Industrial Revolution & Inventions of the 19th century

Teacher: Rose Snyder                                       Grade level: 3-5, 2-3 weeks

History Essential Questions:
What was life like before, during, and after the Industrial Revolution?
How did the Industrial Revolution change the economic future of the United States?
What were the three industrial developments that led the way to industrialization in America?

Standards of Learning:
History Standards of Learning:
SS.5.E.1.3 The student will trace the development of technology and the impact of major inventions on business productivity during the early development of the United States.
SS.5.A.6.3 The students will examine 19th century advancements (canals, roads, steamboats, flat boats, overland wagons, Pony Express, railroads) in transportation and communication.

Reading Standards of Learning:
5.RIT.3 The student will explain the relationships between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
5.RIT.9 The student will integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

Writing Standards of Learning:
5.W.2 The student will write informative/explanatory texts to examine a topic and convey ideas and information clearly.

Science Standards of Learning:
SC.5.N.1.1 The student will recognize that not only does science require creativity in its methods and processes, but also in its questions and explanations.

Lesson Objectives:
1. The student will study major inventions of the American Industrial Revolution and identify the impact on productivity
2. The student will brainstorm ideas, plan, develop, and create their own invention while describing its purpose.
3. The student will present their invention to others in a small or whole group setting.

Materials:
Primary and secondary source resources
Various materials for their INVENTIONS!

Books and Videos:
1. The Bobbin Girl by Emily McCully.
   Rebecca Putney is a bobbin girl who helps support her struggling family by working all day in a hot, noisy cotton mill. Working conditions at the mill are poor, and there is talk of lowering the workers’ wages. Rebecca’s friend, Judith wants to protest the pay cut – but troublemakers loose their jobs. Rebecca is torn between keeping her job or joining the protest.
Activities and Discussion Questions:

1. During the Industrial Revolution, what happened to labor? (It went from skilled craftsmen to unskilled workers on assembly lines at factories.)
2. What happened to craftsmen? (Lost money because things could be made on an assembly line faster and cheaper.)
3. Who worked in the factory (immigrants, women, children, sharecroppers who moved North to work in factories)
4. Create a Bobbin Girl story map.
5. Create a Venn Diagram for comparison of Rebecca Putney in “Bobbin Girl” with Grace in “Counting on Grace”.

2. *Counting on Grace* by Elizabeth Winthrop, 227 pgs.

Twelve-year-olds, Grace and Authur, are forced to leave school in order to work in the local textile mill to support their families. Vermont, turn of the 20th C. Their teacher encourages them to write to the National Child Labor Committee. The NCLC sends Lewis Hines to photograph and document the children working in the mill but nothing seems to change until Arthur takes some drastic measures.

The Industrial Revolution began with textiles. The *flying shuttle* was the first machine to revolutionize the textile industry, which allowed the weaver to produce almost twice as much cloth. The *Spinning Jenny*, a simple wooden machine spun several threads at once instead of just one thread. In 1769, Richard Arkwright’s work resulted in the invention of a large spinning machine that used a water wheel to turn wooden rollers at different speeds and twist carded cotton onto multiple spindles. The stronger cotton thread was perfect for warp. He set up a band-new system of divided labor, giving each worker a specific task. The tasks did not require much skill and kids as young as 10 worked at his mill.

Discussion Questions:

1. Children were supposed to be 15 years old when they went to work in the mills. What jobs are children allowed to do today, and at what age?
2. Grace and her sister also help the family with chores, such as laundry. What chores do you help with at home?
3. How is your family like Grace's? How is it different?
4. People in Grace's town came to the U.S. from Canada and France to find jobs working in mills and on farms. Why do people immigrate to the U.S. today? What types of difficulties do immigrant face today?

3. The Industrial Revolution: Investigate How Science & Technology Changed the World with 25 Projects. Carla Mooney. In the 100 years of the Industrial Revolution, the world changed from make-your-own everything to a society of manufactured goods. This book introduces the individuals who led this revolution and how their innovations impacted the lives of everyone, rich and poor, city-dwellers and farmers alike. It includes enrichment activities that kids can do with minimal supervision: creating a water-powered wheel, designing a steam ship, building a telegraph machine, and making a pinhole camera.


Background Information:
Until the early 1800s, most people had to make the items they needed, such as tools and clothes, by hand in their homes. The Industrial Revolution that occurred in the late 18th to 19th century was of great importance to the economic future of the America that produced improved systems of transportation, communication, and banking. It was a period of rapid invention, when machines were invented to do the work of many people. Industrialization marked a shift to powered, special-purpose machinery, factories, and mass production. Along with the development of the steam engine, the iron and textile industries played central roles.
Three industrial developments led the way to industrialization in America:
(1) Transportation and communication was expanded
(2) Electricity was effectively harnessed
(3) Improvements were made to industrial processes

Lesson Procedure:
1. The teacher will build background knowledge by asking the students questions if they have parents or grandparents that make things by hand. For example, candle-making, canning jams, crocheting, knitting or using tools and wood to make a birdhouse, growing vegetables to consume, etc.


