

TPS-STEM Lesson Plan

Title: The History and Engineering Design of Cars

Overview: Students will study the development of cars in the early 1900's. In viewing different cars and discussing Henry Ford's thoughts of mass producing affordable cars, students will discuss the changes in society because of the continuing development of cars. The students will also compare Ford's accomplishments with the previously discussed engineering design process.

Objective:

Students will...

- Compare various modes of transportation, including the development of cars, and discuss the benefits and drawbacks of those developments.
- Discuss how Henry Ford's use of the assembly line (technology), changes in work conditions (social science), and basic engineering (engineering and math) made cars affordable.
- Discuss how Henry Ford used the engineering design process, previously studied in class, to make changes to the car to meet the needs of society.
- Identify ways the development of the car changed society.
- Apply the engineering design process to a mousetrap car project.

Time Required:

- Discussion and analysis - two 40 minute class periods
- Design and present car of the future - one 40 minute period
- Mousetrap Car Project - one week

Recommended Grade Range: Middle School (6th - 8th grades)

Subject Areas: Science, Social Studies, Technology

Standards:

- S8.A.1.1.3 - Use evidence, such as observations or experimental results, to support inferences about a relationship.
- S8.A.1.2.1 - Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments.
- S8.A.1.2.3 - Describe fundamental scientific or technological concepts that could solve practical problems.



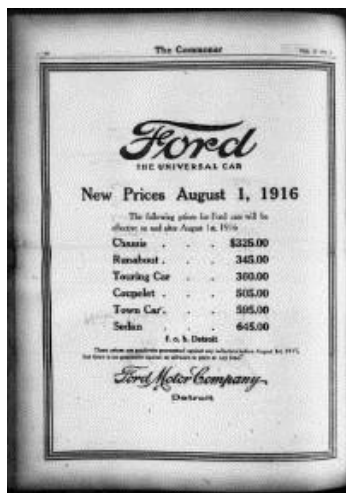
- S8.A.1.3.4 - Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.
- S8.A.2.1.6 - Identify a design flaw in a simple technological system and devise a possible solution
- S8.A.3.1.3 - Explain the concept of order in a system.
- S8.A.3.1.5 - Explain how components of a natural or man-made system play different roles in a working system.
- S8.A.3.2.2 - Describe how engineers use models to develop new and improved technologies to solve problems.
- S8.C.2.1.3 - Describe how one form of energy can be converted into a different form of energy.
- S8.C.3.1.1 Describe forces acting on objects.

Credits: Eileen Joll

PREPARATION

Materials Used:

Analysis tools, photos, top hat model writing paper, newspaper handouts, PowerPoint slides, promethium board, blank paper



The commoner., January 01, 1917, Page 32, Image 32

About The commoner. (Lincoln, Neb.) 1901-1923

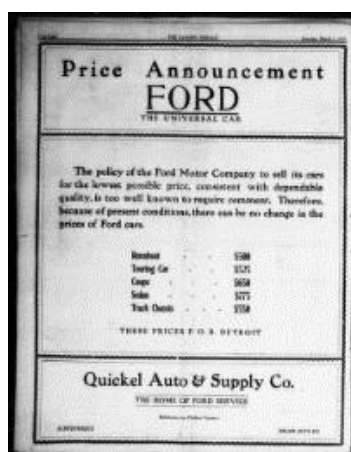
The commoner. (Lincoln, Neb.), 01 Jan. 1917. *Chronicling America: Historic American Newspapers.* Lib. of Congress.

