Name & Number (if applicable): ___________________________________

1: _______/8 + ______ late

2: _______/7 + ______ late

3: _______/6 + ______ late

4: _______/6 + ______ late

5: _______/9 + ______ late

Incorrect/incomplete: –______

Scaled score: ______/40

Unit 8 Learning Goals – Electric Circuits

Goal Set 1:

Students will be able to analyze current flow in basic electric circuits.

4.0	I can analyze complex problems involving current flow in basic electric circuits.
3.0	**I can analyze current flow in basic electric circuits.** **This includes…** • Analyzing the requirements of a basic electric circuit. • Analyzing the nature of electric current. • Using Ohm's law to relate resistance and voltage to current.
2.0	I can recognize, recall, and explain specific vocabulary and concepts including: • Circuit, current, drift speed, alternating current, direct current, conventional current, schematic diagrams, resistance, Ohm's law. I am able to… • Identify and create basic circuits based on the minimum requirements of current flow. • Analyze electric current as the rate of charge flow. • Analyze the magnitude and direction of electric current, both from a conventional perspective and a realistic perspective. • Distinguish between drift speed of electrons in a circuit and the speed of the electric field that makes current move. • Distinguish between alternating current (AC) and direct current (DC) by analyzing the properties of both. • Represent circuits with schematic diagrams. • Analyze the electric resistance of various wires based on their characteristics. • Use Ohm's law to calculate resistance, voltage, and current.
1.0	With help, partial success at 2.0 content

Check yourself:

Level 2.0

1.) Describe the minimum requirements of an electric circuit.

2.) Describe the nature of electric current in a circuit made of solid materials.

3.) Circle the appropriate response to the following statements. More than one may apply.

a. In electric circuits, current flows fast.
That is so true! That is such a lie. My name is Alex.

b. In electric circuits, an electric field is established slowly.
That is so true! That is such a lie. I like Santa.

c. In electric circuits, an electric field makes the current flow.
That is so true! That is such a lie. I can't tell turtles and tortoises apart.

d. Drift speed is the rate at which an electric field is established when a circuit is completed.
That is so true! That is such a lie. I spy with my little eye something red.

e. Current flows from positive to negative.
That is so true! That is such a lie. Cheese.

f. Conventional current is not actual current.
That is so true! That is such a lie. I'm afraid of wild turkeys.

g. In alternating current, electrons wiggle back and forth but don't actually go anywhere.
That is so true! That is such a lie. My sock is bunched up in my shoe.

h. Alternating current comes from batteries.
That is so true! That is such a lie. I haven't clipped my nails in weeks.

i. Direct current always flows toward the positive terminal.
That is so true! That is such a lie. There's a weird smell in this room.

j. When there is more resistance in a circuit, there is more current.
That is so true! That is such a lie. Everything is cool when you're part of a team.

k. When there is more potential difference across a circuit, there is more current.
That is so true! That is such a lie. I still have a blankie.

l. When there is more voltage in a circuit, there is more current.
That is so true! That is such a lie. My name is not Alex.

Level 3.0

1.) Create a schematic diagram to represent the most basic electric circuit.

2.) An ammeter in a circuit reads 2.5 mA. How much charge (in Coulombs) passes through that ammeter every second?

3.) Circle the characteristics of a wire with high resistance.

Hot cold long short wide thin conductive not so conductive

4.) Why would anyone put a resistor into a circuit?

5.) A circuit connected to a 1.5 V battery has a light bulb with 5.0 mA running through it. What's the resistance of the bulb?

Level 4.0

Given the circuit in question 5 from level 3.0, imagine a second bulb is added next to the first bulb.

1.) How would the voltage in the circuit change (if it changes?) Include a calculation with your answer if applicable.

2.) How would the resistance in the circuit change (if it changes?) Include a calculation with your answer if applicable.

3.) How would the current in the circuit change (if it changes?) Include a calculation with your answer if applicable.

<u>**Goal Set 2:**</u>

Students will be able to analyze the behavior of series circuits.

4.0	I can analyze complex circuits that involve series components.
3.0	**I can analyze the behavior of series circuits.**
2.0	I can recognize, recall, and explain specific vocabulary and concepts including: • Circuit, schematic diagrams, current, resistance, voltage, Ohm's law, series circuit I am able to… • Use Ohm's law to perform calculations involve current, voltage, and resistance.
1.0	With help, partial success at 2.0 content

Check yourself:

<u>**Level 2.0**</u>

Design a series circuit with three resistors by drawing a schematic diagram in the space below. Write the values for voltage and resistance by each component.

