Civilian Conservation Corps in Mississippi and Bridge Building

Objectives
Using the Clifford G. Worsham Scrapbook depicting the building of structures in Mississippi’s Tishomingo State Park by the Civilian Conservation Corps in 1939, students will learn about the Civilian Conservation Corps and their work in Mississippi. Students will also gain a basic knowledge of forces on a bridge and how to counteract them through proper design or engineering techniques.

This lesson is adaptable for grades 4–12.

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Civilian Conservation Corps in Mississippi and Bridge Building

Objective
Using the Clifford G. Worsham Scrapbook depicting the building of structures in Mississippi's Tishomingo State Park by the Civilian Conservation Corps in 1939, students will learn about the Civilian Conservation Corps and their work in Mississippi. Students will also gain a basic knowledge of the forces torque and stress on a bridge and how to counteract them through proper design or engineering techniques.

Materials:
Elementary
Civilian Conservation Corps in Mississippi handout, State of Mississippi Highway Map, Mississippi CCC Camps Elementary worksheet, What is a Bridge? worksheet, Forces handout, wooden rulers, popsicle sticks, 2 popsicle sticks glued together, licorice, pretzel sticks, scissors, and Making a Bridge.

Secondary
Civilian Conservation Corps in Mississippi handout, State of Mississippi Highway Map, Mississippi CCC Camps Secondary worksheet, What is a Bridge? worksheet, Finding Bridges of Mississippi, Building A Bridge instruction sheet, and Bridge Competition teacher instructions.

Procedures may be adaptable for several grade levels and specific subject matter:

Activity One: The Civilian Conservation Corps in Mississippi
1. Distribute and read the Civilian Conservation Corps in Mississippi handout.
2. In class - Have students plot the Mississippi CCC companies listed on the http://www.ccclegacy.org/CCC_Camps_Mississippi.html website on a highway map.
3. Distribute the grade level appropriate Worksheet, Mississippi CCC Camps, and have students work on the questions. You will need the key to the list located at the following link. http://www.ccclegacy.org/CCC_Camp_Lists.html
4. Discuss their answers.
   a. Was the CCC a program that the students think was beneficial to the people in Depression Era America?
   b. Would it be a valuable organization now?

Extension Activity
1. Research groups and/or organizations that are active in the present day United States that are based on the CCC.
2. Use the scans of the CCC Yearbook pages 15-22 to discuss conditions, jobs, supplies and other features of the camps. Also discuss the differences that might be observed based on the camp’s, “separate but equal,” idea that was practiced in the CCC.

Elementary
Activity Two: What is a Bridge?
1. Distribute the worksheet What is a Bridge.
2. Have students work through the worksheet.
Activity Three: Forces and Making a Bridge
1. Divide students into pairs.
2. Distribute wooden rulers, popsicle sticks, glued popsicle sticks, pretzel sticks, and licorice and Forces handout to the pairs.
3. Have the students follow the directions on the worksheet and answer the questions.
4. Discuss their findings as a class. (Answer to 4c revolves around bolts and rivets used to hold the bridge together. Over time they can be loosened and shear can cut the bolts)
5. Break the class into two groups.
6. Distribute the Make a Bridge help the students follow directions.
7. Discuss the activity with the class.

Secondary
Activity Two: Bridge Basics
1. Distribute the What is a Bridge? and Finding Bridges of Mississippi worksheet and handout.
2. Students will need internet access to research and finish the worksheet.
3. Discuss the students’ findings.
Extension Activity – Have students do research on historic bridges nearby. Have them identify those that are still in use, and those that have been replaced.

Activity Three: Building a Bridge
1. Divide students into pairs
2. Have students research the bridge they think would be the strongest or is the best design.
3. Handout the Building a Bridge instruction sheet.
4. Have the students present their bridges and what they think the strengths of their bridge are.

Extension Activity - Have students put the bridges they built to the test. Follow the Bridge Competition–Teachers Instructions included in this packet.
Civilian Conservation Corps in Mississippi

During America’s Great Depression in the 1930’s President Franklin D. Roosevelt, developed government programs that would employ many out of work and poor young men. He called the programs “A New Deal For America”. The Emergency Conservation Work (EWC) Act, also known as the Civilian Conservation Corps (CCC), passed in 1933 was one of the New Deal programs.

Its aim was to employ young men as a peacetime army to work on soil conservation, forestry, and parks projects across the United States. Young men of various backgrounds from all over the U.S. joined the CCC to work in camps, earn a living, and learn new skills. Finally in 1937 Congress saw the value of the CCC and supported and developed it more.

The CCC was an experiment for America. The members were considered an army and received military training and were formed into companies. The U.S. was divided into Corps Areas and in each area there were regions and then districts. Mississippi and Alabama were part of Army Corps Area IV, Region 8 District D. The U. S. Army and Army Corp of Engineers were the commanders of the camps and companies and ran the day-to-day operations. In 1937 Camp Educational Advisors (CEA) as well as Local Employed Men (LEM) were added to the camps.

