

## Thomas Edison and his Light Bulb

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<b>Lesson Overview</b>	<p><b>Details</b></p> <p>Prior to this lesson, students will have little experience with electricity. This lesson will be the second lesson within the unit. They were introduced to electricity with a challenge. They were given a battery, a piece of aluminum foil and a light bulb and told to try and get the bulb to light using those materials. They had to document their trials in their journals, both in writing and with illustrations, whether they were successful or not. They were also asked to document any observations that they have made, as well as modifications that they were planning to make for the next trial. Students were made aware that they might not be successful in getting their light bulb to light. At the end of the lesson, we held a discussion in class about the discoveries and observations that they made.</p> <p>During this lesson, students will be asked to make predictions about the parts of the incandescent light bulb by drawing a diagram in their journals and labeling the parts that they know, or that they think they know. They will also predict what happens when a light bulb lights and how it works. They will then watch the film and be able to gather information and build their knowledge of the light bulb.</p> <p>After this lesson, we will continue to explore electricity and how a light bulb works. We will look at the light bulb again and learn how each part works in order for it to light up. Students will gain a better understanding as to how a light bulb works which will help them in understanding how electricity works. The lessons that follow involve student explorations in building various electric circuits; series, parallel, circuits with switches, and testing for conductors of electricity.</p>
<b>Objectives</b>	<ul style="list-style-type: none"> <li>~Students will illustrate and label a light bulb in their journals.</li> <li>~Students will predict in writing, how a light bulb works in their journals.</li> <li>~Students will compare and contrast the manufacturing of an incandescent light bulb from the past to the present through discussion.</li> </ul>
<b>Time Required</b>	One 40-minute period One-hour period
<b>Grade Level(s)</b>	(Students in the 4 <sup>th</sup> grade have science two times a week; they have a 40-minute period and then an hour-long period) 4 <sup>th</sup> Grade
<b>Topic(s)</b>	Electricity
<b>Era/ Time Period</b>	Early Motion Pictures, 1897-1920
<b>Format(s) of primary sources used</b>	A day with Thomas A. Edison / General Electric Co. ; producer, Bray Studios.
<b>Film</b>	



<p><b>Standards Addressed</b></p>	<p>STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.</p> <p>C. Know and apply concepts that describe properties of matter and energy and the interactions between them.</p> <p>12.C.1a Identify and compare sources of energy (e.g., batteries, the sun).</p> <p>STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.</p> <p>A. Know and apply the concepts, principles and processes of scientific inquiry.</p> <p>11.A.2a Formulate questions on a specific science topic and choose the steps needed to answer the questions.</p> <p>11.A.2b Collect data for investigations using scientific process skills including observing, estimating and measuring.</p> <p>11.A.2c Construct charts and visualizations to display data.</p> <p>11.A.2d Use data to produce reasonable explanations.</p> <p>11.A.2e Report and display the results of individual and group investigations.</p> <p>STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.</p> <p>A. Know and apply the accepted practices of science.</p> <p>13.A.2a Demonstrate ways to avoid injury when conducting science activities (e.g., wearing goggles, fire extinguisher use).</p> <p>13.A.2b Explain why similar investigations may not produce similar results.</p> <p>13.A.2c Explain why keeping accurate and detailed records is important.</p> <p>B. Know and apply concepts that describe the interaction between science, technology and society.</p> <p>13.B.2b Describe the effects on society of scientific and technological innovations (e.g., antibiotics, steam engine, digital computer).</p> <p>13.B.2c Identify and explain ways that science and technology influence the lives and careers of people.</p>
<p><b>Preparation</b></p> <p><b>Materials Used</b></p> <p><b>Resources Used</b></p>	<p>Student Journals</p> <p>Flashlight Light Bulbs</p> <p>Magnifying Glasses</p> <p>Laptop Computers</p> <p>Symposium and Projector</p> <p>Pencils</p> <p>Green Pens (used for class discussions and making revisions)</p> <p><i>A Day with Thomas Edison.</i> H. Schroeder. General Electric Co. 1922? <i>Inventing Entertainment: the Early Motion Pictures and Sound Recordings of the Edison Companies.</i> 26 Sep. 2002. <i>American Memory.</i> Library of Congress. <a href="http://lcweb2.loc.gov/cgi-bin/query/r?ammem/papr:@field(NUMBER+@band(edmp+4057s6))">http://lcweb2.loc.gov/cgi-bin/query/r?ammem/papr:@field(NUMBER+@band(edmp+4057s6))</a>.</p>

