American Innovation
During the Industrial Revolution

Select lesson plans that most directly support
The Henry Ford's educational theme
"American Innovation"

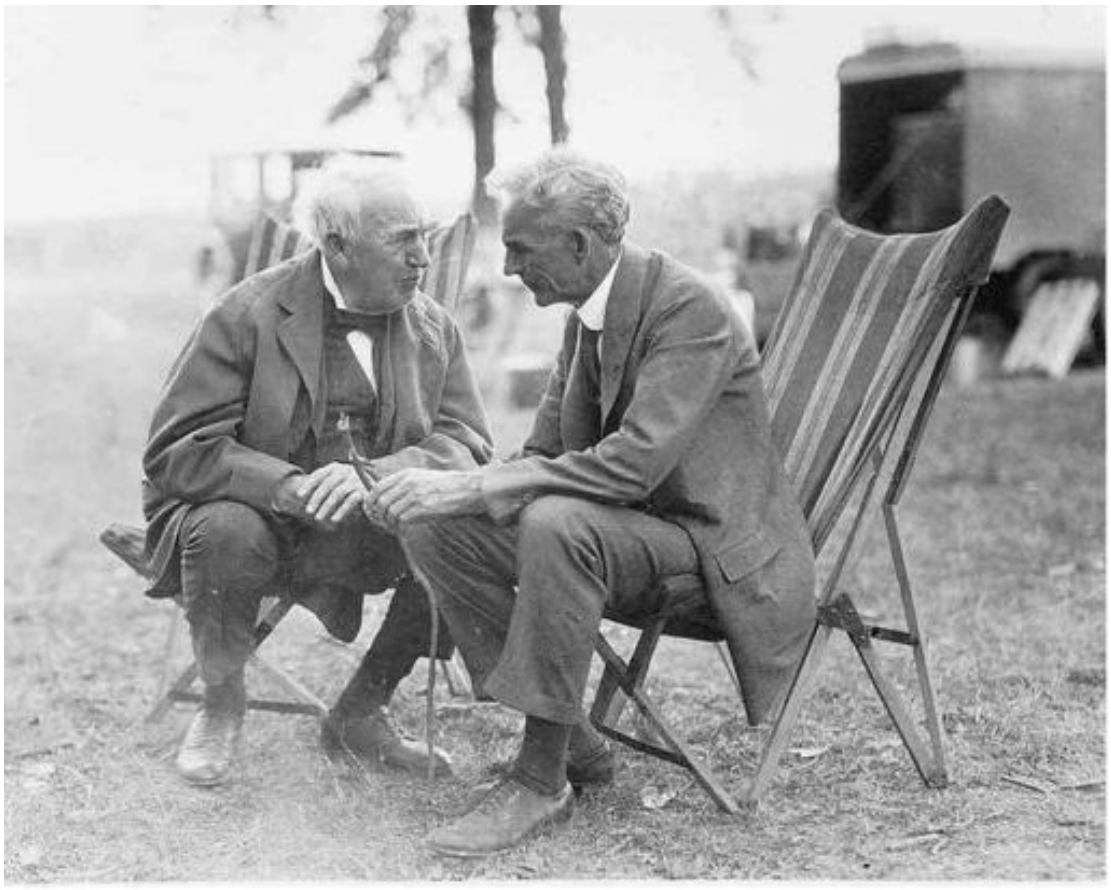
Created by participants in the
National Endowment for the Humanities
Landmarks of American History and Culture Workshops
for School Teachers:
America's Industrial Revolution at The Henry Ford,
2009, 2010, 2011

America's Greatest History Attraction

Elementary Lesson Plan 1

Sally Meyer, Crabapple Lane Elementary School, Peachtree City, GA

American Innovators:
Henry Ford and Thomas Edison



Source: http://www.nps.gov/archive/edis/graphics/ford-tae.jpg

Title of Lesson: American Innovators: Henry Ford and Thomas Edison

Grade Level: 5th

Overview: This unit is designed to allow gifted fifth-grade students the opportunity to explore the lives of two remarkable American innovators, Henry Ford and Thomas Edison. After hearing a brief biography of each personality, students will create a timeline of their lives, compare them using a Venn diagram, and then do more extensive research on one of them. Using that research, students will create a memorial to the individual they have chosen and present their project to classmates.

Instructional Sequence

Introduce the topic; students brainstorm

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Read Henry Ford's biography; students take notes

↓

Read Thomas Edison's biography; students take notes

↓

Compare/Contrast Henry Ford and Thomas Edison

- Timeline
- Venn diagram
- Writing

↓

Student Research and Projects

↓

Presentations

Established Goals (standards)

Georgia Gifted Benchmarks:

5.2 Students will develop and practice creative thinking and creative problem-solving skills.

- The student will be able to forge possible options for compromise between divergent positions.
- The student will be able to evaluate solutions (results) and identify the most elegant.

5.3 Students will develop and practice critical thinking and logical problem-solving skills.

- The student will be able to defend strategies used to solve problems and identify the most elegant solution.
- The student will be able to explain the interconnected relationships of real-world problems and possible solutions in terms of economic, sociological, environmental, and political issues.

5.4 Student will develop advanced communication skills.

- The student will be able to organize elements of a task and promote engagement of peers to accomplish a desired result.

5.5 Students develop an understanding of self.

- The students will be able to demonstrate recognition of their responsibilities as a result of their membership in a community.

Georgia Performance Standards

Social Studies

SS5H3 The student will describe how life changed in America at the turn of the century.

- b. Describe the impact on American life of …Thomas Edison (electricity).

SS5H4 The student will describe U.S. involvement in World War I and post-World War I America.

- b. Describe the cultural developments and individual contributions in the 1920s of…..the automobile (Henry Ford)…

SS5E1 The student will use the basic economic concepts of trade, opportunity cost, specialization, voluntary exchange, productivity, and price incentives to illustrate historical events.

- f. Give examples of technological advancements and their impact on business productivity during the development of the United States.

SS5E2 The student will describe the functions of the three major institutions in the U.S. economy in each era of United States history.

- a. Describe the private business function in producing goods and services.

What enduring understandings are desired?

Students will understand that…

- learning is driven by questions and a desire for knowledge
- risk and success go hand in hand
- hard work and success go hand in hand
- different people have different talents

What essential questions will be considered?

- What is Henry Ford's legacy?
- What is Thomas Edison's legacy?

What key knowledge and skills will students acquire as a result of this unit?

Students will know…	*Students will be able to…*
▪ The important events in the life of Henry Ford ▪ The important events in the life of Thomas Edison ▪ The impact of the innovations of Henry Ford and Thomas Edison on life in the 19th century and beyond	▪ Create a timeline of the important events in the life of Henry Ford ▪ Create a timeline of the important events in the life of Thomas Edison ▪ Research and analyze the innovations of Henry Ford and Thomas Edison ▪ Compare and contrast the character traits and personal interests of Henry Ford and Thomas Edison ▪ Create a memorial to either Henry Ford or Thomas Edison

Who was Henry Ford?

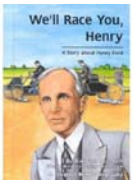
Vocabulary: innovator, innovation, invention, mobility, Model T, assembly line

Lesson Questions:

- What is an innovation? An innovator?
- What is the difference between an innovation and an invention?
- Why do we remember Henry Ford?
- What is the Model T, and how did it change America?
- What is the assembly line? How has it impacted production?

Activities

- Begin the lesson by brainstorming what students know about Henry Ford.
- Discuss the meaning of innovations.
  - How are innovations different from inventions, or are they the same thing?
  - What do you think provides the impetus for an innovation?
  - Is an innovator the same as an inventor?
  - Can a person who improves someone else's invention be considered an innovator?
- Read the book, *We'll Race You Henry: A Story about Henry Ford* by Barbara Mitchell. Instruct students to take notes on the Henry Ford note taking sheet. Provide instruction about what an *important* event is, if necessary. For example, who he married is not the reason we remember him, but improving the assembly line is.



- As you read, discuss the events in the story. At the end, ask students to share their choices for important events, character traits, challenges faced, and what they liked best about Henry Ford.
- Share primary source documents, such as Ford's patent for the "motor carriage" and pictures of the Model T and the assembly line.
- Spend an extended amount of time on:
  - the assembly line: how its implementation changed the efficiency of modern factories, the mind numbing tasks workers were expected to complete, how it is now an integral component of almost every type of production around the world, etc.
  - the Model T: how it made America mobile, creating the need for highways, motels, and fast food

Formative Assessment

- Teacher observation
- Class discussion
- Note taking sheet

Summative Assessment

- Memorial project

Resources:

- *We'll Race You Henry: A Story about Henry Ford* by Barbara Mitchell
- Notes worksheet

Primary Source Documents

- Patent number 686,046 (Motor Carriage)
- Photos of the assembly line, Model T, and Henry Ford

Henry Ford

Date of Birth _____Date of Death _____

Famous for _____

Important events in Henry Ford's life (include year or age):

1.

2.

3.

4.

5.

What challenges did Henry Ford overcome?

What character traits did Henry Ford exhibit? Explain your choice.

What do you like best about Henry Ford? Explain your choice.

Henry Ford

Old 16
In 1908, Old 16, the Locomobile race car, won the prestigious Vanderbilt Cup. Its victory marked the first time an American car won an international auto race and served notice to the rest of the world that America was poised to change the auto industry forever.

Made: 1906
ID: 97.9.1
Photo ID: G981

15 Millionth Ford Model T Touring Car
This was the last car of the Model 'T' series. After completing this car, the Ford Motor Company began preparations to build the new Model 'A'. The 4-cylinder, 22.5hp, 5-passenger touring car is marked with Engine No. 15,000,000.

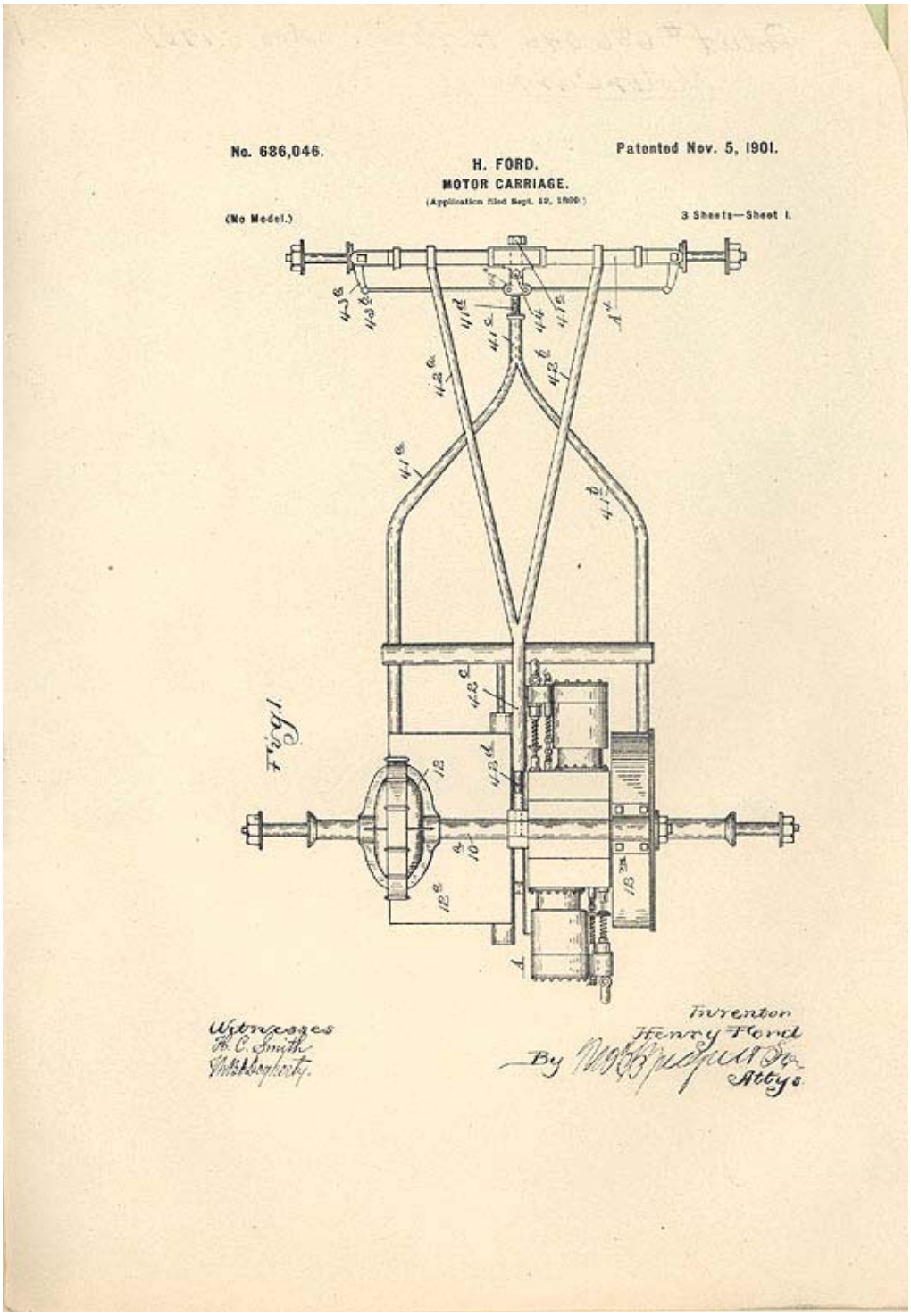
Made: 1927
ID: 00.136.124

Ford Model T Truck
Hauling 8,000 Pounds of Hay

McDonald's Sign
Standing 26 feet high, this neon-illuminated sign was installed in August of 1960 at the second McDonald's franchise in the state of Michigan. It reads, "Licensee of the MCDONALD'S Speedee Service System -- HAMBURGERS Over Million Sold."

Made: 1960
ID: 86.137.1

Source http://www.thehenryford.org/museum/automobile.aspx:



U.S. Patent No. 686,046 on the Motor-Carriage granted to Henry Ford and the Detroit Automobile Company, 11/5/1901
Source: www.fi.edu/learn/case-files/ford/full/01_11_0...

Who Was Thomas Edison?

Vocabulary: incandescent, perseverance,

Lesson Questions:

- What is an innovation? An innovator?
- What is the difference between an innovation and an invention?
- Why do we remember Thomas Edison?
- What important inventions did Thomas Edison develop?
- What is the incandescent light bulb, and how did it change America?

Activities

- Begin the lesson by brainstorming what students know about Thomas Edison.
- Review the meaning of innovations and inventions.
    - How are innovations different from inventions, or are they the same thing?
    - What do you think provides the impetus for an innovation?
    - Is an innovator the same as an inventor?
    - Can a person who improves someone else's invention be considered an innovator?
- Instruct students to list the five materials things they could not live without and set it aside.
- Read the book, *Inventing the Future: A Photobiography of Thomas Edison* by Marfe Ferguson Delano. Instruct students to take notes on the Thomas Edison note taking sheet. Review what an *important* event is, if necessary. For example, that he nicknamed his children Dot and *Dash* is not the reason we remember him, but the light bulb is.

- As you read, discuss the events in the story. At the end, ask students to share their choices for important events, character traits, challenges faced, and what they liked best about Thomas Edison. Discuss/debate results. Ask students if they think Edison is an innovator, an inventor, or both. With a partner, have students discuss how Edison could have developed ideas for 1093 patents.
- Share primary source documents, such as Edison's patent for the light bulb, his quotes about work ethic, and photos of him sleeping on a table. Discuss.
- Instruct students to review the list of items they could not live without. Discuss how many of them are the result of Thomas Edison's inventions. For example,
    - MP3 player-sound recording. You can listen to an original recording of Thomas Edison at the National Park website. http://www.nps.gov/edis/photosmultimedia/the-recording-archives.htm
    - Movies-the light bulb, movie camera, and recorded sound.

Formative Assessment

- Teacher observation
- Class discussion
- Note taking sheet

Summative Assessment

- Memorial

Resources

- *Inventing the Future: A Photobiography of Thomas Edison* by Marfe Ferguson Delano
- Notes worksheet

Technology/Primary Source Documents

- Copies of Edison's patents for the phonograph and light bulb
- Photographs of Edison at work and sleeping
- Photographs of Edison's inventions

Thomas Edison

Date of Birth _____Date of Death _____

Famous for _____

Important events in Thomas Edison's life (include year or age):

1.

