

# Electricity Unit Review Answers

1. The electrons move when charge is transferred from one atom to another.
2. Which of the following is not part of the electrical nature of matter (circle the incorrect answer)
  - a. All matter is made up of subatomic particles called atoms
  - b. At the center of the atom is the nucleus in the center are the (+) and (-) charges, around the orbit are the (-) charges.
  - c. If atoms gain electrons they become positively (+) charged
3.
  - a. A cotton sweater (-) and a pair of wool pants (+)
  - b. Your hair (+) and a plastic comb (-)
  - c. Your silk pj's (+) and your cotton sheets (-)
4. There is less moisture in the air in the winter so there are fewer water molecules to remove charges from charged surfaces. Water acts as a conductor moving electrons away from the individual.

5. Static wicks - electrons flow off the tip of the rod into the air.  
(usually attached to air planes)

Grounding - the earth absorbs the built up charges (i.e. lightning rods)

6. Source – cell or battery (provides the energy)

Load – toaster, light bulb (is given the energy)

Connecting wires – copper, aluminum (connects the various parts of the circuit)

Control device – switch, thermostat (controls if the load is on or off)

7. A closed circuit is one in which electricity is flowing. An open circuit is one in which there is a break in the flow of electricity.

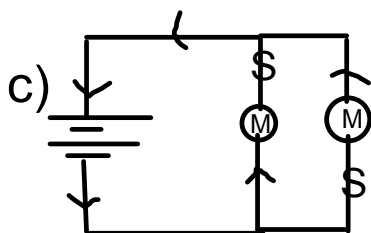
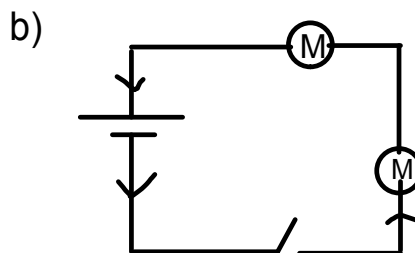
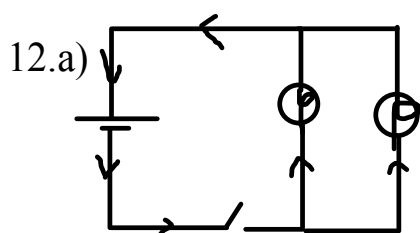
8. Static electricity stays in one place on an object and current electricity is an electric charge that is moving in one or more paths.

9. The electric charge flows from the negative terminal of the dry cell, through the circuit and back to the positive terminal of the cell. Negative charges that are released at the negative terminal are attracted to the positive terminal (unlike charges attract)

10. A series circuit is when the parts of the circuit are wired to one another in a single path. A parallel circuit is when the parts of the circuit are each on their own separate branch. The parallel circuit would have the least amount of resistance, there are multiple paths through which current can flow, so the resistance of the overall circuit is lower than it would be if only one path was available.

11. a. This is an example of a series circuit

b. If R1 stopped working neither R2 nor R3 would work. This is a series circuit and if there is a break anywhere in the path it will not work because there is only one pathway for electrons to flow from negative to positive.



13. a. electrical potential/voltage **V , volts**  
b. electric current **A , amps**  
c. electric resistance **R,  $\Omega$**

14. To design a circuit with two 1.5V batteries and two light bulbs that would create the least amount of resistance it would need to be constructed in parallel. Parallel circuits have less resistance than series circuits because each load has its own pathway from negative to positive rather than sharing the electrons in a single path.

15. a) The relationship between current and resistance is an inverse relationship. The greater the resistance the less the current is. Resistance slows down the flow of electrons and current measures the flow, so every time you add a resistor the flow is slowed even less.

b) The relationship between voltage and current is a direct relationship. When voltage increases current also increases. Voltage is the amount of electrons available and current measures the flow of electrons if you increase the amount of electrons you in turn increase the flow of them.

c) The relationship between voltage and resistance is also a direct relationship the voltage must increase as resistance increases for there to be enough electrons flowing through the circuit to create electricity.

16. a) How much current is running through a circuit which has a voltage of three 1.5V batteries and a resistance of  $40\Omega$ .

$$\begin{aligned} V &= 3 \times 1.5V = 4.5V & I &= \frac{V}{R} = \frac{4.5V}{40\Omega} = 0.1A \\ R &= 40\Omega \end{aligned}$$

b) How many 1.5V batteries would be required to power a circuit with a current of 2A and a resistance of  $1.5\Omega$ ?

$$\begin{aligned} I &= 2A & V &= I \times R \\ R &= 1.5\Omega & V &= 2A \times 1.5\Omega \\ & & V &= 3V \end{aligned}$$

It would take two 1.5V batteries to power the circuit.

c) Calculate the resistance flowing through a circuit with 120V and 0.5A of current.

$$\begin{aligned} V &= 120V & R &= \frac{V}{I} = \frac{120V}{0.5A} = 200\Omega \\ I &= 0.5A \\ R &= ? \end{aligned}$$

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