



# Teacher's Guide

# Bridges



## Dear Educator,

Get to know the amazing structures that span great distances to help us “bridge the gap” between two places! While reading **KIDS DISCOVER Bridges**, your young engineers will learn about the fascinating topics at right.

This Teacher's Guide is filled with activity ideas and blackline masters to help your students enjoy and learn more from *Bridges*. Select or adapt the activities that suit your students' needs best.

Thank you for making **KIDS DISCOVER** a part of your classroom.

Sincerely,

**KIDS DISCOVER**

P.S. We would love to hear from you!  
E-mail your comments and ideas to [teachers@kidsdiscover.com](mailto:teachers@kidsdiscover.com)

## Meeting the Standards

✓ Physical Science  
– *National Science Education Standards*

✓ Visit [www.kidsdiscover.com/standards](http://www.kidsdiscover.com/standards) to find out more about how **KIDS DISCOVER** meets state and national standards.

## PAGES WHAT'S IN BRIDGES

- 2–3 Bridge the Gap**  
The beauty and practicality of bridges—plus, record-breaking bridges!
- 4–5 Beam Me Across!**  
Beam bridges and how they work
- 6–7 The Art of Arch-ery**  
How does an arch bridge work?
- 8–9 What Suspense!**  
How a suspension bridge works, plus outstanding examples!
- 10–11 Vasco da Gama Bridge**  
This beautiful bridge in Portugal looks like an enormous stringed instrument.
- 12–13 Variations on a Theme**  
Cable-stayed bridges, covered bridges, movable bridges, and more!
- 14–15 A Bridge is Born**  
Twelve steps to building the Brooklyn Bridge
- 16–17 Bridges in Art**  
Songs, paintings, poems, movies, and books inspired by bridges
- 18–19 Student Activities**  
An acrostic, bridge match-up, and resources

## • IN THIS TEACHER'S GUIDE •

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4 Discussion and Writing Questions

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7 Everything Visual (Graphic Skills) 

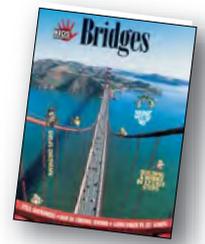
8 Cross-Curricular Extensions

9–12 Answer Keys to Blackline Masters

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# PREREADING ACTIVITIES



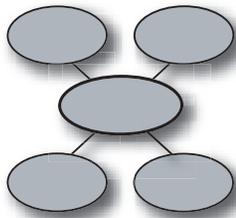
**B**efore distributing **KIDS DISCOVER *Bridges***, activate students' prior knowledge and set a purpose for reading with these activities.

## Discussion

To get students thinking about how this topic relates to their interests and lives, ask:

- ✓ *What is the most interesting bridge you ever crossed? Where is it located? What makes the bridge interesting to you?*
- ✓ *What do you want to learn about bridges?*

## Concept map



**E**xplain to students that they will be reading *Bridges*. Ask: *What are some words that are related to bridges?* List students' responses on the board. (See box below for some words they may suggest.) After creating a list, ask students to group the words into categories, such as **Types** or **Famous Bridges**. Create a concept map by writing *Bridges* on the board and circling it. Write the categories around the circle and draw lines between the ideas to show connections. Then print the words from the list around the appropriate categories. Encourage students to add more words to the concept map as they read *Bridges*.

### KEY TERMS

- |                      |                   |
|----------------------|-------------------|
| ✓ beam               | ✓ Brooklyn Bridge |
| ✓ arch               | ✓ caisson         |
| ✓ suspension         | ✓ abutment        |
| ✓ bascule            | ✓ aqueduct        |
| ✓ truss              | ✓ tension         |
| ✓ Golden Gate Bridge | ✓ compression     |

## Get Set to Read (Anticipation Guide)



**C**opy and distribute the **Get Set to Read** blackline master (page 3 of this Teacher's Guide). Explain to students that this **Anticipation Guide** will help them find out what they know and what misconceptions they have about the topic. **Get Set to Read** is a list of statements—some true, some false. Ask students to write whether they think each statement is true or false in the **Before Reading** column. Be sure to tell students that it is not a test and they will not be graded on their answers. The activity can be completed in a variety of ways for differentiated instruction:

- ◆ **Have students** work on their own or in small groups to complete the entire page.
- ◆ **Assign pairs** of students to focus on two statements and to become "experts" on these topics.
- ◆ **Ask students** to complete the **Before Reading** column on their own, and then tabulate the class's answers on the chalkboard, on an overhead transparency, or on your classroom computer.
- ◆ **Review the statements** orally with the entire class.

If you predict that students will need assistance finding the answers, complete the **Page Number** column before copying **Get Set to Read**.

