Curiosity Guide #207
Bridges

Accompanies Curious Crew, Season 2, Episode 7 (#207)

Simple Suspension Bridge

Investigation #4

Description

Find out how suspension bridges work!

Materials

- 2 hard-cover books of similar size, cardboard bricks, 3-ring binders, or wooden boards
- Twine or heavy string
- Scissors
- Measuring tape
- Meter stick
- Hand weights

Procedure #1

1) Cut three lengths of string so that each is 2 feet long.
2) Loop a string around the short side of a cardboard brick. Tie the string tightly.
3) Repeat with a second brick and string.
4) Stand each brick on end. Slide the string loops up near the top edges of the bricks.
5) Separate the bricks so that there is about eighteen inches between them.
6) Tie each end of the third string through the string loop on the top of each brick. This will leave a slightly draped line between the two bricks.

7) Holding the meter stick, press down carefully on the draped string.
8) What happens to the bricks? Do they fall in toward each other?
9) Remove the string.

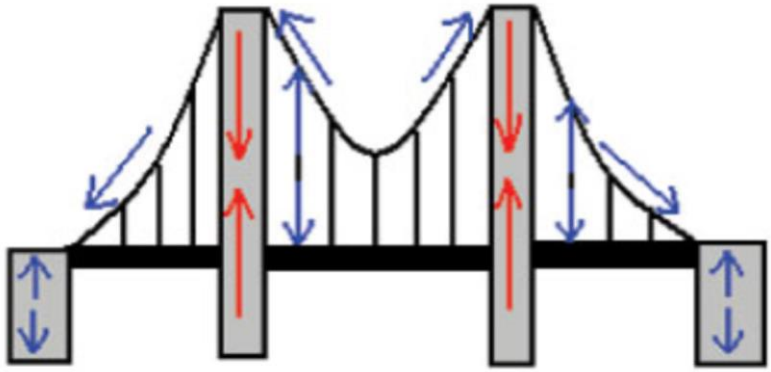
Procedure #2

1) This time, cut a 4-foot length of string.
2) Tie each end of the longer string around a small hand weight or heavier object.
3) Stand up the two bricks with 18 inches between them.
4) Drape the string over the top of the bricks as before.
5) Separate the weights to leave a similar amount of slack as in the first experiment.
6) Press down again with the meter stick on the center of the slack string.
7) Did you notice a difference? What happens?

My Results

Explanation

In the first example, the applied load from the meter stick compressed the string bridge to fall to the center. Adding the outside weights pulls the string outward and transfers the tension force along the string to the weights. At the same time, the cardboard bricks are pushed down toward the floor to handle the compression force.



Something to think about: The Mackinac Bridge, or Big Mac, in Michigan is a good example of an M-style suspension bridge. Do you see how the cables make the shape of an M? The bridge was opened in 1957. It connects the upper and lower peninsulas of Michigan with Lake Michigan on one side and Lake Huron on the other. Those tall towers withstand the compression forces on the bridge, while all of those cables transfer the tension back to the piers on the ends. "Oh the Mackinac bridge, she's a mighty fine bridge, five hundred feet high, and five miles long."

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