The CCC was started to give jobs to young men for 6-month enlistments, with the option to re-enlist. Requirements for enrolling in the CCC were simple. Applicants had to be unmarried men between the ages of 18 and 26, physically fit, and U.S. citizens. These rules were relaxed later when armed forces veterans were finally allowed to join the program. These basic rules were not always applied fairly to all enrollees. African Americans and Native Americans who applied were not always chosen despite being a large part of the population who needed jobs and money. This discrimination was widespread, but it was more noticeable in Corps areas IV, VIII, and IX where there complaints of African Americans and other races were working side by side with whites in camps were voiced. Even though the 1933 act that created the CCC specifically said “no discrimination shall be made on account of race, color and creed,” In 1935 CCC Director Robert Fechner issued an order for the “complete segregation of colored and white enrollees.” After Fechner’s order, separate camps and companies were established for whites, African Americans, and Native Americans. When the CCC was disbanded in 1943, of the more than 3 million men enrolled only 250,000 were African American and 80,000 were Native Americans.

For their work the men were paid $30 a month, but they were only allowed to keep $5 as it was mandatory to send the remaining $25 home to help support their families. The jobs were assigned according to the purpose of their companies. Companies labeled SCS worked on soil conservation projects including planting trees and other vegetation, forestry or National Forest project such as planting seedlings, fighting forest fires, building roads and bridges, erecting fences and, fire towers, and installing telephone lines. Soil conservation and forestry projects in Mississippi
were related to the state's timber boom and potential loss of topsoil. Other companies with the designation of SP helped build state parks in Mississippi. You can still see their work today at Tishomingo, Roosevelt State Parks, and others where cabins, bridges, lakes and other buildings are still in use. Companies were also placed in the Vicksburg National Military Park to work on the park grounds.

Camps were established to house the men who lived in tents while they build the barracks, recreation hall, administration building, and other buildings on the site. The men were treated like soldiers, and stayed in camp until they were given leave. They relied on the camp for their food and livelihood. Camps taught reading, writing, and first aid as well as running heavy equipment, woodworking building furniture and more. In 1937 District D reported that over 2,000 men had learned to read and write and 800 men were taking first aid lessons. One man who was in Company 3494 was illiterate and by the time he was discharged he could read at 5th grade level. The CCC also provided movie nights and a traveling library the men used when they weren’t working.

The men in the CCC companies came from different backgrounds to work together and learn new skills. Local Employed Men (LEM) taught CCC men different skills. Specialized engineers and architects, both private and from the Army Corps of Engineers, worked with the CCC commanders to plan projects such as dam and bridge building. The National Park Service approved plans for the parks as well. There wasn't much money to buy supplies for the projects so they had to work with what the land provided, and what they could scrounge for supplies from around the camps. The 1937 District D Yearbook list several facts and accomplishments for that year.

- The average camp day cost for the first half of 1937 was $28.52, for the last half it was $23.90 – a reduction of 16.2%.
- It would take one man working every day including Sundays 1,834 years to do the work in soil conservation that was done by the CCC men in the district in 1936.
- Education is considered vital in District D and several special training centers were established to which hard working men can be transferred for specialization. The schools were a commercial school; a wood working school and a hog culture school.
- Company 3403 in Burns, Mississippi, fought 47 fires and answered 99 false alarms in March of 1936.
- Company 486, Potts Camp, Mississippi, planted 40,000 trees in one day.
- Company 3496, Coffeeville, Mississippi trained 16 tractor drivers and 40 truck drivers. 104 members of this company are at high school level.
Frank Kimbrell, a former member of Company 3490 is now the owner and manager of station WGRN, “The Voice of North Mississippi” in Grenada, Miss, and he is successful because of the training he got in the CCC.

The average CCC company will use 3,833 pounds of bread, 1,238 pounds of beef, and 640 dozen eggs in a month.”

On December 7, 1941 the Japanese attack on Pearl Harbor in Hawaii brought the United States into World War II. The Army Corps of Engineers were pulled to prepare and fight a war overseas. Government money and materials were diverted to the war resulting in cut-backs in the CCC. Seven months after the attack, Congress voted to no longer fund the CCC. The CCC was disbanded, but not abolished, and the men who had worked there were sent home. Many of the men who had been a part of the CCC later joined the war.

