**Lesson Information**

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| Lesson: (1 of 4) Theory Length: 90 minutes  Unit: (1 of 3) Basic Theory and Practice  Course: Electrical |

**Content Assumptions**

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| Prior to this class, students have taken math and safety courses. |

**Essential Questions**

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| 1. What principles govern the operation of electricity? 2. How can electricity be controlled and used safely? |

**Objectives Assessments**

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| After completing this lesson, students will be able to:   1. Describe the principles of electricity and how it is used in residences. 2. Use Ohm’s Law to calculate unknown parameters in a variety of circuits. | 1. Circuits lab — Instructor observation 2. Ohm’s law worksheet — key |

**Activities/Instruction**

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| **Shock it to Me** (45 minutes)  Using sample materials (as listed in the Materials section), Instructor demonstrates how series, parallel, and combination circuits are formed. During demonstrations, Instructor introduces and defines all relevant electrical terms (e.g., voltage, conductor, insulator, current, resistance, etc.). Instructor also introduces the terms for electrical units of measurement. After Instructor’s demonstrations, each student will model series, parallel, and combination circuits (using the sample materials, or using a simulation as listed in the Materials section). Instructor observes students’ circuits, asking questions to ascertain student understanding.  **Voltage, Resistance, and Current, Ohm-y!** (45 minutes)  Instructor builds upon the introduction to electrical units of measurement given in the earlier demonstrations, outlining Ohm’s Law and how it can be used to determine different unknowns in electrical circuits. Following instruction, Instructor may work through sample problems with students, or use a simulation (as listed in the Materials section) to demonstrate how voltage, current, and resistance are interrelated. Instruction should take about 30 minutes.  Instructor then distributes copies of the Ohm’s Law worksheet (as listed in the Materials section) for students to complete. |

**Materials**

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| For students:   * http://phet.colorado.edu/en/simulation/circuit-construction-kit-ac (Simulation of circuit construction using direct and alternating current) * http://www.mcffa.com/uploads/4/4/8/0/4480777/ohms\_law\_worksheet.pdf (First two pages are the worksheet.)   For Instructor:   * Sample electrical materials (power sources, wiring, loads, switches) that may be set up in a variety of circuits * http://phet.colorado.edu/en/simulation/ohms-law (Simulation demonstrating Ohm’s Law) * http://www.mcffa.com/uploads/4/4/8/0/4480777/ohms\_law\_worksheet.pdf  (Last page is the answer key.) |