2.

3.

4.

5.

What challenges did Thomas Edison overcome?

What character traits did Thomas Edison exhibit? Explain your choice.

What do you like best about Thomas Edison? Explain your choice.

To the Honorable Commissioner of Patents:

Your Petitioner Thomas A. Edison

of Menlo Park in the State of New Jersey

prays that LETTERS PATENT may be granted to him

for the invention of an Improvement in Electric Lamps and in the method of manufacturing the same

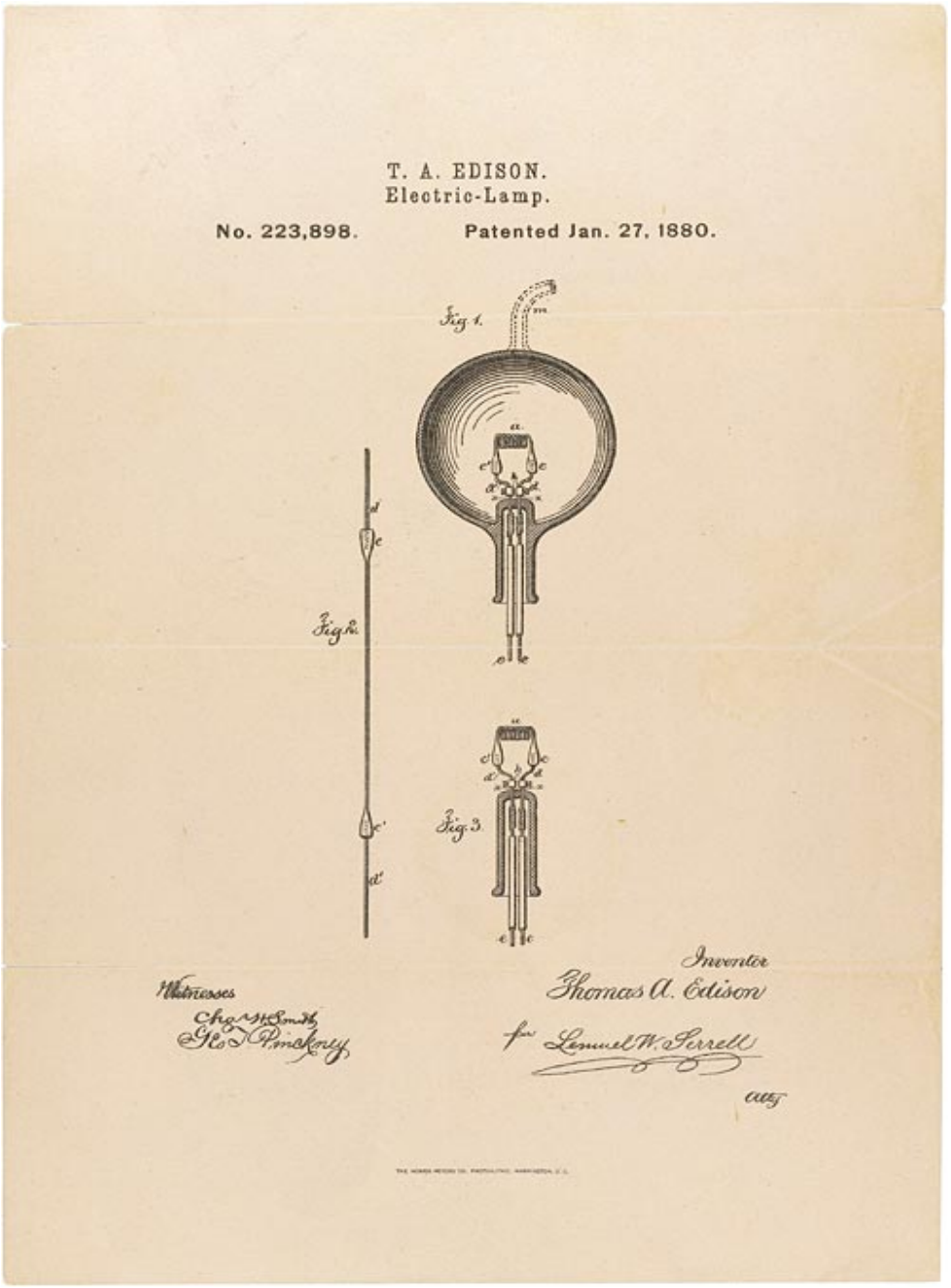
set forth in the annexed specification. (Case No. 186.)

And further pray that you will recognize LEMUEL W. SERRELL, of the City of New York, N. Y., as his Attorney, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the Patent, and to transact all business in the Patent Office connected therewith.

_____

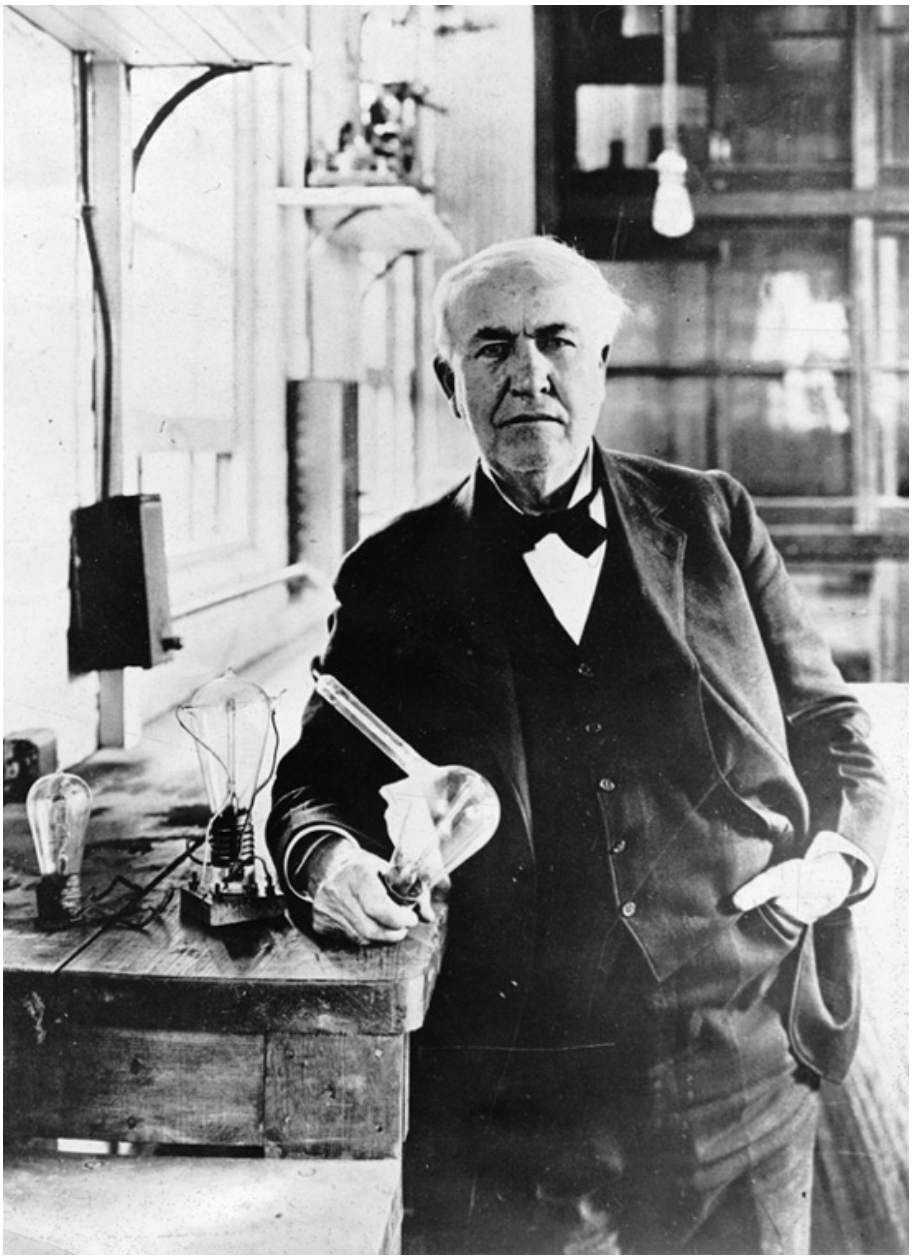
_____ 1879.

Source: www.ourdocuments.gov

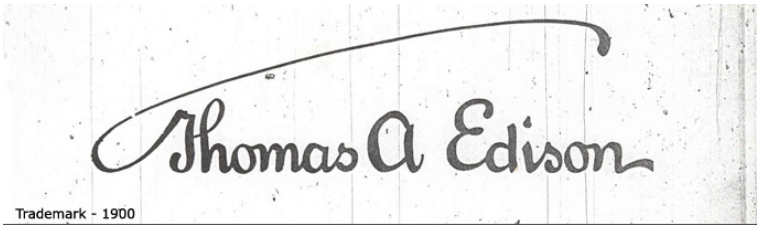


Thomas Edison's Electric Lamp
Patent Drawing

Record Group 241
Records of the Patent and Trademark Office
National Archives and Records Administration
ARC Identifier: 302053
Source: www.ourdocuments.gov



Source:
http://www.archives.gov/exhibits/american_originals_iv/images/thomas_edison/thomas_edison.jpg



Comparing and Contrasting Henry Ford and Thomas Edison

Vocabulary:

Lesson Questions:

- How were Henry Ford and Thomas Edison alike?
- How were Henry Ford and Thomas Edison different?
- What do you think they talked about when they spent time together?

Activities:

- Provide students with white construction paper (18x24). Instruct them to fold the paper in half lengthwise. Working in groups, students will use their notes to create a timeline of Thomas Edison's life on one half of the paper. On the other half of the paper, they will create a timeline for Henry Ford's life. The class will discuss similarities and differences they note in the lives of the two men.
- Provide students with a blank Venn diagram (or instruct them to create one). Working alone, students will add details about Ford and Edison to the two circles, and add things they have in common to the middle. These can be events or experiences they shared (i.e., camping, the 50-year anniversary of the light bulb) or character traits, like perseverance and curiosity.
- The class will discuss results.
- Finally, the class will discuss the following questions:
    - Were Henry Ford and Thomas Edison innovators or inventors?
    - Which one do you think was more important to our history?
    - Why do you think they were friends?
    - What do you think they talked about when they were together?
- This portion of the unit will conclude with students writing a persuasive paper about this prompt:
    - Who created the biggest change in American life, Henry Ford or Thomas Edison?

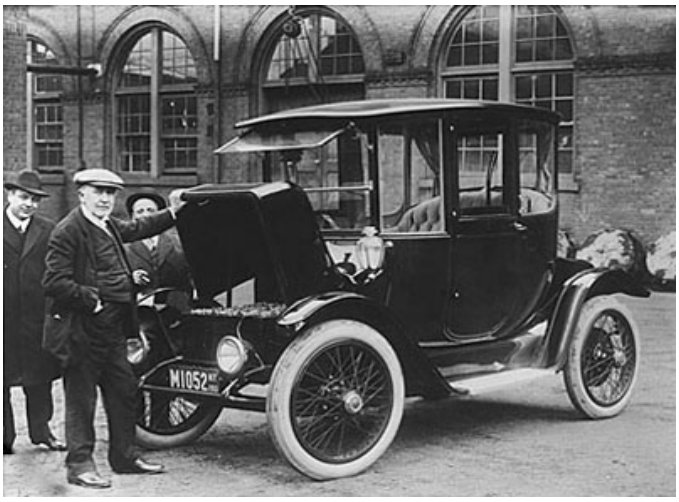
Formative Assessment

- Teacher observation
- Class discussion
- Venn diagram
- Timeline
- Writing

Summative Assessment

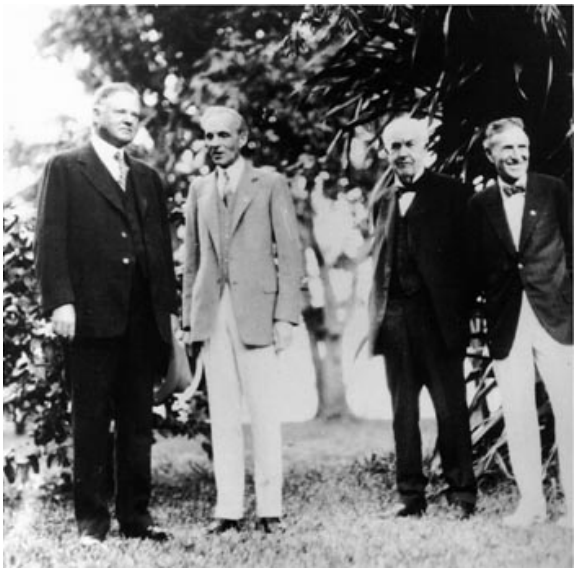
- Memorial

Resources: Venn diagram, white construction paper (18x24)

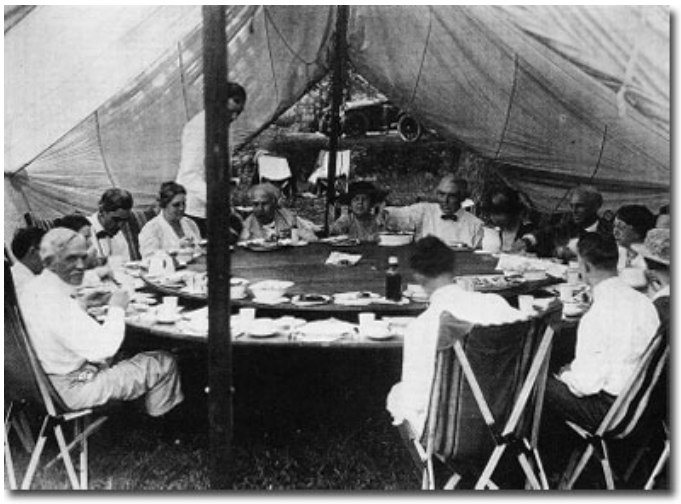


Thomas Edison inspects electric car in 1914. He and Henry Ford had planned to use Edison's nickel iron battery to power clean, efficient, affordable cars for the masses that would be recharged by home wind turbines, according to author Edwin Black in 'Internal Combustion'.

Source:
www.evworld.com/images/edison_ev1914.jpg



President Herbert Hoover, Henry Ford, Thomas Edison, and Harvey Firestone at Edison's 82nd birthday. Ft. Myers, Florida, February 11, 1929.Credit: Herbert Hoover Library
http://teachpol.tcnj.edu/amer_pol_hist/thumbnail341.html



Camping with Thomas Edison, Henry Ford, and Harvey Firestone
Source:
www.dnr.state.md.us/feature_stories/00000141.jpg

Research and Project

Vocabulary: memorial, commemorate, expectations

Lesson Questions:

- How should we remember Henry Ford and Thomas Edison?

Activities

- Discuss why we would want to memorialize a person, such as Henry Ford or Thomas Edison. Explain the history and purpose of The Henry Ford Museum and Greenfield Village.
- Review/introduce possible ways to memorialize a person (flag, coin, monument, school, roads, statue, etc.)
- Explain project and expectations:
  - Students research and take notes on the life of either Thomas Edison or Henry Ford.
  - Students create a memorial that reflects the importance of Henry Ford or Thomas Edison.
- Students present projects to the class.

Formative Assessment

- Teacher observation
- Teacher/student conferences
- Notes

Summative Assessment

- Project

Resources:

Encyclopedias, biographies, non fiction books, approved internet sites, such as www.nps.gov/edis
Poster boards, clay, markers, paint, etc.

American Innovators
Final Project

The personality I have chosen is

_____

Due Date:

Using the skills you have developed this year, you will research either Henry Ford or Thomas Edison, create a memorial to your choice, and present your work to the class.

Presentation
Your presentation must be 4-5 minutes long and address the following:

General Information

- Background information (childhood, school, early life, etc.)
- What were his/her important accomplishments?
- Why was Henry Ford or Thomas Edison influential?
- Which of his inventions/innovations do you think was the most important?

Character

- What challenges did he face?
- What character traits did he represent?
- Who were his friends?

