Fill-In-The-Blank (for first part of Lesson 6)

Physics 12 **Name:** Key **Blk:** _____

Lesson 1 Electrostatics (fill-in-the-blank pg 258 - 264)

The study of electricity began in 700 BC when amber was rubbed with fur and attracted small pieces of leaves and straw.

Volta, in 1800, produced the first battery.

Static Electricity

The Greek word for amber (fossilized tree sap) is "elektron".

Static electricity is electricity at rest.

Conductors are materials that allow electrons to flow. Insulators are materials that do not allow electrons to flow. Metals are good conductors. Some insulators include amber, glass, rubber, fur, silk, plastic

Benjamin Franklin, in the 18th Century, explained the amber effect through a model of matter in which an electric fluid is transferred from one object to another.

Now we know that only electrons can move and be transferred by rubbing. Protons are fixed. A negative charge results from an excess of e^-; a positive charge results from a shortage of e^- and; a neutral object has an equal number of electrons and protons.

Grounding means to provide a path for electrons to enter or leave an object. This neutralizes the object.

Charging by Friction

When rubber rod is rubbed with fur or wool the rod becomes negative.

When a glass rod is rubbed with silk the rod becomes positive.

Law of Charges:

- Like charges repel.
- Opposite charges attract.

Charging by Induction

If a charged rod is brought close to, but not touching, a conductor, the electrons will rearrange themselves within the conductor.

In a neutral electroscope:

- A + charged rod (not touching) will attract electrons to the head of the electroscope.
- A − charged rod (not touching) will repel electrons from the head.
- In both cases the electroscope leaves will diverge until the charged rod is removed from the area.

- If the electroscope is grounded while the charged rod is near, what happens? What charge does the electroscope have after charged rod is removed?
  - + rod grounding will add e⁻ to scope → neg charge
  - – rod " " remove e⁻ from scope → pos charge

Explain how to use an electroscope to determine the charge on an object.

- put known charge on the scope (say pos) then if bring other object "near"
  - if leaves diverge further, then positive
  - " " move together, " " neg.
- opposite reactions if scope charge is neg.

Charging by Contact

When a neutral pith ball, or any neutral object actually, touches a positively charged object, some e⁻ are transferred from the pith ball making the pith ball positive. When a neutral pith ball touches a negatively charged object, some e⁻ are transferred to the pith ball making the pith ball negative.

Examples: Describe the 4 examples given in the text of electrostatic charging.

Walk across carpet - you become "–", e⁻ jump to door knob

Dryer static - diff materials touch and pull apart, get opp. charges so cling.

Thunderstorms - clouds charge from touching, induce charge on ⊕'s surface, e⁻ jump down or up

Balloon on wall - balloon contacts hair/shirt, balloon induces opp. charge on wall so attracts

Law of Conservation of Charges: Electric charges are neither created nor destroyed - they are just moved from one place to another.