<p><b>Procedure (Activity/s)</b></p>	<ol style="list-style-type: none"> <li>1. Have students get their journals, pencils and green pens.</li> <li>2. Pass out a flashlight light bulb and magnifying glass to each student. Using their pencil, ask them to draw the light bulb in their journals. Tell them that they can use the magnifying glass to get a closer look if they would like.</li> <li>3. Once students have finished their illustrations, ask them (still using pencil) to label any parts that they know, or that they think they know. Explain to them that it is ok to guess and be wrong because we will be going over this information; you just want to see what they know for now.</li> </ol> <p>***For students who struggle with drawing the diagram in their journals, they can glue a print out of a light bulb diagram and the label.</p> <ol style="list-style-type: none"> <li>4. Then ask students to write a short paragraph in their journals (in pencil) of how they think that the light bulb works. Explain to them that they can use their documentation from the previous activity that they did (described in lesson overview) for help.</li> <li>5. Ask 2-3 students to shares their observations of the light bulb. This can lead into some discussion of how the various parts of the light bulb work and the role that they play into lighting it.</li> <li>6. Explain to students that we are going to explore how a light bulb works further. Explain that we are going to use the help of Thomas Edison. A short conversation may need to take place about who he is and why he is so important.</li> <li>7. Pass out laptops to students. There are enough so that there is one laptop for every pair of students. Using the Sympodium and projector in the classroom, show students where to access the film series “A Day with Thomas Edison”.</li> <li>8. Explain to the students that they will be watching parts 3, 4, and 5 of this series. Ask them to use the film to gather knowledge of the structure of a light bulb. Encourage them to take notes and add to their diagram. They will have 15-20 minutes to work on this.</li> <li>9. When they have finished, take 5-10 minutes to have students share what they have discovered. Have students use green pens to record ideas from the class discussion in their journals.</li> <li>10. End the period with a discussion comparing and contrasting the manufacturing of the light bulb from the film to today. How would things be different? How would they be the same? How is the light bulb different today? Is it different?</li> <li>11. Explain to students that next time they will be reading about how a light bulb works (using the “How Stuff Works” site through the Library of Congress) and they will be able to go back to their diagrams and make any revisions in their journals (in green pen) to their diagrams and/or paragraphs.</li> </ol> <p><b>Extension: This lesson can also be extended into an environmental discussion. Students can research alternative forms of energy, explore and compare compact fluorescent light bulbs to incandescent, etc.</b></p>
<p><b>Evaluation (Rubric/s)</b></p>	<p>Student Journals- rubric  ~Students fill rubric out first and then teacher fills it out  Informal Observation  ~Notes kept on student comments and behaviors about the activity; these are written on student reports (report cards are completely narrative and there are no grades)</p>

Science Rubric	3	2	1
Science Content #_____	Written responses demonstrate an understanding of <b>MOST</b> of the science concepts and include accurate use of <b>MOST</b> of the vocabulary.	Written responses demonstrate an understanding of <b>SOME</b> of the science concepts and include accurate use of <b>SOME</b> of the vocabulary.	Written responses demonstrate an understanding of <b>FEW</b> of the science concepts and include accurate use of <b>LITTLE</b> of the vocabulary.
Table of Contents #_____	I am <b>VERY</b> careful to accurately record activities into the table of contents.	I am careful <b>MOST OF THE TIME</b> about accurately recording activities into the table of contents.	I am <b>NOT CAREFUL</b> and need to do a better job of accurately recording activities into the table of contents.
Scientific Drawings #_____	Diagrams, drawings, and charts are <b>MOSTLY</b> clear, accurately labeled, and have relevant detail.	Diagrams, drawings, and charts have some incorrect labels, are not carefully drawn or have too little detail.	Diagrams, drawings, and charts are unclear, not labeled, sloppy and incomplete with very <b>LITTLE</b> detail.
Legibility & Thoroughness of Daily Entries #_____	My handwriting is <b>USUALLY</b> the best I can do. My journal includes <b>MOST</b> of my observations, activity records, and notes from discussions.	My handwriting is <b>SOME-TIMES</b> the best I can do. My journal includes <b>MANY</b> of my observations, activity records, and notes from discussions.	My handwriting is <b>SLOPPY</b> . My journal includes only a <b>FEW</b> of my observations, activity records, or notes from discussions.

**Green** – Student Self-evaluation (Write pages as examples) **Purple** – Teacher’s evaluation

**GOALS** (What do you plan on improving and how you plan on accomplishing it):

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_