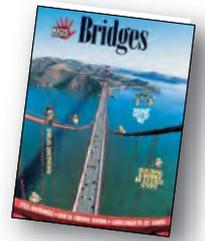
## Preview

**D**istribute *Bridges* and model how to preview it. Examine **titles, headings, words in boldface type, pictures, charts, and captions**. Then have students add new information to the **Concept Map**. If students will only be reading a few pages at one sitting, preview only the selected pages.

## BE WORD WISE WITH POWER VOCABULARY!

**Y**ou have exclusive access to additional resources including Power Vocabulary blackline masters for every available KIDS DISCOVER title! These activities introduce students to 15 specialized and general-use vocabulary words from each KIDS DISCOVER title. Working with both types of words helps students develop vocabulary, improve comprehension, and read fluently. Follow the links from your Teacher's Toolbox CD-ROM and find your title to access these valuable resources:

- ◆ Vocabulary cards
- ◆ Crossword puzzle
- ◆ Word find
- ◆ Matching
- ◆ Cloze sentences
- ◆ Dictionary list



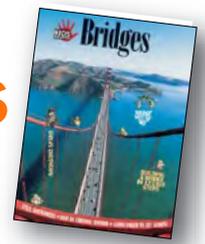
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# Get Set to Read

What do you know about bridges? In *Before Reading*, write *true* if you think the statement is true. Write *false* if you think the statement is not true. Then read *KIDS DISCOVER Bridges*. Check back to find out if you were correct. Write the correct answer and the page number where you found it.

**CHALLENGE:** Rewrite each false sentence in a way that makes it true.

Before Reading		After Reading	Page Number
_____	1. The world's longest bridge is 24 miles long.	_____	_____
_____	2. Some bridges have been built mainly to attract tourists.	_____	_____
_____	3. The vertical post on a bridge is called a girder.	_____	_____
_____	4. China has an arch bridge that was built nearly 1,400 years ago.	_____	_____
_____	5. Suspension bridges are the least expensive type of bridges to build.	_____	_____
_____	6. The Golden Gate Bridge connects Staten Island and Brooklyn.	_____	_____
_____	7. Some bridges open to allow ships to pass through.	_____	_____
_____	8. The Brooklyn Bridge was one of the most amazing engineering feats in history.	_____	_____
_____	9. The Brooklyn Bridge was completed in 1972.	_____	_____
_____	10. A movie was made about prisoners of war in World War II who were forced to build a bridge.	_____	_____



Use the following questions as oral discussion starters or for journaling. For additional in-class discussion and writing questions, adapt the questions on the reading comprehension blackline masters on pages 5 and 6.

### Cover

Have students look at the cover lines and image. Ask:

- ✓ What do you think is the purpose of a cover line? Why do you think each cover line was chosen? What does each one mean?
- ✓ Why do you think this particular bridge image was chosen? If you were to choose a bridge to go on the cover of a magazine titled "Bridges," what bridge would you choose? Why?

### Pages 2–3

Six record-breaking bridges are shown on pages 2 and 3. Ask:

- ✓ Of these six bridges, which one would you most like to visit? Explain your answer.

### Pages 2–3

- ✓ Do you have any beam, arch, or suspension bridges near your town? What do they look like?

### Pages 4–5

- ✓ Have you ever seen a beam bridge? What did it look like? Where was it?
- ✓ Do you think you could build a beam bridge? What materials would you use? Where would you build it?
- ✓ Would you like to walk on the bridge that is pictured at the top of page 4? Why or why not? What do you think would be the most difficult part about walking on that bridge?

### Pages 6–7

- ✓ Have you ever seen an arch bridge? Where was it? What did it look like? What materials was it made from?
- ✓ Which of the bridges on pages 6 and 7 do you think is the most interesting? Why? Which bridge would you most like to visit? Why?



### Pages 8–9

- ✓ Have you ever seen a suspension bridge? Where was it? What did it look like?
- ✓ How do you think the collapse of the Tacoma Narrows Bridge, pictured along the bottom edge of pages 8 and 9, changed bridge building? Do you think it helped improve bridge building or did it set it back?

### Pages 10–11

Have students look at the bridge on pages 10 and 11. Ask:

- ✓ Why do you think this image was chosen for the center spread? What is your impression of this bridge: Do you think it is a startlingly beautiful bridge, or do you think it is an eyesore? Explain your answer.



**Give students the chance to develop a board game with the information that they learned in a KIDS DISCOVER issue.**

### Pages 12–13

Most bridges take people from one side of a river to another. But bridges that span the exact same lengths vary in many ways. Ask:

- ✓ Why do you think there are so many variations in bridges?

### Pages 14–15

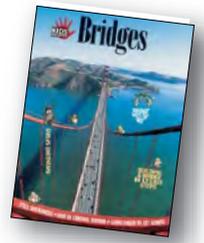
People who build bridges face a variety of dangers. Ask:

- ✓ What dangers do you think construction workers on bridges face? Would you like to help in the construction of a bridge? Explain.

