

ask

CAN CARS CHANGE?

This month's issue of ASK takes the reader on a road trip to explore the history of the automobile. Impressive science and creative minds are constantly working to produce vehicles that are better for the driver, as well as the planet. Fuel up and prepare to examine the evolution of the car, and learn how scientists are paving the way for a cleaner future.

CONVERSATION QUESTION

How are scientific advancements improving the automobile?

TEACHING OBJECTIVES

- Students will learn about the mechanical features of self-driving cars.
- Students will learn about the historical inventions that led to the modern car.
- Students will learn about the alternatives to gas-powered cars.
- Students will collect evidence from the text to produce accurate information.
- Students will obtain information from a nonfiction text.
- Students will compare and contrast alternative power sources for cars.
- Students will write a story using second person narrative.
- Students will use information from the article to create and solve mathematical word problems.
- Students will draw and label the components of an alternatively powered vehicle.



In addition to supplemental materials focused on core STEM skills, this flexible teaching tool offers vocabulary-building activities, questions for discussion, and cross-curricular activities.

SELECTIONS

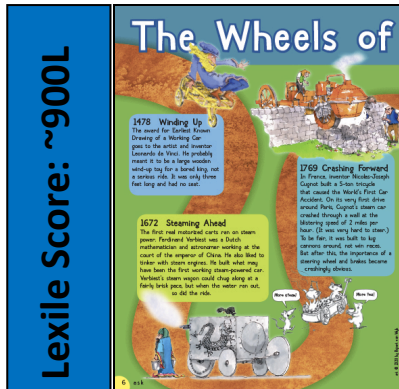
- **The Wheels of Invention**
Expository Nonfiction, ~900L
- **The Car That Drives Itself**
Expository Nonfiction, ~700L
- **Goodbye Gas**
Expository Nonfiction, ~900L

Ask® Teacher Guide: September 2020

The Wheels of Invention

pp. 6–9, Expository Nonfiction

Buckle up and discover how the modern car developed throughout history. Science, mathematics, and great imaginations all contributed to the automobile as we know it today.



RESOURCES

- Are We There Yet?

OBJECTIVES

- Students will learn about the historical inventions that led to the modern car.
- Students will obtain information from a nonfiction text.
- Students will use information from the article to create and solve mathematical word problems.

KEY VOCABULARY

- astronomer (p. 7)** a scientist who studies the stars, planets, and other natural objects in space
- engineer (p. 6)** a person who uses science, math, and creativity to solve technical problems
- inventor (p. 7)** a person who creates a new method or device
- mathematician (p. 7)** a person who is trained in the study of numbers and calculations

ENGAGE

Conversation Question: How are scientific advancements improving the automobile?

Ask students what transportation they took to arrive at school today. Make a list on the board and encourage students to brainstorm as many forms of transportation as they can. Discuss why certain methods of travel are more suitable than others in specific situations. (Ex: bicycle for trails, plane for long distances, etc.)

INTRODUCE VOCABULARY

Post the key vocabulary terms on the board. Have the students use resources to define them and then display the given definitions. Reveal the title of the article, "The Wheels of Invention," and ask students to predict how all the experts listed in the vocabulary section contributed to the modernization of cars.

READ & DISCUSS

Reinforce comprehension of the facts presented in the article by using the following prompts to direct discussion.

- Who is credited with drawing the earliest known sketch of a working car?
- Explain how a five-ton tricycle caused the world's first car accident.
- What was so amazing about the car that Karl Benz invented?
- What was the goal of Ransom Olds and Henry Ford?
- What improvements are modern-day car makers currently pursuing?

CONCEPT/SKILL FOCUS: Obtaining Information

INSTRUCT: Guide students to obtain information from the text, captions, and drawings in the article. Remind them that the article was written to present a detailed timeline of how the car evolved over time and how experts have continued to make improvements. Instruct students to correctly match the name on the right with his contribution on the left.

ASSESS: Collect and review graphic organizers. Arrange peer remediation if necessary.

