

You may omit any one question from the first three sections.

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

1. The force of _____ occurs between objects with different charges.
2. Conduction occurs when _____ are transferred from one object to another.
3. A _____ is a device that converts electrical energy to kinetic energy.
4. Charging by _____ occurs when electrons are rubbed away from one object by another.
5. The opposition to flow of charge is called _____.
6. Moving charge not only produces an electric field, it also produces a _____.
7. The _____ is the unit for potential difference.
8. As current _____ potential difference decreases across a circuit.
9. A magnet is always strongest near its _____.
10. _____ magnets have domains that can un-align and realign in the presence of an external magnetic field.

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

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|--|--------|
| 1. The flow of protons is a common form of electric current. | T or F |
| 2. The total amount of charge in the universe changes over time. | T or F |
| 3. Non-metals make the best conductors. | T or F |
| 4. The unit for electric current is the volt. | T or F |
| 5. Thick wires have greater resistance than thin wires. | T or F |
| 6. The ground is thought to be an infinite source of charge. | T or F |
| 7. Electromagnets can be turned on and off. | T or F |
| 8. Magnets can be cut in half to produce single North and South poles. | T or F |
| 9. A current carrying coil of wire can attract a magnet. | T or F |
| 10. Domains can be thought of as tiny magnets within a magnet. | T or F |

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

1. A negative ion has...

a. one proton.	c. more electrons than protons.
b. more protons than electrons.	d. equal electrons and protons.
2. If two charges attract each other, the two charges must be...

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

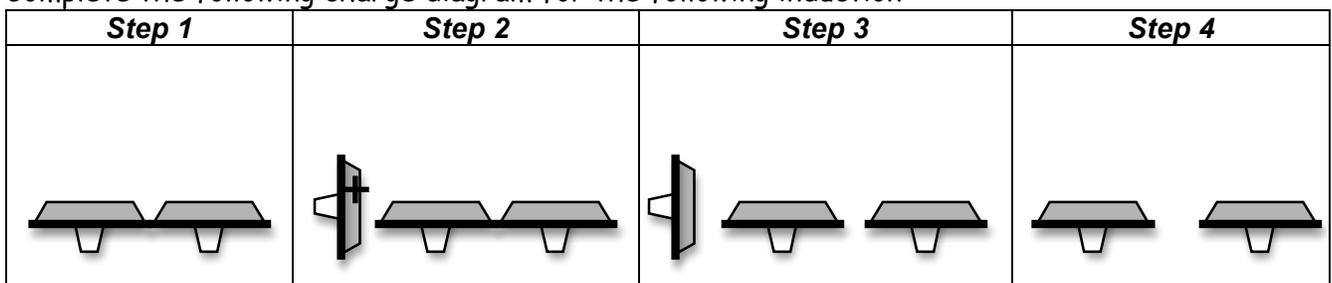
a. lightning rod.	c. light bulb.
b. cell or a battery.	d. solar cell.

4. A device that converts electrical energy to sound energy is a...
- a. generator.
 - b. motor.
 - c. speaker.
 - d. Both (a) and (b)
5. Which of the following is a poor conductor?
- a. Copper
 - b. Human body
 - c. Gold
 - d. Nickel
6. What type of current comes from the outlets in your home?
- a. direct current
 - b. alternating current
 - c. electric discharge
 - d. static electricity
7. The strength of the electric force between two charged objects depends on the...
- a. size of the objects.
 - b. size of the charges.
 - c. the distance between the charges.
 - d. Both (b) and (c)
8. Objects can become charged by contact through...
- a. friction.
 - b. conduction.
 - c. induction.
 - d. Answers (a) and (b)
9. Shuffling your feet on a carpet is an example of charging by...
- a. friction.
 - b. conduction.
 - c. induction.
 - d. reduction.
10. We can say that charge...
- a. cannot be created.
 - b. cannot be destroyed.
 - c. is conserved.
 - d. All of the above
11. Clothing sticks together when you remove them from the dryer because...
- a. the clothing is magnetized.
 - b. the clothing is short circuited.
 - c. they are not charged.
 - d. of static electricity.
12. The greater the potential difference...
- a. the lesser the current.
 - b. the greater the current.
 - c. the greater the difference in charge.
 - d. Answers (b) and (c)
13. Charges continually switch from flowing in one direction to flowing in the reverse in...
- a. alternating current.
 - b. static electricity.
 - c. river current.
 - d. direct current.
14. If two different sized light bulbs (40 W and 100 W) are connected to a battery in two parallel loops, what do the two bulbs have in common?
- a. Voltage
 - b. Current
 - c. Resistance
 - d. Power
15. The area around a magnet in which magnetic forces can be felt is called the magnetic...
- a. field.
 - b. domain.
 - c. poles.
 - d. solenoid.

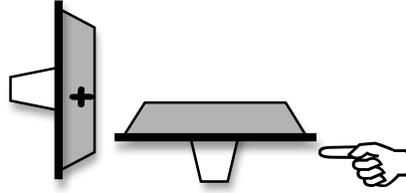
16. The magnetic effects of a bar magnet are strongest near the...
- center.
 - top.
 - ends.
 - bottom.
17. A magnet that is suspended and free to rotate is affected by...
- the Earth's geographic poles.
 - the Earth's magnetic field.
 - the Earth's gravity.
 - Both (b) and (c).
18. The alignment of these determines strength of a magnet.
- Poles
 - Domains
 - Coils
 - Both (a) and (c).
19. Sprinkling iron filings over a bar magnet, show the magnet's...
- relative strength.
 - field lines.
 - magnetic field.
 - All of the above
20. A magnet can demagnetize if...
- it is dropped.
 - it is heated.
 - it is struck very hard.
 - All of the above

Short Answer (20 points / 2 points each):

- How does a charged Electrophorus only power a Neon bulb for only a few moments?
- What are the difference between insulators and conductors? Please answer in terms of electron configuration. Give two examples of each.
- Explain what it means for an object to be polarized and give an example with a diagram.
- Complete the following charge diagram for the following induction:



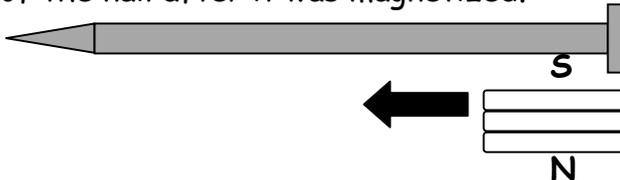
5. What type of charge will flow to the ground in the following induction diagram? Why?



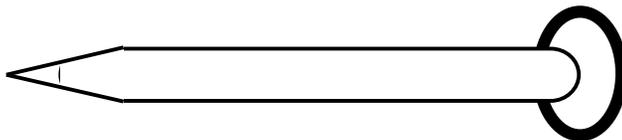
6. Sketch two light bulbs connected in series and two light bulbs connected in parallel to a battery. Which one will produce the greater current (brightness) in the bulbs? Why?

7. The power company measures electrical energy in kilowatt-hours (kWh) and charges \$0.30 per kWh. If you use a 1200 W iron for your clothes for 20 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 un-magnetized nail below:



10. What would be two ways to increase the speed of one of the motors we created in class?