Level 3.0

A series circuit has two batteries, each with 9.0 V, and six resistors: 200 Ω, 400 Ω, 600 Ω, 800 Ω, 1000 Ω, and 20 Ω. (You thought I was going to write 1200 Ω, didn't you?)

1. Create a schematic diagram for this circuit.

2. What is the total ("equivalent") resistance in this circuit?

3. How much current flows through the circuit?

4. How much current flows through the 200 Ω resistor?

5. Compare your answer from question 4 to the amount of current that flows through the 1000 Ω resistor.

6. How much voltage is used by the 200 Ω resistor?

Level 4.0

Design a schematic diagram for a circuit that has a total of four resistors such that resistors A & B are in series with each other, resistors C & D are in series with each other, but AB is not in series with CD.

Goal Set 3:

Students will be able to analyze the behavior of parallel circuits.

4.0	I can analyze complex circuits that involve parallel components.
3.0	**I can analyze the behavior of parallel circuits.**
2.0	I can recognize, recall, and explain specific vocabulary and concepts including: • Circuit, schematic diagrams, current, resistance, voltage, Ohm's law, series circuit, parallel circuit I am able to… • Use Ohm's law to perform calculations involve current, voltage, and resistance.
1.0	With help, partial success at 2.0 content

Check yourself:

Level 2.0

Design a parallel circuit with three resistors that are all in parallel with each other by drawing a schematic diagram in the space below. Write the values for voltage and resistance by each component.

Level 3.0

A parallel circuit has two batteries, each with 9.0 V, and six resistors: 200 Ω, 400 Ω, 600 Ω, 800 Ω, 1000 Ω, and 1200 Ω. (You thought I was going to write 20 Ω, didn't you?)

1. Create a schematic diagram for this circuit.

2. What is the total ("equivalent") resistance in this circuit?

3. How much current flows through the battery in this circuit?

4. How much current flows through the 200 Ω resistor?

5. Compare your answer from question 4 to the amount of current that flows through the 1000 Ω resistor.

Level 4.0

Design a schematic diagram for a circuit that has a total of four resistors such that resistors A & B are in parallel with each other, resistors C & D are in parallel with each other, but AB is not in parallel with CD.

<u>Goal Set 4:</u>

Students will be able to analyze the behavior of complex (compound) circuits.

<table>
<tr><td>4.0</td><td>I can analyze the behavior very complex compound circuits.</td></tr>
<tr><td>3.0</td><td>I can analyze the behavior of complex (compound) circuits.</td></tr>
<tr><td>2.0</td><td>I can recognize, recall, and explain specific vocabulary and concepts including:
Circuit, schematic diagrams, current, resistance, voltage, Ohm’s law, series circuit, parallel circuit, compound circuit
I am able to…
Use Ohm’s law to perform calculations involve current, voltage, and resistance.
Analyze the behavior of series circuits.
Analyze the behavior of parallel circuits.</td></tr>
<tr><td>1.0</td><td>With help, partial success at 2.0 content</td></tr>
</table>

Check yourself:

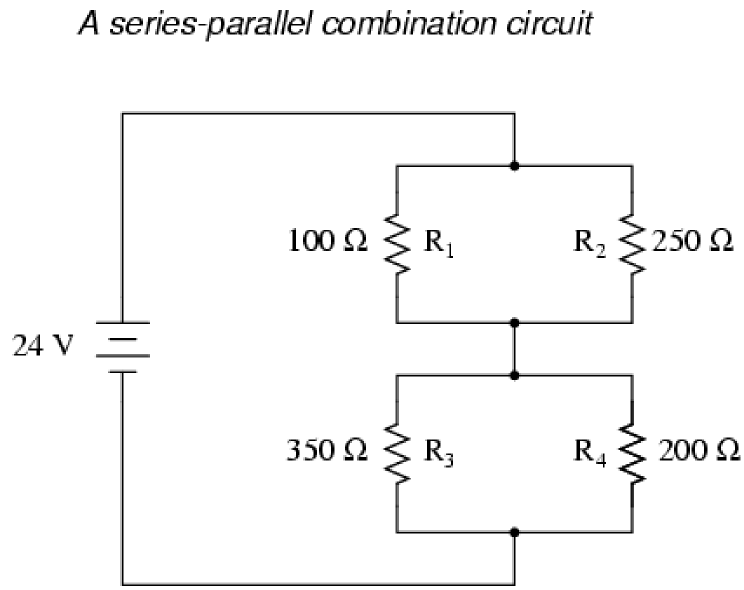
<u>Level 2.0</u>

1.) Explain how a compound circuit is different from a series circuit or a parallel circuit.