The CCC was one of many New Deal programs designed to help the nation recover from its greatest financial and environmental crises. Along with the CCC, other New Deal programs including the Tennessee Valley Authority, the Rural Electrification Administration, the Works Progress Administration, and the Farm Security Administration played a role in Mississippi. The CCC leaves a lasting visual presence where the men worked. You can see it in state parks, National Parks and National Forests. The CCC men learned new skills and were proud of their work. The program also provided an income for these young men and their families at a time when work was scarce. You can look at programs like today’s AmeriCorps started by President Kennedy in the 1960’s and others that are modeled on this New Deal program.
Name: _____________________________________________________________  Date: ________________

**Mississippi CCC Camps Elementary**
Use the online Worsham Photograph Album at the following link: http://mdah.state.ms.us/arrec/digital_archives/series/worsham. Also, the CCC Legacy Camp list and key http://www.ccclegacy.org/CCC_Camp_Lists.html, plotted highway map, and Civilian Conservation Corps in Mississippi to finish this worksheet

1. How many CCC Companies did Mississippi have from 1933-1942? _________________________________

2. What were the requirements for being enlisted in the CCC? _________________________________

3. What kind of training did they receive as a part of the CCC? _________________________________

4. What kinds of housing did the CCC workers have? _________________________________

5. Who planned the projects the CCC workers worked on? _________________________________

6. What CCC projects are the workers working on in the Worsham Photograph album? _________________________________

7. According to Clifford Worsham, how much money was used to complete the projects at Tishomingo State Park? _________________________________

8. Where does Worsham say they got the supplies for the projects? _________________________________

9. What are three of the types of classifications of CCC companies we had in Mississippi?

___________________________       ___________________________       _____________________________
10. Who ordered the segregations of the CCC companies? __________________________________________

11. Was the CCC segregated across the country or only in Corps Area IV? Why? ______________________
____________________________________________________________________________________
____________________________________________________________________________________

12. What types of projects did the CCC work on in Mississippi? ________________________________
____________________________________________________________________________________
____________________________________________________________________________________

13. There was a major timber boom at the turn of the century across Mississippi, especially in the Piney Woods
region. Look at the companies you have put on the highway map. How might this explain the concentration
of CCC camps in Mississippi and the projects that they were working on?
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

14. Identify the Mississippi State Parks that were worked on by the CCC.
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

15. What does MP mean and what location would they have been working on? ______________________
____________________________________________________________________________________

16. How do you think that the CCC program helped the men involved in it? ________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

17. When and why was the CCC disbanded? ___________________________________________________
____________________________________________________________________________________
Name _________________________________________  Date ______________

**Mississippi CCC Camps Secondary**

Use the online Worsham Photograph Album at the following link: [http://mdah.state.ms.us/arrec/digital_archives/series/worsham](http://mdah.state.ms.us/arrec/digital_archives/series/worsham). Also, the CCC Legacy Camp list and key, plotted highway map, and Civilian Conservation Corps in Mississippi to finish this worksheet.

1. How many CCC Companies did Mississippi have from 1933-1942? ______________________________

2. What were the requirements for being enlisted in the CCC? Why were requirements placed on enlistees?
   ______________________________________________________________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________

3. The education opportunities offered through the CCC were extensive why were they necessary? __________
   ______________________________________________________________________________________
   ______________________________________________________________________________________

4. What role did the U.S. Army play in the CCC? Why do you think this was? _________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________

5. Why were there educators and skilled that the workers at Tishomingo State Park had that helped with the projects they were working on? ________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________

6. What CCC projects are depicted in the Worsham Photograph album and what funds did they have to complete them? ________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________
7. What three types of CCC companies did we have in Mississippi?
   ___________________________        _________________________        ___________________________

8. Who ordered the segregation of CCC companies? __________________________

9. Was the CCC segregated across the country or only in Region 8? Why? __________________________
   ___________________________________________________________________________________

10. What types of projects did the CCC work on in Mississippi? __________________________
    ___________________________________________________________________________________

11. Note the concentration of CCC camps in Mississippi and the projects that they worked on. Do you think
    you might be able to identify the reason that the CCC needed to do those works in those areas?
    ___________________________________________________________________________________
    ___________________________________________________________________________________
    ___________________________________________________________________________________
    ___________________________________________________________________________________

12. Identify the Mississippi State Parks that were worked on by the CCC.
    ___________________________________________________________________________________
    ___________________________________________________________________________________

13. Why were they required to send home a portion of their pay? Do you think that the money made a
difference at home? __________________________
    ___________________________________________________________________________________

19. How do you think that the CCC program helped the men involved in it? __________________________
    ___________________________________________________________________________________
    ___________________________________________________________________________________

21. When and why was the CCC disbanded? __________________________
    ___________________________________________________________________________________
Mississippi CCC Camps Elementary

Use the online Worsham Photograph Album at the following link: http://mdah.state.ms.us/arrec/digital_archives/series/worsham. Also, the CCC Legacy Camp list and key, plotted highway map, and Civilian Conservation Corps in Mississippi to finish this worksheet.

