42.10	30.21	0.0	35.7	38.9
01:00	43.1	72.4	ESE @ 3.5	0.00	41.36	30.22	0.0	34.8	39.0
02:00	42.4	73.8	ESE @ 6.8	0.00	38.14	30.21	0.0	34.6	38.5
03:00	41.3	74.3	SE @ 5.5	0.00	37.64	30.20	0.0	33.7	37.5
04:00	40.7	71.7	ESE @ 3.9	0.00	38.22	30.22	0.0	32.3	36.5
05:00	39.3	74.8	ESE @ 1.5	0.00	39.30	30.22	0.0	32.0	35.7
06:00	39.5	71.7	ESE @ 2.0	0.00	39.50	30.24	0.0	31.1	35.3
07:00	39.3	64.8	ESE @ 5.9	0.00	34.99	30.26	24.1	28.5	33.9
08:00	42.9	53.6	SE @ 5.9	0.00	39.27	30.27	41.7	27.2	35.1
09:00	47.8	48.1	ESE @ 6.1	0.00	44.99	30.27	51.7	29.1	38.5
10:00	51.4	44.3	ESE @ 4.2	0.00	50.35	30.27	61.1	30.4	40.9
11:00	54.7	39.9	ESE @ 11.0	0.00	51.59	30.26	71.5	30.8	42.8
12:00	58.4	34.7	ESE @ 5.5	0.00	57.87	30.24	80.8	30.6	44.5
13:00	60.1	28.8	SE @ 9.6	0.00	58.65	30.22	83.5	27.6	43.9
14:00	62.2	29.2	ESE @ 12.3	0.00	60.71	30.20	85.0	29.7	46.0
15:00	64.7	27.9	E @ 4.2	0.00	65.77	30.18	84.0	30.8	47.8
16:00	65.0	29.7	SE @ 8.1	0.00	65.01	30.16	79.1	32.6	48.8
17:00	65.0	30.8	SE @ 12.7	0.00	64.18	30.15	69.9	33.5	49.3
18:00	64.0	32.5	ESE @ 3.3	0.00	65.36	30.15	52.8	33.9	49.0
19:00	59.7	37.1	ENE @ 0.9	0.00	59.70	30.14	15.7	33.5	46.6
20:00	55.3	44.4	ENE @ 2.0	0.00	55.30	30.15	0.0	34.0	44.7
21:00	51.6	53.0	ENE @ 3.3	0.00	51.24	30.17	0.0	35.0	43.3
22:00	48.9	59.6	E @ 3.3	0.00	48.16	30.17	0.0	35.5	42.2
23:00	48.0	64.1	E @ 4.8	0.00	46.00	30.15	0.0	36.5	42.3

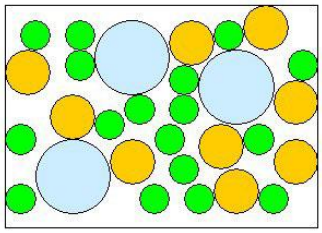
Questions:

1) Determine the highest relative humidity for the day and when it occurred.
2) Determine the lowest relative humidity for the day and when it occurred.
3) What happened to the relative humidity data during the day? Did it rise, fall, or remain steady?
4) What changes are seen in temperature during the day?
5) Is there a correlation between temperature and relative humidity?

Let's visualize the atmosphere near the Earth as spaces that can be filled. These spaces are occupied by nitrogen - containing molecules (approximately 78%), oxygen molecules (approximately 20%), and other molecules including water vapor (approximately 2%). Nitrogen-containing molecules along with oxygen molecules are always present in the same relative percentages, taking up the same number of spaces. Molecules like water are then allowed to move into the remaining spaces. A water molecule is in fact a very large molecule compared to others found in the atmosphere.

