Homework due Thursday 10-18-18:
Some of the greatest thinkers of all time literally just sat around all day and thought. In science courses, we typically value observation, experiment, mathematical modeling, defining vocabulary, etc. But, philosophers and abstract thinkers have also had a major influence on science. For example, the first to propose the idea of an atom was a Greek philosopher Democritus, who thought it up just because it made sense to him.

A little more recently, a 17 year old teenager in Germany began a thought experiment. He imagined himself riding a bicycle next to a light beam. He imagined what things would look like and how he would perceive the universe in this state. The thought experiment would eventually lead to the development of many of the major theories of modern physics. And the teenage philosopher was none other than Albert Einstein.

Like philosophers and imaginers like Einstein, just sitting and thinking of the ideas behind science is a very important exercise for anyone who wants to become a good scientist! Spend some time tonight contemplating each of these three problems:

Problem 1: Conventional Current
This is a true statement.
A negative charge moving to the left is equivalent to a positive charge moving to the right.
Spend some time just contemplating *why* it is true.

Problem 2: Electron drift:
Imagine yourself as an electron in a wire. The freedom! You can go wherever you want, and yet you move totally randomly. Spend a few minutes on this.
Then, somebody hooks the wire up to a battery, and your motion is still almost totally random random. In fact, so close to random that any observer wouldn't be able to tell the difference. But, you drift ever so slightly to one side, so that, hours and hours into the future, you will end up somewhere different.
[Your *drift velocity* is your motion only to that new place, not all your motion, by the way.]

Problem 3: The affect of a resistor on a circuit:
Imagine all the electrons moving through a circuit (You don't need to worry about drift and random motion for this one.) This time, don't imagine yourself as an electron, but as someone standing above, watching them all move around in the circuit like a giant line of ants. And they are moving fast, like ants with jet packs attached to their back! Then, someone adds a resistor in the middle of the circuit, and the entire chain slows down. Imagine the feeling of watching the entire, fast moving chain suddenly slow way down.

Spend at least five minutes thinking about problems 1 and 3, and at least seven on problem 2.

Write me a note that copies these three statements, word for word.
"I _____ do solemnly swear that I spent at least five minutes thinking about how a negative charge moving to the left is equivalent to a positive charge moving to the right."

"I _____ do solemnly swear that I spent at least seven minutes imagining myself as an electron and trying to feel what random motion and electric current felt like."

"I _____ do solemnly swear that I spent at least five minutes envisioning an electric current and how a resistor slows it down."

Then, sign the bottom of the page.

This assignment is totally honor system, the only thing you need to turn in is the signed affirmation.

I would also highly recommend watching the YouTube videos to which I linked on the website. They are all under H: Explain Current Subatomically and J: Explain Voltage Subatomically!