1. How many CCC Companies did Mississippi have from 1933-1942? 105 companies

2. What were the requirements for being enlisted in the CCC? Between the ages of 18-26, physically fit, and unmarried.

3. What kind of training did they receive as a part of the CCC? Trained by the Army as a peacetime army.

4. What kinds of housing did the CCC workers have? They would live in tents until they were able to build themselves barracks.

5. Who planned the projects the CCC workers worked on? Specialized engineers and architects.

   CCC Commanders and the National Park Service

6. What CCC projects are the workers working on in the Worsham Photograph album? Tishomingo State Park works. Building a pool, damming a creek for a lake, building a bridge, a baseball field, parking lots.

7. According to Clifford Worsham, how much money did the workers have to complete the projects at Tishomingo State Park? $238 and scavenged and donated materials.

8. Where does Worsham say they got the supplies for the projects? Quarried the stone, cable from a dam project at Pickwick Landing, borrowed bulldozer, dismantled old CCC barracks for lumber, timbers were cut from the camp site.

9. What three types of CCC companies did we have in Mississippi? Forestry, Military Park, Soil Conservation, State Parks, Private Forests, Army Soil Conservation.
10. Who ordered segregated the CCC companies? **CCC Director Robert Fechner**

11. Was the CCC segregated across the country or only in Corps Area IV? Why? **The CCC was ordered segregated across the country. Corps Area IV was one of the more vocal areas along with Areas VIII, and IX.**

12. What types of projects did the CCC work on in Mississippi? **Planting trees and other plants, terracing grounds to prevent soil erosion, building structures, bridges, roads, telephone lines, fences, parks.**

13. There was a major timber boom at the turn of the century across Mississippi, especially in the Piney Woods region. Look at the companies you have put on the highway map. How might this explain the concentration of CCC camps in Mississippi and the projects that they were working on? **The timber boom was a quick harvesting of timber from the pine forests around Mississippi. The quick harvesting of the trees left the land with no natural protection against soil erosion. The CCC workers were tasked with planting trees and other vegetation to stop the erosion of the soil.**

14. Identify the Mississippi State Parks that were worked on by the CCC. **Clarkco, Holmes County, Leroy Percy, Percy Quin, Roosevelt, Shepard, Tishomingo, Tombigbee, and Wall Doxey State Parks.**

15. What does MP mean and what location would they have been working on? **Military Park.** **Vicksburg Military Park.**

16. How do you think that the CCC program helped the men involved in it? **World War II began in December 1941 and the monies and manpower had to redirected to the war effort.**
Mississippi CCC Camps *Secondary*

Use the online Worsham Photograph Album at the following link: [http://mdah.state.ms.us/arrec/digital_archives/series/worsham](http://mdah.state.ms.us/arrec/digital_archives/series/worsham). Also, the CCC Legacy Camp list and key, plotted highway map, and Civilian Conservation Corps in Mississippi to finish this worksheet.

1. How many CCC Companies did Mississippi have from 1933-1942? _________________________________  **105 companies**

2. What were the requirements for being enlisted in the CCC? Why were requirements placed on enlistees?

   *Between the ages of 18-26, physically fit, and unmarried. Later relaxed for veterans.*

3. The education opportunities offered through the CCC were extensive. Why were they necessary? __________

   *A high number of them were illiterate.*

4. What role did the U.S. Army play in the CCC? Why do you think this was? ____________________________

   *The National Park Service controlled the camp and projects and the U.S. Army trained and controlled the men of the camps.*

5. Why were there educated and skilled that the workers at Tishomingo State Park had that helped with the projects they were working on? ________________________________

6. What CCC projects are depicted in the Worsham Photograph album and how much money was budgeted to complete them? **Tishomingo State Park works. Building a pool, damming a creek for a lake, building a bridge, a baseball field, parking lots. Quarryed the stone, cable from a dam project at Pickwick Landing, dismantled old CCC barracks, cut timber for lumber. $238 and scavenged and donated materials.**
7. What three types of CCC companies did we have in Mississippi?  

**Forestry, Military Park, Soil Conservation, State Parks, Private Forests, Army Soil Conservation, National Parks**

8. Who ordered the segregation of CCC companies?  

**CCC Director Robert Fechner**

9. Was the CCC segregated across the country or only in Region 8? Why?  

**The CCC was ordered segregated across the country. Corps Area IV was one of the more vocal areas along with Areas VIII & IX. IX.**

10. What types of projects did the CCC work on in Mississippi?  

**Soil conservation, planting trees, fighting fires, building bridges, building park structures, roads, and erecting telephone lines and fences.**

11. Note the concentration of CCC camps in Mississippi and the projects that they worked on. Do you think you might be able to identify the reason that the CCC needed to do those works in those areas? What are today’s approach to this reason?  

