

*Today is open binder for one group member. You may omit any one question from the first three sections.*

**Using Vocabulary: (5 points / 1/2 point each):** Fill in the correct term.

- The force of \_\_\_\_\_ occurs between objects with the same charge.
- Objects become charged when they gain or lose \_\_\_\_\_.
- A \_\_\_\_\_ is a device that converts electrical energy to light energy.
- Charging by \_\_\_\_\_ occurs between objects that do not come in contact.
- The flow of charge is called electric \_\_\_\_\_.
- The electric \_\_\_\_\_ is the region around a charge that can exert a force on another charged particle.
- The \_\_\_\_\_ is the unit for electrical power.
- A \_\_\_\_\_ circuit that has all parts connected in a single loop.
- Magnetic poles always occur in \_\_\_\_\_.
- Moving \_\_\_\_\_ produce the magnetic fields that can give an atom a north and a south pole.

**True or False (5 points / 1/2 point each):** Indicate if the statement is true or false.

- The age of a charge influences the force it exerts. T or F
- Electric charges must always occur in pairs. T or F
- Charging by friction does not involve physical contact. T or F
- The unit for potential difference is the volt. T or F
- Thin wires have less resistance than thick wires. T or F
- Increasing resistance in circuit increases electric current. T or F
- Copper is a great insulator. T or F
- All magnets have two poles, a North and South. T or F
- A current carrying coil of wire produces a magnetic field. T or F
- Domains can be unaligned and realigned easily in a permanent magnet. T or F

**Multiple Choice (20 points / 1 point each):** Circle the correct answer

- A positive ion has...
 

a. one proton.	c. more electrons than protons.
b. more protons than electrons.	d. equal electrons and protons.
- Two charges repel each other, the two charges must be...
 

a. both positive.	c. both negative.
b. positive and negative.	d. Either (a) or (c)
- A device that can convert chemical energy to electrical energy is a...
 

a. lightning rod.	c. light bulb.
b. cell or a battery.	d. All of the above

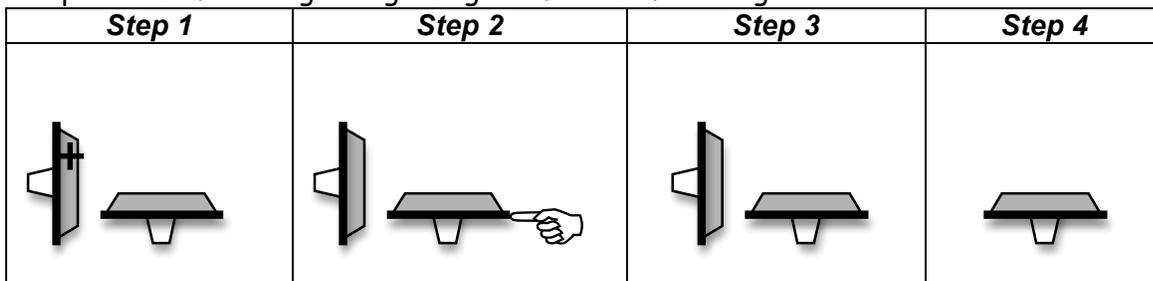
4. A device turns electrical energy into kinetic energy is called a...
  - a. motor.
  - b. generator.
  - c. fuse.
  - d. circuit.
5. Which of the following is NOT an insulator?
  - a. rubber
  - b. water
  - c. Styrofoam
  - d. wood
6. Which of the following determines the strength of an electric force between charged objects?
  - a. The size of the charges.
  - b. The color of the charges.
  - c. The distance between the charges.
  - d. Both answers (a) and (c)
7. Objects can become charged by
  - a. friction.
  - b. conduction.
  - c. induction.
  - d. All of the above
8. Rubbing a balloon on your hair, charges the balloon by...
  - a. friction.
  - b. conduction.
  - c. induction.
  - d. polarization.
9. A negatively charged balloon near a soda can will build up charge in the can by
  - a. friction.
  - b. conduction.
  - c. induction.
  - d. reduction.
10. If an uncharged piece of metal touches a negatively charged balloon, charge is transferred by
  - a. friction.
  - b. conduction.
  - c. reduction.
  - d. induction.
11. A difference in charge between the two connections of a battery is also called...
  - a. potential charge.
  - b. potential problem.
  - c. potential force.
  - d. potential difference.
12. In a good insulator, electrons are usually...
  - a. free to move around.
  - b. tightly bound in place.
  - c. joined to other electrons.
  - d. not held to atoms.
13. The primary reason a bird can perch harmlessly on a single bare high voltage wire is that...
  - a. the bird has a very large electrical resistance.
  - b. the bird's feet are close together.
  - c. there is no potential difference across the bird's feet.
  - d. the bird is grounded.
14. Charge flows in the same direction in...
  - a. alternating current.
  - b. direct current.
  - c. all types of current.
  - d. static electricity.
15. Two bulbs are connected in a series circuit. If you were to add three more bulbs in series with the original two, what would happen to the overall brightness of the bulbs?
  - a. The bulbs would no longer glow.
  - b. The bulbs would grow dimmer.
  - c. The bulbs would grow brighter.
  - d. The brightness would not change.

