

The Industrial Revolution: Powering the World

Timeline Activity

Grade Level:	Time Frame:
6th Grade 9th Grade 11th Grade	50 Minutes
Standards (ALCOS Social Studies):	
<p>1) Explain the impact of industrialization, urbanization, communication, and cultural changes on life in the United States from the late nineteenth century to World War I.</p> <p>9) Describe the impact of technological inventions, conditions of labor, and the economic theories of capitalism, liberalism, socialism, and Marxism during the Industrial Revolution on the economies, societies, and politics of Europe.</p> <ul style="list-style-type: none"> • Identifying important inventors in Europe during the Industrial Revolution • Comparing the Industrial Revolution in England to later revolutions in Europe <p>11) Explain the transition of the United States from an agrarian society to an industrial nation prior to World War I. [A.1.a., A.1.b., A.1.c., A.1.d., A.1.e., A.1.f., A.1.i., A.1.k.]</p> <ul style="list-style-type: none"> • Interpreting the impact of change from workshop to factory on workers' lives, including the New Industrial Age from 1870 to 1900, the American Federation of Labor-Congress of Industrial Organizations (AFL-CIO), the Industrial Workers of the World (IWW), the Pullman Strike, the Haymarket Square Riot, and the impact of John D. Rockefeller, Andrew Carnegie, Samuel Gompers, Eugene V. Debs, A. Philip Randolph, and Thomas Alva Edison 	

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- Identifying issues regarding depletion of nonrenewable resources and the sustainability of renewable resources
Examples: ocean shelf and Arctic exploration for petroleum, hybrid engines in cars, wind-powered generators, solar collection panels

Objectives:

Students will identify individuals and organizations that contributed to the revolution of industry and how each new technological advancement impacted economies, societies, and politics.

Students will interpret how products and inventions, as well as, the communication of new ideas developed from the initial discovery of electricity and its ongoing impact on energy production.

Background Information:

Throughout history, there have been many individuals and organizations who have contributed to the lasting global impact that was initiated by the industrial revolution. From 1752, when Ben Franklin tied a key to a kite during a storm proving that static electricity and lightning were the same to 1970 when former President Richard Nixon ordering the creation of the Environmental Protection Agency, we know that there has been much development in technology and industry that has impacted our nation, our world, our societies, and our own lives. However, there has been much destruction to our environment that have paralleled those developments along the way.

This activity provides an in depth look at the timeline of the history of energy that has powered our world, promotes questions of what challenges the present and future bring, and encourages problem-solving discussions on “what’s next” for powering our world.

Materials:

- (Version 1-with research) FOR EACH STUDENT:
 - Access to computer lab or laptops/iPads
 - Printed “Powering the World Graphic Organizer” worksheet(pages 1-2)
 - Printed and cut-out “Powering the World Research Prompts”
 - Each student gets one random card to assign their research topic
- (Version 2-without research) FOR EACH STUDENT:
 - Printed “Powering the World Graphic Organizer” worksheet (page 3)
 - Printed and cut-out “Powering the World Timeline Cards”
 - Each student gets one random card to assign their historically significant person/date/contribution

Engage:

Version 1 (15 minutes):

1. Each student should receive one research prompt card to assign their research objective. Students will complete “The Industrial Revolution: Powering the World Part I” research activities using a computer, laptop, or other device and using credible internet sources.

Version 2 (5 minutes):

1. Each student should receive one timeline card that lists a significant person, date, and contribution. They should take a few minutes to read the card
2. Next, students should turn and talk to a neighbor on their left and right side answering the question:
 - a. What is similar or different about the information on you and your neighbors’ cards?
3. Students should come to a group conclusion on how these significant people and dates compare. They should reflect back on the topic of the **industrial revolution** in general.

Explore:

Version 1 (20 minutes):

1. Students should use their “Important Year” to organize themselves into a timeline.
 - a. The timeline starts with the date “1752 Ben Franklin.”
 - b. This activity is best completed in a hallway or on a sidewalk.
2. After organizing chronologically, students should each give a brief synopsis of their research including:
 - a. Influential Person
 - b. Important Year
 - c. Contribution to Industry

Version 2 (25 minutes):

1. Each student should receive one timeline card that lists a significant person, date, and contribution. They should take a few minutes to read the card
2. Next, students should turn and talk to a neighbor on their left and right side answering the question:
 - a. What is similar or different about the information on you and your neighbors’ cards?
3. Students should come to a group conclusion on how these significant people and dates compare. They should reflect back on the topic of the **industrial revolution** in general.