<http://chroniclingamerica.loc.gov/lccn/46032385/1917-01-01/ed-1/seq-32/>

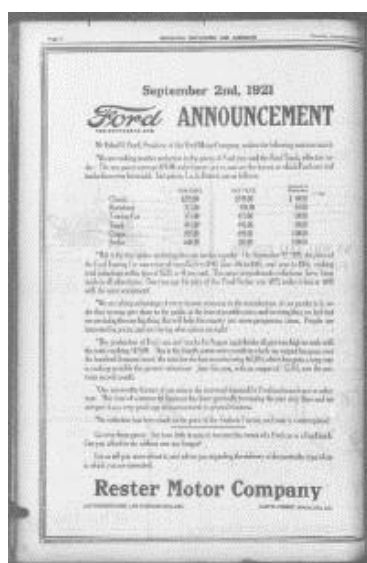




The Garden Island., September 07, 1920, Page 5, Image 5
 About [The Garden Island. \(Lihue, Kauai, H.T.\) 1902-current](#)
 The Garden Island. (Lihue, Kauai, H.T.), 07 Sept. 1920. *Chronicling America: Historic American Newspapers*. Lib. of Congress.
<http://chroniclingamerica.loc.gov/lccn/sn82015411/1920-09-07/ed-1/seq-5/>



The evening herald., March 01, 1919, Section Three, Page Page Eight, Image 24
[The evening herald. \(Albuquerque, N.M.\) 1914-1922](#)
 The evening herald. (Albuquerque, N.M.), 01 March 1919. *Chronicling America: Historic American Newspapers*. Lib. of Congress.
<http://chroniclingamerica.loc.gov/lccn/sn92070582/1919-03-01/ed-1/seq-24/>



Bogalusa enterprise and American., September 15, 1921, Page 8, Image 8
 About [Bogalusa enterprise and American. \(Bogalusa, La.\) 1918-19??](#)
 Bogalusa enterprise and American. (Bogalusa, La.), 15 Sept. 1921. *Chronicling America: Historic American Newspapers*. Lib. of Congress.
<http://chroniclingamerica.loc.gov/lccn/sn88064055/1921-09-15/ed-1/seq-8/>





The Bienville Democrat., September 21, 1922, Image 6
About [The Bienville Democrat. \(Arcadia, Bienville Parish, La.\) 1912-1980](#)

The Bienville Democrat. (Arcadia, Bienville Parish, La.), 21 Sept. 1922. *Chronicling America: Historic American Newspapers.* Lib. of Congress. <http://chroniclingamerica.loc.gov/lccn/sn88064069/1922-09-21/ed-1/seq-6/>



Capital journal. (Salem, Or.), 23 Sept. 1920.

Chronicling America: Historic American Newspapers. Lib. of Congress. <http://chroniclingamerica.loc.gov/lccn/sn90066132/1920-09-23/ed-1/seq-3/>



Title Ford car, 4/9/24

Created / Published [19]24 April 9.

Digital Id npcc 10987 <http://hdl.loc.gov/loc.pnp/npcc.10987>





Title Herbert E. French in Ford car
Created / Published [between 1912 and 1930]
Digital Id npcc 27655
<http://www.loc.gov/pictures/item/npc2008008155/>



Title Ford Motor Co. (cars parked at Robey Mtr. Co.)
Created / Published [between 1916 and 1917]
Digital Id npcc 32503
<http://www.loc.gov/pictures/item/npc2008013004/>



**Title Ford Motor Co., Ford touring car at Monument,
[Washington, D.C.]**
Created / Published [between 1910 and 1926]
Digital Id npcc 32138
<http://www.loc.gov/pictures/item/npc2008012639/>



Ford Motor Co. Duz delivery car

Created / Published [between 1910 and 1926]

Digital Id npcc 32114

<http://www.loc.gov/pictures/item/npc2008012615/>



Title Ford Motor car

Created / Published [1923]

Digital Id npcc 08221

<http://www.loc.gov/pictures/item/npc2007008220/>



Ford motor car, Lincoln at rifle range

Created / Published [1924]

Digital Id npcc 11144

<http://www.loc.gov/pictures/item/npc2007011143/>



Mrs. Wm. Upton, 70 yrs. old who drove Ford car from San Francisco to Washington

Created / Published [between 1909 and 1920]

Digital Id npcc 20449

<http://www.loc.gov/pictures/item/npcc2008000949/>



[First and ten millionth Ford]

Contributor Names Detroit Publishing Co., publisher

Created / Published 1924 June 4.