**The timber boom was a quick harvesting of timber from the pine forests around Mississippi left the land with no natural protection against soil erosion.**

12. Identify some Mississippi State Parks that were worked on by the CCC.  

**Clarkco, Holmes County, Leroy Percy, Percy Quin, Roosevelt, Shepard, Tishomingo, Tombigbee, and Wall Doxey State Parks.**

13. Why were they required to send home a portion of their pay? Do you think that the money made a difference at home?  

14. How do you think that the CCC program helped the men involved in it?  

15. When and why was the CCC disbanded?  

**World War II began in December 1941 and the monies and manpower had to be redirected to the war effort.**
1. The Using Service:

3. The Army Overhead.


2. C. B. Annis, Project Supt.

5. Denard Green, Senior Leader.

CAMP CHARACTERS

Thomas C. Cleveland
Most Popular

Woodrow M. Rogers
Most Polite

Thomas B. Kelso
Nearst

Bryan Harris
Best Athlete

Howard C. Hopeley
Biggest Shark

Winston Simpson
Biggest Chowhound

John W. Brooks
Biggest Goldbruck

Frank Backlund, Jr.
Biggest Grouch

2403RD COMPANY
1. A running-in machine.
2. Enrollees loading on trucks to go to work.
3. Unloading from trucks at camp.
4. A literary class.
5. The cools and K. P.'s.
6. Enrollees constructing a fence.
7. The work shop.
8. A class in first aid.
9. Tree planting.
10. The fire tower.

BURNS, MISSISSIPPI
Members

Reading, left to right—


2403rd
COMPANY
9-15
BURNS, MISSISSIPPI

COMPANY 2403 fought forty-seven fires, and answered 99 false alarms in one month—March, 1936. During that year they fought 284 fires. But since April 17, 1937, to December, the company has not fought a single fire nor answered a false alarm. Is this
not a record? Is there any other U. S. forest camp in Mississippi that has had similar experiences?

The company won the district Rangers’ award for the best control of fire in the Bienville National Forest in 1937. A total of 219 days elapsed between the last fire and the one preceding it in the protective area of the camp. This is believed to be an all-time record.

The company is at work on a forestry project. Twenty-two miles of gravel road have been completed, and six more miles are under construction. Twenty-three miles of woven wire fence have been erected. Two thousand acres of waste lands have been put into production and 5,000 additional acres are receiving attention during the 1937-38 planting season. The men have built fifteen bridges with a total of twenty-two spans, installed forty-eight miles of telephone lines, and added three complete fire towers.

While they think of themselves as among the best fire fighters in the country, they take off their hats to an ex-enrollee of the company who, at the risk of losing his own life, rescued infant negro triplets from a burning building. His name is W. E. Hawkins.

The company has much to be proud of besides its work program. It has a driver, Bartow Whitcomb by name, who has driven his truck more than 120,000 miles without an accident; it has fourteen men who have been trained as heavy duty machinery operators; it has a mess said to be one of the best in the district; and it has “Contact” men, chief among whom are Jennings Coker, Nelson Brand, Charles West, Clyde James and Jack.
1. The Using Service:


3. The Army Overhead:
First row: Byrd, Bowle, Perkins, James, Israel, Craig.
Second row: Singleton, Burnett, Bunn, Wright, Cockrell, Stuart, Elkin, Cockrell.

4. The Technical Overhead:
First row: Williams, Harper, Adkins, Kincaid.
Second row: Stuart, Williams, Powers, Monday, Davis.

CAMP CHARACTERS

4425TH COMPANY
1. Building truck trail.
2. The glee club.
3. First aid class.
4. Camp reading room.

5. The baseball team.
6. Riprappel filling with rocks.
7. Cooks and K. P.’s, left to right:
   First row: Lee, Craig, McNair, Cook, Elgin, Cockrell.

8. Camp orchestra.
9. Leveling fill.

MERIDIAN, MISSISSIPPI
Members

Reading, left to right—


4425th COMPANY P-76
MERIDIAN, MISSISSIPPI

COMPANY 4425 at Meridian, Mississippi, has the largest average attendance at Sunday school of any company in the district. It boasts an average of 125. Another of its claims to fame rests upon its record of having taught seventy-five men to read and write. It
is developing men who are not afraid to appear in public. Colonel Adolphus Burnette, an enrollee, appeared as speaker before the Young Men's Business Club of Meridian, colored; Hilliard Holland, John R. Ellis, and A. C. Holmes were on a program at the Meridian Baptist Seminary, and the quartette which is composed of Zebedee Perry, Floyd Harper, Irvin Cherry and Wilber G. Harper, gave a concert at the First Congregational Church in Meridian. The glee club and the quartette have been heard in radio throughout Alabama.

Events which brought Tommy J. Wright and Franklin Bates into the limelight, and gave them an opportunity to demonstrate their knowledge of life saving, were the rescuing of two brother enrollees, Willie Stamps and Franklin Cousin. Both of these young men were seized with cramps while in swimming, and had it not been for the quick thinking, and the knowledge of life saving which Wright and Bates had, they would have both drowned.

