

Your Name: _____

GEO101IN
Introduction to Weather and Climate
Classwork 3: Why do the winds blow?
February 12, 2005
For completion in class

1. Plot the daily maximum temperature for Tucson vs. date for the first 10 days of January. Mark each temperature with a small “x”. What is the primary feature you see in the data (this kind of plot is called a time series)?

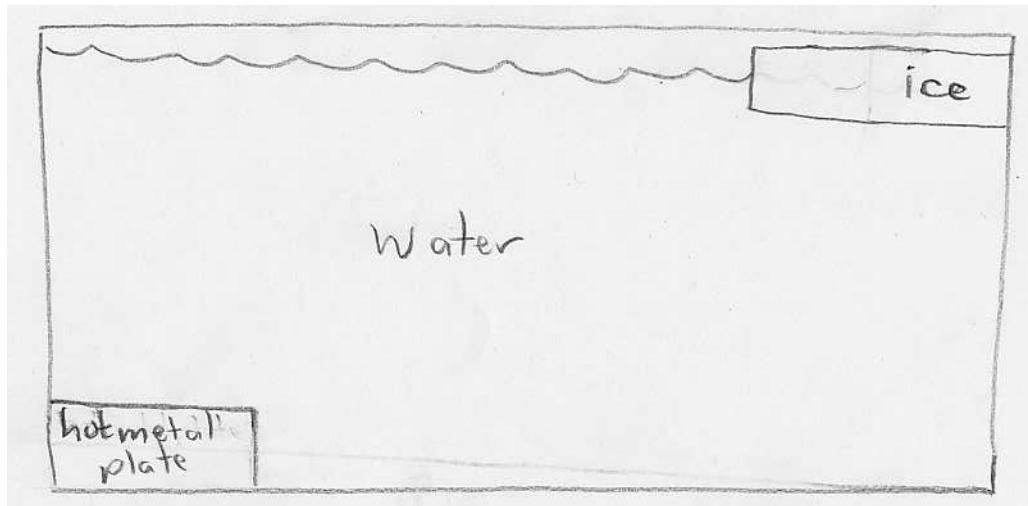
Date:	1	2	3	4	5	6	7	8	9	10
Max. Temp. (deg. F):	65	62	66	59	51	56	65	72	70	70

2. Use the attached description of weather symbols to read the information from the chart on the screen for the southwest region/Tohono O'odham Nation for the early morning of February 3, 2005. Write down the information from the chart below.

3. Suppose I put a piece of dry ice (freezing temperature: -112°F) inside a sealed plastic bag underneath a heavy weather and climate textbook. What will happen to the elevation of the textbook above the table as the dry ice warms and turns into carbon dioxide gas? How is this another example of the First Law of Thermodynamics?

4. Explain how riding a bicycle is another example of the Second Law of Thermodynamics. Where does the energy come from? How is it put to work? How is some energy wasted?

5. Consider the following experimental setup (same as that we're about to see):



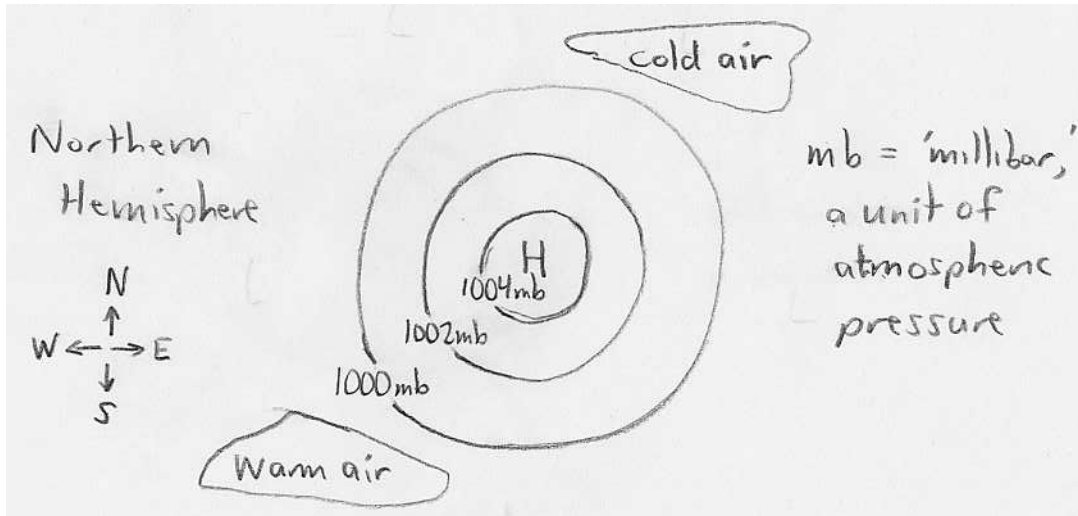
Draw on the diagram the following features:

- Direction in which the water **just below the ice** will flow.
- Direction in which the water **just above the hot plate** will flow.
- Direction in which **surface** water will flow.
- Direction in which **water at the bottom** will flow.

How does this water circulation move heat around in the tank?

6. Pair up with a classmate. While one of you rotates this piece of paper, have your partner try to draw a **straight line** across it in the space below. What happened? Why?

7. Schematically draw with arrows the geostrophic force balance and the wind direction in the following diagram of a high pressure system in the Northern Hemisphere. In geostrophic balance the pressure gradient force is balanced by the Coriolis force. Also show the direction of air flow.



Suppose there is warm air to the southwest of the high pressure system, and cold air to the northeast of the high pressure system. For example, the northern edge of the high pressure system could be over southern Canada, while the southern edge could be over southern Arizona. Given the wind direction about the high pressure system, how will the system help reduce the south-north contrast in temperatures between these two regions that exists during wintertime?

8. Use the weather map showing pressure contours on the screen, together with your understanding of geostrophic balance, to explain the direction in which winds are blowing at the surface. Does this inference fit with what you described in Problem 2?