3. The teacher will read aloud Bobbin Girl by Emily McCully to introduce students to the reality of children working in factories for long hours and little pay. Discuss questions they may have.

4. Show video: Living History: Living During the Industrial Revolution, Discoveryeducation.com. 20 min. There is a short quiz following the video.


6. Students will research one of the industrial inventions and describe its importance to the industrial development in America. Use 3x5 note cards, draw a picture of the invention from the table below or another and answer the following questions. They will present their findings to the class or in small groups.

   -When was ________ invented?
   -Who invented it?
   -How is it useful?
   -How has this invention changed over time?

7. Students will work individually or in small groups to research an invention of the 19th century in America. They will use the Internet, books, and primary sources to gather information. The table below can be used as a reference. Introduce the book: The Industrial Revolution: Investigate How Science and Technology Changed the World by Carly Mooney, which includes 25 projects students can create like, the knitting spool. This is a great resource for extension activities, projects that students can create.

8. Students will create their own invention using the following format and rubric. Remember: Necessity is the Mother of Invention!

   **Key inventions and transportation of the Industrial Revolution**

<table>
<thead>
<tr>
<th>Person</th>
<th>Invention(s)</th>
<th>Importance</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eli Whitney</td>
<td>Cotton gin</td>
<td>Revolutionized the way cotton was harvested in the South</td>
<td>1793-1798</td>
</tr>
<tr>
<td></td>
<td>Interchangeable parts</td>
<td>Revolutionized manufacturing industry in the North</td>
<td></td>
</tr>
<tr>
<td>Robert Fulton</td>
<td>Steam Engine</td>
<td>Used compressed steam to power a motor, more power than a team of horses</td>
<td>1807</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and could pull heavier loads</td>
<td></td>
</tr>
<tr>
<td>Francis Cabot</td>
<td>Textile mill</td>
<td>Large factories that produced more cloth built in the north where fast-moving rivers</td>
<td>1813</td>
</tr>
<tr>
<td>Inventor</td>
<td>Invention</td>
<td>Contribution</td>
<td>Year</td>
</tr>
<tr>
<td>----------</td>
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</tr>
<tr>
<td>Peter Cooper</td>
<td>Locomotive – <em>Tom Thumb</em></td>
<td>Railroads soon became the main form of transportation</td>
<td>1830</td>
</tr>
<tr>
<td>Cyrus McCormick, John Manny</td>
<td>The Reaper, Telegraph, Co-inventor of Morse Code</td>
<td>A Machine that could harvest four times as much grain as people working by hand</td>
<td>1832, 1835</td>
</tr>
<tr>
<td>Samuel F.B. Morse</td>
<td>Steel plow</td>
<td>Vastly improved the efficiency of fabric &amp; clothing industry</td>
<td>1837</td>
</tr>
<tr>
<td>William Kelly</td>
<td>“Air-blowing” process in iron</td>
<td>Converted molten iron into steel.</td>
<td>1847</td>
</tr>
<tr>
<td>Isaac Singer</td>
<td>Sewing machine</td>
<td>Improves and markets Howe's Sewing Machine</td>
<td>1851</td>
</tr>
<tr>
<td>Leavenworth &amp; Pike’s Peak Express Company</td>
<td>The Pony Express</td>
<td>Mail carriers who traveled on horseback along a trail 2,999 miles long</td>
<td>1859-1861</td>
</tr>
<tr>
<td>William Le Baron Jenney</td>
<td>Skyscraper, Designed fortifications during Civil War</td>
<td>Enabled construction of tall, multi-story buildings for office and commercial use</td>
<td>1861-1885</td>
</tr>
<tr>
<td>Cyrus Field</td>
<td>Transatlantic Cable</td>
<td>Connected countries with U.S.</td>
<td>1866</td>
</tr>
<tr>
<td>Alexander Graham Bell</td>
<td>Telephone</td>
<td>Improved communication</td>
<td>1876</td>
</tr>
<tr>
<td>Thomas Alva Edison</td>
<td>Phonograph, telephone, Incandescent light bulb</td>
<td>Music, Electric lighting in homes</td>
<td>1877-1898</td>
</tr>
<tr>
<td>Nikola Tesla</td>
<td>Induction Electric Motor</td>
<td>Motors for small machines</td>
<td>1888</td>
</tr>
<tr>
<td>Orville &amp; Wilbur Wright</td>
<td>First Airplane</td>
<td>Man could fly!</td>
<td>1903</td>
</tr>
<tr>
<td>Henry Ford</td>
<td>Model T Ford, Assembly line</td>
<td>Improved transportation</td>
<td>1908-1913</td>
</tr>
</tbody>
</table>

**Examples of Primary Sources:**

- Early Sewing Machine
- Textile Mill – 1820’s
Steps to Invent:
1. Brainstorm ideas.
2. Plan and design it. (Breadboard, Model, Prototype)
3. Name it.
   Optional Steps:
5. Give it a trademark.