Evaluation of your personality

- Who influenced him?
- Would he have been in the gifted program?
- Would you want to be a friend of Ford/Edison?
- Do you think he was in inventor or an innovator? You can only choose one.

Note: You should be able to tell, not read, about your personality on (date).

Visual

- Think about the impact this person has made on the world. Remember the many ways a person can be memorialized.
- Create an innovative memorial to either Thomas Edison or Henry Ford. There are no limitations, other than it must be your personal best.
- Your visual must include a commemorative "plaque" that provides a brief summary of his life.

We will be devoting at least one hour in class each week to research, but you will also need to do some of the work at home, especially during the initial research period.

I understand that my child has a research project due in Enrichment on (date).

Parent Signature

Self Assessment/Teacher Assessment Name_____

Scale: 4-Excellent (I would be proud to show the principal and my parents)
3-Good (Hard Work is evident, but there is room for improvement)
2-Fair (I can improve this in many ways to meet the objective)
1-Poor (I can't believe I turned this in)
0-Not Observed

	4	3	2	1
Background • Major life events • Accomplishments • Why is this person influential? • Most important innovation	All topics covered in depth with examples	All topics covered, but not in depth OR Most topics covered in depth	Most topics covered or topics not covered in depth	Topics barely covered and/or no examples given
Character • Challenges • Friends • Character Traits	All topics covered in depth with examples	All topics covered, but not in depth OR Most topics covered in depth	All topics covered, but not in depth OR Most topics covered in depth	Topics barely covered and/or no examples given
Gifted Program? • Qualifications (ability, achievement, creativity, motivation)	Choice fully supported using all four qualifications and explained with examples	Decision partially explained (only some areas or no examples)	Decision made, but not fully explained in terms of qualifying areas	Decision stated, but not explained at all
Memorial ▪ Represents the character AND his accomplishments ▪ Is creative and innovative	▪ It is easy to see exactly who is being memorialized and why. ▪ Very innovative.	▪ The observer can tell who is being represented, but the memorial presents an incomplete picture. ▪ Innovative	▪ The memorial presents an incomplete picture. ▪ It is not innovative.	▪ Not clear who is being memorialized or what he accomplished ▪ Mundane presentation

Presentation • Told-did not read • Made Eye contact • 4-5 minutes	Spoken confidently with frequent eye contact for 4-5 minutes	Spoken with eye contact most of the time for 4-5 minutes OR Spoken confidently with continuous eye contact for less than 4 minutes	Spoken with limited eye contact for 4-5 minutes OR Spoken with eye contact most of the time for less than 4 minutes	Read with limited eye contact for four minutes or less
Total Score				

Comments:

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Elementary School Lesson Plan 2

Cynthia Szumlanski, Marshall Christian Academy, Albertville, AL

Title of the Lesson: Edison: Yesterday, Today, and Tomorrow

Grade Level: 4

Overview: Students will investigate yesterday's demand, today's uses and tomorrow's adaptations for Edison's inventions.

Central Question: How does practical application influence the demand for new inventions and technology?

Learning Objectives: Students will explain why one of Edison's inventions was needed or wanted by the public.
Students will explain how one of Edison's inventions has been useful to them.
Students will explain how one of Edison's inventions may be improved in the future.

Assessment Tools: Rubric

Key Concepts: Invention, Innovation, Consumer Demand

Evidence Sources: The History of the United States, ABEKA
Pretzer, William S., Working at Inventing: Thomas A. Edison and the Menlo Experience, Henry Ford Museum and Greenfield Village, 1989
Adkins, Jan, Thomas Edison, DK publishing, 2009
Paul Israel's lecture at NEH workshop
Images from **The Henry Ford** website

Time Frame: 3 days

Instructional Sequence: Teacher will instruct students on Thomas Edison's background and accomplishments. Teacher will highlight specific inventions and their uses including images of those inventions. Teacher will explain the student project.

Student Project Ideas: Students will make a presentation to the class highlighting one of Edison's inventions using the following guidelines:
Choose one of Edison's inventions and explain why you chose that invention.
Describe the invention.
Explain why people wanted or needed the invention.
Explain how invention has been improved.
Use your imagination and explain how you might improve this invention.
Include at least one visual aid in your presentation.

Anticipated Challenges: Students may have difficulty thinking outside the box in thinking of an improvement for their chosen invention.

Curriculum Links: Science: ABEKA Science 4th grade Scope and Sequence, Chapter 6, "Energy, Sound, and Hearing" History: ABEKA History 4th grade Scope and Sequence, Chapter 15, "An Age of Progress"

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Middle School Lesson Plan 1

Jason Sheldon, Brandon Middle School, Ortonville, MI

Title of the Lesson: Change, Progress, and Unintended Consequences – America's Industrial Revolution

Grade Level: 8

Overview: Students will analyze changes in textile manufacturing, agriculture, communication, transportation, and daily life, from the early 19th century to today. Students will use this information to determine the positives and negatives of innovation. In the final assessment piece students will confront an unintended consequence of a modern form of technology in a real world setting.

Central Question: Is change always for the better? Are there unintended consequences to progress?

Learning Objectives: Students will be able to identify inventions that shifted the nature of textile manufacturing, agriculture, communication, transportation, and daily life from the early 19th century to today.
Students will understand the links between the types of technology used in the above categories and why the technology changed.
Students will think critically about the words "progress", "change", and "consequence" and how these words are related.
Students will identify a modern consequence of technology and work to change it in the final assessment piece.

Assessment Tools: Class Discussion
Journal Entries
Invention Timelines
Final Assessment Piece

Key Concepts: Changes and inventions in the areas of textile manufacturing, agriculture, communication, transportation and daily life will be addressed. The focus will be on what drove change and how change led to unintended consequences and further change.

Evidence Sources: Parent Interview
Class Discussion
Small Group Research and Assembly of Timeline
Notes on Group Presentations

Time Frame: 5 Class Periods

Instructional Sequence:

Day #1 - Class will begin with a discussion of the "Technology Today vs. Yesterday" interviews that were assigned at the end of class on the prior day. As a class, lists of various types of technology used by middle school students now and by middle school students in the past will be created and analyzed. Class will close with students responding to a journal entry in response to the following question: "Why do things change? Is change always for the better?".

Day #2 - Class will begin with a teacher led discussion of the journal entry from the end of day one. The focus of the discussion will be on the idea that change and progress are synonymous. Next, students will be divided into small groups and will be assigned a list of inventions from one of the categories mentioned above. For example, the agriculture group would be given a list of items such as the scythe, the reaper, the combine, etc. Students must then research these items using the internet and their textbooks and place them on a timeline along with the inventor(s) and a brief explanation of how the invention represented an improvement from the prior item (How did the reaper make life easier for farmers when compared to the scythe?)

Day #3 - Each of the five groups will present their timeline to the class with students taking notes on the areas of technological improvement that their group did not research.

Day #4 - Class will begin with students responding to the following in their journals: "What is a consequence? What are some consequences of the technological improvements discussed in class yesterday?" Next, the class will discuss their journal entries with the teacher presenting the idea that some consequences can be unintended. Following this discussion, the teacher will display the lists from day one focusing on the various types of technology used by middle school students now and by middle school students in the past and ask students if there have been any unintended consequences associated with these improvements. At the close of class the final assessment piece will be assigned.

Day #5 – Class time will be allotted to students to work on the final assessment piece.

Student Project Ideas: The final assessment piece will give students an opportunity to address an unintended consequence of innovation in any of the five categories studied in the lesson. For example, students can write a letter or e-mail as a concerned citizen to a clothing manufacturer who imports its textiles.

Anticipated Challenges: Lack of knowledge of early 19th century innovations and how those innovations evolved into items that are used today.
Vocabulary deficiencies in regards to words such as progress, unintended, and consequence.
Understanding that the word revolution means change and that America's Industrial Revolution continues today.
(All of these potential problem areas are addressed throughout the lesson, particularly in the journaling and class discussion portions of the lesson.)

Curriculum Links: GLCE's - 8-U4.2.1Comparing Northeast and the South- compare and contrast the social and economic systems of the Northeast and the South with respect to geography and climate and the development of agriculture, including changes in productivity, technology, supply and demand, and price (EI.3, I.4)
industry including entrepreneurial development of new industries, such as textiles (EI.I)
the labor force including labor incentives and changes in labor forces (EI.2)
transportation including changes in transportation (steamboats and canal barges) and impact on economic markets and prices (EI.2, I.3)

Technology Today vs. Yesterday

1. On the back of this sheet, list at least five technologies that you rely upon along with the reasons why these devices are so important to you. (10 points)

2. Interview an adult in your life and ask him or her to list the technologies that they relied upon when they were in the eighth grade. Include the year that this person was in eighth grade and why the devices were important to them. (10 points)

3. Compare the two lists. What similarities did you find? Differences? (5 points)

4. Have the adult you interviewed print and sign his or her name at the bottom of the page. (5 points)

The Unintended Consequences of America's Industrial Revolution

Throughout this lesson, we have analyzed how changes in textile manufacturing, agriculture, communication, transportation, and daily life have had both positive and negative consequences upon society. Now you will be asked to analyze how current technologies have impacted one of the five categories mentioned above.

First, you should select a category and think about how modern technology has impacted that category.

For example, how has the automobile changed transportation?

Next, make a list of the positive and negative consequences that this technology has had upon society.

Positive – Individuals have unlimited mobility with their cars.

Negative – Automobiles have led to a dependency upon fossil fuels.

Next, focusing upon your list of negative consequences, choose one item and formulate a plan of action to promote change.

In order to reduce our dependency upon fossil fuels as they relate to automobiles, I believe that major cities and their surrounding areas should provide adequate public transportation options such as subway systems.

Finally, follow through on your plan of action.

For the above example, one option would be to send a letter or an e-mail to your representative asking why there is a lack of public transportation options and demanding a change.

POTENTIAL UNINTENDED NEGATIVE CONSEQUENCES

TEXTILE MANUFACTURING –

MANUFACTURING OF CLOTHING OUTSIDE OF THE U.S.

OUTSOURCING OF JOBS

AGRICULTURE –

MSG / HIGH FRUCTOSE CORN SYRUP

RELIANCE ON MARKET SYSTEM FOR FOOD PRICES AND AVAILABILITY

COMMUNICATION –

LACK OF FACE TO FACE COMMUNICATION

TEXTING WHILE DRIVING

ONLINE DANGERS – PREDATORS, IDENTITY THEFT

1,000 FRIENDS ON FACEBOOK BUT DON'T KNOW YOUR NEIGHBOR

TRANSPORTATION –

AIR POLLUTION/GLOBAL WARMING

RELIANCE UPON FOSSIL FUELS

REDUCED PROXIMITY TO FAMILY

DAILY LIFE –

REDUCTION OF "FAMILY TIME" - BONDING, DINNER AT THE TABLE

POTENTIAL DAMAGE TO RELATIONSHIPS INCLUDING MARRIAGES

America's Greatest History Attraction

Donovan Pruett, La Joya Middle School, Visalia, CA

Middle School Lesson Plan 2

Title of the Lesson/Activity: Thomas Edison and the Industrial Age *Jeopardy* PowerPoint Review

Grade Level: 8th Grade U.S. History

Overview: Students will be able to answer review questions about Thomas Edison and his contributions to the Industrial Age based on previous lesson plans in a *Jeopardy*-type question-and-answer format. This marks the culmination of a mini (3-day) unit on Thomas Edison.

Central Question/Problem: Will the *Jeopardy*-type format (with sounds and graphics) provide a fun and stimulating way for students to review material on Thomas Edison in advance of the quiz?

Learning Objectives: California Standard 8.12.9
Students will name the significant inventors and their inventions and identify how they improved the quality of life (e.g., Thomas Edison).

Assessment Tools: Teacher walks around monitoring while students in groups of four will compete against each other for the most points in *Jeopardy*. Each student needs to work together as a team to provide an answer. The most points wins (see attached PowerPoint slides) PowerPoint, laptop and projector will be used to show the material.

Key Concepts: *Jeopardy* will be a review game that covers the basic points of the previous lessons on Thomas Edison and the Industrial Revolution. The categories are: Background, Biography/Inventions, Other Inventors and Miscellaneous.

Evidence/Sources: Classroom textbook, miscellaneous work sheets and supplemental teacher materials, thehenryford.org

Duration: 30 minutes

Instructional Sequence:

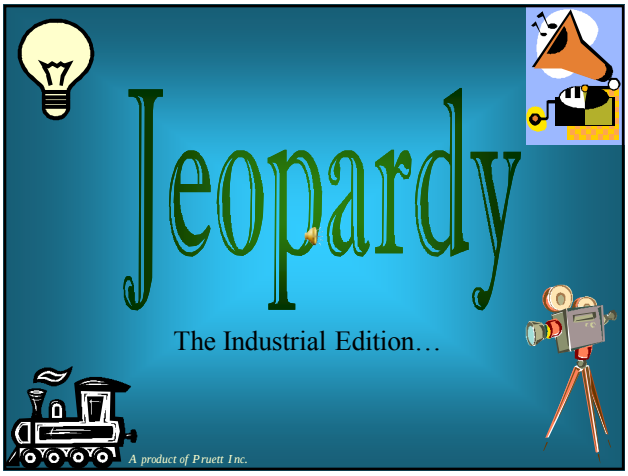
Step 1, 5 minutes – Students complete the warm-up activity of the day.

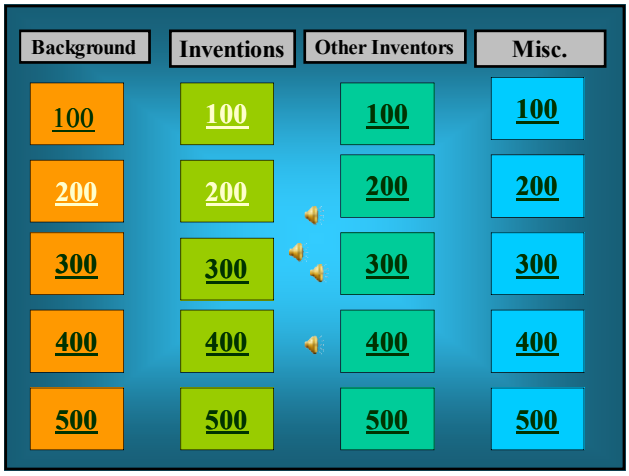
Step 2, 5 minutes – With students already in groups, teacher explains the basic steps of *Jeopardy*. Each question is worth anywhere from $100 to $500, with increasing difficulty the more the question is worth. Bonus questions worth double and triple the dollar value are hidden somewhere on the board. A "fastest hand" question will determine which group goes first. That group gets to choose where to start and can start anywhere on the board. They may keep the board for up to three correct answers in a row, and no student can answer more than one question back to back. Once three correct answers in a row have been given, another fastest hand question is given to determine which group gets the board next (the group previously in control of the board may participate in the fastest hand question again).

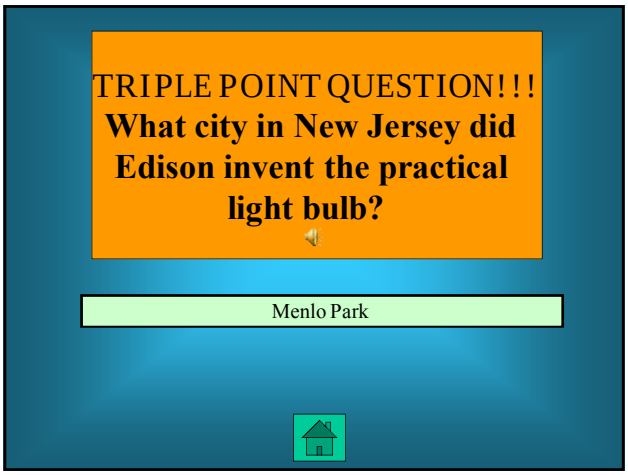
Step 3, 30 minutes – Begin playing *Jeopardy* by determining who's fastest in the fastest hand question. That team keeps the board, winning dollars/points until three consecutive questions have been answered. The game then cycles until all questions are complete or 30 minutes are up.

