

ask®

TEACHING OBJECTIVES

- Students will read and analyze nonfiction articles
- Students will ask questions and define problems
- Students will construct explanations and design solutions
- Students will obtain, evaluate, and communicate information
- Students will engage in argument from evidence
- Students will analyze and interpret data

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.

ISSUE TOPIC

The bicycle has been in the works for nearly 200 years. During this time, the bike has been altered and outfitted for a smoother and safer ride. Find out how the modest bike has solved transportation problems and is part of a solution for a healthier world.

CONVERSATION QUESTION

What problems has the invention of the bicycle solved?

ABOUT ASK® MAGAZINE

Each themed issue of ASK® helps young students master science concepts and encourages independent inquiry in science and invention through a mix of fresh perspectives, in-depth feature articles, literature, science activities, and humor.



SELECTIONS

- **A Bumpy Ride**
Expository Nonfiction, ~1060L
- **Making a Place for Bikes**
Expository Nonfiction, ~950L
- **The Bike Soldiers**
Expository Nonfiction, ~930L

CONNECTING CURIOUS MINDS

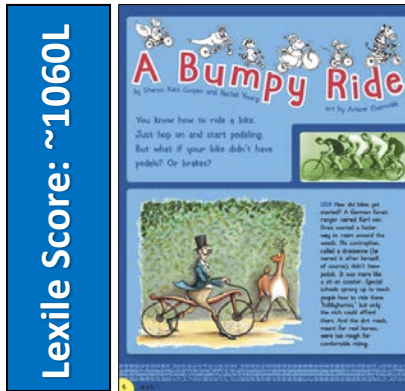
Cricket Media offers 11 award-winning magazines for toddlers to teens. Our ePals Global Community® pairs educators and students around the world in exciting project-based learning. Our CricketTogether™ program matches mentors and students to build reading, writing, and critical thinking skills.

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A Bumpy Ride

pp. 6–10, Expository Nonfiction



THE ARTICLE

Take a tour of the changing form and function of the bicycle and discover how design thinking was used to make improvements.

RESOURCES

- **Problem/Solution Graphic Organizer**

OBJECTIVES

- Students will read and analyze a nonfiction article
- Students will ask questions and define problems
- Students will construct explanations and design solutions

KEY VOCABULARY

- **contraption (p. 6)** a machine that is unusual or strange
- **mechanisms (p. 10)** pieces of machinery
- **quadricycles (p. 8)** cycles that use four wheels

ENGAGE

Conversation Question: What problems has the invention of the bicycle solved?

Invite students to imagine what the first bicycle might have looked like. In small groups, have students draw a picture and label some of the main parts. Then ask them to make a list of how the bike might have been used to help people.

INTRODUCE VOCABULARY

Write the vocabulary words where they are visible to the class. Together, read the words aloud. Ask volunteers to share possible meanings. Acknowledge correct meanings and then read the definitions aloud. Finally, tell students to look for these words as they read the article.

READ & DISCUSS

Read the article together as a class, then have students form small groups to discuss these questions:

- What are some of the biggest changes to bicycles since 1870?
- What parts of the modern bicycle are most important to its function (what a bike can do)?
- What problems did bicycles solve through time?
- How did the bicycle change people's lives and culture?
- What makes people want to keep improving an invention?

SKILL FOCUS: Design Solutions

INSTRUCT: With a partner, have students brainstorm problems with bicycles today. Pass out copies of the **Problem/Solution Graphic Organizer**. Have them make a list of problems and solutions, and then choose one as a basis for designing a solution. Have them consider two or three ways the problem could be solved by altering the bike design or changing the way bikes are used. Then have them choose their best solution. Students will write the problem and solution using examples and evidence to support their ideas. Example: (Problem) It is difficult to ride bikes in the rain, because mud sprays up on the rider. (Design Solution) The bike raincoat covers the bike, preventing mud from splashing.

ASSESS: Students write a summary that explains how bicycles have been designed over time to solve problems. Ask students to support their explanations. Look for evidence that students understand the problem-solution relationship in designing bicycles.

EXTEND

Art Students draw a diagram of a bicycle they design, including labels to show the special features. Explain that diagrams use both science and art to communicate information.

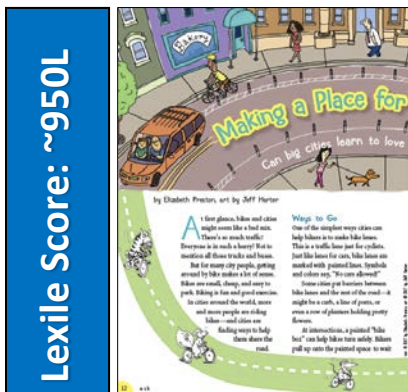
What problems has the invention of the bicycle solved?

Read the article and record the problems and solutions inventors of the bicycle solved through time. The first one is done for you.