As the temperature of a substance decreases, the substance contracts. This is most evident in gases. As air temperatures decrease, the number of spaces available to be filled decreases. The nitrogen-containing and oxygen molecules fill the spaces. There are then fewer spaces for water to occupy. The percentage of spaces filled by water molecules compared to the number of spaces available is called relative humidity. Precipitation develops when water droplets, ice pellets or snowflakes in a cloud combine and become too heavy to remain in the cloud, thus falling toward the surface. Precipitation can be in the form of rain, freezing rain, snow, sleet or hail. When the relative humidity is near 100%, dew and frost also form on a surface such as grass or a windshield.

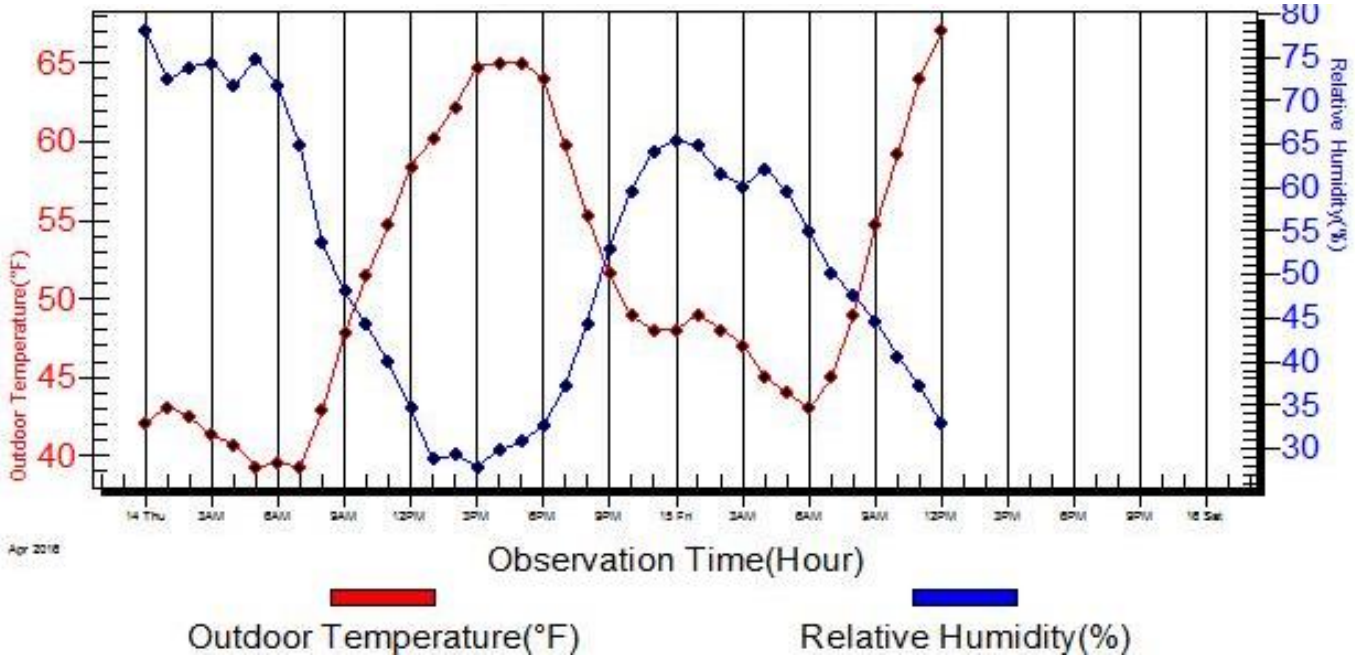




As the relative humidity increases toward saturation, the chance of precipitation increases.

Conclusion Questions:

6) What is relative humidity?
7) How does relative humidity change during the day?
8) When relative humidity decreases away from saturation, what happens to the chance of precipitation?
9) What other weather parameters are related to or affect relative humidity?
10) List the five different types of precipitation.
11) What is the forecast when relative humidity is at 100%?



12) Does the dew point temperature change greatly during the day?
13) Is the temperature lower than the dew point at any point on the graph?
14) Is there a point where the two temperatures are identical? What does that signify?