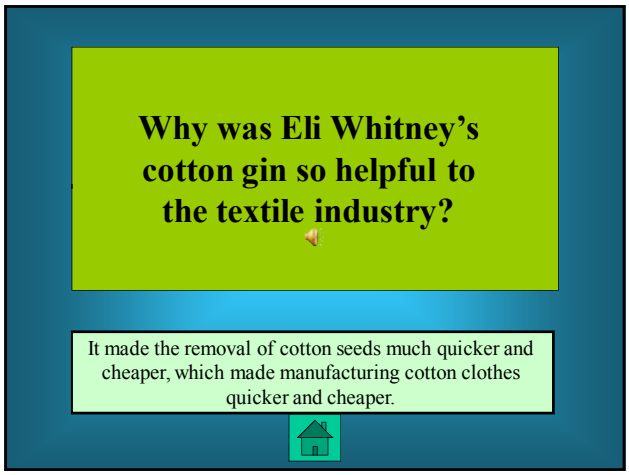
Step 4, 5 minutes – Final *Jeopardy*. All teams with dollars/points are allowed to play final *Jeopardy*. First, as a group, students must write down a wager on a separate sheet of paper. The group wager can be any number up to the total number of points they have. Correct answers will add the points wagered; incorrect answers will lose those points. This will determine which team is the ultimate winner.

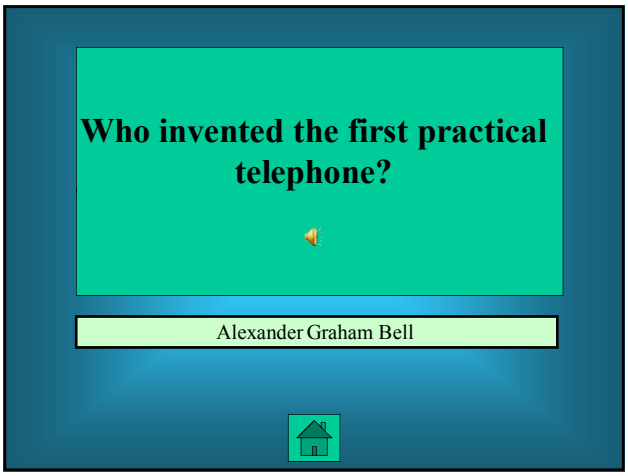
Anticipated Student Conceptions or Challenges to Understanding: *Jeopardy* is for review purposes. Only significant challenge is if students are unfamiliar with the basic rules of the TV show. This challenge is rare. Group members will be able to inform any student who is unsure, since they have to work together as a team to win properly.

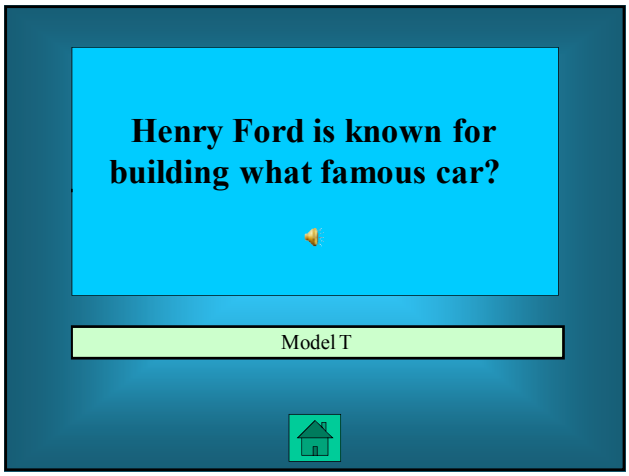












Name a reason why steam power has advantages in the early 1800's:

Don't have to be next to water, portable, can make traction engines, leads to new discoveries in internal-combustion engines, etc. etc.

What did Cyrus McCormick Invent?

The Reaper

Who invented one of America's first automobiles?

The Duryea brothers

What is a nickname for the late 19th century in America?

The Gilded Age, (or Victorian Age)

Which country did the Industrial Revolution start in?

England

What did John Deere first invent?

New type of steel plow.

Who was responsible for the first practical sewing machine?

Issac Singer

Was Henry Ford successful in his first attempt at manufacturing cars?

No, Ford Motor Company was his third attempt, the first two failed.

What form of transportation started using steam power in the 1830's?

Locomotives

What Edison invention was popular before the light bulb?

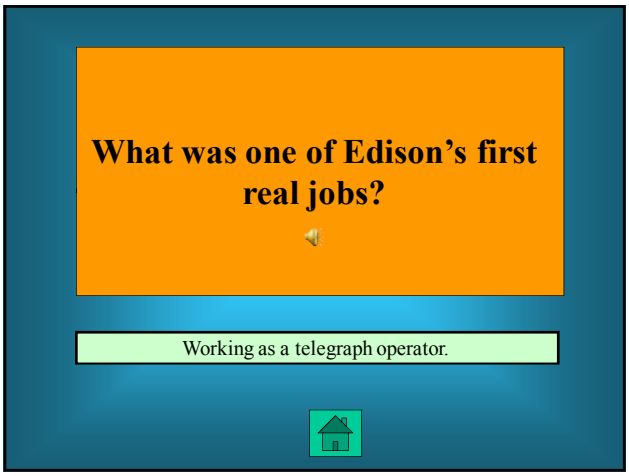
The phonograph

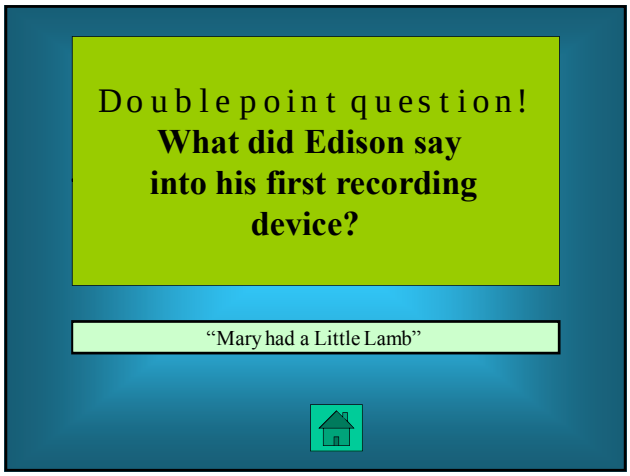
Henry Ford did not invent the car, but is more famous for inventing what?

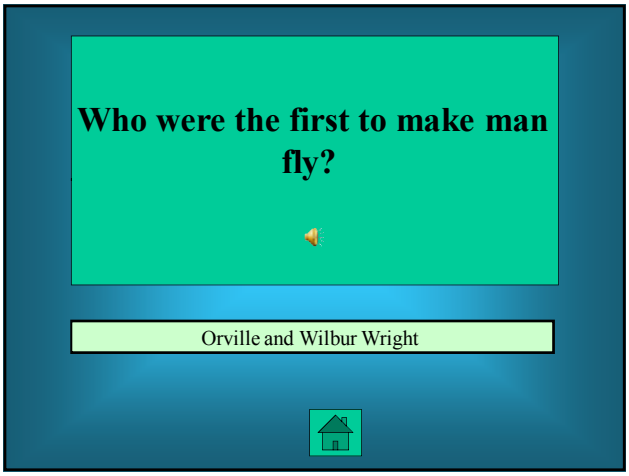
The modern day assembly line.

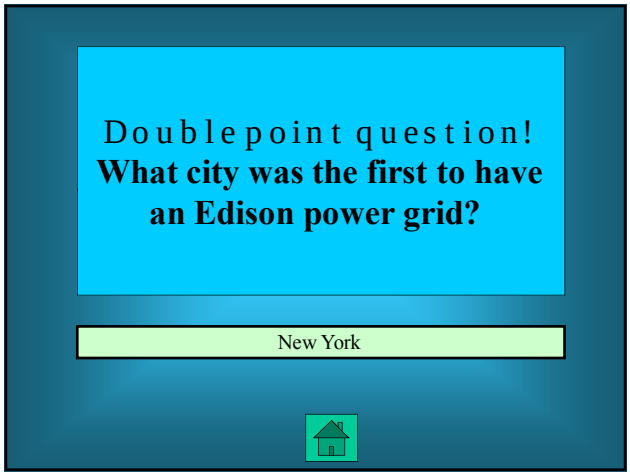
Name another invention of Edison's besides the light bulb, phonograph, and motion picture camera:

Etc. Etc. Etc. hundreds…









Brenda M. Jones, Aisha Shule/W.E.B. DuBois Preparatory Academy, Detroit, MI

High School Lesson Plan 1: Title of Lesson/Activity: African-American Inventors in the Industrial Revolution

Grade Level: 10th

Overview: A lot of attention has been given to Henry Ford and Thomas Edison as industrial innovators; however, many African-Americans did contribute to our evolving industrial development. This lesson will focus on how specific African-American inventors impacted the American Industrial Revolution.

Central Question/Problem: How did African-American inventors influence the American Industrial Revolution?

Learning Objectives:

- Students will understand the contribution of African-American inventors.
- Students will work together effectively in groups.
- Students will use technology for research.

Assessment Tools: Students will create and contribute to the assessment rubrics by determining the criteria for a written informative summary and class oral presentation. Teacher will observe how students gather information and work with others in their group.

Key Concepts: How did the inventions of these African Americans impact your life and the life of other Americans?

Evidence/Sources: Students will need computers with Internet access, paper and pens. Students will be assigned to a group, and each group will research a specific African-American inventor, such as Garrett Morgan, Frederick McKinley Jones, David Crosthwait, Lewis Latimer, Granville Woods and Madame C. J. Walker. Each group will be responsible for writing a short summary, which will include a brief biography and at least 10 facts about the inventor.

At the end of the project, each group will be accountable for an oral presentation, which must include all members, on how this individual influenced their lives and the American Industrial Revolution.

Duration: 7 days

Instructional Sequence:

Day 1: Teacher will discuss Henry Ford and Thomas Edison and how they are known as great visionaries in the Industrial Revolution. Next, the teacher will discuss how many African Americans were also visionaries but were overlooked due to racism and discrimination. Finally, the teacher will model a lesson on Elijah McCoy and discuss how he impacted the Industrial Revolution and answer any questions. The teacher will discuss group assignment and how students will be responsible for creating their own writing and oral presentation rubric. (Provide each student with sample rubric.)

Day 2: Students will create a rubric for written informative summary and oral presentation. Students will be assigned to a group and assigned a specific inventor. Each group will be given a class computer and begin research.

Day 3: Gather information on inventor.

Day 4: Begin to draft and revise summary.

Day 5: Complete summary and submit, and then begin work on presentation.

Day 6: Complete presentation.

Day 7: Present oral presentation to class.

Student Project Ideas: The majority of this work will be done in class, but students must be responsible for editing and proofreading their own work.

Anticipated Student Conception or Challenges to Understanding: The teacher must pay close attention to students who will allow other students to do the work, and they are just along for the grade.

Curriculum Links:

CE 1.3.6 – Participate collaboratively and productively in groups.
CE 1.3.8 – Evaluate own and others' effectiveness in group discussions and formal presentations.
CE 1.4.1 – Identify, explore and refine topics and questions appropriate for research.
CE 1.3.1 – Compose written, spoken and/or multimedia composition in a range of genres.

America's Greatest History Attraction®

High School Lesson Plan 2

Mary Anthrop, Catholic Central Jr/Sr High School, Lafayette, IN

Title of Lesson: Age of Steam

Grade level: 9-12

Overview: In this lesson students explore the development and use of steam power in Europe and the United States in the 18th and 19th centuries. Students will also connect the development of steam power with the birth of the Industrial Revolution and the role it played in their local community during the 19th century.

Central Question(s): How did inventors use the power of steam?

Why did steam power bring about the Industrial Revolution?

Learning Objectives: Students will be able to:

a) identify the major inventors of steam powered machinery;

b) explore the various uses of steam power; and

c) examine primary resources and draw conclusions from them.

Assessment Tools: Students will participate in discussion concerning the essential questions during and after the PowerPoint presentation. Finally students will complete the Age of Steam Document Analysis as a graded assignment.

Key Concepts: The Evolution of the Use of Steam Power in the 18th and 19th Century

Evidence/Sources: Age of Steam (PowerPoint presentation), Age of Steam Documents and Analysis handout Rutland, Jonathan. The Age of Steam. New York: Random House, 1987.

Duration: 1 class period of 50 minutes

Instructional Sequence: Students will view and discuss the Age of Steam (PowerPoint presentation) and complete the Age of Steam Document Analysis.

Student Project Ideas: Students might enrich their understanding of the evolution of steam power by designing their own steam powered inventions. Further research into the local community's use of steam power – steamboat trade, railroad trade and travel – might enhance the understanding of the economic and social impact of steam power.

Anticipated Challenges: Students might have difficulty understanding how steam power "works." Students may want to watch animated films of steam power.

Curriculum Links: United States History Standards for Grades 5-12: Era 6 (1870-1900) Standard 1: How the rise of corporations, heavy industry, and mechanized farming transformed the American people.

The Age of Steam Documents

A Stirring Appeal

To Those Who are Interested in the Welfare of the City

The Daily Chronicle, Marshall (Michigan), December 13, 1883

… I appeal to the people of our city to make a determined effort to have the amount of their notes placed in the bank without delay. We cannot, we must not lose this opportunity. The building of the shops here means a rapid increase in the population of our city. It means a rapid rise in the value of every piece of property in our city. It means a rapid increase in our manufacturing interests. It means that every store and dwelling house in our city will be quickly and permanently occupied. It means that necessity be erected without delay. It means that new houses all over the city must of necessity be erected without delay. It means that every vacant lot in our magnificent business street will soon be occupied by brick buildings….

About the Shops

Some Figures and Facts Concerning the Big Industry

Lafayette *Journal*, July 4, 1892

… The organization known as the Lafayette and Monon Railway company, will build its principal machine and car shops, which will cost when fully equipped with machinery, about $450,000, together with side tracks, turn tables, transfer table, and all necessary facilities for a large plant of this character. The buildings will extend for a distance of one-half mile, the side tracks necessary for these buildings will be about five miles in length, which , with one an done-half mile of main track, will make about six and one-half miles of new track.

The total cost of main track, side track, and shops will be about $450,000. Of this amount the Monon railway company will furnish all the money excepting $100,000, the right of way, and the cost of 45 acres of land, which are estimated to amount to $130,000, this being the amount, of aid asked for from Fairfield township….

Paint and car shop, 110x410 -	$62,000	Elevated coal track	2,500
Machine and boiler shop, 110x350	54,000	Cinder pit	1,000
Engine house, 30 stalls	42,000	Transfer table, power and pit, 60x390	6,500
Planning mill and cabinet shop, 110x170	28,000	Iron turn table, 60 feet	3,500
Office and store room, 2 stories, 50x130	22,000	Retaining walls on street lines	3,500
Blacksmith shop, 70x160	17,000	Drainage	5,000
Tin and copper shop, 70x80	9,000	Heating apparatus	6,000
Boiler room, 40x60	6,000	Water service	6,000
Paint and oil room, 30x40	5,200	25,000 feet side tracks	27,500
Boiler room, 40x40	4,500	Reorganizing freight yards	6,800
Dry kiln, 40x70	5,000	1 ½ miles of main track	8,350
Oil house, 30x30	4,000	Machinery and fixtures	94,750
Out buildings, iron racks, etc.	3,000		
Sand house. Frame, 38x40	1,000	Total cost	$450,000
Grading, 50,000 cubic yards	8,500		
Coal platform, 12 dumps	7,500		

All buildings will be one story brick, with slate roof, except where noted. These shops will have the capacity for working 1,000 men.

The Monon Company will start with about 600 men, whose average pay will be $2 per day, making a monthly pay roll is over $30,000 at the start, with a gradual increase.

