Name:_____ Block: _____ Date: _____
IP 614

Review of Static Electricity

Central Concept: Stationary and moving charged particles result in the phenomena known as electricity and magnetism.

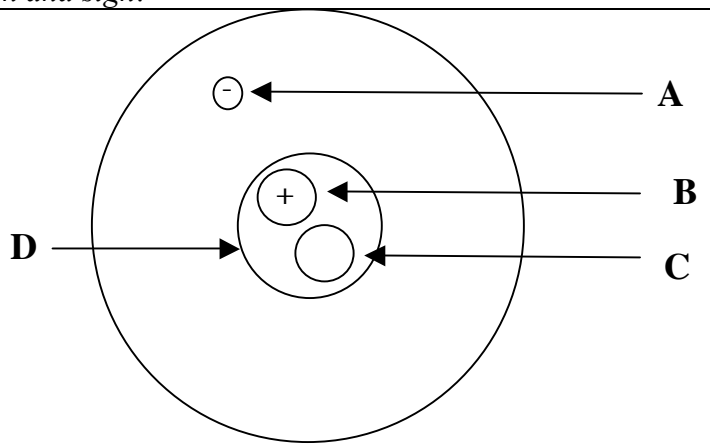
5.1 Recognize that an electric charge tends to be static on insulators and can move on and in conductors. Explain that energy can produce a separation of charges.
5.4 Describe conceptually the attractive or repulsive forces between objects relative to their charges and the distance between them (Coulomb's law).

Part 1: Matching

Match each of the following terms with the appropriate description. Write the letter of the best answer to the left.

Terms	Description
_____ 1. atom	a. a small, negatively charged particle
_____ 2. proton	b. a neutral particle
_____ 3. electron	c. the smallest particle of an element that keeps the properties of that element
_____ 4. neutron	d. a positively charged particle

Match each of the following terms with the appropriate letter on the atom diagram. Pay attention to location and sign!

Terms	
____ 5. proton	
____ 6. nucleus	
____ 7. electron	
____ 8. neutron	

Match each of the types of objects with a description of the charges on the object.

Type of Object	Charge on the object
_____ 9. A positively charged object.	a. An object with an equal number of protons and electrons.
_____ 10. A negatively charged object.	b. An object with more protons than electrons.
_____ 11. A neutral object.	c. An object with more electrons than protons.

Match the interaction with the pair of PARTICLES. Interactions may be used more than once.

Pairs of PARTICLES	Interaction
_____ 12. A proton and an electron.	a. attract
_____ 13. A proton and a proton	b. repel
_____ 14. A proton and a neutron	c. no interaction
_____ 15. An electron and an electron	
_____ 16. A neutron and a neutron.	
_____ 17. An electron and a neutron.	

Match the interaction with the pair of OBJECTS. Interactions may be used more than once.

Pairs of OBJECTS	Interaction
_____ 18. A positively charged object and a negatively charged object.	a. attract
_____ 19. A positively charged object and a neutrally charged object.	b. repel
_____ 20. A neutrally charged object and a neutrally charged object.	c. no interaction
_____ 21. A negatively charged object and a negatively charged object.	
_____ 22. A positively charged object and a positively charged object.	
_____ 23. A negatively charged object and a neutrally charged object.	

Part 2: Fill in the Blank

Word Bank: Choices may be used once, more than once or not at all.

Amount	Decrease	Repelled
Attract	Increase	Rubber
Attracted	Insulator	Same
Charge	Neutral	Neutral
Conductor	Repel	

24. A proton and an electron have the same _____ of charge but opposite _____.

25. Two objects with the same charge _____ each other.

26. Two objects with opposite charges are _____ to each other.

27. A neutral object is _____ to a charged object.

28. A proton will repel another proton but it will _____ an electron.

29. A neutral object has the _____ amount of positive charge and negative charge.

30. An atom is usually _____ since it usually has the same number of protons and electrons.

31. A _____ allows charge to flow easily through it.

32. An _____ has tightly bound electrons.

33. Copper is an example of a good _____.

34. _____ is an example of a good insulator.

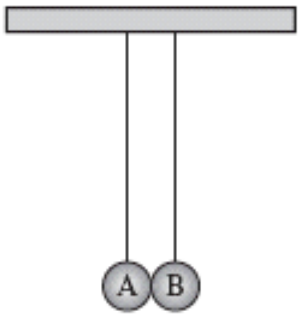
35. A good wire consists of a _____ in the center surrounded by an _____.