16. The Earth's magnetic field...
- is similar to a bar magnets, but it has four poles.
  - is created by moving electric charges in Earth's core.
  - is very weak.
  - is strongest at the geographic poles.
17. If you attach a magnet to a string so that the magnet is free to rotate, you will see that the ends of the magnet will point...
- north.
  - south.
  - east.
  - Both (a) and (b).
18. A compass needle is
- a fixed.
  - a non-magnetic piece of metal.
  - is free to rotate.
  - a magnetic piece of non-metal.
19. If you were to sprinkle iron filings over a bar magnet, where would they fall?
- between the field lines
  - along the field lines
  - only on top of the bar magnet
  - only at the ends of the bar magnet
20. The magnetic field of a coil of wires can be increased by...
- adding more loops.
  - increasing the current.
  - putting an iron core inside the coil to make an electromagnet.
  - All of the above

**Short Answer (20 points / 2 points each):**

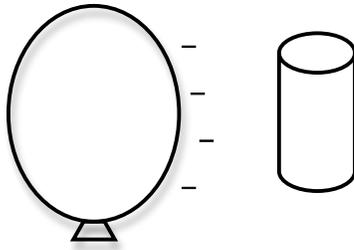
- Why did you receive a shock when touching the Van de Graff generator once it was already turned on for a few moments? Why would the shock be worse if you were not wearing shoes?

- Complete the following charge diagram for the following induction:



- What are the difference between insulators and conductors? Please answer in terms of electron configuration. Give two examples of each.

4. A negatively charged balloon is brought near but not in contact with a soda can. Draw the charge distribution of the polarized soda can.

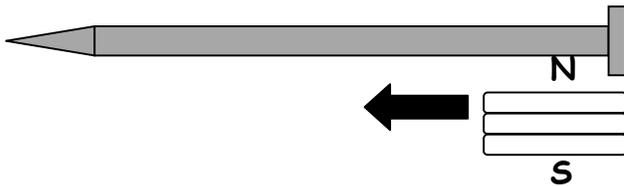


5. Water flows from higher elevations to low elevations. How is this similar to charge flowing from the Electrophorus to the neon bulb?

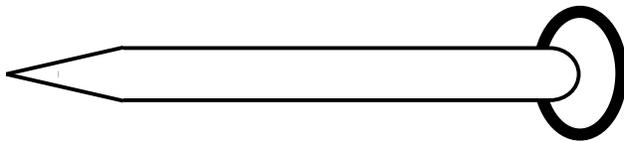
6. Which would be more logical... series or parallel connections around the house? Why?

7. The power company measures electrical energy in kilowatt-hours (kWh) and charges \$0.20 per kWh. If you use a 500 W microwave oven 40 hours a month, what would be your monthly bill?

8. Stroking it with a stack of ring magnets as shown below magnetizes a nail. Show the new polarity of the nail after it was magnetized.



9. Sketch the domains for a magnetized nail below:



10. What are two ways to increase the strength of following electromagnet?

