1) What causes the polarization of charge in a conductor?

2) What is the polarization of charge?

3) Why is water (H₂O) classified as a “polar” molecule? Draw a diagram to assist your explanation.

4) What is net charge of a polarized conductor? (positive negative neutral depends on the rod)

5) Explain why an insulator cannot be polarized.

6) Show the net charge distributions for following objects in parenthesis for the scenarios below.

   Positive rod held next to a neutral aluminum can. (can)
   Negative rod held next to a neutral aluminum can. (can)
   Neutral rod held next to a neutral aluminum can. (can)
   Negative rod held next to a balloon. (balloon)

   Equally positive rods are held on opposite sides or a neutral aluminum can, one further from the can than the other. (can)
   One positive rod is held on the left side of the neutral aluminum can while a negative rod is held on the right side. (can)
   Equally positive rods are held on opposite sides or a neutral aluminum can, equal distances from the can. (can)

An electroscope is a device used to determine the presence of a charged object. The ball, stem and leaves are conductors that are all connected. Charge is free to roam. The leaves are made of a light weight material and will spread apart when electrons are pulled up to the ball or when electrons are pushed down to the leaves.

Neutral Electroscope

7) Show the distribution of charge on the electroscope if a positive rod is brought near, but does not touch the neutral electroscope.
8) What is the charge of the rod? (positive   negative   neutral)

9) What is the charge of the electroscope? (positive   negative   neutral)

Not only can an electroscope be used to determine if an object is charged, it can also be used to measure how charged an object is compared to other charged objects by how far apart the leaves spread. The stronger the force from the charged object, the farther apart the leaves. Electrosopes cannot simply measure how much access charge an object has nor can they tell us what charge (positive or negative) an object is.

10) A charged object is held at various distances from an electroscope; draw the separation of charge and leaf positions for the following pictures.

![Diagram of electroscope with charged objects]

11) Draw the separation of charge and the leaves for the pictures below. Assume the two charged rods are equal and opposite in charge.

![Diagram of electroscope with charged objects]

12) Could the leaves ever get above an angle of 180° of separation? Why or why not?

13) Could the leaves ever get exactly an angle of 180° of separation? Why or why not?

14) What does an electroscope do?

15) What does an electroscope not do?
Methods of charging

Name:________________________

1) When you rub a glass rod with silk, what charge does the rod become? (positive   negative   neutral)

2) When you rub a plastic rod with rabbits fur, what charge does the rod become? (positive   negative   neutral)

3) What is a ground?

Given the situations below an object will be grounded; show the flow of electrons either from the ground, to the ground, or no electron flow.

Intermixed below are the steps for charging an object by conduction and induction. 1) Cut them out and put them in the correct order. 2) On each picture draw in the correct net charge distribution and/or transfer or electrons with an arrow signifying the direction of the flow.

Conduction steps (list the correct order):_______________________
Induction steps (list the correct order):_______________________

A) The negative rod is brought near the electroscope.
B) The positive rod is removed.
C) The positive rod is brought near the electroscope.
D) The negative rod is removed.

E) While the positive rod is held near, but not touching the electroscope, the electroscope is grounded.
F) The electroscope is charged negatively.
G) A plastic rod is charged by rubbing it with fur.
H) The electroscope is charged negatively.

I) The ground is removed.
J) A glass rod is charged by rubbing it with silk.
K) The negative rod touches the electroscope.