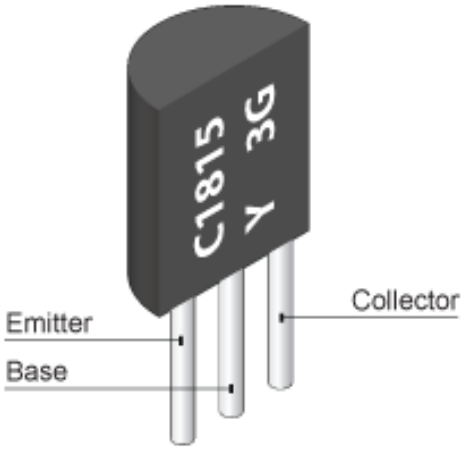
The following are state standards that I have not covered yet, but will be on the STAR test next week.

d. Students know the properties of transistors and the role of transistors in electric circuits.

- A transistor is a small electrical component that acts like a little switch. It has 3 leads (wires coming out of it). If you send a tiny amount of current to one lead, then it turns the switch on and allows a big current to travel through the other two leads. Look at a picture of a transistor below. The collector is where electrons are going, but can't get through to the emitter (because the switch is off). If you send a little bit of current to the "base". Then the electrons can go from the collector the to the emitter (the switch is on).



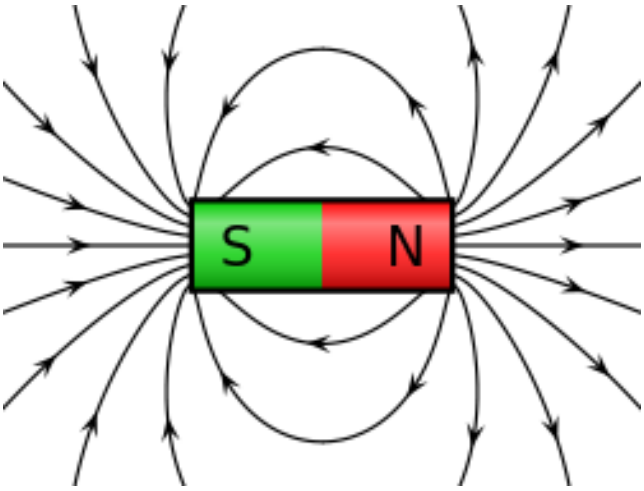
e. Students know charged particles are sources of electric fields and are subject to the forces of the electric fields from other charges.

- A charged particle like an electron or proton have electric fields around them. Electric fields can be drawn as arrows. Arrows leave positive particles and point toward negative particles. The electric fields from one particle can interact with other fields (so that two positives repel, two negatives will repel, and a positive and a negative will attract) **You must know that the electric field lines will have arrows pointing from Positive to Negative.**

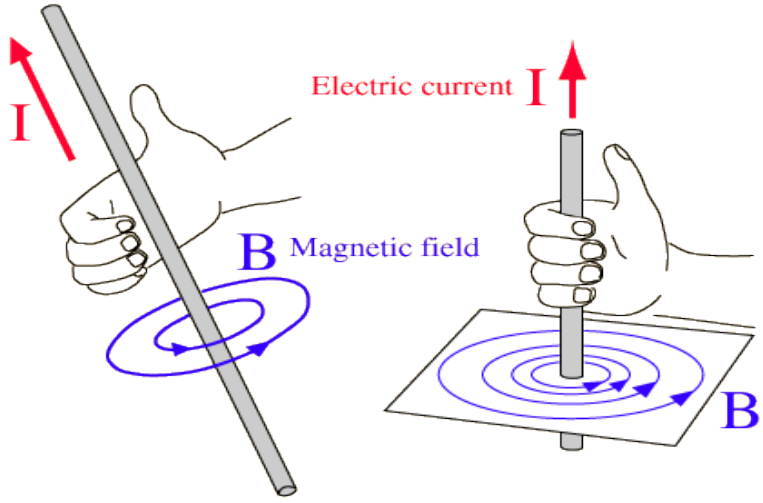
f. Students know magnetic materials and electric currents (moving electric charges) are sources of magnetic fields and are subject to forces arising from the magnetic fields of other sources.

- Magnetic fields are different than electric fields. Electric fields are produced around charged particles like protons and electrons, BUT magnetic fields can be made by the following:

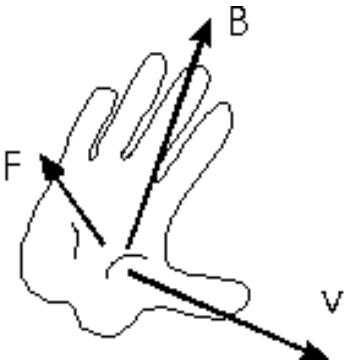
- Magnetic materials. These are magnets. There are different types of magnets, but the most common is iron that has been magnetized. (this is caused by the iron atoms to have all their electrons spinning in the same direction) **You must know that the arrows in a magnetic field around a magnet will have arrows pointing from North to South.**



- A current carrying wire: A wire that has a current in it will have a magnetic field around it. This was first discovered when scientist were playing with a current carrying wire and a nearby compass had its needle start moving. They thought this was weird. **You must know how to draw the magnetic field around it. Its called the right hand rule. Take your right hand and grab the wire with your right hand. Make sure your thumb is pointing in the direction of the current and wrap your fingers around the wire. Your fingers will represent the direction of the magnetic field.**



- The thing that creates a magnetic field in a charged particle that is moving. We already know that a charged particle makes an electric field, but it also magically makes a magnetic field when it is moving ONLY if it is moving. Since a charged particle like a proton can make a magnetic field, it can be pushed around by a magnet. What does the magnet do to the moving proton? Does it speed it up? Does it slow it down? Does it make it turn in a circle? Hint: The magnetic field from the magnet will apply a force perpendicular to the motion of the moving proton. Soooo it makes it turn. You need to know what direction it will turn using another right hand rule: Point your finger in the direction of the magnetic field (B), point your thumb in the direction that that proton is moving (v) and you palm is the direction of the force on the proton.



Right Hand Rule (This applies only to a Positive charge like a proton. If the charged particle is negative like an electron, then you need to use your left hand.)

h. Students know changing magnetic fields produce electric fields, thereby inducing currents in nearby conductors.

- As stated in the above standard, if you change a magnetic field, then it will produce an electric field. That electric field will interact with the electrons in a nearby wire. To sum it up, it is possible to make electrons move using magnets. That's how generators work. You move magnets around wires and electrons start moving in the wire and that's what electricity is! (electrons moving in a wire)

i. Students know plasmas, the fourth state of matter, contain ions or free electrons or both and conduct electricity.