Shocking Demos

It’s so shocking, even your hairs will stand at attention!

Quiz Today

- Closed notes, closed computers, no help from neighbors, no talking.
- 10 points
- One or two word answers
- Roughly 7-8 minutes
- Get out a sheet of paper

Questions

1. What is static electricity?
2. How is static electricity produced?
3. What are the two types of charges?
4. What elementary particle carries charge?
5. What experiment determined the quantity of charge on the electron?
6. What famous scientist conducted this experiment?
7. List two practical uses of static electricity.
8. This law explains why a magnetic field is produced in the opposite direction of magnetic flux entering a coil of wire.

Van De Graaff Generator

- Air breakdown at 3E6 Volts/meter
- 390,000 volts
  - Is actually safe only because it is an one time charge. If it was current it would be extremely dangerous.
- Hair raising experience

Polarization

- http://phet.colorado.edu/en/simulation/balloons
- This causes neutral objects to be attracted to charged objects.
- The neutral object still has no charge but is polarized such that one side exhibits more of a charge than the other side.

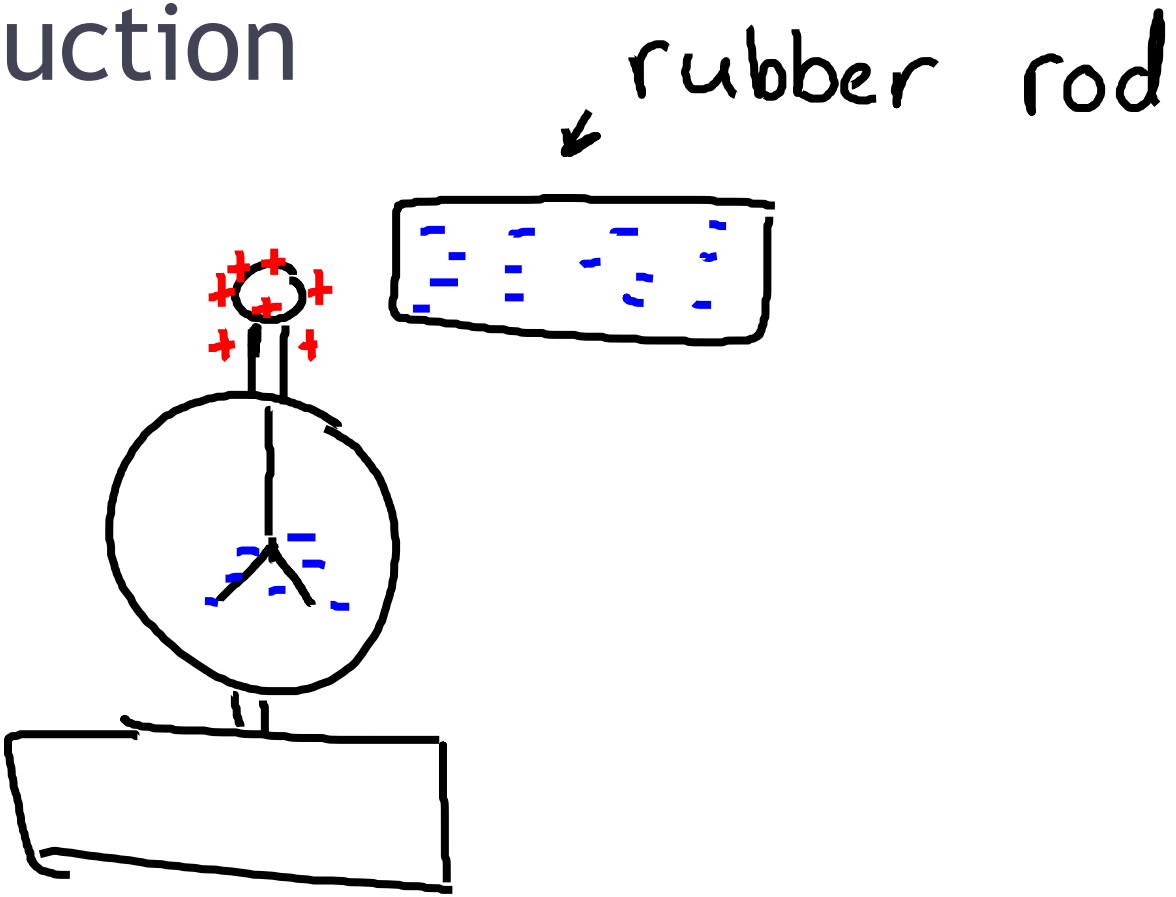
Demos

- Balloons and water
- Measuring devices
  - Pith balls
  - Electroscope (Gold leaves)

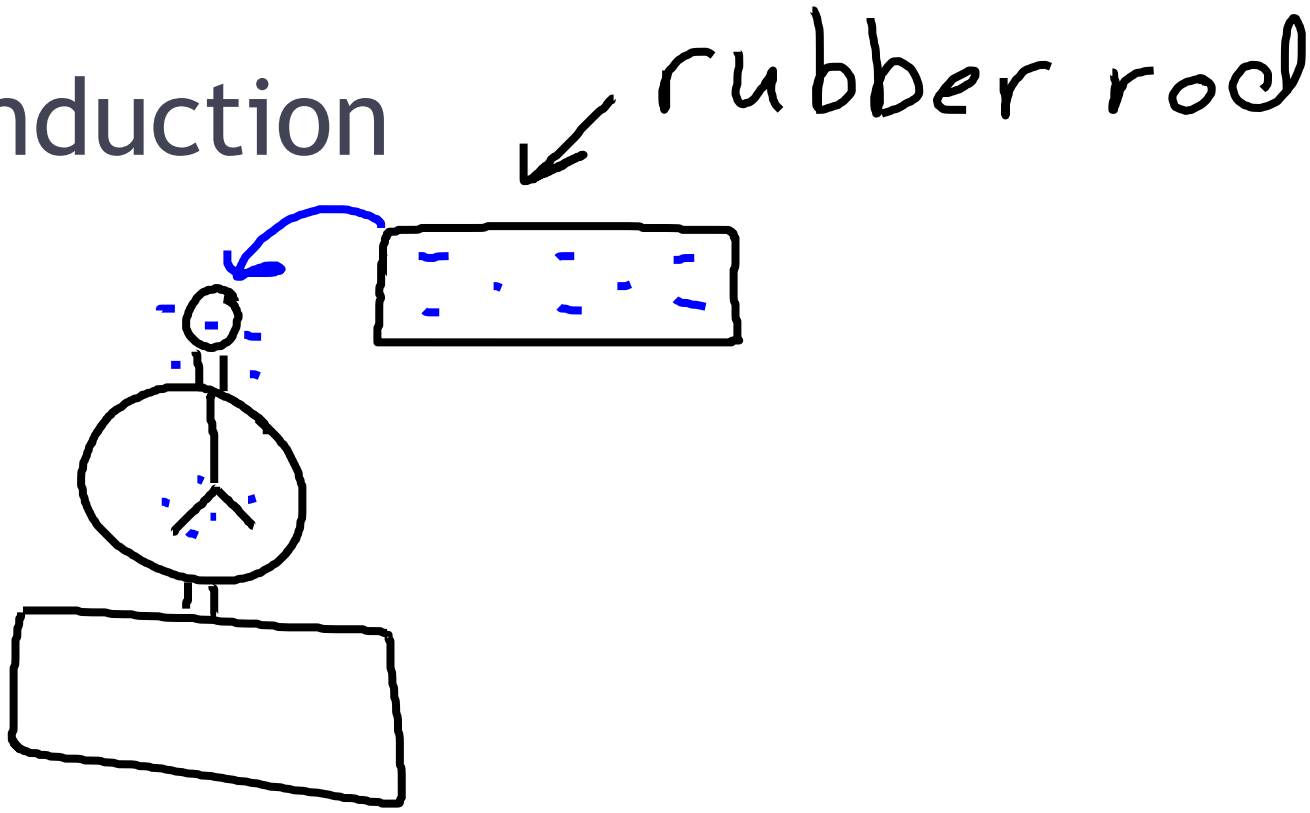
3 ways to charge an object

- Induction
  - This is essentially polarization
- Conduction
  - This is touching charged object and neutral object together.
- Residual Charge by Conduction
  - This is holding a charged object near a neutral object. Then another neutral object comes in contact with the original neutral object. This causes charge to carry into the original neutral object because it is polarized.