2.) What rules apply to both series circuits and compound circuits?

3.) What rules apply to both parallel circuits and compound circuits?

Level 3.0



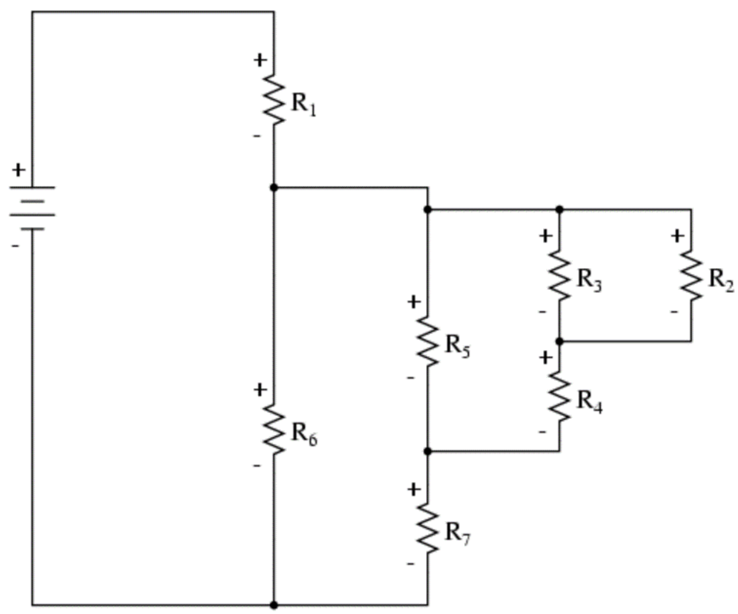
1.) Find the equivalent resistance of the compound circuit above.

2.) Find the current in each of the resistors in the compound circuit above.

3.) How much voltage runs through R_4?

Level 4.0

Have at it! Find the current in and voltage used by each resistor in the circuit below. Enjoy!



Resistor	Resistance (Ω)	Current (A)	Voltage (V)
R_1	110		
R_2	120		
R_3	130		
R_4	140		
R_5	150		
R_6	160		
R_7	170		
			12

Goal Set 5:

Students will be able to analyze household wiring and safety systems, including an analysis of electric power.

4.0	I can analyze the behavior of very complex compound circuits.
3.0	**I can analyze household wiring and safety systems, including an analysis of electric power.**
2.0	I can recognize, recall, and explain specific vocabulary and concepts including: • Circuit, schematic diagrams, current, resistance, voltage, Ohm's law, series circuit, parallel circuit, compound circuit, power, short circuit, fuse, circuit breaker, grounding. I am able to… • Use Ohm's law and the electric power equation to perform calculations involve current, voltage, resistance, and power.
1.0	With help, partial success at 2.0 content

Check yourself:

Level 2.0

1.) Explain how the electric power relates to the concept of power we explored in unit 4 (the energy unit) where power was equal to energy use per unit time.

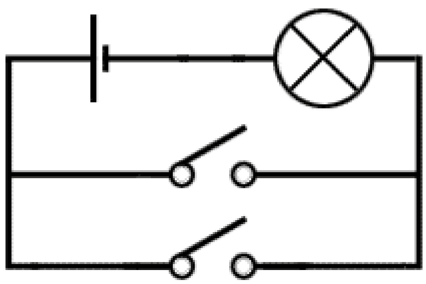
2.) How much power?

