Electricity Study Guide KEY

Answer the following questions for each objective:

Objective 1: Students will be able to use Ohm's Law in order to calculate current, voltage, and resistance.

- What is the current produced with a voltage of 630 volts through a resistance of 5 ohms? I=V/R I=630/5
 - I=126 amps
- What resistance would produce a current of 60 amps from a 9-volt battery?
 R=V/I
 R=9/60
 R=0.15 ohms
- What voltage is necessary to produce a current of 260 amperes through a resistance of 0.02 ohms? V=I x R V=260 x 0.02
 - V=5.2 volts
- 4. What is the current produced by a 12-volt battery flowing through a resistance of 0.004 ohms? I = V/R
 - I=12/0.004
 - I=3000 amps
- If the potential difference is 80 volts and the resistance is 50 ohms, what is the current? I=V/R I=80/50
 - I=1.6 amps
- 6. What is the current in problem 5 if the voltage were doubled? What happened to the current? I=V/R
 - I=160/50 I=3.2 amps The current also doubled
- 7. What is the current in problem 5 if the resistance were doubled? What happened to the current? I=V/R I=80/100

I=80/100 I=0.8 amps The current is halved

8. What can you predict would happen to the current in a device if the resistance of the device increases and the voltage stays the same? Explain how you arrived at this answer. You can show an example if necessary.

Current decreases.

- 9. What can you predict would happen to the resistance in a device if the voltage increases, but the current stays the same? Explain how you arrived at this answer. You can show an example if necessary. **Resistance increases.**
- 10. What can you predict would happen to the voltage in a device if the resistance increases, but the current stays the same? Explain how you arrived at this answer. You can show an example if necessary. Voltage increases

- 11. What can you predict would happen to the current in a device if the resistance of the device decreases and the voltage stays the same? Explain how you arrived at this answer. You can show an example if necessary.
 - **Current increases**
- 12. What can you predict would happen to the resistance in a device if the voltage decreases, but the current stays the same? Explain how you arrived at this answer. You can show an example if necessary. **Resistance decreases**
- 13. What can you predict would happen to the voltage in a device if the resistance decreases, but the current stays the same? Explain how you arrived at this answer. You can show an example if necessary. Voltage decreases
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Objective 2: Students will be able to identify a parallel and series circuit and explain the difference between the two. 14. Write down the function of each of the four parts of a circuit:

- Voltage source Supplies the power to move the electrons through the circuit
- Conductor Carries the electrons throughout the circuit
- Electrical device The part of the circuit that is being powered
- Switch A control which allows electrons to flow through a circuit or to stop the flow of electrons in a circuit

15. Draw and label a series circuit



17. What is the difference between a series and a parallel circuit?In a series circuit, the electrons can only follow one path; if one electrical device is not working, all of the others will also not work. In a parallel circuit, the electrons travel in any path that they can to reach all electrical devices; if one electrical device is not working, it does not affect the others on the circuit.

18. Give an example of something that is wired in a series circuit. How do you know it is a series circuit? A children's toy that lights up or makes noise. If one part breaks, the entire thing stops working.

Older Christmas lights; if one bulb burns out, all of the lights on that string go dark.

19. Give an example of something that is wired in a parallel circuit. How do you know it is a parallel circuit?

Christmas lights, if one light bulb burns out, all of the other remain lit A house; if one light fixture or an appliance stops working, everything else still does. Light fixtures with multiple bulbs; if one bulb burns out, the others stay lit.

- 20. How do electrons flow in a series circuit? All electrons follow in one path.
- 21. How do electrons flow in a parallel circuit? In the path of least resistance, any way they can to reach all electrical devices