The Breadboard
An important step in planning how you will develop your invention and what it will look like is to create a breadboard. Show that your idea of the invention can work. First, draw a picture of your breadboard. Label the important parts. On the back of your paper, write about how your invention will work.
The Model
Now that you have made the breadboard, you are ready to create the model. While planning the model, you need to think about more than the invention itself. An inventor considers the questions below as he/she makes the model.

1. What type of consumer will be interested in your invention?

_____________________________________________________________________________

2. What special features will your invention have in order to attract consumers?

_____________________________________________________________________________

3. What will it cost to produce your invention?

_____________________________________________________________________________

4. How much money will your invention sell for?

_____________________________________________________________________________

5. Where will you sell it?

_____________________________________________________________________________

6. If your invention is an improvement on a previous one, in what way is it better?

_____________________________________________________________________________

7. If your invention is a brand new product, in what way is it unique?

_____________________________________________________________________________

The Prototype
The prototype is the next step in the development of your invention. It is usually a sample made by hand that looks and performs exactly like the finished product. Make a prototype of your invention. Take a picture of it and glue or tape it in the box below. Describe what it is designed to do.

What’s in a Name?
Don’t underestimate the importance of a product’s name. Think about the advertisements and commercials you have seen. Which ones caught your attention because of the unusual, clever, funny or easy to remember? The name can also help the inventor or manufacturer sell it!

Brainstorm possible names for your invention. Consider how you would like other people to remember your invention.

Think of a brief descriptive phrase that explains what your invention is designed to do. Using your description, brainstorm a one, two, or three word title for your invention.

Finally, write the name of your invention! __________________________________________
### Rubric: Invention & written report

<table>
<thead>
<tr>
<th>100 possible pts.</th>
<th>15 pts.</th>
<th>20 pts.</th>
<th>25 pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clarity of the Invention (25 total)</strong></td>
<td>When looking at the display and listening to the presentation, it is not clear what the purpose of the invention is. It is not easy to determine what problem the invention will solve.</td>
<td>When looking at the display and listening to the presentation, the invention’s purpose is clear. It is possible to see what problem the invention will solve.</td>
<td>When looking at the display and listening to the presentation, the invention’s purpose is extremely clear.</td>
</tr>
<tr>
<td><strong>Neatness &amp; Presentation (25 total)</strong></td>
<td>The display may not be neatly done. It does not attract the viewer’s eye. The presenter does not speak in a very clear voice or make much eye contact with the audience.</td>
<td>The display is neatly presented and pleasing to the viewer’s eye. The presenter speaks in a clear voice and makes moderate eye contact with the audience.</td>
<td>The display is extremely well presented &amp; pleasing to the viewer’s eye. The presenter speaks in an extremely clear and audible voice and maintains continuance with the audience.</td>
</tr>
<tr>
<td><strong>Written/Typed Description (25 total)</strong></td>
<td>The report has not been well edited. More than one mistake is evident. <em>Two of the three requirements for the written description are missing from the write up.</em></td>
<td>The write up has been edited, but one mistake remains. <em>One of the three requirements for the written description is missing from the write up.</em></td>
<td>The write up has been very well edited. There are no apparent mistakes. <em>All three of the requirements for the written description are included in the write up.</em></td>
</tr>
<tr>
<td><strong>Effort (25 total)</strong></td>
<td>The display shows little or to no effort.</td>
<td>The display shows moderate effort.</td>
<td>The display shows an extreme amount of effort.</td>
</tr>
</tbody>
</table>

Three requirements for the written/typed descriptions include:

1. Name of the Invention
2. Purpose of the Invention
3. Your feelings about making the invention
Assessments/Evaluation:
Formative Assessment: The student will compose a report and create an invention based on research and primary source documents that describes a major invention and its impact on productivity during the early development in the United States.

EXTENSION ACTIVITIES:
1. Using the 3x5 note cards of inventions that changed our lives, create a timeline for classroom.

2. Students can research photographs of various houses and tenements; students investigate how peoples' living conditions varied depending on their work. Do you think the family that lived here was ever hungry? Would you have felt safe here?

3. Identify Lowell, Massachusetts on a U.S. map. Find photos of textile mills from the turn of the century. Examine pieces of cloth under a microscope or by using a hand lens. Focus questions: What is cloth and thread made of? How are cloth and thread made? How did machines change over time in the textile industry?

4. [http://www.wartgames.com/themes/factories.html](http://www.wartgames.com/themes/factories.html) Factory Children - Life in the Factories Where students can see animations of the spinning mill, winding gear, paddle steamship, iron bridge, and others as well as interactive games and activities.


6. Other Websites to investigate:
   [http://library.thinkquest.org/4132/info.htm](http://library.thinkquest.org/4132/info.htm) Big Inventions