Page/Year	Problem	Solution
Page 6 1818	Needed a faster way for forest rangers to travel through the woods.	A bicycle without pedals that was scooted with the rider's feet.

Making a Place for Bikes

pp. 12–15, Expository Nonfiction



THE ARTICLE

Bikes and cars make a dangerous mix in the city. This article explores a wide range of solutions to protect cyclists and help them get to more places.

OBJECTIVES

- Students will read and analyze a nonfiction article
- Students will construct explanations and design solutions
- Students will obtain, evaluate, and communicate information

KEY VOCABULARY

- **barriers (p. 12)** things that block movement from one place to another
- **cyclists (p. 12)** people who ride bikes
- **intersection (p. 12)** where two roads meet

ENGAGE

Conversation Question: What problems has the invention of the bicycle solved?

Project or draw a map of the school neighborhood and discuss different obstacles and dangers to bikers. Discuss what is in place to protect cyclists and what else could be done to allow for safer bicycle travel.

INTRODUCE VOCABULARY

Display the vocabulary words and read them aloud. Ask volunteers to explain the meanings of words. Acknowledge correct meanings and then read the definitions aloud. Finally, tell students to look for these words as they read the article.

READ & DISCUSS

Have students read the article silently. Then conduct a whole-class discussion using the following questions:

- What design decisions can make a city safer for bikes?
- Is your community cycle friendly? Why or why not?
- What problems do bike-safe cities solve?
- Which of the solutions in the article does your community have in place?

SKILL FOCUS: Communicate Information

INSTRUCT: Explain that they will take on the role of city planners and offer suggestions on how to make their neighborhood more cycle friendly. Project a map of the neighborhood and discuss what is in place to keep cyclists safe. Next, mark places on the map that are most dangerous to bikers.

In small groups, have students take on the role of city planners and design a solution to one of the problem areas. Have students create a short presentation to share with the rest of the class to demonstrate their solution to the problem.

ASSESS: Have students trace the safest bike route between two destinations on a neighborhood map. Ask students to write out the directions and explain why they chose this route.

EXTEND

Social Studies Students use map skills as they look for safe bike routes and mark maps with symbols to show hazards.

The Bike Soldiers

pp. 18–23, Expository Nonfiction

Lexile Score: ~930L



THE ARTICLE

Bikes were the way to go in the 1890s. Find out how soldiers set off on a historical journey to demonstrate just how well they could travel on two wheels.

RESOURCES

- **Pros and Cons Graphic Organizer**

OBJECTIVES

- Students will read and analyze a nonfiction article
- Students will engage in argument from evidence
- Students will analyze and interpret data

KEY VOCABULARY

- **demonstrate (p. 19)** to show or explain through action
- **lieutenant (p. 19)** a military rank, a junior officer rank

ENGAGE

Conversation Question: What problems has the invention of the bicycle solved?

Distribute copies of the **Pros and Cons Graphic Organizer**. Students work in small groups to brainstorm and compare the disadvantages and advantages of using bicycles (rather than horses) in the army.

INTRODUCE VOCABULARY

Display the vocabulary words and read them aloud. Ask volunteers to explain the meanings of words. Acknowledge correct meanings and then read the definitions aloud. Finally, tell students to look for these words as they read the article.

READ & DISCUSS

Have students read the article silently, then work with a partner to look for evidence that the bicycle helped the soldiers make their historic trip. Then use the following questions to discuss the article as a whole class.

- What problems was the lieutenant solving when he convinced the Spalding Bike Company to make changes for the army bike?
- What did the lieutenant and the army riders demonstrate?
- Do you think if the automobile had not been invented, the bike would be used for more purposes than it is today?
- How was cycling in the late 1890s different from cycling today?

SKILL FOCUS: Communicate Information

INSTRUCT: Explain that pioneers in science and invention have to be skillful in communicating information. Tell students that often, people are not convinced of the usefulness of a new idea unless strong reasons and evidence are given. Have students complete the **Pros and Cons Graphic Organizer** in small groups. Then, have students pretend to be Lieutenant Moss and write an ad to convince soldiers to join the bike corps to take the 1,900-mile bike trip. Remind students to use the information in the article to help them communicate what the soldiers would need to know to be convinced to sign up for such an adventure.

ASSESS: Have students show what they know by writing a pretend newspaper article highlighting the events covered in the article. Have them include who, what, where, when, why, and how to demonstrate their understanding of how bicycles were used as a new way for army travel in the 1890s.

EXTEND

Social Studies Students use a map to trace the route of the bike soldiers. Have them mark the most treacherous places along the route.

Pros and Cons

What problems has the invention of the bicycle solved?

U.S. Army Lt. James Moss had to analyze the pros and cons of using bicycles in the army. Create your own pro/con chart to see what possible reasons the lieutenant may have used to support his decision to use bikes over horses.



Pros: Benefits of Using a Horse	Pros: Benefits of Using a Bike
Cons: Disadvantages of Using a Horse	Cons: Disadvantages of Using a Bike