Evaluate:

Version 1 (15 minutes):

1. Students will complete “The Industrial Revolution: Powering the World Part II” graphic organizer by discussing out loud the events of the Industrial Revolution and the associated pros and cons regarding the impact on society and the environment. They should complete the short answer portion individually after discussing and reflecting on the timeline activity as a whole.

Version 2 (20 minutes):

1. Students will complete “The Industrial Revolution: Powering the World” graphic organizer by discussing out loud the events of the Industrial Revolution and the associated pros and cons regarding the impact on society and the environment.

Resources:

<https://www.thehistoricalarchive.com/happenings/57/the-history-of-electricity-a-timeline/>
<https://solenergy.com.ph/solar-panel-philippines-edmond-becquerel/>
<https://www.smithsonianmag.com/sponsored/brief-history-solar-panels-180972006/>
<https://www.britannica.com/science/photoelectric-effect/Applications>
<https://www.britannica.com/biography/James-Watt>
<https://www.historytoday.com/miscellanies/let-there-be-wind>
<https://www.usbr.gov/lc/hooverdam/history/articles/naming.html>
https://www.pbs.org/wgbh/theymadeamerica/whomade/insull_hi.html
<https://americanbusinesshistory.org/from-hero-to-hated-americas-most-tragic-entrepreneur/>
<https://www.bell-labs.com/about/awards/1956-nobel-prize-physics/#gref>
<https://www.history.com/topics/great-depression/history-of-the-tva>
<https://www.epa.gov/history/origins-epa>
<https://www.cincinnati.com/story/sports/mlb/reds/2020/05/22/mlb-first-night-baseball-game-crosley-field-1935-reds-phillies/5195230002/>
<https://www.osti.gov/servlets/purl/12143>

Name of Historical Researcher: _____ Date: _____

The Industrial Revolution: Powering the World Part I

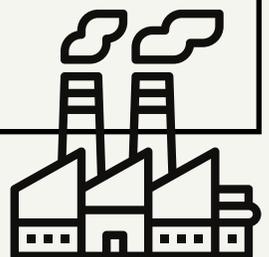
Influential Person:

Important Year:

Invention or Contribution:

Draw it!

Impact on Industry:



Name of Historical Researcher: _____ Date: _____

The Industrial Revolution: Powering the World Part II

The Industrial Revolution was an important time of economic growth and culture change for our country and world. After discussing with your classmates, consider the pros and cons of the impacts of this time in history. Add your thoughts to the boxes below.

Pros ⊕

Cons ⊖

Next Steps:

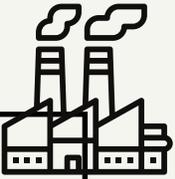
Considering the last few centuries of change, reflect on what today and what the future might look like as a result of the industrial revolution and as we continue to grow. Are we growing sustainably or should we make changes to the way we use our resources and "power the world"?



Name: _____

Date: _____

The Industrial Revolution: Powering the World



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1752 Ben Franklin ties a key onto a kite during a storm and proved that static electricity and lightning were the same. His correct understanding of electricity would provide the “spark” for the future of power.

1763 James Watt drastically improves the design of the steam engine leading to a driving force for the industrial revolution.

1800 Alessandro Volta invents the first electric battery. The “volt” is named in his honor.

1808 Humphry Davy invents the first effective “arc lamp.” The arc lamp was a piece of carbon that glowed when attached to a battery by wires.

1820 Hans Christian Oersted, A.M. Ampere, and D.F.G. Arago work on separate experiments to confirm the relationship between electricity and magnetism.

1821 Michael Faraday invents the first electric motor.

1826 Georg Ohm defines the relationship between power, voltage, current and resistance in “Ohms Law.”

1831 Michael Faraday proves that electricity can be made by changes in an electromagnetic field. Faraday’s experiments about how electric current works, led to the understanding of electrical transformers and motors.

1832 Hippolyte Pixii builds the first “dynamo,” an electric generator capable of delivering power for industry. Pixii’s dynamo used a crank to rotate a magnet around a a piece of iron wrapped with wire.

1835 Joseph Henry invents the electrical relay, used to send electrical currents long distances.

1837 Thomas Davenport invents the electric motor, an invention that is used in most electrical appliances today.

1839 Sir William Robert Grove develops the first fuel cell, a device that produces electrical energy by combining hydrogen and oxygen.

1839 Edmond Becquerel discovers the photovoltaic cell, the basis of solar cells, explaining how electricity can be produced from sunlight.