Reproduction Number LC-DIG-det-4a27901 (digital file from original)

<http://www.loc.gov/item/det1994022920/PP/>

Automobile parade (Video)

Created / Published United States: Thomas A. Edison, Inc., 1900.

Digital Id lcmp002 m2b46029 <http://hdl.loc.gov/loc.mbrsmi/lcmp002.m2b46029>

America's Stories from America's Library

<http://www.americaslibrary.gov/>

PROCEDURE:

1. Watch the Automobile Parade - Nov. 4, 1899
Use the [Analyzing Motion Pictures Tool](#) to analyze the video as a group.
If this is a young or beginner group, watch the video a second time with guided questions for students to look for things they may have missed the first time.
2. Discuss other modes of transportation used at the time of the video (1900's) pointing out ones in the video.
Discuss the benefits and disadvantages.
Use the Top Hat Method to record differences (compare/contrast).



3. Using the completed top hat form, have the students write a compare/contrast paragraph on the modes of transportation in the 1900's.
4. Introduce Henry Ford -
[Read America's Story from America's Library](#)
Discuss Henry Ford's changes in the way cars are made highlighting the assembly line, three 8 hour shifts, and the effect these had on society.
5. Analyze photograph - [The first and the ten millionth Ford](#)
Using the [Analyzing Photographs Tool](#), analyze the photo as a group comparing Ford's first car and his ten millionth car noting the differences in the cars, the effects on society, and speculating on why Ford made the changes that he did.
6. Discuss the fact the Henry Ford made different kinds of cars.
Break students into groups of 2 or 3. Assign each group a photo of a different Ford car from 1909 to 1924.
Using the [Photo Analysis Tool](#), students make observations and reflect on how the car may have been used (family car, business car, hauling, everyday car, car for the elite, etc.).
7. A representative from each group reports their findings as each group shares their picture.
8. As a group, look at newspaper advertisements and discuss different models advertised, their purposes, as well as prices.
9. Review the Engineering Design Process introduced in an earlier class (see attachment).
Discuss how Henry Ford applied the design process to the changes in the models of the Ford cars.
10. Discuss how the different models of cars affected society and how society brought about the increase in the various models. (Designing for a need).
11. Using the knowledge of Henry Ford's work, students will design and present a car for a new purpose. Given a basic chassis, students will draw a car, five things that make it unique, and who it is designed for and why. Students will identify how it meets a new need in today's society.
12. Introduce the Mousetrap Car project where students will design and implement a mousetrap driven car to race. Given basic materials, students will design the remainder of the car's looks and technology to make the car function.
13. Demonstrate the movement of a car that is powered by mousetrap. Car winners will be determined by distance, speed, and most creative looks.



Extensions

- Social Studies: Tie-ins to 20th Century developments.
- Technology: The assembly line and other technological developments.
- Math: Find the rate of change of Ford's cars as they decreased in price or comparing the costs of different kinds of cars vs. other costs of the times.

Evaluations

- Informal evaluation of participation in the analysis of photos, newspapers, and video.
- Compare/Contrast writing assignment.
- Use of the engineering design process (especially the test and evaluate and redesign steps) in the development of their mousetrap car.

References:

#1

Engineering Design Process:

1. Think of an idea
2. Research
3. Brainstorm
4. Choose an idea
5. Build a prototype
6. Test and Evaluate
7. Redesign
8. Communicate your results

#2

Mousetrap Car

<http://www.capstonekids.com/make-stuff/projects/mousetrap-car.html>

http://tbpmindset.org/modules/GatorTRAX/Mousetrap/Mousetrap_Cars_Simple_Instructions.pdf

