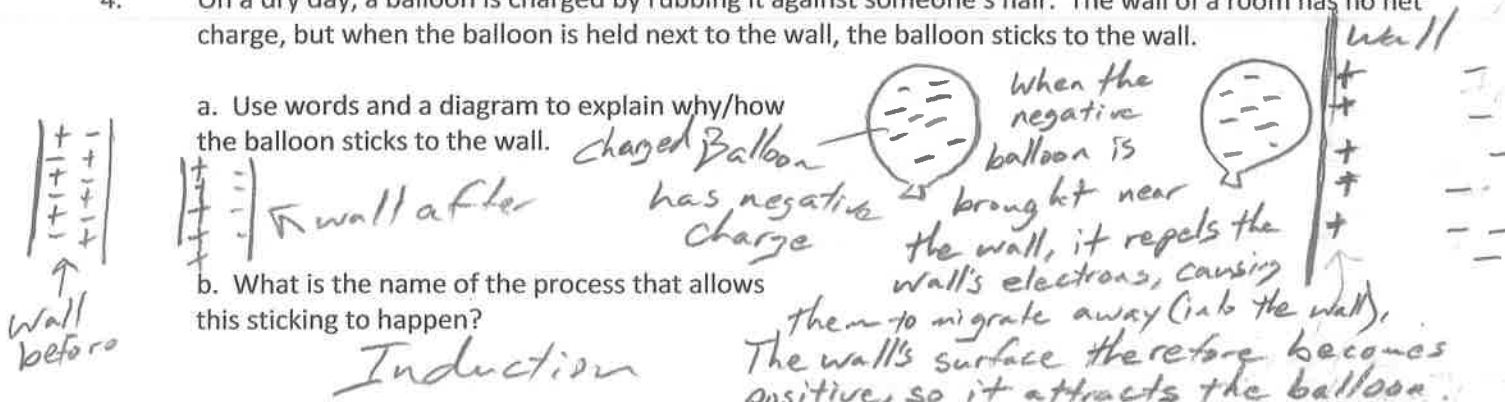


- protons are positively charged particles in an atom.
- electrons are negatively charged particles in an atom.
- If a battery (or any object) becomes "charged," that can mean two things. Describe both possibilities.  
An excess of electrons or a dearth (lack) of electrons.
- On a dry day, a balloon is charged by rubbing it against someone's hair. The wall of a room has no net charge, but when the balloon is held next to the wall, the balloon sticks to the wall.



a. Use words and a diagram to explain why/how the balloon sticks to the wall.  
 charged Balloon has negative charge  
 wall after

b. What is the name of the process that allows this sticking to happen?

Induction

Answer choices for 5-11:

- a. Volt      b. Joule      c. Coulomb      d.  $1.6 \times 10^{-19} \text{C}$       e.  $-1.6 \times 10^{-19} \text{C}$   
 f. Ampere      g. Newton      h. Ohm

- |                                |                                  |
|--------------------------------|----------------------------------|
| 5. <u>g</u> Force              | 9. <u>d</u> Charge of one proton |
| 6. <u>a</u> Electric Potential | 10. <u>b</u> Energy              |
| 7. <u>h</u> $\Omega$           | 11. <u>h</u> Resistance          |
| 8. <u>c</u> Unit of Charge     | 11.5. <u>f</u> Current           |

- A closed system comprises 2 objects. Object A has a charge of -5. Object B has a charge of +14.
  - What is the net charge of the system? +9
  - If the charge of Object A changes to -8, what is Object B's new charge? +17
  - What evidence do you have to prove that this is true?

Law of Conservation of charge (says net charge will remain constant @ +9)

- Two charges are attracted to one another.
  - What do you know about the charges' signs? Opposites
  - If the objects are moved closer together, so that they are half their original distance, how does their new force of attraction compare to their original force of attraction? 4x
- Two charges repel one another. If the objects are moved farther apart, so that they are now five times farther apart, how does their new force of repulsion compare to their original force of repulsion?

1/25 x

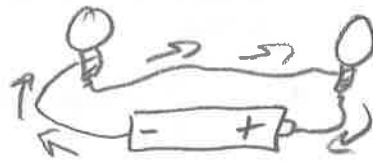
- insulators are materials with tightly held electrons.
- conductors are materials with loosely anchored electrons.

Answer Choices For 17-29:

- a. ~~Current~~
- b. ~~Electric Field~~
- c. ~~Resistance~~
- d. Parallel Circuit
- e. Series Circuit
- f. Electric Potential
- g. ~~Battery~~
- h. Voltage
- i. ~~Electric Field Lines~~
- j. Circuit
- k. ~~Electric Potential-energy~~

- 17. g A device that provides voltage. It can be thought of as an electron pump.
- 18. k Energy that may be stored by pushing like charges together.
- 19. b The region around a charged object where a force would be exerted on other charged particles.
- 20. c This is provided by a bulb, a hairdryer, or anything that slows the flow of electrons.
- 21. a The amount of electron flow.
- 22. f or h This can be thought of as the amount of "pressure" that is pushing electrons.
- 23. j A path (often a wire) along which electrons can flow.
- 24. i Arrows that point in the direction that a positive charge would move.
- 25. f Another name for Voltage
- 26. e A circuit in which each electron must flow through every device.
- 27. d A circuit that provides multiple electron paths, including a separate path through each device.
- 28. e If there is a break in any part of this type of circuit, electrons will not flow through any part of the circuit.
- 29. d If you have one bulb in this type of circuit, and then you add another one, there will not be any change in the brightness of your first bulb.

30. Draw a diagram of a circuit with two bulbs, in **series**, controlled by one switch. The bulbs should be powered by a battery. Use arrows to show the direction of **electron flow**.



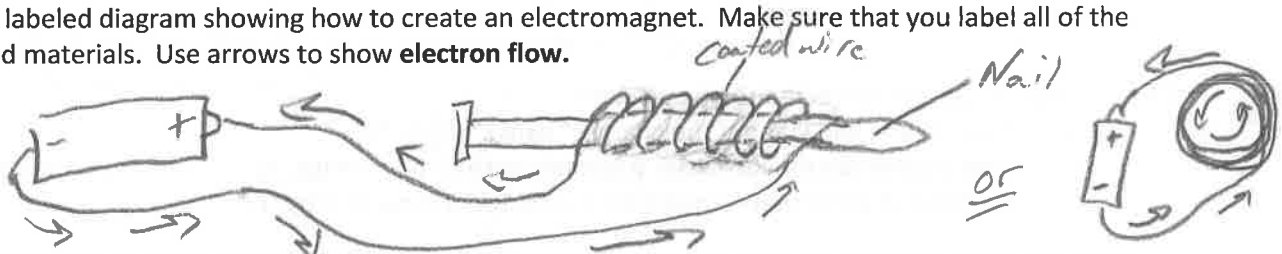
*electrons flow out of negative, toward positive*

*Attach extra paper for drawings (if necessary)*

31. Draw a diagram of a circuit with two bulbs, in **parallel**, controlled by one switch. The bulbs should be powered by a battery. Use arrows to show the direction of **electron flow**.



32. Draw a labeled diagram showing how to create an electromagnet. Make sure that you label all of the required materials. Use arrows to show **electron flow**.



*Any loop of wire with current flowing through it.*

33. Draw a labeled diagram showing how to create a motor. Make sure that you label all of the required materials. Use arrows to show **electron flow**.