1841 James Prescott Joule shows that energy is conserved in electrical circuits involving current flow, thermal heating, and chemical transformations. A unit of thermal energy, the Joule, was named after him.

1844 Samuel Morse invents the electric telegraph, a machine that could send messages long distances across wire.

1860's J.C. Maxwell creates a new era of physics when he unifies magnetism, electricity and light. Maxwell's four laws of electrodynamics ("Maxwell's Equations") eventually led to electric power, radios, and television.

1876 Charles Brush invents the "open coil" dynamo (or generator) that could produce a steady current of electricity.

1878 Joseph Swan invents the first incandescent lightbulb (also called an "electric lamp"). His lightbulb burned out quickly.

1878 Charles Brush develops an arc lamp that could be powered by a generator.

1878 Thomas Edison founds the Edison Electric Light Co. (US), in New York City. He bought a number of patents related to electric lighting and began experiments to develop a practical, long-lasting light bulb.

1879 Thomas Edison invents an incandescent light bulb that could be used for about 40 hours without burning out. By 1880 his bulbs could be used for 1200 hours.

1881 Werner von Siemens invents the electric streetcar.

1882 Thomas Edison opens the Pearl Street Power Station in New York City. The Pearl Street Station was one of the world's first central electric power plants and could power 5,000 lights.

1882 Edward Johnson puts the first electric lights on a Christmas tree.

1883 Nikola Tesla invents the "Tesla coil", a transformer that changes electricity from low voltage to high voltage making it easier to transport over long distances.

1883 Charles Fritts creates and installs the first solar panels on a New York City rooftop.

1884 Nikola Tesla invents the electric alternator, an electric generator that produces alternating current (AC). AC electrical systems are better for sending electricity over long distances.

1884 Sir Charles Algernon Parsons invents the steam turbine generator, capable of generating huge amounts of electricity.

1886 William Stanley develops the induction coil transformer and an alternating current electric system.

1887 Heinrich Hertz observes that ultraviolet light (from sunlight) creates more power than visible light giving more information for the use of solar powered cells.

<p>1887 James Blyth becomes the first person to generate electricity from a spinning wind turbine.</p>	<p>1888 Nikola Tesla demonstrates the first “polyphase” alternating AC system including everything needed for electricity production and use: generator, transformers, transmission system, motor (used in appliances) and lights.</p>
<p>1888 George Westinghouse, the head of Westinghouse Electric Company, buys the patent rights to Tesla’s AC system.</p>	<p>1888 Charles Brush builds and uses the first large windmill to generate electricity and charge batteries in the cellar of his home in Cleveland, Ohio.</p>
<p>1892 Samuel Insull, a businessman, finances the world’s largest power plant, Harrison Street Station in Chicago and sells electricity to the “general public” as it had before been a special commodity for the upper-class.</p>	<p>1908 James Murray Spangler invents the first electric vacuum cleaner.</p>
<p>1908 Alva John Fisher invents the first electric washing machine.</p>	<p>1911 Willis H. Carrier invents the first electric air conditioning system.</p>
<p>1913 Thomas Murray creates the first air pollution control device, the “cinder catcher.”</p>	<p>1923 Hans Geitel and Julius Elster produce a usable photoelectric cells that would be used to develop film and television, as well as, power sources for solar cells.</p>

<p>1928 President Herbert Hoover initiates the construction of the Boulder Dam (Hoover Dam) to produce hydroelectric power.</p>	<p>1933 President Franklin D. Roosevelt establishes the Tennessee Valley Authority (TVA) as a New Deal program in order to provide electricity and jobs to rural Tennessee Valley area that spans seven states in the Southeast.</p>
<p>1935 Larry MacPhail flipped a switch to power 632 lamps in order to host the first night baseball game in major leagues (Reds vs. Phillies) in Ohio.</p>	<p>1951 Walter Zinn and his Argonne National Laboratory staff generate electricity using nuclear energy using their EBR-I nuclear reactor.</p>
<p>1956 John Bardeen, Walter H Brattain, and William Shockley at Bell Telephone Laboratories create a small semiconductor device which led the way for the digital age and telecommunication.</p>	<p>1962 Rachel Carson, scientist and author, publishes her work Silent Spring which led to increased awareness of how industry was negatively affecting the environment.</p>
<p>1970 President Richard Nixon ordered the creation of the Environmental Protection Agency (EPA) in order to respond to environmental problems including air pollution and waste disposal from industries.</p>	<p>1</p>
<p>2</p>	<p>3</p>

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