36. If you take two charged objects and move them farther apart, the force that they exert on each other will _____.

37. You double the charge on a balloon. The force that this balloon is able to exert on another charged object will _____.

Part 3: Multiple Choice

1.) The diagram below shows two aluminum spheres.



Aluminum sphere A contains a small negative charge and is touched by aluminum sphere B, which has a larger negative charge. Which of the following occurs next?

A. Protons flow from sphere B to sphere A.
B. Protons flow from sphere A to sphere B.
C. Electrons flow from sphere B to sphere A.
D. Electrons flow from sphere A to sphere B.

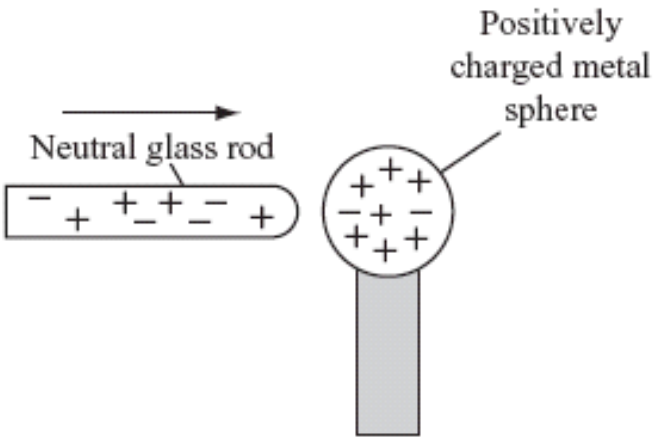
2.) Why does a plastic rod have a negative charge after being rubbed with a piece of fur?

A. The fur gives up protons to the rod.
B. The rod gives up electrons to the air.
C. The fur gains protons from the rod.
D. The rod gains electrons from the fur.

3.) A negatively charged rubber rod was brought near some small pieces of paper. The rod's charges repelled the negative charges in the pieces. Which of the following caused the repulsion of the negative charges?

A. conduction
B. gravitation
C. induction
D. insulation

4.) The figure below shows a neutral glass rod and a positively charged metal sphere.



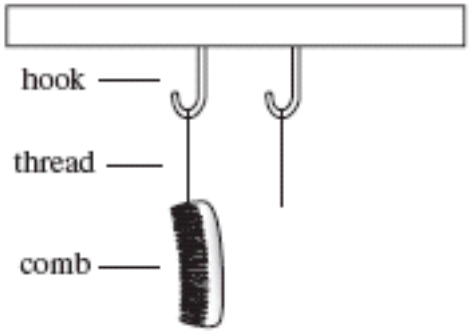
Which of the following best describes the movement of charges as this glass rod touches the sphere?

A. Negative charges move from the sphere to the glass rod.
B. Negative charges move from the glass rod to the sphere.
C. Positive charges move from the sphere to the glass rod.
D. Positive charges move from the glass rod to the sphere.

5.) Which of the following describes an object that must have a net negative charge?

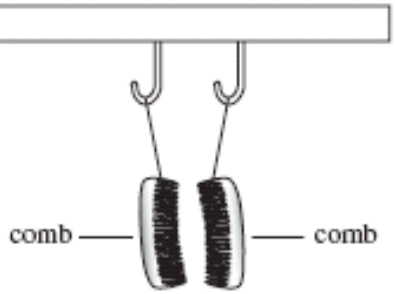
A. It contains more molecules than atoms.
B. It contains more electrons than protons.
C. It is carrying an electric current.
D. It is made of metal.

6.) A student combs her hair with a hard rubber comb and then hangs the comb on a loop of light thread that is suspended from a hook as shown below.

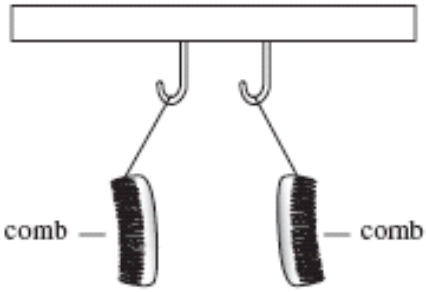


She immediately combs her hair with a second identical comb and hangs it on the second suspended loop of light thread. If the combing has caused a charge to accumulate on the combs, which of the following shows what will occur?