EXTEND

Mathematics On page 9, the article states, "In 1908, Ford improved the assembly line so that they could build a car in 93 minutes." How many cars could they complete in 24 hours? Instruct students to use the RDW (Read-Draw-Write) process to express their answers. Challenge them to use other mathematical data from the article to create their own word problems for classmates to solve.

Are We There Yet?

Use information from the article, “The Wheels of Invention,” to correctly match the inventor with his accomplishment. Place the letter on the line next to the inventor’s name.

- | | |
|-----------------------------|---|
| 1. _____ Oliver Evans | A. improved the assembly line and created the affordable Model T |
| 2. _____ Wilhem Mayback | B. built what may have been the first working steam-powered car |
| 3. _____ Henry Ford | C. built a low-slung, gas-powered car with the engine in the front and called it the “Mercedes” |
| 4. _____ Ferdinand Verbiest | D. built what may have been the first boat-car |
| 5. _____ Siegfried Marcus | E. received one of the most famous patents in history for inventing a gas-powered 3-wheeled car |
| 6. _____ Karl Benz | F. improved engines, but ultimately declared the car to be a senseless waste of time |

Review the article’s timeline and find the dates for the events listed above. Put them in order below.

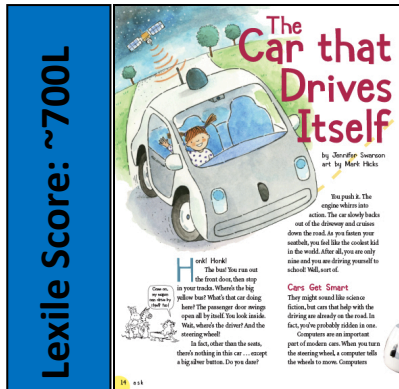
1.	4.
2.	5.
3.	6.

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The Car That Drives Itself

pp. 14–17, Expository Nonfiction

Climb in and set your course. This article explores the mechanical features of self-driving cars, and addresses the advantages and disadvantages of this innovative technology.



RESOURCES

- Full Speed Ahead

OBJECTIVES

- Students will learn about the mechanical features of self-driving cars.
- Students will collect evidence from the text to produce accurate statements.
- Students will write a story using second person narrative.

KEY VOCABULARY

- **GPS (p. 17)** a satellite-based navigation system
- **LIDAR (p. 16)** a detection system that uses light from radar
- **radar (p. 17)** a detection system that uses radio waves
- **sensors (p. 16)** mechanical devices that respond to physical stimuli

ENGAGE

Conversation Question: How are scientific advancements improving the automobile?

How hard is it to program a self-driving car? Utilize an open space to have students set an obstacle course for their blindfolded partner. Instruct them to place an object some distance away and then use a series of commands to lead their partner to this destination. They must include at least five directions, as cars typically need to make several turns and avoid objects. Discuss the experience.

INTRODUCE VOCABULARY

Post the vocabulary words where they are visible to the class. Instruct students to do a word hunt through the article to locate these words. Have them underline the sentences in which they appear. Challenge students to use context clues to determine meanings. Discuss actual meanings and add definitions to the terms posted on the board.

READ & DISCUSS

Read the article aloud with the class. Have students reread the article in small groups to answer the questions below. Discuss responses.

- Explain how computers are an important part of many modern-day cars.
- How did Google create and test their own self-driving car?
- What are the advantages of a self-driving car?
- What are some of the problems with self-driving vehicles?
- Do you think that driverless cars will become commonplace in your lifetime? Why/Why not?

CONCEPT/SKILL FOCUS: Collecting Evidence

INSTRUCT: This article presents the reader with an abundance of simply stated information regarding the self-driving car. Tell students that they are going to look for errors in summary statements and collect evidence that will help them to make the sentence true. They will need to consult the article to gather accurate information. Review the instructions on the graphic organizer, *Full Speed Ahead*.

ASSESS: The objective of this lesson is to help students to practice the ability to discriminate information, as well as to practice the skill of collecting evidence. Create dialogue as students are working on their charts, and then collect organizers to evaluate individual understanding.

EXTEND

ELA Reread the “science fiction” introduction on page 14 aloud. The scenario explains that you have just boarded a self-driving car as transport to school. Instruct students to continue this story using second person narrative (the pronoun *you*) and describe the entire journey to school.

