

# What Gives?

Education  
IOWA PBS

Fetch!  
with Ruff Ruffman

Today's challenge is to design and construct a suspension bridge. Can you build a bridge out of cardboard that won't collapse under the weight of a pile of books?

## 1 Get what You need.

- 2 chairs with backs
- 3 11" x 17" sheets of corrugated cardboard
- Duct tape
- String
- Hole puncher
- Scissors
- Yard or meter stick
- Paper and pencil
- Books

## 2 Learn the parts of a suspension bridge.

The *deck* (or road) is suspended from hangers. The *hangers* are attached to the cables. The *cables* are draped over the towers, then secured to the ground on either end of the bridge by solid rock or huge concrete blocks called *anchors*.

## 3 Set up the deck and suspension cables.

Get into a group of 4. Tape 3 pieces of cardboard together to make the deck, and place across 2 chairs. (Only 3" of the deck should rest on each seat.) Make 2 cables out of string, each 3 yards long. Drape the cables over the towers (the chair backs) so they hang above the deck.

## 4 Brainstorm and design.

Figure out the best way to attach the cables to the deck. The goal is to make a sturdy, strong bridge. Talk ideas over with your group and sketch out designs with paper and pencil. Follow the building rules:

- Don't tape the deck to the chairs.
- Don't tape the cables to the chairs or floor.
- Don't tie the cables to the chairs.

## 5 Build Your bridge.

- **Two kids** serve as the anchors. They hold the cables at each end, pulling them over the chair backs and down to the ground.
- **Two kids** use hole punchers, string, scissors, and duct tape to make hangers to attach the deck to the cables, while the anchors pull the cables tight.

## 6 Revise Your design, if necessary.

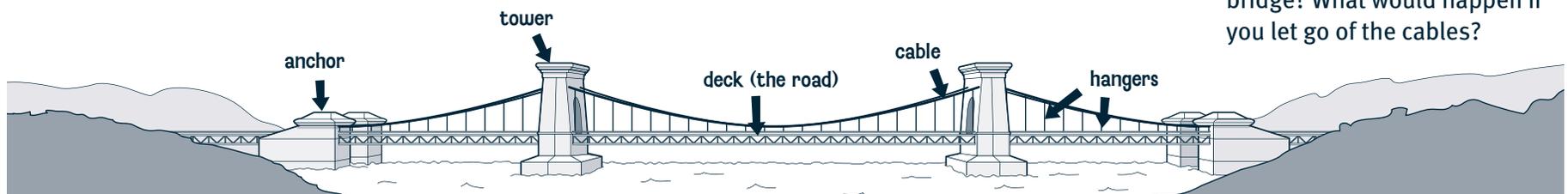
Is your bridge working the way you want it to? Try putting an object on the deck. If it's not holding up, brainstorm ideas and redesign.

### chew on This!

Suspension bridges are among the strongest and longest of bridges. How do they work? The deck is suspended from vertical hangers that are attached to two heavy cables. The cables are pulled over the towers and secured by heavy anchors at each end. Weight pushes down on the deck, but the cables and hangers holding it up transfer the weight to the strong towers, which support the weight of the bridge.

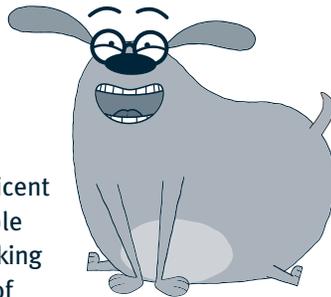
## 7 Test Your bridge.

Pile books on the deck, one at a time, while the anchors pull the cables. How many books can your bridge hold? Take turns being anchors so that everyone can feel the pull on the cables from the books. What's supporting the weight of the bridge? What would happen if you let go of the cables?



# Cool science Jobs!

Like designing bridges?  
Then you might love  
one of these jobs.



## Structural Engineer

Think of what it would be like to build a magnificent suspension bridge—not only do they help people get to where they need to go, but they’re breathtaking works of art! Structural engineers design a lot of amazing things, including bridges, skyscrapers, and even wild roller coaster rides. Wheeeeeeeeeeeeeeee!!!

## Environmental Engineer

When a bridge is built, environmental engineers make sure it won’t damage the plants, animals, and habitats nearby. They protect our planet by finding new and better ways for nature and technology to work together. By cleaning up water and air pollution, designing new recycling systems, or protecting endangered species, they make our world a greener place.



Watch the related FETCH! episode, “Dog of the Rings,” on PBS KIDS GO! (check local listings) or visit the FETCH! Web site at [pbskidsgo.org/fetch](http://pbskidsgo.org/fetch).



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Fold

# Fetch!

# What Gives?

Uh, oh! I just tried to cross a flimsy little footbridge, but I’m scared it’s going to collapse! On the other side is a fantastic new Chinese restaurant—they say the moo shu liver is scrumptious! Can you build me a sturdy bridge so I can get across? Better make it extra strong—I might be a few pounds heavier on the return trip!

## GOOO FETCH!