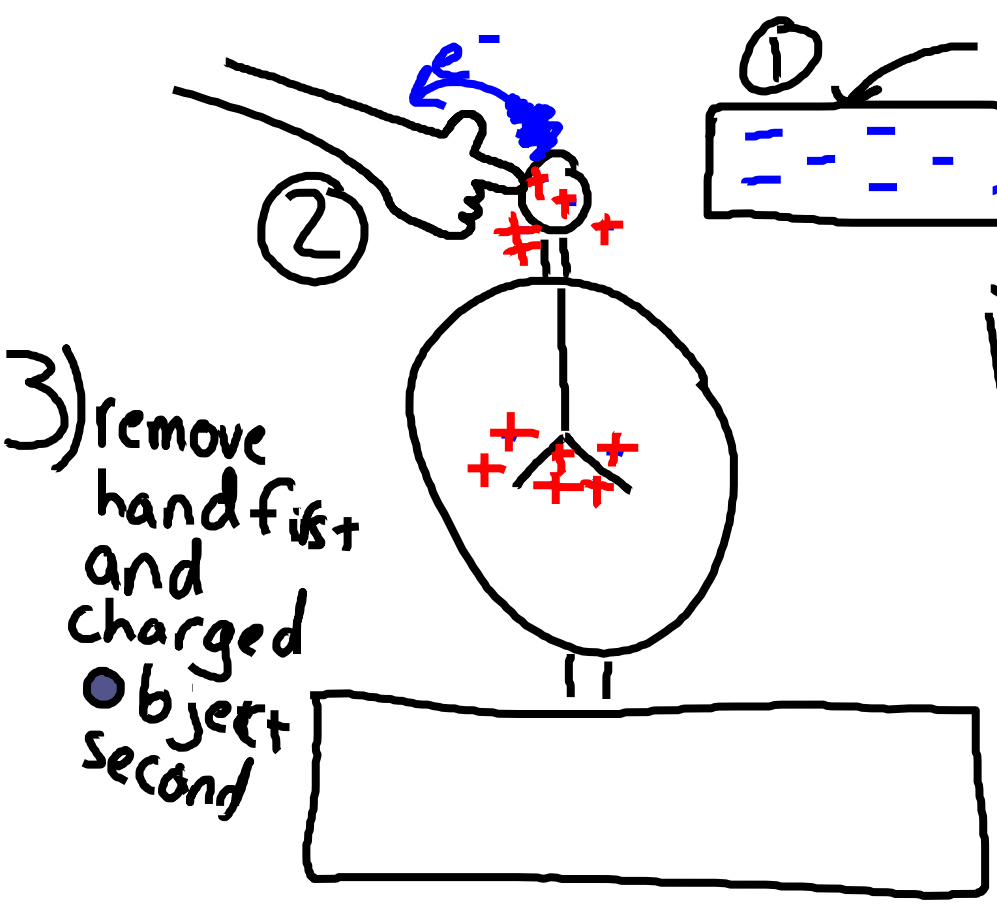
Induction



Conduction



Residual Charge by Conduction



Conductors versus Insulators

- Structure is cubic crystal structure
- Many free electrons
- Electrons flow easily
- Static charge resides on outer surface equally distributed.
- Can be used as a shield against harmful EM radiation.

Conductors versus Insulators

- Electrons don’t flow
- Complex molecular structure

Examples of each

- Conductors
  - silver
  - copper
  - gold
  - aluminum
  - dirty water
  - metals
- Insulators
  - glass
  - rubber
  - Silk
  - Fur
  - pure water

Demo