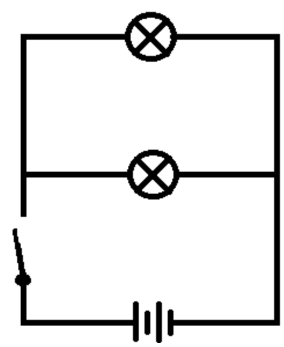
a. 300 Ohms and 120 Volts

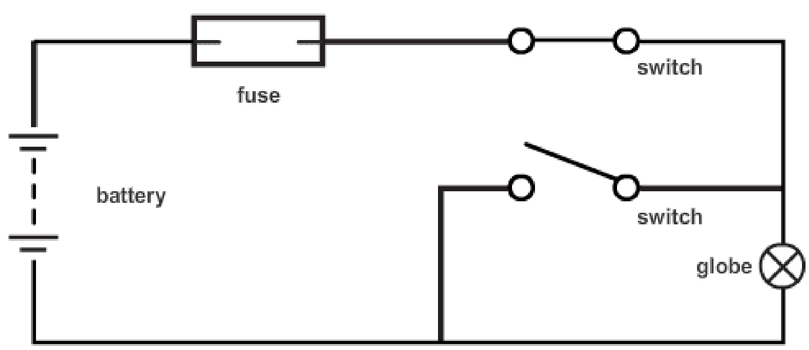
b. 12 Amperes and 120 Volts

c. 15 Amperes and 1200 Ohms

3.) In the following circuits, if there's a way to close a switch to make a short circuit, highlight or circle that path.







Level 3.0

1.) What does grounding mean in the context of electricity?

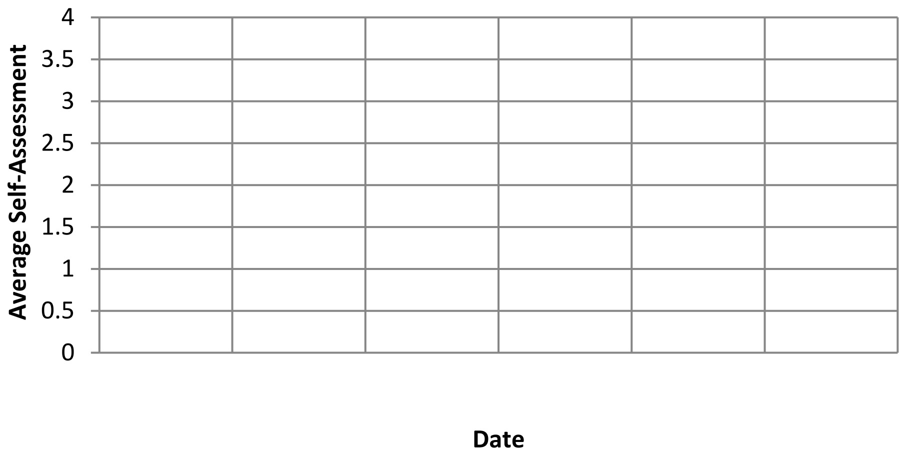
2.) Draw a schematic diagram for a circuit coming from a circuit breaker (the voltage source) that can provide electricity to a bedroom with an overhead light operated by a switch and three outlets.

3.) If you plug in the following appliances to a 120 V circuit that can handle 10 A of current, will the circuit breaker trip? 400 Watt television, three 100 Watt lamps. Justify your answer quantitatively.

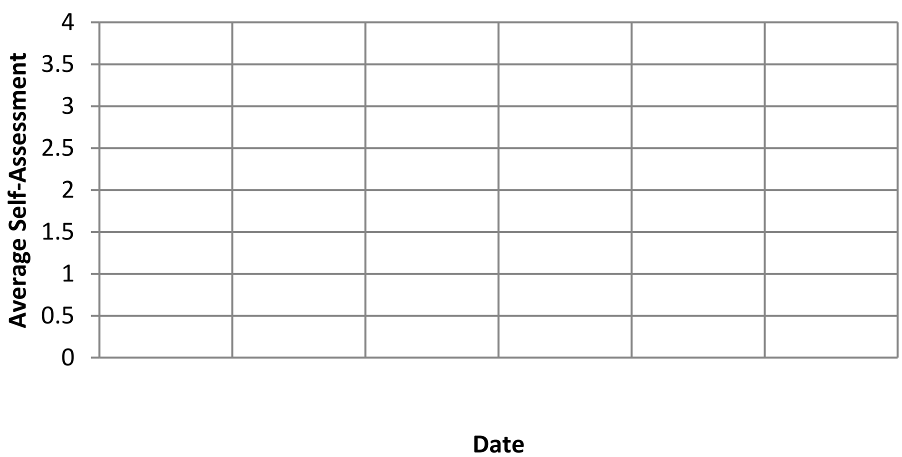
4.) Explain why the circuit breaker box in a house or apartment is located where the electricity enters the building. Use a schematic diagram to justify your answer.

Chart your Progress

Goals Set 1



Goals Set 2



Goals Set 3

Goals Set 4

Goals Set 5