The personnel of the camp today is varied. Some of the men are from large and middle sized cities. Some come from country towns and villages, and some from the wide open spaces. Their talents are as varied as the places from which they come, but the educational program has been developed to meet their needs. In the group are musicians, teachers, singers, farmers and workers in many trades, but it is said by those who visit the camp that the camp life is as harmonious as if the men were all of one age, one class, or one calling.

The camp is now in its second location, having moved from Belzoni, Mississippi, on May 15, 1937. The location was as uninviting as one could be—a large field of black loam, cotton stalks and grass, inhabited by mosquitoes. But the zest with which the men fell to on the job of constructing permanent quarters was a good sample of the kind of work they would do out in the field, when they got started on their new project. A recent work accomplishment is the completion of forty miles of telephone lines.

Members

Reading, left to right—


Members Not in Picture


That the men are taking advantage of their opportunities to learn while on the job is shown by the fact that nine specialists have been trained in the use of heavy machinery, forty men are qualified first aiders, two are qualified life savers and ten good cooks have

(Continued on page 216)
What is a Bridge?

We are going to focus on the pieces of a bridge and the four basic bridge designs.

**Pieces of a Bridge**

**Vocabulary**

**Abutment** - A retaining wall supporting the ends of a bridge or viaduct.

**Beam** - A horizontal structure member supporting vertical loads by resisting bending. A girder is a larger beam, especially when made of multiple plates. Deeper, longer members are created by using trusses.

**Deck** – The roadway portion of a bridge, including shoulders. Most bridge decks are constructed as reinforced concrete slabs, but timber decks are still seen in rural areas and open-grid steel decks are used in some movable bridge designs.

**Cable** - Part of a suspension bridge extending from an anchorage over the tops of the towers and down to the opposite anchorage. Suspenders or hangers are attached along its length to support the deck.

**Column** - A vertical, structural element, strong in compression.

**Load** - Weight distribution throughout a structure; loads caused by wind, earthquakes and gravity affect how weight is distributed throughout a structure.

**Pier** - A vertical structure that supports the ends of a multi-span superstructure at a location between abutments. Also see column.

**Span** - The horizontal space between two supports of a structure. Also refers to the structure itself. May be used as a noun or a verb.

- The clear span is the space between the inside surfaces of piers or other vertical supports.
- The effective span is the distance between the centers of two supports.

**Suspender** - Tension members of a suspension bridge which hang from the main cable to support the deck. Also similar tension members of an arch bridge which features a suspended deck. Also called hangers.

**Truss Travel Systems** – Placement of the deck for travel on the structure of a truss bridge

- **Deck** – Travel system where the deck is on top of the bridge structure
- **Pony** - Travel system where traffic travels under the bridge structure.
- **Through** - Travel system where traffic travels through the middle of the bridge structure.

**Types of Bridges**

- Beam
- Arch
- Truss
- Suspension
- Cantilever
- Cable-stayed
**Arch**
- Arch bridges use compression forces to transfer the load to the abutments.
- A series smaller arches will disperse the load among smaller arches and the abutments.

**Beam**
- Beam bridges are built with horizontal beams set on vertical supports.
- If the beams crossing a span are too long, they might not be able to support the weight.
- The longer the spans are the more supports are required.

**Truss**
- Truss's vertical and diagonal struts to carry shear.
- Compression and tension work together to carry the load.
- Truss Bridges have three travel systems: Deck – on the top of the truss, Through – through the middle of the truss system, and Pony – travel system that in the base of the truss system.
- There are several different truss styles which are used for varying spans.

**Suspension**
- Suspension bridges use a combination of tension and compression.
- Cables can only carry tension loads.
- Suspension bridges are light allowing them to cross very long distances.
- The deck is suspended by the cable systems that is supported by towers in the middle span, and backstays on land.
- Because suspensions bridges are so lightweight, measures have to be taken to avoid high winds to effect them. The Tacoma Narrows Bridge collapse in 1947 is a prime example.
Finding Mississippi Bridges

*Search online to find a Mississippi example of each bridge style and follow the directions for each bridge. Print an image of the bridge and glue it into the box for each bridge. Notate the source of each of your images on the back of the worksheet.*

1. **Arch Bridge**
   a. Location: _____________________________
   b. Road/Highway a part of: ________________
   c. Date of construction: ____________________
   d. Length of span: __________________________
   e. Why do you think this bridge was chosen for this span:
      ____________________________________________________________________________________

2. **Beam Bridge**
   a. Location: _____________________________
   b. Road/Highway a part of: ________________
   c. Date of construction: ____________________
   d. Length of span: __________________________
   e. Why do you think this bridge was chosen for this span:
      ____________________________________________________________________________________

3. **Truss Bridge**
   a. Location: _____________________________
   b. Road/Highway a part of: ________________
   c. Date of construction: ____________________
   d. Length of span: __________________________
   e. What type of truss is this? __________________
   f. Why do you think this bridge was chosen for this span:
      ____________________________________________________________________________________

4. **Suspension Bridge**
   a. Location: _____________________________
   b. Road/Highway a part of: ________________
   c. Date of construction: ____________________
   d. Length of span: __________________________
   e. Why do you think this bridge was chosen for this span:
      ____________________________________________________________________________________
Forces

Follow the instructions below. Write down your observations about the forces exerted on the various materials given to you.

