

### Kill-A-Watt Activity

<b>Grade/Grade Band:</b> 6-8/9-12	<b>Topic:</b> Electricity	<b>Subject Area:</b> Physical Science/Chemistry
<p><b>Brief Lesson Description:</b> A kilowatt meter is used to measure the electricity consumed by holiday lights. This information is used to calculate the cost to provide electricity for the lights.</p>		
<p><b><u>NGSS Performance Expectations:</u></b></p> <p><i>This activity can be used to facilitate the following performance expectation:</i></p> <p>HS-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.* [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.]</p>		
<p><b>Science &amp; Engineering Practices:</b>                  Planning and carrying out an investigation                  Using mathematical and computational thinking                  Constructing explanations and designing solutions</p>	<p><b>Disciplinary Core Ideas:</b>                  HSPS.B: Conservation of energy and energy transfer</p>	<p><b>Crosscutting Concepts:</b>                  Cause and effect                  Energy and matter</p>
<b>LESSON PLAN – 5-E Model</b>		
<p><b>ENGAGE: Suggested Opening Activity ( Access Prior Learning / Stimulate Interest / Generate Q’s)</b>                  Optional:                  Christmas Vacation Lights Scene, <a href="https://www.youtube.com/watch?v=iXaw70X7wb4">https://www.youtube.com/watch?v=iXaw70X7wb4</a></p> <p>What is happening here?  <i>Guiding Question: Can you afford to have holiday lights like Clark Griswold?</i></p>		
<p><b>EXPLORE: Lesson Description:</b></p> <p>Students use a Kill-A-Watt meter to determine the wattage used by two different strands of holiday lights. This data is then used to calculate the cost to run each strand of lights for one hour, one day and one month. Then students calculate the cost to run multiple strands of each light.</p>	<p><b>Materials Needed</b>                  Kilowatt meter                  Holiday lights  <a href="#">Student Handout</a></p>	
<p><b>EXPLAIN: Concepts Explained:</b> The relationship between a watt, a kilowatt hour and generation/transmission charges from the electric company.</p>	<p><b>Key Vocabulary:</b>                  Conserve                  Energy                  Watt/Kilowatt/Kilowatt hour</p>	

<p><b>ELABORATE: Suggested Activity</b>  <i>(Making sense through building models and constructing explanations by connecting concepts to the SEP and CCC. )</i></p>	<p><b>SEP (Select/highlight)</b></p> <ol style="list-style-type: none"> <li>1. Asking questions</li> <li>2. Developing and using models</li> <li>3. Planning and carrying out investigations</li> <li>4. Analyzing and interpreting data</li> <li>5. Using mathematics and computational thinking</li> <li>6. Constructing explanations</li> <li>7. Engaging in argument from evidence</li> <li>8. Obtaining, evaluating, and communicating information</li> </ol>	<p><b>CCC (Select/highlight)</b></p> <ol style="list-style-type: none"> <li>1. Patterns.</li> <li>2. Cause and effect</li> <li>3. Scale, proportion, and quantity.</li> <li>4. Systems and system models.</li> <li>5. Energy and matter</li> <li>6. Structure and function</li> <li>7. Stability and change.</li> </ol>
<p><b>EVALUATE Formative Monitoring (Questioning / Discussion):</b></p>		<p><b>Summative Assessment (Quiz / Project / Report):</b> Post lab questions provided.</p>
<p><b>Suggestion(s) to Elaborate Further / Reflect / Enrich:</b> Students could conduct this investigation at home in real life. They could learn how to read their own electric bill, find out where their electric company obtains electricity and learn about renewable and nonrenewable energy sources.</p>		