Monon's New Train

A Beautiful Passenger Train Built in This City

Lafayette Daily Courier, September 23, 1896

Some months ago the Monon road officials decided to take four or five old and worn passenger coaches of an ordinary character off the road, send them to the shops here, where that could be put through a course of repairs, remodeling and so on, eventually coming forth better than new. Four of these old coaches, not one of which looked as if it could wobble over another mile of track, were put into the hands of the boss mechanics, rushed through the transformation process and today go out into the world again as the prettiest train in the west. Master Mechanic Watkeys, Assistant Master Mechanic W.P. Coburn and Superintendent Charles Coller have had charge of this work, and they are as proud as new fathers. Superintendent L.H. Parker chaperoned a party of newspaper men to the shops yesterday, where they were kindly treated by the heads of the departments. The shops from one end to the other were opened to them, and they saw all of the wonderful machinery which has been so fully described by the press in days gone by. The electric light plant, the air plant, the steam plant, the boiler rooms, the iron workers quarters, the marvelous boring machines, the cutting machines, the wonderful mechanisms of all sorts which save hundreds of dollars a day to the company. In the big paint shop where the four new coaches which went out today, spick and span, burnished like a silver screen, glorious results of man's determination. The workmen were still engaged in painting several of the interiors, but the work is as good as completed. This model train went north this afternoon, and will be placed on the air line. It is the train which makes the flying run from Chicago to Cincinnati in seven hours and forty-five minutes. There is a combination mail, express and baggage car, a smoker, a ladies car and a beautiful combination chair car and diner. The latter is as handsome a piece of car building as has ever been seen here and reflects great credit upon the shops. The painting, upholstering, glass work and everything about this coach is elegant. From one end to the other the train is a model of beauty, strength and convenience. All of the work was done in the shops here, and the master mechanic is certainly conservative when he says that anything from an engine to a hand car can be built by the 300 men at work under him. The shops are the pride of Lafayette.

The Age of Steam and the Local Community

Carefully read the newspaper articles about the railroad shops at Marshall, Michigan and Lafayette, Indiana. Then respond to the following questions. Use complete sentences.

1) What was a railroad shop?

2) Why would citizens compete for a railroad shop in their community?

3) What do you think are the authors' attitudes about industrialization?

Quote from the document.

4) What does the document tell you about life in the U.S. at this time?

5) Write 2 questions about industrialization that are left unanswered by the documents.

a)

b)

Age of Steam

Greenfield Village - Michigan

Essential Question

- How did inventors use the power of steam?
- Why did steam power bring about the Industrial Revolution?

An Overview

- Before 1800 wind, water and the muscles of people and animals worked machines.

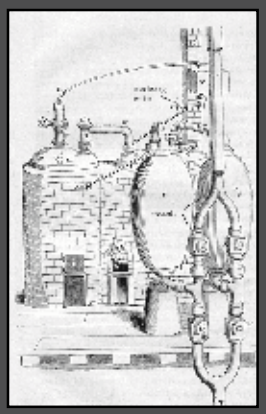
Greenfield Village - Michigan

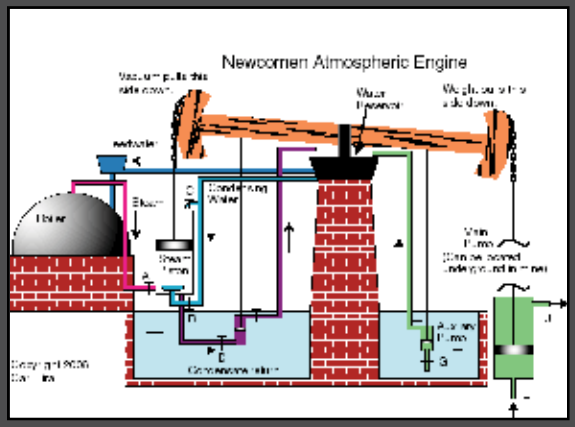
- Steam engines brought about the Industrial Revolution.
- Steamships replaced sailing ships.
- Railways revolutionized land travel.

Steam Firsts

- 1698 – Thomas Savery builds the first steam-driven pump.
- 1712 – Thomas Newcomen invents the beam engine.
- 1769 –Nicholas Cugnot builds the first steam-driven vehicle – a gun carriage.

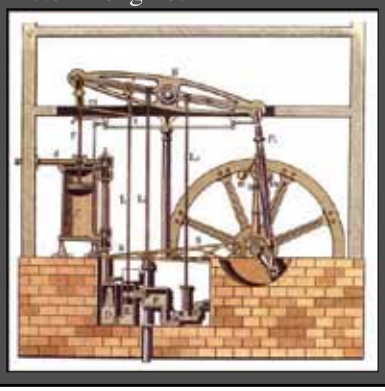
Savery Pump





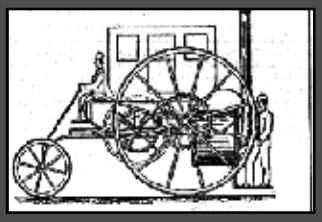
Newcomen Steam Engine

- 1780s – James Watt builds the first "double-action" steam engine.



- 1787 – John Fitch builds the first practical steamboat.

- 1804 – Richard Trevithick builds the first steam locomotive.



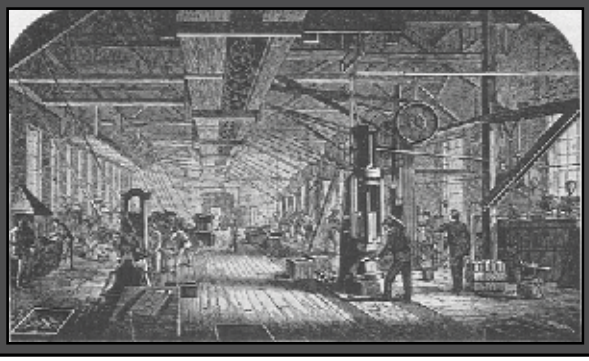
- 1839 – James Nasmyth invents steam hammer for iron foundries.

Steam Engines at Work

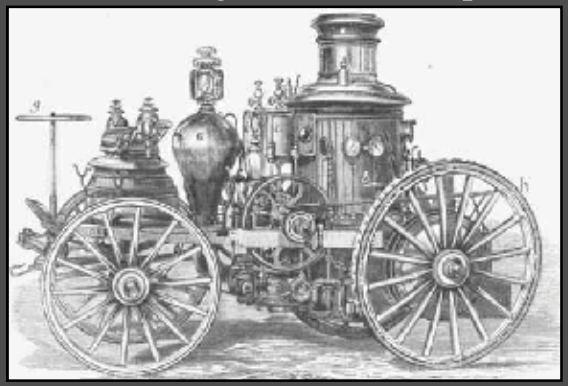
- Drive pumps to remove water from mines.
- Drive machines in factories and workshops.
- Work the pumps of fire engines.
- Drive saws and threshing machines for farmers.

Drive pumps to remove water from mines.

19th Century Factory



Fire Engine Water Pump



Steam Engine and Thresher

Steamships

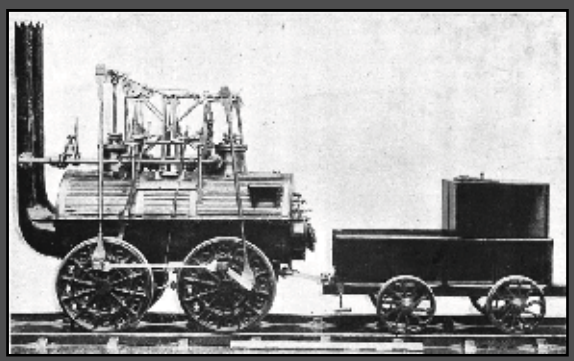
- 1807 – American Robert Fulton invents the first practical steamboat to carry passengers – the Clermont – a boat fitted with paddle wheels and turned by single –cylinder engines.

Robert Fulton

Locomotives

- 1804 – First steam locomotive moved coal in wagons in mines.
- 1825 – George Stephenson and son Robert built first public railway.

First Public Railway



American Tom Thumb in 1830 Race

Steamships

- Iron ships replaced wooden ships. Steam engines drove screw or propellers. Steamships would soon cross the Atlantic Ocean.
- 1912 – The most famous steamship the Titanic struck an iceberg and sank with the loss of 1,513 lives.

Titanic -1912

The New York Times.

TITANIC SINKS FOUR HOURS AFTER HITTING ICEBERG; 866 RESCUED BY CARPATHIA, PROBABLY 1250 PERISH; ISMAY SAFE, MRS. ASTOR MAYBE, NOTED NAMES MISSING

Steam Cars

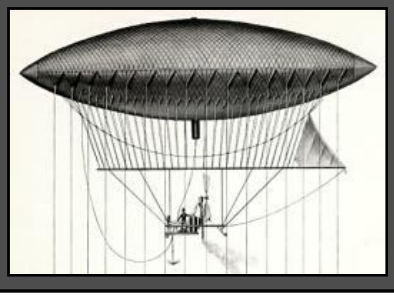
- 1801- Richard Trevithick built a steam carriage.
- 1836 – Walter Hancock ran a public steam coach in London – the Automaton.

1830s – England

- 1899 – Stanley brothers built a successful car.
- 1906 – A Stanley steam car set a world record of 128mph.

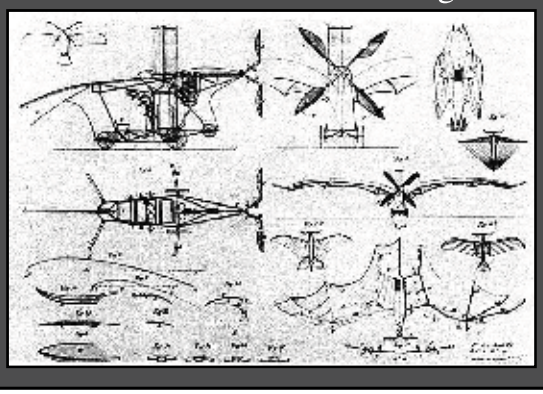
Steam Curiosities

- 1852 – Henri Giffard built a cigar shaped balloon and fitted a steam engine with a basket.



- 1884 – Morton invented a steam washing machine that worked by turning a handle .
- 1890 – Clement Ader built the Eole – a steam-powered airplane. It took a hop, but could not fly!

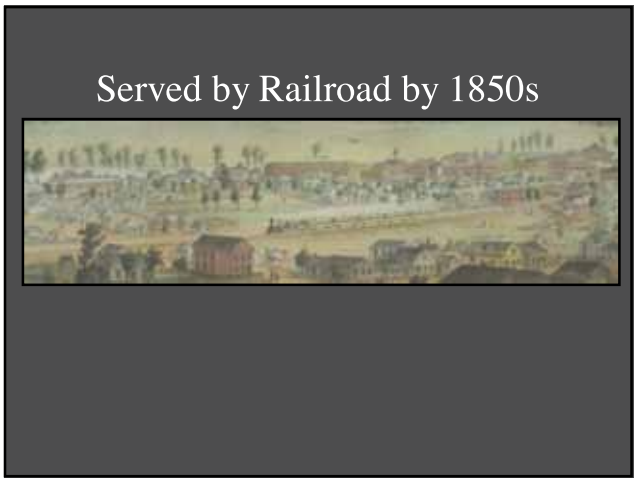
Eole -1890 Patent Drawings

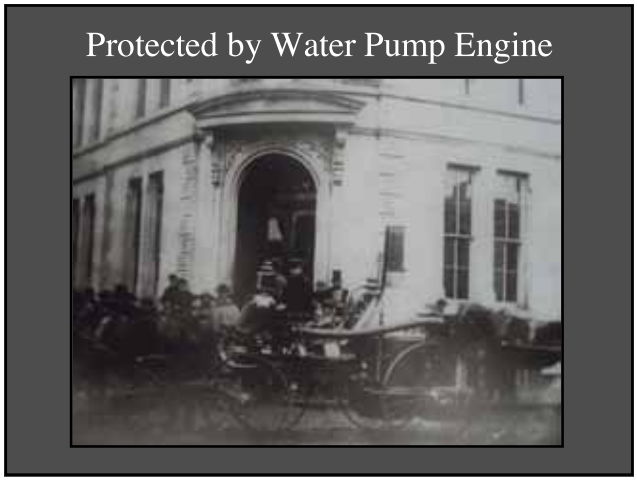


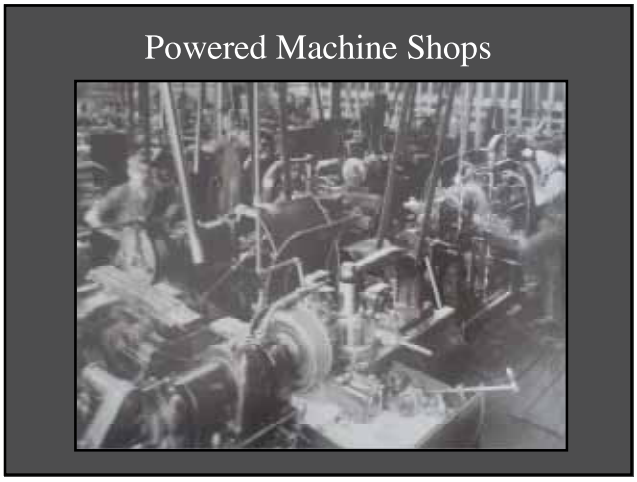
Steam Power in Tippecanoe County, Indiana

Lafayette in 1850s

Served by Steamboats by 1830s


Served by Railroad by 1850s


Protected by Water Pump Engine


Powered Machine Shops

Used by Farmers in 1880s-1930s
Steam Engine and Threshing

Steam Powered Railroad System
Contributed to
Employment, Transportation and Trade

- "The locomotive is the most human of machines; it breathes, eats, works and sleeps; it is emotional; has the sulks, groans and pants under heavy tasks, yet rejoices in its strength; it is patient and resolute, and finally rushes proudly home on time; it is a thing to love, and men have died for it."

Railroad Gazette, 1884

Monon Shops – Opened in 1895

Served Louisville, New Albany and
Chicago Railroad Line

1958 - Roundhouse

Work of the Roundhouse

1884 - Marshall, Michigan

Greenfield Village - Michigan


Turntable


Turning
the
Table

America's Greatest History Attraction®

High School Lesson Plan 3

Mary Anthrop, Catholic Central Jr/Sr High School, Lafayette, IN

Title of Lesson: Inventing and Thomas Edison

Grade level: 9-12

Overview: Students will explore Thomas Edison's ideas on inventing and discuss his contributions to the development of the technological age from the 19th century to today. Students will also present an argument for his most significant or meaningful invention.

Central Question(s): How did Thomas Edison's philosophy of inventing and his inventions create the foundation of a technological age of a new century?

Learning Objectives: Students will be able to:

a) identify Edison's major inventions;

b) describe his research and development methods; and

c) evaluate his contribution to the technological age.

Assessment Tools: Students will compose an essay response to the question: which Edison invention, the phonograph, light bulb or moving picture projector most fulfilled "the largest possible measures of happiness and prosperity."

Key Concepts: Edison's Philosophy on Inventing and Key Inventions that Created the Technological Age of the 20th century

Evidence/Sources: Inventing and Thomas Edison (PowerPoint) presentation and handouts – Lists of "Things to Do" – Thomas Edison's Notebooks, Checking an Item off Edison's Lists, Thomas Edison's Words of Wisdom, Thomas Edison's Image and Thomas Edison Essay and the document – Another View of Edison's To Do Lists.
Carlson, Laurie M. Thomas Edison for Kids His Life and Ideas. Chicago: Chicago Review Press, 2006.

Duration: 2-3 class periods of 50 minutes

Instructional Sequence: Students will view the Inventing and Thomas Edison presentation and discuss the essential question. Insert document reading and activities when appropriate and as time allows. Complete the sequence with the essay as an assessment.

Student Project Ideas: Students may want to visit various links to Edison sites for the essay assessment, such as The Thomas Edison Papers at http://edison.rutgers.edu/.

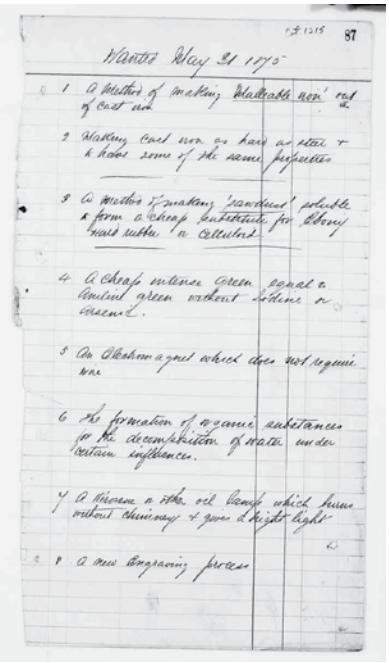
Students may also want to watch an Edison film at Inventing Entertainment at http://memory.loc.gov/ammem/edhtml/edhome.html or see and listen to early phonograph at a museum.