Full Speed Ahead

Collect evidence from the text to replace the **bold** word. Look back at the article, “The Car That Drives Itself,” and write the word that makes the sentence true in the boxes below.

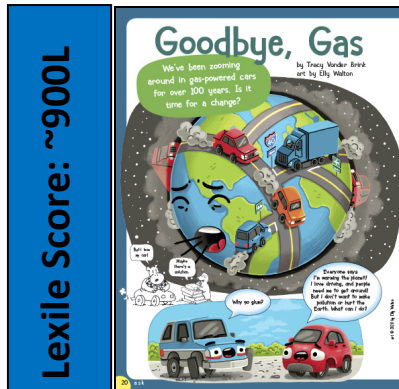
1. The **manual** safety in self-driving cars can keep the vehicle from drifting and brake if a car gets too close.
2. Google’s self-driving car is entirely automatic, even without **lights**.
3. The biggest advantage of robot-cars is **cost**.
4. Human drivers are actually much better at responding to **rain** than self-driving cars.
5. The U.S. Department of Transportation estimates that **49%** of traffic accidents are caused by human error.
6. In order to be able to follow a route to a destination, self-driving cars use **mirrors** and a computer.

1.	4.
2.	5.
3.	6.

Goodbye Gas

pp. 20–25, Expository Nonfiction

“Gas Guzzlers” may soon become a thing of the past. This article examines several different options for powering cars and discusses alternative fuels that may help save our warming planet.



RESOURCES

- Road Trip

OBJECTIVES

- Students will learn about the alternatives to gas-powered cars.
- Students will compare and contrast alternative power sources for cars.
- Students will draw and label the components of an alternatively powered vehicle.

KEY VOCABULARY

- **electric car (p. 22)** a car that has an electric motor that runs on batteries
- **fuel cell car (p. 24)** a car that uses hydrogen for fuel
- **hybrid car (p. 23)** a car that has both a gas and electric engine
- **solar car (p. 24)** a car that has an electric motor that has a battery and can be charged by the sun

ENGAGE

Conversation Question: How are scientific advancements improving the automobile?

As a prereading activity, begin a brainstorming web with the words **ALTERNATIVE POWER** in the center. Have the students assist in generating information for the web that emphasizes the prior knowledge that students bring to this topic. Post the title of the article, “Goodbye Gas,” and prepare to read.

INTRODUCE VOCABULARY

Post and review the key vocabulary words. Distribute the article and direct students to notice the subheadings. Remind students that subheadings in nonfiction texts are used to organize information for improved comprehension. Have students note that the subheadings help readers to identify sections in the article that will elaborate on each key term.

READ & DISCUSS

Divide the class into five groups and assign them each a different question to discuss. Reconvene and have each group share the main points of their conversation. The class should be taking notes so that after each group has shared, the students will have thorough answers to each question.

- Explain how gas engines work.
- Where does gasoline come from?
- Why is gasoline harmful to our planet?
- What is biofuel? Why is this an exciting development?
- Why would alternative power be especially beneficial for trucks and buses?

CONCEPT/SKILL FOCUS: Compare and Contrast

INSTRUCT: Elicit from the students that the main idea of the article is to explore how advancements in technology are proposing more efficient sources of energy to power vehicles. Allow students to work with a partner to complete the graphic organizer, *Road Trip*, that compares gas-powered, electric, and hybrid automobiles. Encourage the pairs to share their finished work, instructing them to amend their own charts if necessary.

ASSESS: Collect and review the *Road Trip* organizers.

EXTEND

Graphic Arts Have students review the article and instruct them to study the diagrams of cars and their fuel components on pages 21–25. Instruct them to choose the car with the fuel source that they think is the most practical solution for our future and draw a sketch. Have them label the parts and write a short summary of the benefits of this type of vehicle.

Road Trip

Reread the article, "Goodbye Gas." Record the pros and cons of each powered vehicle.

VEHICLE	PROS	CONS
Gas-Powered Cars		
Electric Vehicles		
Hybrid Vehicles		