### Pages 16–17

The introduction on page 16 says, "Both literally and symbolically, bridges create connections, making our world a smaller place." Ask:

- ✓ What does this sentence mean? How do bridges make "our world a smaller place"?



Name \_\_\_\_\_ Date \_\_\_\_\_

## It's in the Reading

After reading KIDS DISCOVER *Bridges*, choose the best answer for each question.  
Fill in the circle.



Find your answers on the pages shown in the book icon next to each question.

1. The world's widest bridge is located in \_\_\_\_\_.

- A. Hong Kong
- B. Louisiana
- C. Australia
- D. England



2. The vertical post that supports a beam bridge is called a \_\_\_\_\_.

- A. pier
- B. beam
- C. girder
- D. span



3. The weight of an arch bridge is carried outward beginning at the \_\_\_\_\_.

- A. abutment
- B. keystone
- C. pier
- D. span



4. A famous bridge that was completed in 1345 is the \_\_\_\_\_.

- A. Zhaozhou Bridge in China
- B. Pont Neuf in Paris
- C. Pont du Gard in France
- D. Ponte Vecchio in Italy



5. The kind of bridge that spans the longest distances is a(n) \_\_\_\_\_.

- A. suspension bridge
- B. arch bridge
- C. beam bridge
- D. covered bridge



6. The purpose of a truss system on a suspension bridge is to \_\_\_\_\_.

- A. support the piers
- B. reduce swaying of the deck
- C. anchor the cables
- D. create compression



**7. One feature the Vasco da Gama Bridge does NOT have is a(n) \_\_\_\_.**

- A. pier
- B. arch
- C. cable
- D. deck



**8. A beam with a support at only one end is a \_\_\_\_.**

- A. truss
- B. firth
- C. cantilever
- D. swing-span



**9. How does a cable-stayed bridge differ from a suspension bridge?**

- A. A cable-stayed bridge has cables and a suspension bridge doesn't.
- B. The cables of a cable-stayed bridge are not attached to an anchorage.
- C. A cable-stayed bridge does not have a truss.
- D. A cable-stayed bridge does not have towers.



**10. What had to be done before the towers of the Brooklyn Bridge were built?**

- A. Anchorages had to be built.
- B. Steel suspenders had to be hung from cables.
- C. A temporary footbridge had to be built.
- D. Caissons had to be filled with concrete.



**11. One symbolic meaning that bridges have is \_\_\_\_.**

- A. a way to reach enemies during war
- B. communication between two people
- C. the scenic quality of covered bridges
- D. only modern societies can build good bridges



**12. Why do you think people are fascinated by bridges?**

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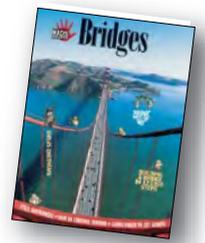
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Name \_\_\_\_\_ Date \_\_\_\_\_

## Everything Visual

A diagram can show how something is constructed and how it works. Compare the diagrams of a beam bridge on page 5, an arch bridge on pages 6–7, and a suspension bridge on pages 8–9. Then answer the questions.

1. How does the compression on a beam bridge and on an arch bridge differ?

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2. Compare the tension on a beam bridge and on a suspension bridge.

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3. What advantages does a suspension bridge have over an arch bridge and a beam bridge?

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4. What is the purpose of the anchorage on a suspension bridge?

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5. Which of the three kinds of bridges has the simplest construction? Explain why it is effective although it is so simple.

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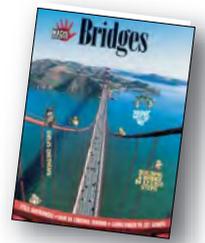
6. Which of the three kinds of bridges has the most complex construction? Explain.

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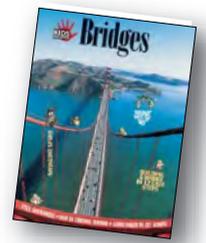
Name **ANSWER KEY** \_\_\_\_\_ Date \_\_\_\_\_

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**CHALLENGE:** Rewrite each false sentence in a way that makes it true.

