



#3650

ROADS AND BRIDGES

Grade Levels: K-9

10 minutes

FILMS FOR THE HUMANITIES 1994

1 Student Activity Sheet

DESCRIPTION

Compares old and new techniques of road building, and shows the process of building a new bridge.

ACADEMIC STANDARDS

Subject Area: Science

- ◆ Standard: Understands motion and the principles that explain it
 - Benchmark: Knows the relationship between the strength of a force and its effect on an object (e.g., the greater the force, the greater the change in motion; the more massive the object, the smaller the effect of a given force)
 - Benchmark: Knows that when a force is applied to an object, the object either speeds up, slows down, or goes in a different direction
- ◆ Standard: Understands basic concepts about the structure and properties of matter
 - Benchmark: Knows that objects can be classified according to their properties (e.g., magnetism, conductivity, density, solubility)
 - Benchmark: Knows that properties such as length, weight, temperature, and volume can be measured using appropriate tools (e.g., rulers, balances, thermometers, graduated cylinders)



Subject Area: Historical Understanding

- ◆ Standard: Understands and knows how to analyze chronological relationships and patterns
 - Benchmark: Knows how to construct time lines in significant historical developments that mark at evenly spaced intervals the years, decades, and centuries
 - Benchmark: Knows how to identify patterns of change and continuity in the history of the community, state, and nation, and in the lives of people of various cultures from times long ago until today

VOCABULARY

- | | |
|------------|-------------|
| 1. traffic | 7. asphalt |
| 2. bus | 8. paving |
| 3. truck | 9. snowplow |
| 4. highway | 10. rut |
| 5. dirt | 11. pothole |
| 6. gravel | 12. groove |



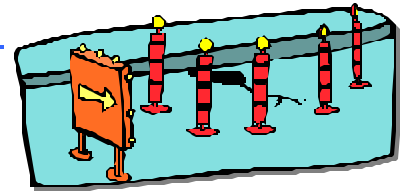
BEFORE SHOWING

1. Put a map of your area on an overhead projector. Ask students to read the names of familiar roads. Tell students to look for different ways that streets are designated (e.g., avenue, road, circle). Make a list on the blackboard. Ask students why certain roads have a special name (e.g., a "circle" is usually a circular street).
2. Ask for a definition of a bridge from the class. Let students describe a bridge that they have seen. What was the bridge made of? Did it cross a creek or a big river? Ask students to name the types of bodies of water that could have a bridge (e.g., stream, lake). Do the students know the names of any bodies of water that are crossed by bridges?

AFTER SHOWING

Discussion Items and Questions

1. Is a dirt or gravel road good for car travel? Why or why not? What's better?
2. What's a highway engineer?
3. How do people build roads today?
4. Name some things that cause wear and tear on a road. What other things can suffer from wear and tear?
5. How is paving tested for a road?
6. What helps highway crews to check a road for rough areas?
7. How are bridges like sculptures?
8. Are bridges the only giant things people build? Name others.
9. What is the first thing that is built for a bridge?
10. What is steel? Why are girders on a bridge made of steel? Name some other things made of steel.
11. Do people begin building a bridge from one end or from both ends? Why?
12. Why does a bridge have to sway?
13. Do you like to travel by car? Where to?
14. What if there were no roads or bridges?



Applications and Activities

1. Super Triangle

You will need to prepare in advance by cutting out magazine pictures of things that have a triangular shape as part of their structure (e.g., crane, bike frame, roof of a house). Display the pictures on the blackboard. Draw triangles on the blackboard. Explain to students that the triangle is a very strong shape. It's used for building all kinds of things. Ask students to point out triangles in the magazine pictures.

2. Flexible Bridge

Distribute Meccano strips or cardboard strips with punched holes and brass fasteners to students. Demonstrate how pieces can be joined. Or distribute Lego pieces. Ask each student to build a bridge. Can they make several designs with the same strips or Lego pieces?

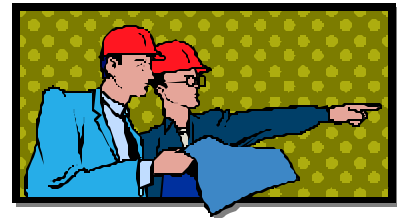
3. Road Engineer

Give each student a sheet of geopaper (paper with dots) or graph paper, a ruler, and a pencil. Ask students to design a map. Have them invent names for the streets. View the maps on an overhead projector and ask students to explain why they chose certain names for their streets.

