



Electric Vehicles Toolkit

HORSE TO HORSEPOWER

**MIDDLE SCHOOL SCIENCE /
SOCIAL STUDIES**

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Horse to Horsepower

How has transportation evolved over time?

Lesson Overview	Career Highlight
Students will sequence historical modes of transportation in chronological order, determine how they function, and identify efficiencies and challenges, and connect this to the evolution of electric vehicles.	Materials Engineer

STEM Course Connections	21st Century Skills	CTE Alignment
Middle School Physical Science Middle School (8th Grade) History	Collaboration Communication	Career Readiness

Engineering Activity	
Science and Engineering Practice #2	Students will create a timeline for the evolution of electric vehicles.

Materials
<ul style="list-style-type: none">• Card Sort (Print 1 copy/tablegroup)• Student Handout• History of Transportation Timeline Template• Electric Vehicle Timeline Template

Essential Questions
<ol style="list-style-type: none">1. What is the purpose of transportation?2. How has transportation evolved over time?3. How has transportation improved daily life?4. What challenges do we have to overcome as we adopt a new mode of transportation?

Background Information
<p>From horses to cars to airplanes, transportation has come a long way within these last couple hundred years. The electric car, which is currently rapidly changing the world, is an invention that first dates back to the 1800s. This is when innovators first began experimenting with the idea of a battery powered vehicle. Around 1890, a chemist named William Morrision helped push the first successful electric vehicle in the United States. With this new innovation, new companies quickly began producing their own types of electric vehicles. Unfortunately, the gas powered vehicle severely overpowered the electric vehicle in terms of cost, performance, and production. The</p>

discovery of Texas crude oil was the ultimate blow to the electric car because oil for a gas car had become so insanely cheap. By 1935, electric cars disappeared. The electric vehicle showed glimpses throughout the decades, but it finally made its first breakthrough when the Toyota Prius, a hybrid electric vehicle, was released in 1997. The second breakthrough was when a company named Tesla started producing high end electric cars. In addition, gas cars emit greenhouse gasses and the new concerns of global warming allowed the emission-free electric vehicle to be a more viable option to consumers. Seven states in the United States will ban sales of gas cars in 2035, which means electric vehicles will likely be the future of transportation.

Mission Prep

Engage (10 mins)

Pose the following warm-up questions for students to respond to in [their student handout](#):

- How did you get to school today?
- How long did it take? How far did you travel?
- If Jessica lives 9 miles from school and she walks at a rate of 3 mph, how long would it take her to walk to school?

After students respond independently, continue with the “walking to school” example in a whole class discussion:

- If it takes Jessica 3 hours to walk to school, when would she need to leave her home to get to school on time?
- If Jessica leaves school at dismissal to walk home, when would she arrive home?
- What if Jessica has a soccer practice or a piano lesson after school?
- Is our current school and extra-curricular scheduling realistic (or even possible) without cars and/or public transportation?

Explore (10 mins)

- Card Sort
 - Distribute a set of the [card sort](#) to each small group.
 - In partners or table groups, have students try to match the modes of transportation with the correct time period and place in chronological order on the timeline in [the student handout](#) or using this [Canva Template](#)
 - Without any resources, this will be challenging. Encourage students to think critically about what technology is needed for each and how certain modes of transportation must have been developed prior to others.

Launch

Explain (15 mins)

- Show this short clip from the Atlantic [An Animated History of Transportation](#)
- Using the clip and the National Museum of American History “America on the Move” [website](#), encourage students to adjust or “correct” their cards if necessary to be chronologically accurate.
- Circulate classroom to check for accuracy and support student groups as needed.

Elaborate (20 mins)

- Each team member selects 1 of the transportation examples and determines:
 - How did it work?
 - What was its primary purpose?

- How did it improve daily life?
 - What challenges did it pose that society had to overcome?
- Students record their responses in [the student handout](#)
- When finished, students share their selected modes of transportation's function, purpose, and effects on daily life with their table group.

Exploration

Evaluate (35 mins)

- Electric Vehicle Timeline

Students will research the history of electric vehicles from their inception to present day, identify 7 key dates and create a timeline.

Students can create their own template or use [this template](#) as a starting point.

Extend

- Gallery Walk

- To synthesize the content, have students perform a gallery walk. Post the following prompts on large sheets of paper or white boards around the room. Encourage students to add at least one comment and place a star next to any prior comments that they agree with.
 - How has transportation evolved over time?
 - What is the primary purpose for moving to electric vehicles?
 - How will Electric Vehicles improve daily life?
 - What challenges do we have to overcome as we adopt a new mode of transportation?
 - How will careers change? What skills will continue to be needed? What new skills will be needed?
 - At this station, if you'd like, you can share [the Career Profile of Rosa Obregon](#), a Mechanical Test Operations Engineer from NASA Stennis Space Center.

CA NGSS Standards

- MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved
- MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
- ESS3.C: Human Impacts on Earth Systems § Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise
- MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century

CTE Alignment

C1.0 Understand historical and current events related to engineering design and their effects on society.

Resources

The Atlantic. (2015b, July 8). *An Animated History of Transportation*. Wwww.youtube.com; The Atlantic.

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Hamilton, J. (2017, June 30). *Careers in Electric Vehicles : U.S. Bureau of Labor Statistics*. Bls.gov.

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