Before Reading	After Reading	Page Number
_____ 1. The world's longest bridge is 24 miles long.	_____ <i>True</i>	_____ <i>p. 2</i>
_____ 2. Some bridges have been built mainly to attract tourists.	_____ <i>True</i>	_____ <i>p. 3</i>
_____ 3. The vertical post on a bridge is called a <del>girder</del> pier.	_____ <i>False</i>	_____ <i>p. 4</i>
_____ 4. China has an arch bridge that was built nearly 1,400 years ago.	_____ <i>True</i>	_____ <i>p. 6</i>
_____ 5. Suspension bridges are the <del>least</del> most expensive types of bridges to build.	_____ <i>False</i>	_____ <i>p. 8</i>
_____ 6. The Golden Gate Bridge <del>connects Staten Island and Brooklyn</del> spans San Francisco Bay.	_____ <i>False</i>	_____ <i>p. 9</i>
_____ 7. Some bridges open to allow ships to pass through.	_____ <i>True</i>	_____ <i>p. 13</i>
_____ 8. The Brooklyn Bridge was one of the most amazing engineering feats in history.	_____ <i>True</i>	_____ <i>p. 14</i>
_____ 9. The Brooklyn Bridge was completed in <del>1972</del> 1883.	_____ <i>False</i>	_____ <i>p. 15</i>
_____ 10. A movie was made about prisoners of war in World War II who were forced to build a bridge.	_____ <i>True</i>	_____ <i>p. 17</i>



Name **ANSWER KEY** \_\_\_\_\_ Date \_\_\_\_\_

## It's in the Reading

After reading KIDS DISCOVER *Bridges* choose the best answer for each question.  
Fill in the circle.



Find your answers on the pages shown in the book icon next to each question.

1. The world's widest bridge is located in \_\_\_\_\_.

- A. Hong Kong
- B. Louisiana
- C. Australia (*compare and contrast*)
- D. England



2. The vertical post that supports a beam bridge is called a \_\_\_\_\_.

- A. pier (*word meaning*)
- B. beam
- C. girder
- D. span



3. The weight of an arch bridge is carried outward beginning at the \_\_\_\_\_.

- A. abutment
- B. keystone (*word meaning*)
- C. pier
- D. span



4. A famous bridge that was completed in 1345 is the \_\_\_\_\_.

- A. Zhaozhou Bridge in China
- B. Pont Neuf in Paris
- C. Pont du Gard in France
- D. Ponte Vecchio in Italy (*details*)



5. The kind of bridge that spans the longest distances is a(n) \_\_\_\_\_.

- A. suspension bridge (*details*)
- B. arch bridge
- C. beam bridge
- D. covered bridge



6. The purpose of a truss system on a suspension bridge is to \_\_\_\_\_.

- A. support the piers
- B. reduce swaying of the deck (*cause and effect*)
- C. anchor the cables
- D. create compression



7. One feature the Vasco da Gama Bridge does NOT have is a(n) \_\_\_\_\_.

- A. pier
- B. arch (*draw conclusions*)
- C. cable
- D. deck



8. A beam with a support at only one end is a \_\_\_\_\_.

- A. truss
- B. firth
- C. cantilever (*word meaning*)
- D. swing-span



9. How does a cable-stayed bridge differ from a suspension bridge?

- A. A cable-stayed bridge has cables and a suspension bridge doesn't.
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- C. A cable-stayed bridge does not have a truss.
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10. What had to be done before the towers of the Brooklyn Bridge were built?

- A. Anchorages had to be built.
- B. Steel suspenders had to be hung from cables.
- C. A temporary footbridge had to be built.
- D. Caissons had to be filled with concrete. (*sequence*)



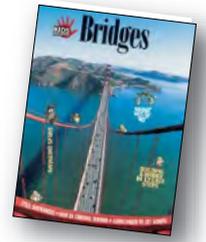
11. One symbolic meaning that bridges have is \_\_\_\_\_.

- A. a way to reach enemies during war
- B. communication between two people (*figurative meaning*)
- C. the scenic quality of covered bridges
- D. only modern societies can build good bridges



12. Why do you think people are fascinated by bridges?

*Answers will vary. Students might describe the beauty of bridges, the wide variety of bridges, and the symbolic meanings of bridges.*



Name **ANSWER KEY** \_\_\_\_\_ Date \_\_\_\_\_

## Everything Visual

A diagram can show how something is constructed and how it works. Compare the diagrams of a beam bridge on page 5, an arch bridge on pages 6–7, and a suspension bridge on pages 8–9. Then answer the questions.

- 1. How does the compression on a beam bridge and on an arch bridge differ?**

*On a beam bridge, the bridge is compressed inward along the top of the bridge. On an arch bridge, the bridge is compressed outward along the bottom of the arch.*

- 2. Compare the tension on a beam bridge and on a suspension bridge.**

*On a beam bridge, the tension goes outward on the lower portion of the roadway. On a suspension bridge, tension is carried along the cables.*

- 3. What advantages does a suspension bridge have over an arch bridge and a beam bridge?**

*A suspension bridge can carry more weight and span longer distances.*

- 4. What is the purpose of the anchorage on a suspension bridge?**

*It supports the cables.*

- 5. Which of the three kinds of bridges has the simplest construction? Explain why it is effective although it is so simple.**

*The arch bridge is simplest. It works because the arch has great natural strength.*

- 6. Which of the three kinds of bridges has the most complex construction? Explain.**

*The suspension bridge has the most complex construction. It has more supporting parts.*