**Force:** fôrs/noun - strength or energy as an attribute of physical action or movement. “The force of the winds pushed the tent over.”

When designing and building bridges and other structures, architects and engineers must take into account the various forces that will be applied to the structure. Bridges for example, have several forces that must be taken into account. Below we are going to talk about the four main forces that effect a bridge and its design.

1. **Compression**
   a. Take the wooden ruler. Hold each end of the ruler between the palms of your hands, and push your hands together. What happens?

   ______________________________________________________
   ______________________________________________________

   b. Take the shorter popsicle stick. Hold each end of stick between the palms of your hands, and push your hands together. What happens?

   ______________________________________________________
   ______________________________________________________

   c. What other words would you use to describe this force? ______________________________________

2. **Tension**
   a. Take the piece of licorice. Grab each end of the licorice, and pull your hands apart. What happens?

   ______________________________________________________

   b. Try this with the popsicle stick apart, is it easy? Why? ______________________________________

   ______________________________________________________

   c. Try this with 2 popsicles sticks that have been glued together. What are your results? ________________

   ______________________________________________________

   d. What other words would you use to describe this force? ___________________________

   ______________________________________________________
3. **Torsion**
   a. Take a piece of licorice. Grab each end of the licorice, and twist them in opposite directions several times. What happens? ____________________________________________
   _______________________________________________________________________

   b. Repeat this with the following materials and observe, record what happens and hypothesize about the outcome of the force on each.
      *Popsicle stick* __________________________________________________________
      _______________________________________________________________________
      *Pencil* __________________________________________________________________
      _______________________________________________________________________
      *Pretzel Stick* ____________________________________________________________
      _______________________________________________________________________
      *2 glued popsicle sticks* ________________________________________________
      _______________________________________________________________________

   c. What other words would you use to describe this force? _________________
      _______________________________________________________________________

4. **Shear**
   a. Take a popsicle stick and cut it with the scissors, describe the outcome.
      _______________________________________________________________________

   b. What other words would you use to describe this force?
      _______________________________________________________________________
      _______________________________________________________________________

   c. What parts of a bridge might be effected by this force and what would the outcome be?
      _______________________________________________________________________
      _______________________________________________________________________

5. **Investigate** resonance and vibrations and discuss the effect they have on the four major forces and what damage they could cause to a bridge.
Making a Bridge
*Follow the instructions below. Write down your observations about the forces exerted on the various materials given or found in your classroom.*

1. Make a beam bridge out of the materials you have in your classroom.

2. Set a toy car on the “bridge,” have students make observations and identify the forces that are being enacted by the car.

3. Work together to find something in the classroom that will create the right forces to support the toy car. *(Look at some of the other bridge styles to get ideas on how you might support the bridge.)*

4. Change variables by increasing the number of cars and see what other materials can be used to support the bridge.

5. Disrupt the bridge by taking one “pier” and start pushing up and down on side long of the deck. Which force is this displaying?

6. Add something to the bridge to counteract the forces you just enacted on it.

7. Label the pieces of the bridge and the pieces they have added and what forces they represent or counteract.
Building a Bridge

Follow the instructions on the worksheet below to design and create a bridge that will have to cross a gap or span of 12”.

1. Research the best and strongest bridge design.

2. Develop your own design. While designing your bridge make sure to take into consideration the following factor.
   a. How are your forces distributed in this design?

   b. Where will you need more support?

   c. How to counteract any negative forces your bridge might encounter?

   d. Any other features that you might be able to design to limit the negative forces on your bridge.

   e. How heavy is your bridge? Is it too heavy?

   f. Have you planned in 3D? How will you securely connect the bridge sides to make them one sturdy piece?

3. Once you have completed the design/sketch of your bridge make a copy and outline it with a dark marker.

4. Use toothpicks and white glue to create the bridge. The sides of the bridge.
   a. Lay a piece of wax paper over a dark outline of the design.

   b. Glue the pieces together on the wax paper to make the structure.

   c. Repeat for the other side of the bridge.

