

*Lesson Title:* **Parallel & Simple Circuits**    *Grade level:* **Grade 6**

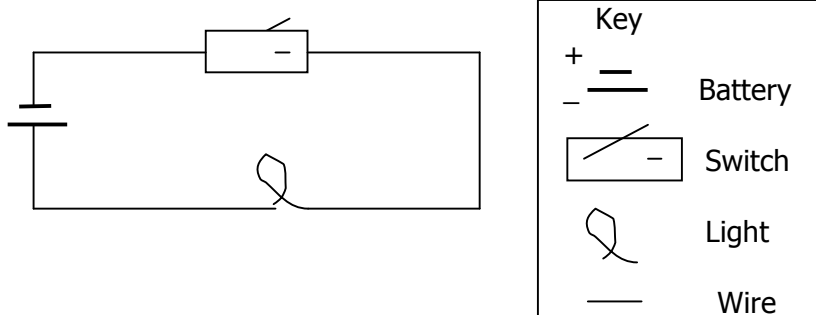
*Discipline Focus:* **Energy & Engineering**    *Length of lesson:* **2- 50 minute periods**

<b>Stage 1 – Desired Results</b>													
<p><b>Content Standard(s):</b>            6.1.2.1.4 Learning and improving from past failures, in order to inform future designs of similar products or systems.            6.1.3.1.1 Describe a system in terms of its subsystems and parts/ inputs, processes and outputs.            6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in a physical science context.            6.2.3.2.2 Trace the changes of energy forms, including thermal, electrical, chemical, mechanical or others as energy is used in devices.</p>													
<p><b>Student Understanding (Unit Goals):</b>            Students will build and understand the affects of building a circuit power sources in parallel and series circuits.</p>	<p><b>Essential Question(s):</b></p> <ul style="list-style-type: none"> <li>• How do series circuits and parallel circuits behave differently?</li> <li>• Where do we see “real world” examples of series and parallel circuits?</li> </ul>												
<p><b>Student objectives (outcomes):</b>            Students will be able to:</p> <ul style="list-style-type: none"> <li>- 1) build, diagram, and describe a series and parallel circuit.</li> <li>- 2) identify examples of parallel circuits in their real life and describe when each of these circuits would be beneficial.</li> <li>- 3) describe differences between these two circuits.</li> </ul>													
<b>Stage 2 – Assessment Evidence</b>													
<p><b>Performance Task(s):</b></p> <ul style="list-style-type: none"> <li>• Build and describe utilities and batteries in simple and parallel circuits</li> </ul>	<p><b>Other Evidence:</b></p> <ul style="list-style-type: none"> <li>• Written tests</li> <li>• Notebooks</li> </ul>												
<b>Stage 3 – Learning Plan</b>													
<p><b>Materials:</b> Circuit Kit including:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">2 switches (single)</td> <td>1 rivet</td> </tr> <tr> <td>2 switches (double)</td> <td>1 motor</td> </tr> <tr> <td>2 battery cases</td> <td>1 long wire</td> </tr> <tr> <td>2 batteries</td> <td>1 bag of conductors and</td> </tr> <tr> <td>2 lights</td> <td>insulators (about 10 Science Notebooks items)</td> </tr> <tr> <td>12 wires</td> <td></td> </tr> </table>		2 switches (single)	1 rivet	2 switches (double)	1 motor	2 battery cases	1 long wire	2 batteries	1 bag of conductors and	2 lights	insulators (about 10 Science Notebooks items)	12 wires	
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### Stage 3 – Learning Plan

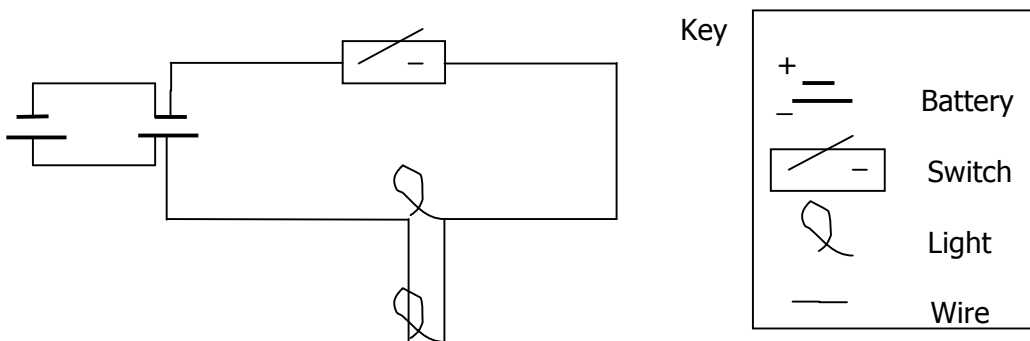
#### Procedure:

- 1) Begin class with review of the simple circuit. Students use materials to build a simple circuit based on the following criteria.
  - A) Students are to build a circuit with 1 light, 1 switch, and 1 battery.  
The light must light up when the switch is on and then turn off with the switch off (demonstrate on and off). When students have this built and working correctly they may call teacher over to verify the circuit is working correctly.
  - B) Students will diagram simple circuit in their science notebooks



- 2) Students will now build a circuit with the following parameters:
  - Circuit will have 2 lights, 1 switch and 1 battery
  - Circuit will light bulbs dimmer than in a simple circuit
  - When you unscrew one light till it goes out the other light also goes out
  - Students should use multi-meter to record voltage in the circuit
  - Use minimum number of wires and like objects are attached to each other
  - Student will call teacher over when circuit is built to check that all parameters are met.
- 3) When teacher OKs circuit, students can diagram circuit in notebook and label it **utilities (power users) in a series circuit**. Students should also list characteristics of this circuit.
- 4) When completed students will now build a new circuit with the following parameters:
  - Circuit will have 2 lights, 1 switch and 1 battery
  - Circuit will light bulbs with same brightness as a simple circuit
  - When you unscrew one light till it goes out the other light stays lit
  - Students should use multi-meter to record circuit voltage
  - Use minimum number of wires and like objects are attached to each other
  - Student will call teacher over when circuit is built to check that all parameters are met.
- 5) When teacher OKs circuit, students can diagram circuit in notebook and label it **utilities in a parallel circuit**. Students should also list characteristics of this circuit.

- 6) When students are finished, we will begin building circuits that includes both batteries (power source) and utilities (power users). Build circuit with the following parameters:
- Utilities will be in a parallel circuit
  - Batteries should make the lights brighter than a simple circuit (Don't leave on too long as the bulbs will burn out.)
  - When one battery is taken out the circuit shuts off
  - Unscrew one light and the other is unchanged
  - Students should use multi-meter to record circuit voltage
  - Student will call teacher over when circuit is built to check that all parameters are met.
- 7) When teacher OKs circuit, students can diagram circuit in notebook and label it **utilities in a parallel batteries in series circuit**. Students should also list characteristics of this circuit.



- 8) When students are finished they can begin building another circuit that includes both batteries (power source) and utilities (power users). Build circuit with the following parameters
- Utilities will again be in a parallel circuit
  - Batteries should make the lights dimmer.
  - When one battery is taken out the circuit is unchanged and lights stay on
  - Unscrew one light and the other is unchanged
  - Students should use multi-meter to record circuit voltage
  - Student will call teacher over when circuit is built to check that all parameters are met.
- 9) When teacher OKs circuit, students can diagram circuit in notebook and label it **utilities in a parallel batteries in parallel circuit**. Students should also list characteristics of this circuit.
- 10) Students should brainstorm uses for each circuit. We have a total of 4 circuits here.
- 11) Students should pack up all materials in kit bag.