Anticipated challenges: Animated films might be helpful in showing students how some of Edison's inventions worked. Excerpts from the documentary film Westinghouse (2008) might help some students understand the war of Currents.

Curriculum Links: United States History Standards for Grades 5-12: Era 6 (1870-1900)

Standard 1: How the rise of corporations, heavy industry, and mechanized farming transformed the American people.

Lists of "Things to Do" – Thomas Edison's Notebooks



Wanted May 31 1875

1 a method of making malleable iron out of cast iron

2 making coal iron as hard as steel and to have some of the same properties

3 a method of making sawdust soluble to form a cheap substitute for ebony hard rubber or celluloid

4 a cheap intense green equal to aniline green without sodine or arsenic

5 an electromagnet which does not require wire

6 the formation of organic substance for the decomposition of water under certain influences

7 a kerosene or other oil lamp which burns without chimney and gives a bright light

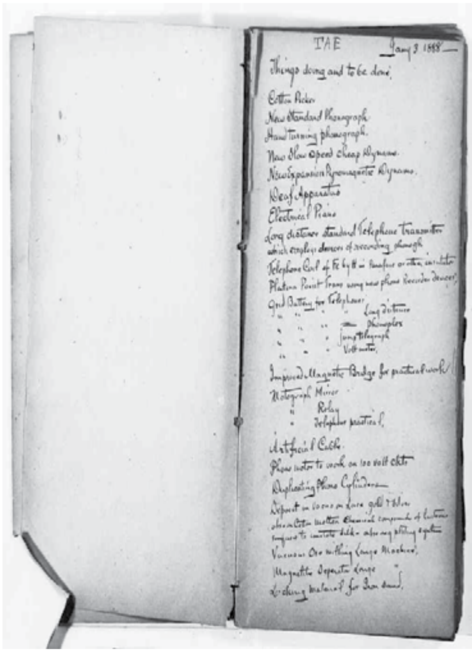
8 a new engraving process

Review Edison's notebook list of 1875. (Copy made be found at http://edison.rutgers.edu)

1) How would you interpret or classify the items on his list?

What do the items tell you about the needs or wants in 1875?

What do the items tell you about Thomas Edison?



TAE January 3, 1888

Things doing and to be done

(edited items)

Cotton picker hand turning phonograph new slow speed cheap dynamo Deaf apparatus electrical piano telephone coil good battery India ink Phonographic clock ink for blind telephone repeater snow compressor Large phonograph for novels, etc. toy phonograph for dolls Red lead pencil equal to graphite butter direct from milk Long distance standard telephone transmitter which employs devices or recording phonograph

Review Edison's notebook of 1888. (Five pages made be found at http://edison.rutgers.edu)

2) Compare and contrast the lists of 1875 and 1888.

What items would you add to Edison's lists? Explain why.

Select a project or an item to invent. Choose an idea from Edison's Notebooks or suggest a project of your own. Then respond to the following in complete sentences.

1) What is your project? Why did you choose your project for research and development?

2) How many workers and what type of workers will you need to complete your project?

3) Create 5 questions that you will ask prospective workers.

a)

b)

c)

d)

e)

4) What incentives will you offer to prospective employees?

5) What equipment or supplies will you need to purchase?

6) How long do you think it will take to complete your project? Develop a preliminary timeline.

7) What experiments or research will you conduct to develop your invention?

8) Sketch a preliminary drawing of your invention below.

Thomas Edison's Words of Wisdom

Review Thomas Edison's thoughts on inventing and discovery. Discuss what he may have meant in the context of his lifetime (late 19th century and early 20th century). Then reflect on how his thoughts might have application today. Respond in complete sentences.

1) "What seems impossible today, may not be tomorrow."

2) "Genius is 1 percent inspiration, 99 percent perspiration."

3) "There ain't no rules around here! We're trying to accomplish something!"

4) "Show me a thoroughly satisfied man and I will show you a failure."

5) "We sometimes learn a lot from our failures if we have put into the effort the best thought and work we are capable of."

Thomas Edison's Image

Then and Now

Carefully examine the cartoon of Thomas Edison at the right.

1) How did the American public view Edison, his work and ideas? Explain and support your answer from clues in the images. Respond in complete sentences.

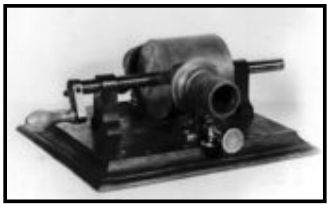
Carefully examine the images below.

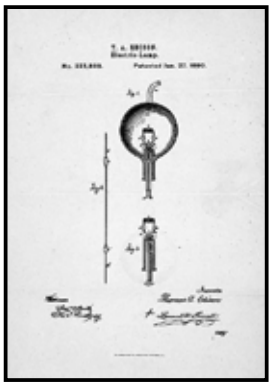
2) How do the cartoons or images above depict the work, ideas and legacy of Thomas Edison? Explain and support your answer from clues in the images. Respond in complete sentences.

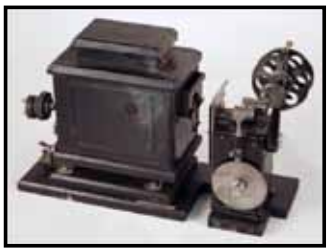
3) How do the cartoons and images in each group differ from one another? Can you explain why?

Thomas Edison Essay

"My desire is to do everything within my power to further free the people from drudgery and create the largest possible measures of happiness and prosperity." Thomas Edison







Which invention, the phonograph, light bulb or moving picture projector do you think most fulfilled "the largest possible measures of happiness and prosperity"? Defend your answer in a five paragraph essay. Be sure and explain the development of your selected invention to support your choice.

Another View of Edison's To Do Lists

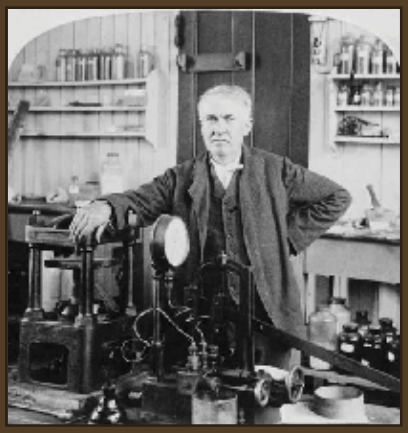
New York Tribune, February 17, 1907

Thomas A. Edison was sixty years old last Monday, but instead of taking chloroform, according to the so-called Oslcrian theory that a man's life ends at threescore years, the famous inventor announced that he was going to start fresh in a new field of scientific endeavor. For the last forty years Mr. Edison has devoted his energies almost wholly to the perfection of inventions which he believed "could be made to pay," and which in some instances have met with such success that they have revolutionized ordinary phases of modem life, have brought the inventor fame and riches and have added so greatly to the wealth of the whole world that at the present time there are two hundred and fifty thousand persons in various countries employed in industries which he has founded. In the future Mr. Edison plans to work untrammeled by commercial fetters. He hopes to solve many a scientific problem vitally associated with human life, even though his discovery may not be a money making scheme. "For many years I have longed to take up purely scientific investigation." said Mr. Edison. In talking with Borne friends on his sixtieth birthday, "but there have been so many things to engross my attention that I have had to defer this kind of work. For years, however, I have been making preparations for this task. I have kept notes of curious things which I have observed in my various experiments, but which at the time were only side issues. When a man is in a laboratory working on a problem he comes across all kinds of phenomena, and he can't take the time to trace these manifestations to their source, because that would interfere with the task he is wrestling with. He is compelled to put these things aside, for if he is striving for the commercial end of the business he must abandon the ideal, unless that, too, will aid him in attaining the commercial goal.

These side vistas into the realms of science, however, have so charmed me that now I have started to retrace my steps and strike out in search of the truths that I know must lie somewhere beyond my former horizon. By means of investigations based on the data of my note books and scrap book I hope to throw light on many subjects which now appear to me as dark mysteries."

Inventing and Thomas Edison
(1842-1931)

"To invent, you need a good imagination and a pile of junk."



Essential Question

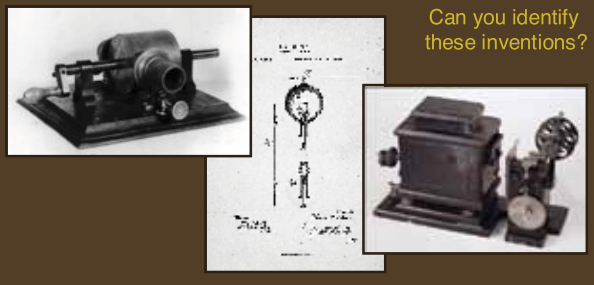
- How did Thomas Edison's philosophy on inventing and his inventions create the foundation of a technological age of a new century?

Thomas Edison's Major Inventions

- 1868 – Vote Recorder
- 1869 – Printing Telegraph
- 1872 – Automatic Telegraph
- 1876 – Electric Pen
- 1877 – Carbon Telephone Transmitter
- 1877 – Phonograph
- 1879 – Dynamo
- 1879 – Incandescent Electric Light
- 1886 – Talking Doll
- 1897 – Moving Pictures Projector (Kinetoscope)
- 1900 – Storage Battery

- "My desire is to do everything within my power to further free the people from drudgery and create the largest possible measures of happiness and prosperity."

Can you identify these inventions?



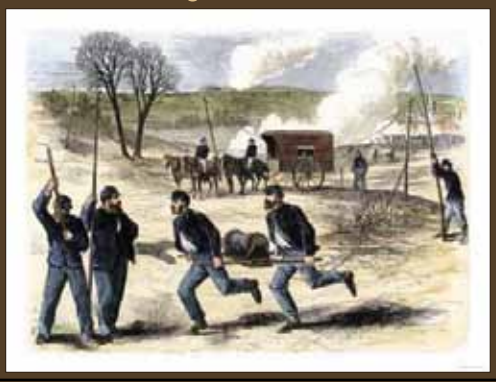
Tramp Operator

Edison

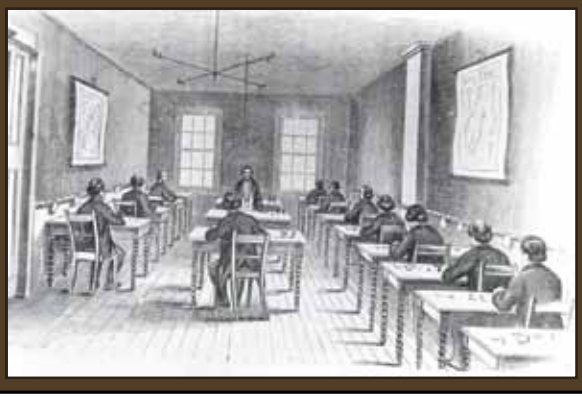
- moved from Michigan to Indiana to Ohio and after the Civil War from Tennessee to Kentucky to Boston as a telegrapher.
- invented disk of paper to record dots and dashes and cock roach trap.
- spent spare time experimenting in a make-shift laboratory.

Samuel Morse Demonstrating Telegraph in New York City

Setting up Telegraph Wires During the Civil War



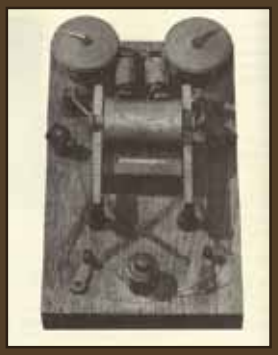
Telegraph Training



First Patents

- 1868 – vote recording machine, but it was not popular with legislators.
- 1870 – stock ticket devise; it operated like the telegraph sending prices over the wire.
- 1872 – perfect the duplex telegraph that could send two messages on one line.

Vote Recorder and Stock Ticket Devise



Inventing as a Business

- Edison, financed by the financial success of stock ticker machines, set up a workshop in Newark, New Jersey in 1871 to invent profitable products.
  - paraffin (wax paper)
  - mimeograph machine
  - electric pen
  - quadruplex telegraph that sent four messages in two different directions at one time.

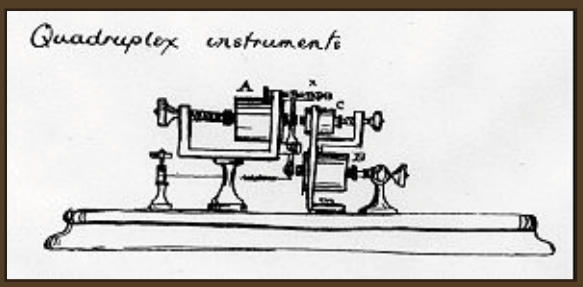
Electric Pen

July 11th, 1877

I have tried the new Electric Pen for writing MS, printing and drawing, and consider it perfectly successful for all three purposes. For simplicity, expedition, and cleanliness in working, it seems to me to be quite unrivalled, and those who, like myself, often require twenty or thirty copies of questions or formulae, &c., will save the cost of the machine in printer's bill several times over in a year.

CHARLES L. DODGSON
Mathematical Lecturer of Ch.Ch ., Oxford

Quadruplex Telegraph Drawing



Scientific American – February 20, 1886

Sending and Receiving Telegram on Moving Trains

At Menlo Park, New Jersey

- Edison set up first commercial research laboratory.
- He promised “a minor invention every ten days and a big thing every six months or so.”
- Initial complex consisted of a large building with an office, library, drawing room and workshop on second floor.

Menlo Park Complex
Greenfield Village - Michigan

Inside Laboratory

Inside Laboratory

Shed for Preparing Carbon

Burning Kerosene Lamps

Glass Building

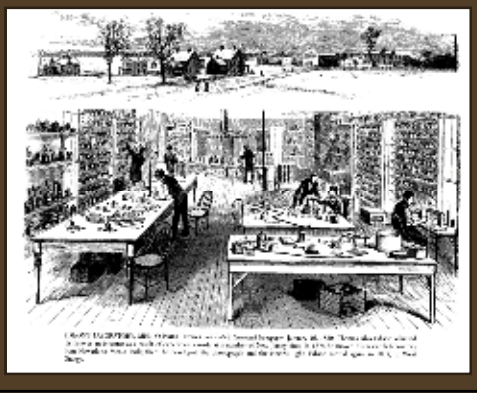
Inside Machine Shop

Boardinghouse for Workers

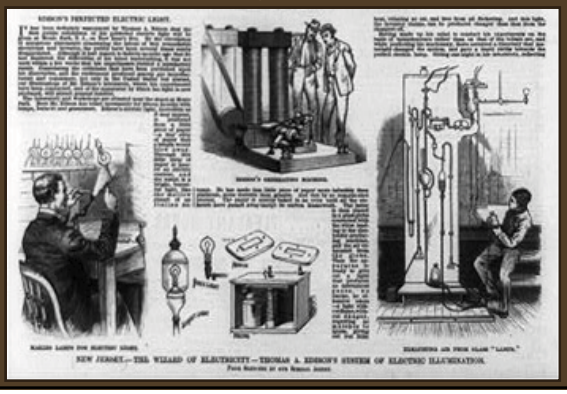
Greenfield Village - Michigan

Electric Lights in Menlo Park

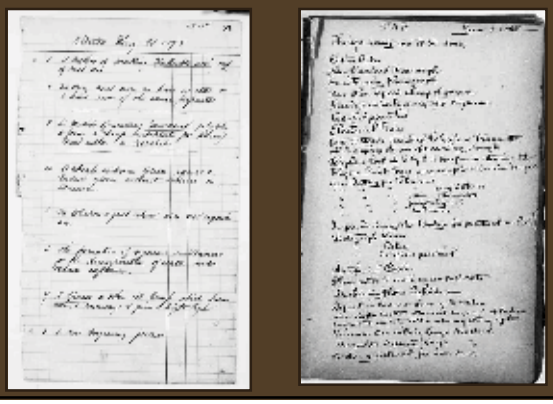
A New Model for Invention



Frank Leslie's Illustrated Newspaper – January 10, 1880

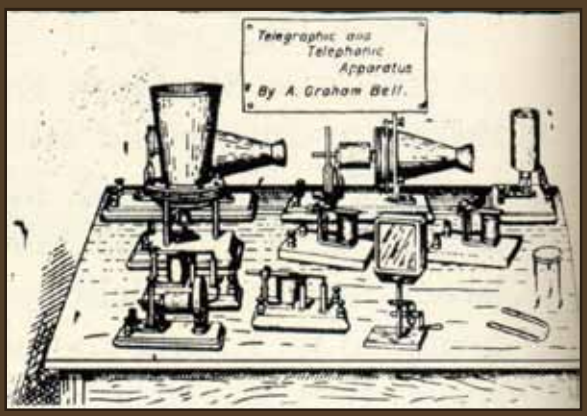


"To Do Lists" 1875 and 1888

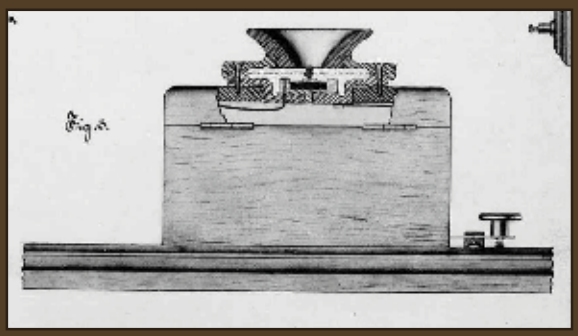


Improvements to the Telephone "Ahoy or Hello?"