4. Box Car

Each student will need:

- a large cardboard box with top (flaps cut off)
- paint, brushes, and/or markers
- four paper plates and two aluminum pie plates
- heavy string or cord
- paper fasteners, about 2 centimeters in length
- masking tape



Cut out a hole in the bottom of the box large enough to slip over a child's hips. For adults: Pierce four holes in the box with scissors at the point where wheels are to be attached. Pierce holes in the center of the paper plates. Give a box and six plates to each student. Have students paint their boxes. Let the boxes dry before students attach paper plates to sides of the boxes with paper fasteners. Have students cover pointed ends of fasteners with tape. Students then can secure the pie plates to the front of the cars to serve as headlights in a similar fashion. For adults: Pierce a hole with scissors in the center of each side of the car. Thread a string or cord through one hole, tying a double knot. Students can now step into their cars for measurement. Pull the string around the back of each child's neck, through the second hole, and tie a second knot.

5. Rules of the Road

Put tape on the floor or schoolyard to represent roadways. Have some students hold paper road signs (available at school or from the transport department) along the roadways. Delegate a traffic officer. Other students can drive their box cars, obeying the traffic rules. If they don't obey rules, the officer will give them a traffic ticket.

RELATED RESOURCES



Captioned Media Program

- Automobiles #3566
- Bill Nye the Science Guy: Human Transportation #3574
- The Development of Transportation (Third Edition) #2373

World Wide Web



The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and "kid-safe" sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- **DISCOVERY ONLINE BRIDGES**

<http://www.discovery.com/stories/technology/buildings/buildings.html>

An extensive collection of information and visuals for skyscrapers, bridges, and tunnels. Text, Webcams, video, and other exciting treatments. Related links along with a link to Discovery's "Greatest Engineering Feats of the Twentieth Century" feature.

- **SECRETS OF LOST EMPIRES**

<http://www.pbs.org/wgbh/nova/lostempires/>

This Web site is a companion for "Secrets of Lost Empires," a special five-part NOVA series where NOVA crews "attempt to ferret out long-forgotten secrets of early architects and engineers." Buttons include "Medieval Siege," "Pharaoh's Obelisk," "Easter Island," "The Roman Bath," and "China Bridge." A "Teacher Resources" link provides scripts to each program that airs and suggested activities.

- **BREAKING BRIDGES**

<http://www.lampstras.k12.pa.us/hschool/physics/bridge.html>

A very visual site about record making and record breaking in the bridge-building business. Movies and Hyperstudio stacks provide interesting and concise information for visitors.

- **NOVA SUPER BRIDGE BUILDING**

<http://www.pbs.org/wgbh/nova/bridge/>

After doing your research (homework) using the links at this site, plan and build your own bridge. Then play the Shockwave game provided by PBS.

- **THE ERIE CANAL: A BRIEF HISTORY**

<http://www.canals.state.ny.us/history/index.html>

Identified as an engineering marvel, the building of the Erie Canal can be uniquely compared to both roads and bridges in celebration of the "Marriage of the Waters."

STUDENT ACTIVITY SHEET

- Mystery Word, Find It, Draw It, and Read It

STUDENT ACTIVITY SHEET

1) MYSTERY WORD

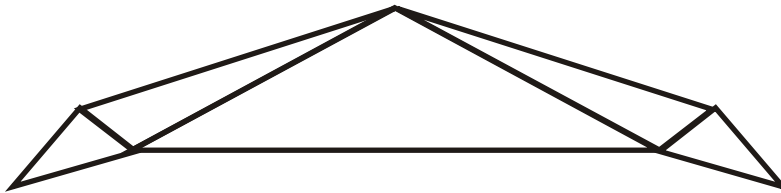
What machine cleans roads and bridges in winter? Circle the correct word in the box:

<i>truck</i>	<i>broom</i>	<i>snowplow</i>
<i>shovel</i>	<i>mop</i>	



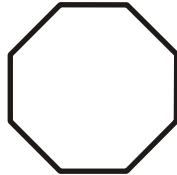
2) FIND IT

How many triangles are there in this bridge? Write the number in the box.



3) DRAW IT

Read the words below each shape. Draw the design of the road sign.



stop



one-way street



danger

4) READ IT

Read the story silently, and answer the questions below.

Mouse sat in her wagon. A cord was tied to it. Balloon pulled the cord. They zoomed down the road. Then they heard a siren. It was a police car. The police officer said, "You were going too fast. Here's a ticket."



Was Mouse driving a car? How was she traveling?

Who pulled the wagon?

What did Mouse hear? Demonstrate a siren, using your voice or hands.
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What did the officer give Mouse and Balloon? Why?

Why should people not drive fast on a road?
