Student Name: _____
Date: _____

An interactive look at the structure, material, and design of bridges

Student Name: _____
Date: _____

Activity Sheet 1:
Types of Bridges

Directions: For this activity you will be researching bridge types through an interactive website. Open the following webpage:
http://www.pbs.org/wgbh/buildingbig/bridge/index.html

Click on the "Bridge Basics" and look over each bridge type to learn more about them. Use the charts below to define the bridge, list some advantages and disadvantages, and find an example of this type of bridge.

Beam Bridge

Definition:	
Advantage(s)	Disadvantage(s)
Example	

Student Name: _____
Date: _____

Truss Bridge

Definition:	
Advantage(s)	Disadvantage(s)
Example	

Arch Bridge

Definition:	
Advantage(s)	Disadvantage(s)
Example	

Student Name: _____
Date: _____

Suspension Bridge

Definition:	
Advantage(s)	Disadvantage(s)
Example	

Cable-Stayed Bridge

Definition:	
Advantage(s)	Disadvantage(s)
Example	

Student Name: _____
Date: _____

***Now* you are ready to take the test. Do step three – Play the game. Place your answers below.**

Site 1: A 5,000-foot span across an ocean bay where huge ships come and go. Which kind of bridge would be most suitable for this location?

Site 2: A 120-foot span across a freeway. Which kind of bridge would be most suitable for this location?

Site 3: A 1,000-foot span across a river busy with barge traffic. Which kind of bridge would be most suitable for this location?

Site 4: A 700-foot span across a deep canyon gorge. Which kind of bridge would be most suitable for this location?

Student Name: _____
Date: _____

Activity Sheet 2:
Making Bridges Stronger – Trusses

Trusses – rigid framework designed to support a structure.

Directions – Take four popsicle sticks that are all attached and make a square. Apply a force to the square and notice what happens. Add more popsicle sticks until the truss is stable. Now do the same for a pentagon and a heptagon truss. Answer the following questions below.

What shape truss pattern is the most stable?

Triangle **Square** **Pentagon**

How many extra supports does it take to make a square truss stable?

_____

How many extra supports does it take to make a pentagon truss stable?

_____

How many extra supports does it take to make a heptagon truss stable?

_____

Student Name: _____
Date: _____

Activity Sheet 3:
Forces on Bridges

Directions – Now that you have learned about the different types of bridges and have thought about the forces that could be acting on the bridges you will now learn about how these forces are applied to the bridges. Go to the following website:
http://www.pbs.org/wgbh/buildingbig/bridge/index.html

On this website you will find a link to "Bridge Basics." This link will take you through each bridge and demonstrate how the forces act on each type of bridge. Below diagram these forces and give a brief written description of the forces.

Beam Bridges

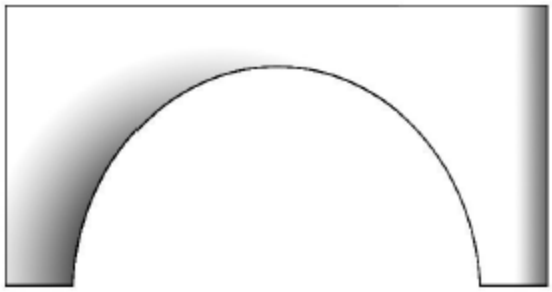
Forces	Written Description
	

Truss Bridges

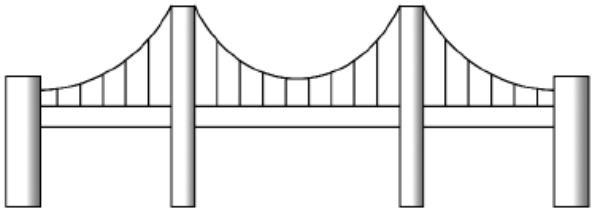
Forces	Written Description
	

Student Name: _____
Date: _____

Arch Bridges

Forces	Written Description
	

Suspension Bridges

Forces	Written Description
	

Now, if time is allowed, you can add the information that you learned yesterday with the information you learned today and take the “Bridge Challenge.” The challenge is located at the bottom of the “Bridge Basics” page.

Student Name: _____
Date: _____

Activity Sheet 4:
Types of Materials

Directions – For this activity students will work in teams with their partners to determine which material will be best for their bridge. Data will be collected and recorded below for the 3 materials provided. If you have materials to use, students can try those as well.

Material 1: _____

Mass: _____

Area: _____

Max. Force withstood: _____

Approximate distance moved: _____

Other observations:

Material 2: _____

Mass: _____

Area: _____

Max. Force withstood: _____

Approximate distance moved: _____

Other observations:

Student Name: _____
Date: _____

Material 3: _____

Mass: _____

Area: _____

Max. Force withstood: _____

Approximate distance moved: _____

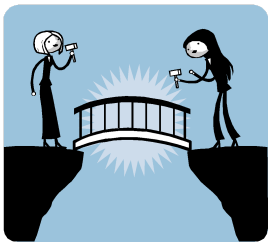
Other observations:

****

What do you and your partner think is the best material for your bridge and why?

Student Name: _____
Date: _____

Physics Olympics: Bridge Building



Objective:
To design and construct a bridge that will support the greatest weight possible.

Apparatus:
Each team will supply one bridge composed of only one material (75 Coffee Stirrers, 75 Wooden Stirrers, or 250 Toothpicks) to build the bridge and one (Tape or Glue) to hold the material together. The testing apparatus will be supplied by the teacher.

Regulations:
The bridge must be free standing (with and without a load). The bridge must fit within the following dimensional ranges: length 30cm-40cm and width 3cm-10cm.

No lamination is allowed. (Lamination is defined here as a build up of five or more consecutive layers in direct contact or separated by only glue.)

Procedure:
The weight of the bridge will be recorded. The bridge will then be placed upon a testing stand which will consist of two surfaces, level with respect to each other and separated by 20cm. A bar will be placed across the roadbed (perpendicular to the bridge's length) at the weakest looking point of the bridge (a bridge being no better than its weakest point) and the weight adding mechanism suspended from this bar. Weight will be added at a slow, steady rate until the bridge collapses or sags to 90% of its original height. At this point, the total weight suspended by the bridge will be recorded.

Scoring:
The score for the bridge build event is determined by the following formula (efficiency of a bridge):
score = (mass supported)/(mass of bridge).

The points will then be scaled to a maximum of 100 points.

Resource: http://www.phys.unt.edu/students/sps/Olympic%20Rules%20Web%20Ver.doc