

Name _____
(20 points, due _____)

ELECTROSTATICS STUDY SHEET

Each of the following questions represents a concept discussed in class. Further information can be found in Chapters 16-17 of the text.

1. By how much does the electric force between a pair of charged particles change when their separation is doubled? Tripled?

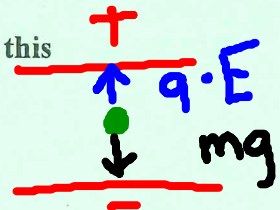
$$F_e = K (q_1 \cdot q_2 / d^2) \quad | \quad F_e \propto q_1 \cdot q_2 / d^2$$

$1/2^2 = 25\%$
 $1/3^2 = 11.11\%$

2. What factors determine whether an object is a conductor or an insulator? What is a semiconductor?

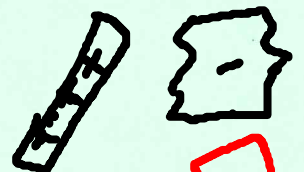
3. Who determined the value of a single charge? Describe (in terms of the 2 forces used) this person's famous experiment which won him the Nobel Prize in Physics.

Robert Millikan Oil Drop exp.



4. When rubbing a neutral glass rod with silk, the rod becomes positively charged, and yet total charge is conserved. Explain.

When silk rubs on the rod ~~they~~ silk picks up - charges



5. State the principle of electrostatic attraction and repulsion.

likes - repel
opposites - attract

6. Define polarization. Use this to explain why neutral objects are attracted to charged.

USES net charge rod to attract or repel e^- which leaves a net charge for each



7. Distinguish between charging by conduction and charging by induction.

Conduction the rod touches the surface / leaves net charge for each
Induction ground the surface and leaves an opposite charge.

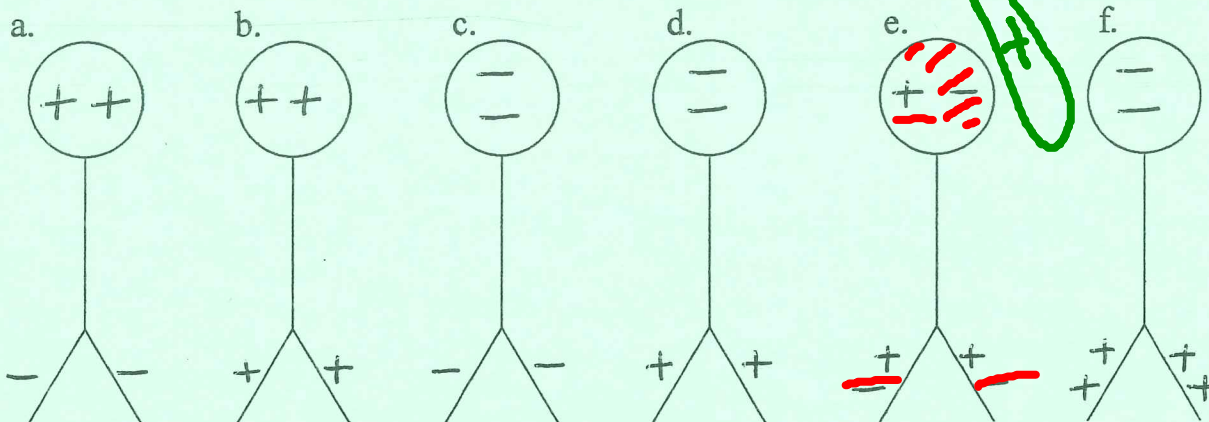
8. Put yourself inside the hollow Van de Graaff generator sphere. When turned on, would you feel a charge? Why or why not?

9. In what way is the charge of a proton similar and dissimilar to that of an electron?

opposite but equal

10. List 5 practical examples of static electricity in today's world.

On the blanks below, place the letter of the diagram that best represents the charge on an electroscope during each of the procedures described:



- D 1. A positively-charged rod is brought near an uncharged electroscope.
- C 2. A glass rod is charged positively by rubbing it with silk. The silk is then touched to a neutral electroscope.
- C 3. A positively-charged rod is brought near a neutral electroscope and the electroscope is charged by induction (by grounding).
- B 4. A neutral electroscope is charged by conduction using a positive rod.
- A 5. A negatively-charged rod is brought near a neutral electroscope.
- F 6. A positively-charged rod is brought near a positively-charged electroscope.
- F 7. A metal rod is brought in contact with a positively-charged electroscope.
- B 8. A neutral plastic rod is brought in contact with a positively-charged electroscope.