Magnetism from Electricity
The Marriage of Electricity and Magnetism

Before 1820:

- Electricity and Magnets were two separate and unrelated phenomena.
- The only magnetism known was that of iron magnets and of "lodestones", natural magnets of iron-rich ore.
- It was believed that the inside of the Earth was magnetized in the same fashion, and scientists were puzzled when they found that the direction of the compass needle at any place slowly shifted, decade by decade, suggesting a slow variation of the Earth's magnetic field.
Hans Christian Ørsted

- In April 1820 Ørsted was giving a lecture on using an early battery (Called a voltaic pile) to heat a wire. As well he was going to demonstrate some of the characteristic of lodestones on compasses.
- As he set up the demonstration he noticed whenever he connected the battery the nearby compass needle deflected.
- It was not until 1864 that James Maxwell was able to explain the nature of the connection between electricity and magnetism.
http://phet.colorado.edu/en/simulation/faraday
http://www.youtube.com/watch?v=emlzh9XXWgQ
Making an Electromagnet

You need a screw or nail, a battery, a length of copper wire, some staples of paper clips and a bit of tape.

1) Use the screw or nail and try to pick up the staples. Does it work?
2) Wind your wire tightly around a screw so that you have at least 25 turns.
3) Tape one end of the wire to the flat end of the battery.
4) Position the battery near the staples.
5) Attach the second end of wire to the battery. What happens?
6) Use the compass to figure out which end of the electromagnet is the positive and which is the negative.
7) Now switch the battery so that the poles are reversed. Now what happens?
8) Disconnect the battery and make a drawing of the whole set-up. Include the direction of the current of electricity and the poles of the electromagnet.
Creating a simple motor

1) Put a small magnet on the end of a screw.
2) Place the pointy end of the screw onto the end of the battery
3) Touch a wire to the opposite end of the battery.
4) Briefly touch the other end of the wire to the magnet.

What happens?

Now attach the screw to the other end of the magnet and repeat the experiment.

Now what happens?

What is different?
Experiment

1) Hold a compass just above the wire with needle parallel to the wire.

2) Connect the wire to the battery.

What happens?

3) Leaving the compass in the same position, connect the battery to the opposite poles.

What happens?
Largest Dam in the World

https://www.youtube.com/watch?v=b8cCsUBYSkw
Pre-Read
Pages 19-24