5. When the bridge sides are done, connect them to form a bridge.

Talk to your teachers. If you are going to have a bridge competition you will need to build a platform set the testing bar on.
Bridge Competition – Teacher Instructions

1. If you would like to make a competition out of it set some limits at the beginning. Some suggestions are:
   a. Set a standard Length for the entire class - Strict 12” span to cross
   b. Only allow a certain weight of toothpicks per bridge (80 grams)
   c. Each bridge must have a flat deck in the middle or on the top (wherever the “traffic” is supposed to cross.)

2. When bridges are complete, have students vote on which bridge they think will be the strongest and why.

3. Make a 12” stable gap for the bridge to cross.

4. Get a testing bar with holes in each end, a chain, and a five gallon bucket, with some weights.

5. Set the bar on the flat platform and hook up the bucket.

6. Add weight little, by little until the bridge breaks.

7. Weigh the bucket (pre-weigh the bucket) and subtract the weight of the bucket from the total.

8. Record the total weight that each bridge held.

9. Examine the winner’s designs and discuss the features of them that made them last longer.
Vocabulary

accomplishment – noun - something done, achieved, or accomplished successfully

architect - ar·chi·tect - a person who designs buildings

boom - verb  to experience a sudden rapid growth and expansion usually with an increase in prices

barracks - noun - a building or set of buildings used especially for lodging soldiers in garrison

civilian - noun - a person who is not a member of the military or of a police or firefighting force

commercial - adjective - emphasizing skills and subjects useful in business

conservation - noun - a careful preservation and protection of something; especially : planned management of a natural resource to prevent exploitation, destruction, or neglect

corps - noun - a tactical unit usually consisting of two or more divisions and auxiliary arms and services

creed - noun - a set of fundamental beliefs; also : a guiding principle

crisis - noun - an unstable or crucial time or state of affairs in which a decisive change is impending; especially : one with the distinct possibility of a highly undesirable outcome

disband - verb - to break up the organization of : dissolve

discharge - verb - to end the service of (someone) in a formal or official way : to release (someone) from duty

discrimination - noun - the practice of unfairly treating a person or group of people differently from other people or groups of people

divert - verb - to take the attention of (someone) away from something or someone

employ - verb - to use or engage the services of or to provide with a job that pays wages or a salary

engineer - noun - a person who has scientific training and who designs and builds complicated products, machines, systems, or

environment - noun - the conditions that surround someone or something : the conditions and influences that affect the growth, health, progress, etc., of someone or something

experiment - noun - something that is done as a test : something that you do to see how well or how badly it works

financial - adjective - relating to money

install - transitive verb - to make (a machine, a service, etc.) ready to be used in a certain place

illiterate - adjective - not knowing how to read or write

mandatory - adjective - required by a law or rule

segregation - noun - the separation or isolation of a race, class, or ethnic group by enforced or voluntary residence in a restricted area, by barriers to social intercourse, by separate educational facilities, or by other discriminatory means
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Worsham (Cliford G.) Photograph Album PI/1997.0003 Mississippi Department of Archives and History, April 18, 2014 http://mdah.state.ms.us/arrec/digital_archives/series/worsham

Other Lessons on Bridge Building


Lewis, Joe “Building Model Bridges Following the Engineering Process,” Yale-New Haven Teachers Institute, April 18, 2014 http://www.yale.edu/ynhti/curriculum/units/2001/5/01.05.04.x.html

MISSISSIPPI DEPARTMENT OF HISTORY LESSON PLANS
TEACHER EVALUATION
COMPLETE BOTH SIDES AND PLEASE MAIL OR FAX TO THE ADDRESS ON THE NEXT PAGE. THANK YOU!

TEACHER NAME

SCHOOL NAME & ADDRESS

EMAIL (OPTIONAL)

TOTAL NUMBER OF STUDENTS___________ GRADE LEVEL ______________________________

LESSON TITLE

1. In your opinion, did this unit elicit better than average student response; if so, how?

2. Which segments of the unit exceeded your students’ attention span?

3. Will this unit be of assistance to you in developing future classroom activities; if so, how?

4. How did this unit add to your earlier teaching on the same subject?

5. Would this teaching unit be handier to use as a:
   ___multi-day unit   ___multi-week unit   ___other

6. Were the activities and lessons appropriate for your students? How?
Please rate the following lesson materials and activities by circling the appropriate number.

4 = excellent, 3 = good, 2 = average, 1 = inadequate

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Activity One        4 3 2 1
Activity Two         4 3 2 1 N/A
Elementary Activity Three 4 3 2 1 N/A
Elementary Activity Four 4 3 2 1 N/A
Secondary Activity Three 4 3 2 1 N/A
Secondary Activity Four 4 3 2 1 N/A
Extension Activities 4 3 2 1 N/A
Overall Lesson        4 3 2 1

We would appreciate any additional comments on this teaching unit and any suggestions for improvement. Comments may be entered in the space below.