Environmental Systems and Societies

*Nature of Science Unit Study Guide*

**What you need to understand for the exam:**

* You need to understand the difference between a qualitative and a quantitative observation.
* You need to be able to identify the observations as qualitative or quantitative.
* You need to write a science question about an object and explain why it is a valid science question.
* You need to evaluate the validity of a science question.
* You need to explain the purpose of a hypothesis.
* You need to identify the following items from a sample experiment: hypothesis, control group, experimental group, independent variable, dependent variable and controlled variables.
* You will need to design a methodology which includes a control group, experimental group(s), a hypothesis, independent variable, dependent variable, controlled variables and safety instructions.
* You will need to organize data into a data table.
* You will need to create an appropriate graph from data organized in a data table.
* You will need to explain when to use a line graph, bar graph, histogram, pie chart, and scatter plot.
* You will need to define the mean, median, and mode and explain why we need three ways to explain where the middle of the data is found.
* You will need to distinguish between negative correlation and positive correlation.
* You will need to summarize when it is appropriate to use a t-test and a chi squared test.
* You will need to understand how a bar graph and a histogram are similar and different.
* You will need to identify a confounding variable in an experiment and explain how to eliminate the cofounding error in a new experiment.
* Given data and a description of an experiment, you will need to use the four step process for writing a conclusion.
* You will need to understand what is meant by the term “thinking scientifically”.

**Resources to consult when studying for the exam:**

* The videos assigned in class
* The article,
* The mini labs done in class
* The “Thinking Scientifically” Prezi
* The Inquiry lab write-up
* The handouts given in class
* The quizzes we took in class

**How should you study for the exam:**

Don’t wait until the night before or God forbid the morning of to prepare. Eat a good breakfast and get a good night’s sleep before hand. I know it sounds stupid, but it really does make a difference and is only possible if you plan ahead.

Concerning basic facts like when to use a t-test or what is a qualitative observation, make flash cards. It does take time to make the cards, but it is a great way to put things into your head. Once the cards are made follow these simple steps

1. Start by looking at the question, repeat it to yourself, then look at the answer and repeat that to yourself. Now set the card down and grab the next one.
2. Repeat step one for 3-5 cards. Now pick up those cards read the question out loud and look at the answer, but don’t repeat it out loud.
3. Take the same 3-5 cards and look at the question but don’t say it out loud. Now say the answer without looking.
4. If you get the answer correct put it into one pile, if not put it in a different pile. Repeat steps 1-4 for the ones you did not get correct, do this until you get them all correct.
5. Once you get all 5 cards correct get 3-5 new cards and start the process over, but when you get to step 3 mix in the cards you have already done.
6. Continue until you can do all the cards quickly (about one second per card).

\*This process can be done alone, but it also works really well when you work with a partner that shows you the questions and reads them aloud to you.

When you are preparing for the sections that require you to do a process (make a graph, a data table or identify variables) I would find data online that is not organized and practice organizing it. With a partner I would race and see who could organize the data correctly the quickest.

If you do not understand a topic I would watch the corresponding video or look at the Prezi to find the answer. I would also look at your lab work and reread the comments I put on your paper(s).

I would reread any articles given in class.