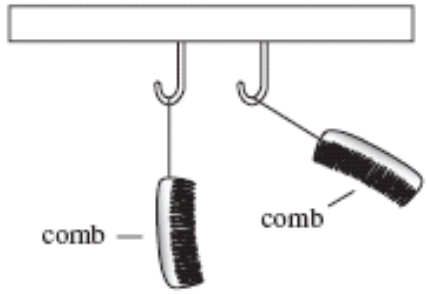
A.



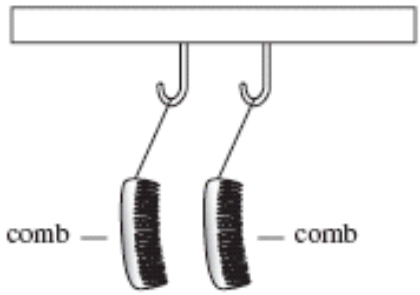
B.



C.



D.



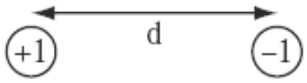
7.) Two oppositely charged objects are separated by a small distance. The objects are then moved three times farther apart from each other.

Which of the following statements best describes what happens to the electrical force between the objects?

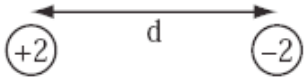
A. The force of attraction increases.
B. The force of attraction decreases.
C. The force of attraction becomes zero.
D. The force of attraction stays the same.

8.) The distance between two charges is represented by d. In which of the following diagrams is the attractive force between the two charges the **greatest**?

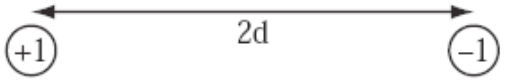
A.



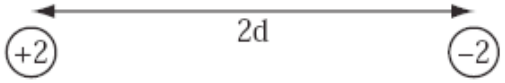
B.



C.



D.



Questions 9-11 ***An electron 1 meter from a charged conducting sphere (which is on an insulating stand) experiences a certain amount of force. We shall give this amount of force a value of 1.0, so a force twice as strong will have a value of 2.0, and so on.***

9.) An electron <u>half</u> a meter away will experience a force from the sphere of:
A. 0.25 B. 0.5 C. 1 D. 2 E. 4

10.) A <u>pair</u> of electrons one meter from the sphere will experience a force of:
A. 0.25 B. 0.5 C. 1 D. 2 E. 4

11.) A <u>pair</u> of electrons <u>two</u> meters from the sphere will experience a force of:
A. 0.25 B. 0.5 C. 1 D. 2 E. 4

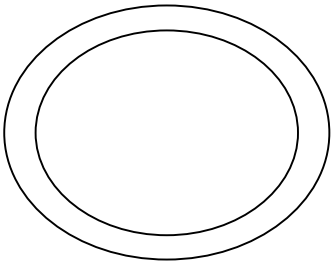
Part 4: Open Response

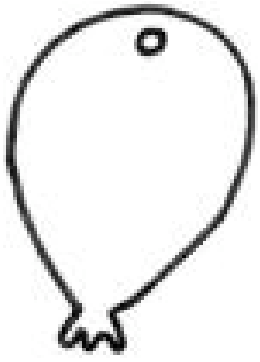
1. Give two reasons why electrons are the particles that are transferred from object to object, not protons.

2. When you walk across the floor, touch a doorknob and get a shock, what are you feeling?

3. During the static electricity lab you placed an empty aluminum soda can on the lab table. You then brought a charged balloon NEAR the soda can.
   a.) Describe what you observe.

   b.) Draw a picture showing the charges in the can and on the balloon.





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4. What is charge? How is it measured?

5. Here is a sample of a triboelectric series.

Electron Grabber <----------> **Electron Donor**

Plastic Amber Cotton Silk Wool Glass Rabbit Fur

Choose two items on this list:

- _____
- _____

Describe how you know which one would become positively charged and which one would become negatively charged if they were rubbed together:"

6. A student rubs a balloon on her hair and the balloon acquires a negative charge.

a.) Explain why the balloon acquires a negative charge.

b.) After the balloon is rubbed on the student's head, the student's hair stands out from her head. Explain why this happens.

The student then brings the negatively charged balloon near another balloon that was charged in the same way.

c.) Describe and explain what happens when the negatively charged balloon is brought near another negatively charged balloon.