- Edison patented the carbon transmitter for the telephone.
- The carbon transmitter allowed for clear and distinct voice recognition.
- Voices could now travel over long distances.



Button of Lamp Black



Phonograph

"Mary had a little lamb,
its fleece was white as snow."

- Edison's work on telephone and telegraph improvements lead to the invention of the phonograph.

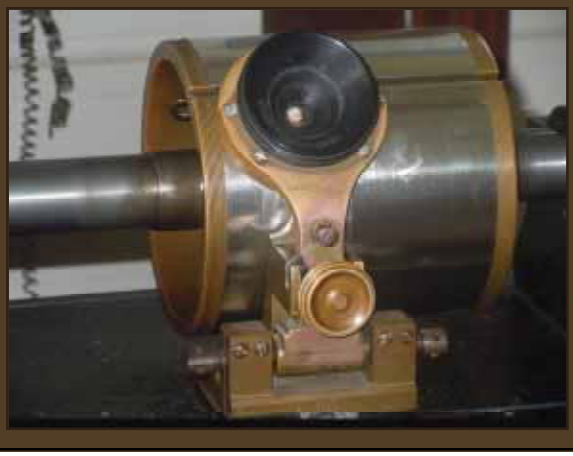
Record Your Voice

Speak into the Tube

Foil

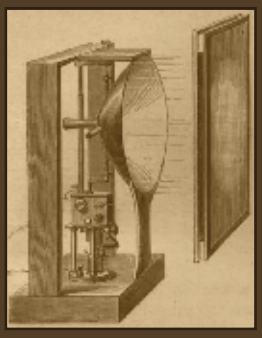
"Needle"

Listen to Recording



- Edison thought that the phonograph would be used to record speeches, lectures, books for the blind and other educational uses.
- Improvements of the phonograph led to wax cylinders, flat disks and plastic records.

Before Thomas Edison's Light Bulb



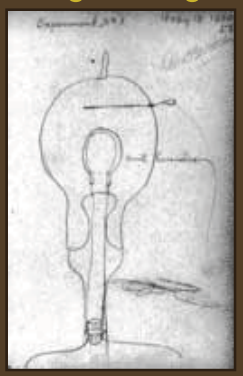
- candles and lanterns,
- whale oil, alcohol and kerosene lamps,
- gas lights and
- arc lights

Arc Light - 1849

A Cleaner, Safer and Brighter Light

Edison faced the challenge of

- finding a filament that burned longer and
- controlling the electric current through several bulbs at one time.

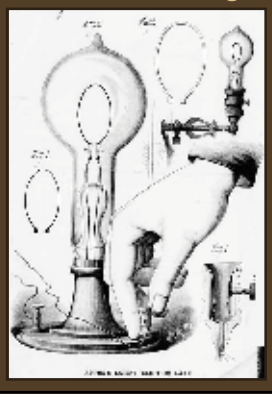


New York *Herald*
December 21, 1879

- "Sitting one night in his laboratory reflecting on some of the unfinished details, Edison began abstractedly rolling between his fingers a piece of compressed lampblack mixed with tar for use in his telephone. For several minutes his thoughts continued far away, his fingers in the meantime mechanically rolling out the little piece of tarred lampblack until it had become a slender filament. Happening to glance at it the iea occurred to him that it might give good result as a burner if made incandescent."

The Solution – Incandescent Light

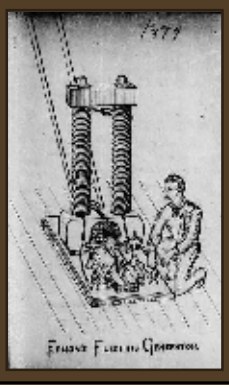
- Burn a filament inside a vacuum with very little oxygen present
- Discover a long lasting filament (bamboo coated with carbon and then carbon filament created with cellulose)



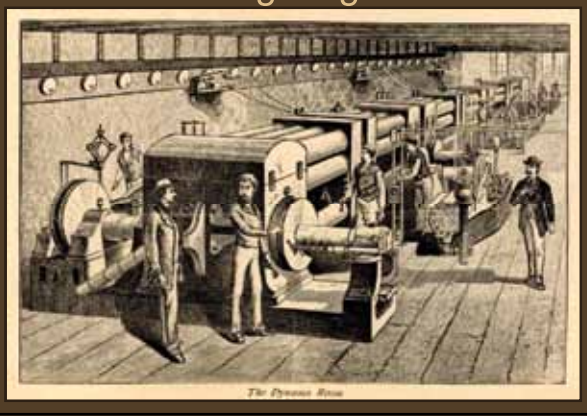
Wizard of Menlo Park

Edison's Electric System

- Edison created a "dynamo" to regulate the electric current flowing out of the heat source.
- Generator burned a fuel like coal that fed electricity to the dynamo.
- Dynamo adjusted the heat energy and sent out a constant stream of electric current.



Electric Lighting Station



War of the Currents - DC or AC?

- Edison competed with George Westinghouse over use of direct current v. alternating current.
- Edison attempted to prove the AC was dangerous.
- Edison hired H.P. Brown to discredit AC.

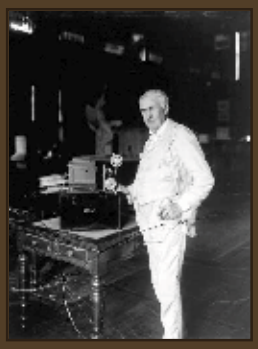
- Edison and Brown proposed that electrical execution with AC would work quickly.

First Use of Electric Chair New York - 1888

- Westinghouse won contract to light World Fair of 1893 and the War of Currents.

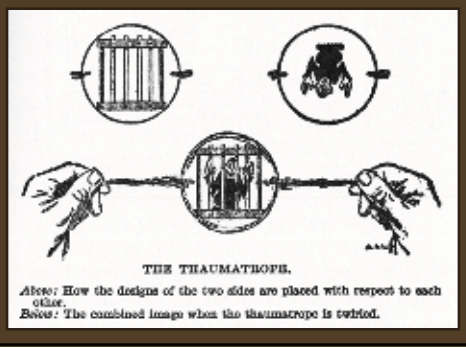
Edison and Moving Pictures

- "do for the eye what the phonograph does for the ear"



The First Moving Pictures

- Thaumatrope



THE THAUMATROPE.

Above: How the designs of the two sides are placed with respect to each other.
Below: The combined image when the thaumatrope is twirled.

Zoetrope

- Eadweard Muybridge, an English photographer, approached Edison in 1886 to discuss how his photographic zoetrope could combine with Edison's phonograph.

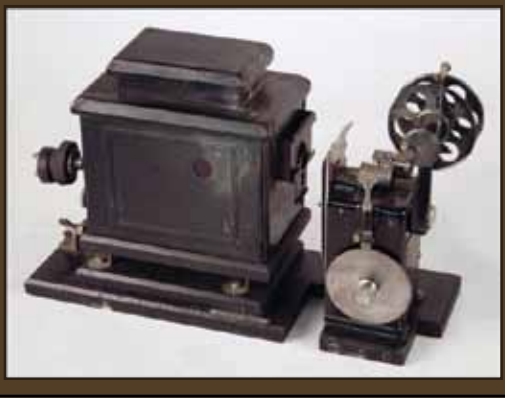
Zoetrope

In Greek - living things (zoa) and turning (thrope)

Kinetoscope Projector

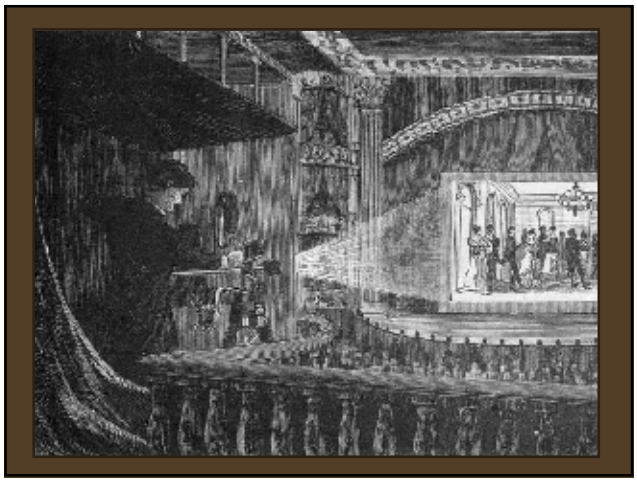
- Edison's team invented a camera that took photographs quickly as a subject moved.
- The photographs were printed on long flexible filmstrips.
- The filmstrips were wound around a cylinder that could be turned by a crank.

Kinetoscope Projector



Vitascope -1896

- Similar to today's movie projector, filmstrips moved through a projector that focused the images upon a wall.
- Edison was not able at first to add sound loud enough for the audience to hear who were several feet away.
- Edison added captions to the pictures.



Moving Picture Development

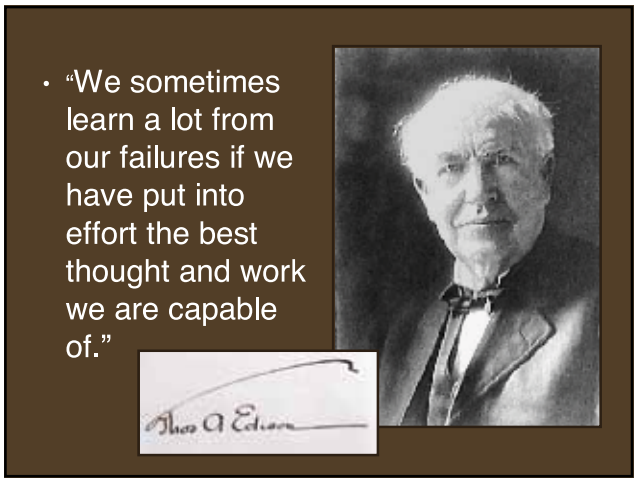
- Edison Manufacturing Company produced news stories called newsreels to be shown in movie theatres – i.e. Spanish-American War and Boer War in Africa. (Some scenes were "recreated" in New Jersey)!
- By 1909 there were 8,000 movie theatres in United States.
- The Edison Studios made first feature film *The Great Train Robbery.*

The Black Maria Studio

- Edison believed that films were more educational than books.
- "It is my firm conviction that a large part of education in coming generations will be not by books but by moving pictures. Children don't need many books when they are shown how to do things. They can learn more by some kinds of moving pictures in five minutes than they can by the usual kinds of books in five hours."

Death in 1931

- "Genius is 1 percent inspiration and 99 percent perspiration."


• "We sometimes learn a lot from our failures if we have put into effort the best thought and work we are capable of."
Thos A Edison

Jawara Jackson, Churchill High School, Livonia, MI

High School Lesson Plan 4: Title of the Lesson/Activity: Invention Tournament

Grade Level: Secondary (grades 9-12)

Overview: Students will study and research key inventions or innovations of the Industrial Revolution. They will construct an argument explaining why their invention was the most influential. Students will present their argument in a series of persuasive presentations.

Central Question/Problem: What is the impact of select inventions of the Industrial Revolution?

Learning Objectives:
1. Research various inventions/innovations of the Industrial Revolution.
2. Analyze the impact of the Industrial Revolution on today's society.
3. Develop persuasive skills in an oral presentation.

Assessment Tools: Students will complete a work sheet that shows their research. Students will complete a persuasive graphic organizer that demonstrates their persuasive ability in a class debate. Students' information on inventions will be evaluated using a presentation rubric and a visual aid rubric.

Presentation Rubric: (Taken from Rubistar – Rubric ID: 1052386)

CATEGORY	4	3	2	1
Preparedness	Student is completely prepared and has obviously rehearsed.	Student seems pretty prepared but might have needed a couple more rehearsals.	The student is somewhat prepared, but it is clear that rehearsal was lacking.	Student does not seem at all prepared to present.
Content	Shows a full understanding of the topic.	Shows a good understanding of the topic.	Shows a good understanding of parts of the topic.	Does not seem to understand the topic very well.
Stance	Takes a clear stand on an issue and fully supports it with appropriate personal or factual information.	Takes a clear stand and gives some support. The information is presented clearly.	Takes a stand but may not have made position very clear.	Did not take a stand on the issue. Presented some information but still is not clear on stance of the issue.

CATEGORY	4	3	2	1
Organization	Has organization that helps to logically develop argument and does not stray off topic.	Has organization that is logical, but it strays a little.	Tried to have an organization but did not do a good job with it and it tends to jump around.	Has no real organization.
Support	Has chosen numerous specific details, illustrations and quotations that more than adequately support stance.	Has chosen enough specific details to support stance.	Tried to support with some details but has not done a very good job. The details may not be the best ones to choose, or they might not even support stance.	Has few or no details.
Time-Limit	Presentation is 3-4 minutes long.	Presentation is 2-3 minutes long.	Presentation is 1-2 minutes long.	Presentation is less than 1 minute OR more than 4 minutes.
Persuasiveness	Makes a dramatic and compelling argument.	Makes a credible effort to persuade the audience.	Shows little evidence of persuasion.	Is not at all persuasive in presentation.

Visual Aid Rubric:

CATEGORY	4	3	2	1
Description	Makes a complete and detailed description of the subject matter and/or elements seen in a work.	Makes a detailed description of most of the subject matter and/or elements seen in a work.	Makes a detailed description of some of the subject matter and/or elements seen in a work.	Descriptions are not detailed or complete.
Creativity	Very carefully constructed, neat, original – 3 illustrations well presented.	Carefully constructed, mostly original and neat – 2 illustrations well presented.	Not much attention to detail – 1 illustrations well presented.	Sloppy work, no illustrations well presented.
Link to Project	Directly links to topic covered, good representation of project	Links to project.	Goes with topic but does not represent it well.	Does not go along with project.

Key Concepts: Influential Inventions

1. Steam Locomotive
2. Telegraph
3. Water Frame
4. Hot Air Balloon
5. Sewing Machine
6. Steamship
7. Bessemer Steel Process
8. (McCormick) Reaper
9. Seed Drill
10. Dynamo
11. Cotton Gin
12. Bicycle
13. Battery
14. Dynamite
15. Flying Shuttle
16. Spinning Jenny

Evidence/Sources: Students will be using the textbook and the Internet to answer key questions about their assigned inventions. Students will also be using select images from The Henry Ford to gather a greater understanding of the Industrial Revolution era. These digital images will be found in The Henry Ford's online collections (http://collections.thehenryford.org/Index.aspx) and the archives of the "pic of the month" (http://www.thehenryford.org/exhibits/pic/archive.asp).

Duration: This lesson will be conducted over 3½ days.

Instructional Sequence: This lesson can be done as an enrichment activity to the Industrial Revolution unit coursework. It can be a pre- or post-activity. Student partnerships will be assigned an invention from the Industrial Revolution era. Students will complete the invention work sheet as they research their invention online. Student groups will complete a persuasive map in preparation for their oral presentation. Students will be using the template found on the readwritethink website (http://www.readwritethink.org/files/resources/interactives/persuasion). This site organizes a persuasive argument around three main ideas supported by the students' researched information. This enables students to put their thoughts into an easy-to-understand graphic organizer. Students will create a visual aid to be used in their presentations. Students will present their information to the class in a debate/presentation format. Students will debate head to head and the class will vote after each round, deciding which invention has the most impact based on the arguments of the students. In round two, students will present their top two arguments within a 1-minute time limit. In round three, students will present their top argument within a 1-minute time limit. In the final round, students will have 5 minutes to present their arguments. The class will vote after each subsequent round.

Presentation Format

Round 1: 1. Steam Locomotive vs. 16. Spinning Jenny
8. (McCormick) Reaper vs. 9. Seed Drill
Round 2: Winner of top group vs. bottom group

Round 1: 4. Hot Air Balloon vs. 13. Battery
5. Sewing Machine vs. 12. Bicycle
Round 2: Winner of top group vs. bottom group

Round 1: 3. Water Frame vs. 14. Dynamite
6. Steamship vs. 11. Cotton Gin
Round 2: Winner of top group vs. bottom group

Round 1: 2. Telegraph vs. 15. Flying Shuttle
7. Bessemer Steel Process vs. 10. Dynamo
Round 2: Winner of top group vs. bottom group

Round 3: Winner of seeds (1,16,8,9) vs. Winner of seeds (4,13,5,12)

Round 3: Winner of seeds (3,14,6,11) vs. Winner of seeds (2,15,7,10)

Round 4: Final two inventions are presented against each other.

Student Project Ideas: In the research phase of the project, students will engage in an extension activity. Students will develop further understanding of their invention and the Industrial Revolution era by analyzing images from The Henry Ford's online collections. This lesson can be adapted by having students study an invention that is highlighted at Henry Ford Museum and Greenfield Village. Students can conduct the research on a field trip to Henry Ford Museum and Greenfield Village.

Anticipated Student Conceptions or Challenges to Understanding: Some students will struggle with the research phase of the activity. Deriving information on the impact of certain inventions can be difficult. Information is not always clearly presented on websites. Students must utilize higher-order thinking to come up with multiple perspective impacts to research. Students may also struggle with the persuasive element of the activity. Deciding on what arguments are compelling may pose a challenge. Likewise, when the class votes for the most influential inventions, it may be difficult for them to judge simply on the arguments presented by the presenters.

Curriculum Links:

World History & Geography

6.1 Global or Cross-Temporal Expectations

Evaluate the causes, characteristics and consequences of revolutions of the intellectual, political and economic structures in an era of increasing global trade and consolidations of power.

U.S. History & Geography

6.1 Growth of an Industrial and Urban America

Explain the causes and consequences – both positive and negative – of the Industrial Revolution and America's growth from a predominantly agricultural, commercial and rural nation to a more industrial and urban nation between 1870 and 1930.

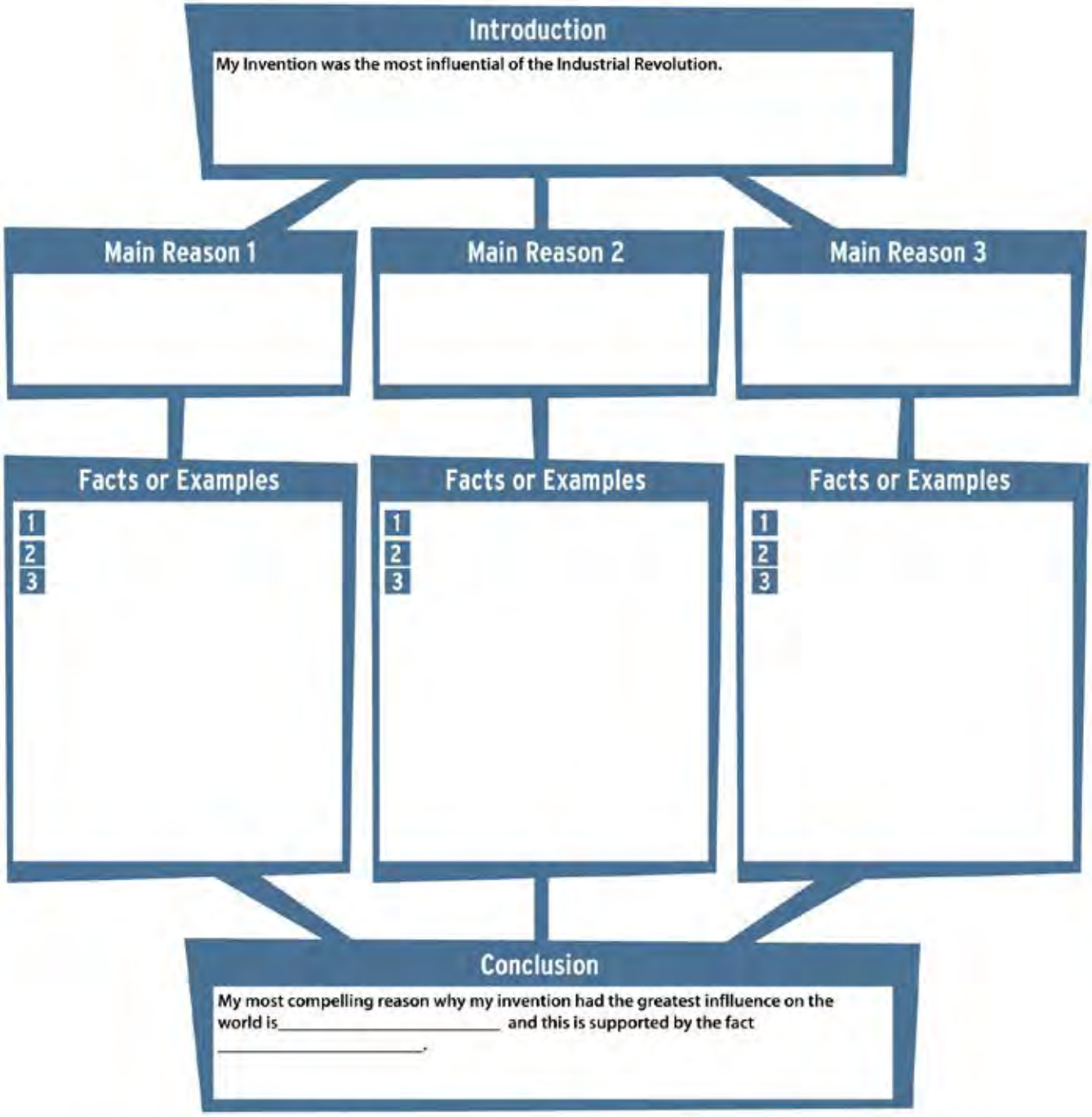
United States History Standards for Grades 5-12: Era 6 (1870-1900)

Standard 1: How the rise of corporations, heavy industry and mechanized farming transformed the American people.

PERSUASION MAP

by: Joe Smith

Steam Locomotive



readwritethink International Reading Association NCTE Thinkfinity verizon foundation

Name_____

Inventions Invitational Tournament Worksheet

You and a partner will be assigned an invention/innovation from the Industrial Revolution of the 1700s-1800s. Your task is to research the invention in order to answer the following questions:

1. Who invented it?
2. When was it invented (year)?
3. What impact did the invention have on life at the time it was invented?
4. What has been the long-term impact of the invention and how did/has it changed the lives of people today? Did it give rise to another invention that has had a greater impact?
5. Connect your invention to the Industrial Revolution digital image.
6. Make a visual aid on a poster or PowerPoint presentation. It must have 3 illustrative images connected to the invention and at least 3 slides/details of your arguments.

Invention:_____

Who:_____

When:_____

Where was it invented?_____

What does it do?_____
_____
_____
_____

Short-term impact:_____
_____
_____
_____
_____
_____

Long term impact:_____ _____
_____
_____
_____
_____
_____
_____
_____

What are 3 arguments for why it was the most important invention of the Industrial Revolution? (You must develop arguments further on the Persuasion Map.)

_____

_____

_____

_____

_____

Answer the extension question that connects the digital image to your invention.

_____

_____

_____

_____

What do you observe in the digital image, and what does the image tell you about the Industrial Revolution?

_____

_____

_____

_____

Extra Credit: Why was your invention created at this particular time in history? What existing invention or process did it replace or improve? _____

_____

_____

_____

Digital Image Extension Question and Location

Location

You will be using select images from The Henry Ford. These digital images will be found in their online collections (http://collections.thehenryford.org/Index.aspx) and the archives of the "Pic of the Month" (http://www.thehenryford.org/exhibits/pic/archive.asp).

Questions

1. Steam Locomotive
   Location: In the online collection search "Allegheny."
   Question: Is the Allegheny typical of steam locomotives of the Industrial Revolution?

2. Telegraph
   Location: In the "picture of the month" archive collection, examine picture for "January 2009." Question: What was the local connection in this picture?

3. Water Frame -
   Location: In the “picture of the month” archive collection, examine picture “August 2000.”
   Question: What was the local connection in this picture?

4. Hot Air Balloon
   Location: In the “picture of the month” archive collection, examine picture for “August 2008.”
   Question: How is your invention connected to the object in the picture?

5. Sewing Machine
   Location: In the “picture of the month” archive collection, examine picture for “February 2004.” Question: How do you think handmade textiles differed from your invention?

6. Steamship
   Location: In the online collection, search “steam ship” and examine boarding passengers image.
   Question: How did your invention relate to migration as seen in the image?

7. Bessemer Steel Process
   Location: In the “picture of the month” archive collection, examine picture for “October 2001.” Question: How did your invention influence buildings such as the one seen in the picture?

8. (McCormick) Reaper
   Location: In the “picture of the month” archive collection, examine picture for “July 2002.” Question: How was your invention similar to the artifact seen in the picture?

9. Seed Drill
   Location: In the online collection, search “thresher” and examine steam thresher.
   Question: How does your invention relate to the image?

10. Dynamo
    Location: In the online collection, search “electricity” and examine gas-steam engine.
    Question: How does your invention relate to the image?

11. Cotton Gin
    Location: In the online collection, search “cotton gin.”
    Question: Describe the people in the image and their interaction with your invention.

12. Bicycle
    Location: In the online collection, search “bicycle” and examine men and women bicyclists.
    Question: What role does the picture tell us about social interactions with your invention?

13. Battery

Location: In the online collection, search “life magazine” and examine advertisement of car.

Question: How does your invention and image of the advertisement purpose to change life?

14. Dynamite

Location: In the online collection, search “war” and examine the B-12 image.

Question: How does your invention relate to the image?

15. Flying Shuttle

Location: In the online collection, search “farm” and examine hay wagon farm scene.

Question: Describe farm work in the picture and how your invention affected farm work.

16. Spinning Jenny

Location: In the “picture of the month” archive collection, examine picture for “March 2001.” Question: How does the use of the artifact in the picture relate to the use of your invention?

America's Greatest History Attraction

High School Lesson Plan 5

Brian Burak, Eppler Junior High School, Utica, MI

Lesson Title: Problem/Solutions with the Industrial Revolution

Topic: Problems solved and problems created by the early Industrial Revolution

Grade Level High School-World History or U.S. History

Overview: Following lessons on the development and advancement of the Industrial Revolution's origins in England and spread to the United States, students will analyze possible problems the industrial revolution looked to solve, what the solutions were to those problems, and possible problems that developed from those solutions.

Objectives: Students will think critically about problem-solution relationships and project possible future problems created by solutions to current problems.

Standards: 6.2.3 **Industrialization –** Analyze the origins, characteristics and consequences of industrialization across the world by

- comparing and contrasting the process and impact of industrialization in Russia, Japan, and one of the following: Britain, Germany, United States, or France

- describing the social and economic impacts of industrialization, particularly its effect on women and children, and the rise of organized labor movements *(National Geography Standard 11, p. 206)*

- describing the environmental impacts of industrialization and urbanization

(National Geography Standard 14, p. 212)

Materials: Textbook
Copies of Problem-Solution-Problem Worksheet
Pen/Pencil

Instructional Sequence: **Opening Activity: Focus Questions**

This lesson takes place after investigation of the early Industrial Revolution has taken place. Students should be familiar with the early inventions, innovations, people and events of the first Industrial Revolution with particular attention being paid to its creation in England and the issues involved.

Start by writing the focus questions on the board. Have students answer them briefly on a sheet of paper.

1. Give an example of a problem people faced that the Industrial Revolution attempted to solve. Was it successful? Explain.
2. What is a possible problem still with us today that may have been created by action(s) during the Industrial Revolution

Call on a few students to share their responses with the whole class and have students comment on them as appropriate. Wrap up this brief discussion by explaining how the focus of this lesson will be to examine problems that were solved by the Industrial Revolution and in turn the new problems created by these solutions

Procedure:

Hand out the worksheet to each student. Go over the directions and explain that someone of the boxes have already been filled in for them. Their job will be to fill in the remaining boxes based on what is already provided for them. In some cases a problem has been presented and they must provide the solution that people came up with to solve that problem and a potential problem this solution caused. In other cases they have been given the solution and it is up to them to figure out what problem that solution tried to solve and what possible future problems could arise from it. It would be good to give the students a “freebie” by doing the first one together as a class. Students should work on this for the majority of the class day. The teacher should play it by ear to see how they are progressing. Options to speed it up could include working as individuals for 20 minutes and the last 10 with a partner, or simply have them work on the entire worksheet with a partner.

For the last 10 minutes of class, bring the students back together for a debrief before they turn in their worksheets (if

you choose to collect them). Emphasize some of the amazing developments people came up with to solve problems, and in turn the new problems that resulted from it. (See the Assessment section for ideas on what to do from here). The end of the class discussion should wrap with a look at students' answers to the Focus Question regarding continuing problems today caused by the Industrial Revolution. Discuss with students how problems created then affect us all today.

Assessment:
Informal assessment can be done by circulating through the class as groups attempt to fill in their chart. Participation and effort can be observed.

Formal assessment can come from a whole class discussion. Every student/group must contribute their answers to a particular Problem-Solution-Problem scenario. Grades can be given for completion, creative/appropriate answers, explanation etc. Another option would be for the teacher to collect each student's/group's worksheet and assess similar criteria but for the whole worksheet rather than just one scenario. A third possibility would be for students to create an additional set of solutions and problems arising from the new problem in the final column on their sheet. For example, on their sheets they had to identify Problem A with Solution A that leads to Problem B. Students could be assigned to continue this pattern by creating Solution B that leads to Problem C and so on.

Further assessment could take the form of a short essay, wherein students respond to the prompt – "Was the Industrial Revolution a good thing or a bad thing? Take the point of view of two different people who would have experienced the Industrial Revolution and answer this prompt from their point of view. Examples include but are not limited to; farmers, factory workers, factory owners, government officials, soldiers, craftspeople, children, slaves (US), ship owners. Keep in mind students can use a male or female perspective for all of these. This option allows them to use information they have already started writing about from Focus Question 2.

This worksheet is to be given to students
Problem-Solution-Problem Activity Worksheet on the Industrial Revolution

As you read about historical events, it is important to evaluate people's actions in light of the need they were trying to meet or the problem that they were trying to solve through their actions. For example, in the 1700's, entrepreneurs in Great Britain established factories in order to meet the demand for cotton cloth. Establishing textile and other factories solved some problems but created new ones – the social conflicts you read about in section 1.

Directions – For each scenario described below, complete the other boxes by expressing the problem, explaining the solution and/or predicting new problems created by the solution(s).

Problem /Issue	Solution	Possible Problems Created by the Solution
1.	Cottage industry workers move from rural areas to cities	
2. The water powered loom invented in 1787, was successful, but only allows for factories near streams and rivers where water power can turn the wheel		
3. Factory owners wanted to use their new machines constantly	Workers were forced to work in shifts	
4.America is a large country that needs transportation to link it and move goods across the nation	Thousands of miles canal are built to connect the nation using Fulton's Steamboat	
5.	People migrate to the United States or move to cities to seek food and jobs increasing the percentage of people in cities by as much as 150%	
6.The transition to city life and manufacturing jobs is not easy. Conditions in factories are poor and many employ women and children for extremely low wages		