



BRIDGE IT!

Be part of the
Great Train
Story.



Be the engineer.

Build a bridge!

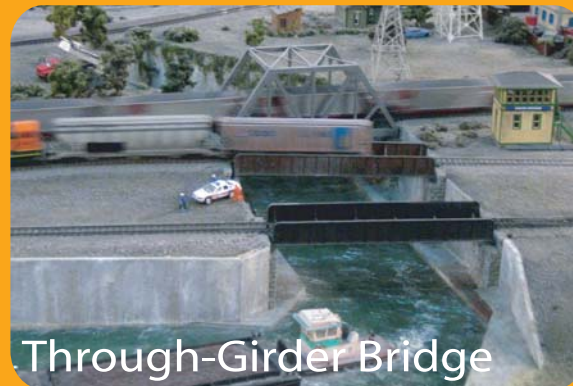
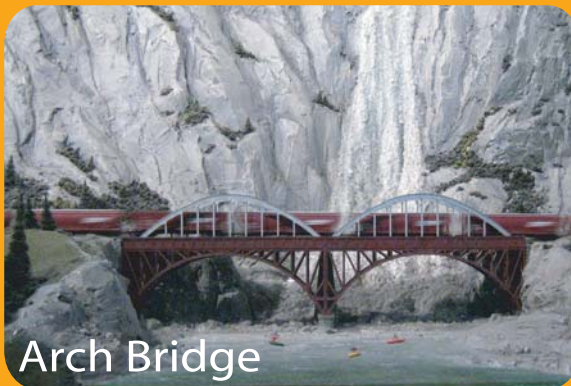
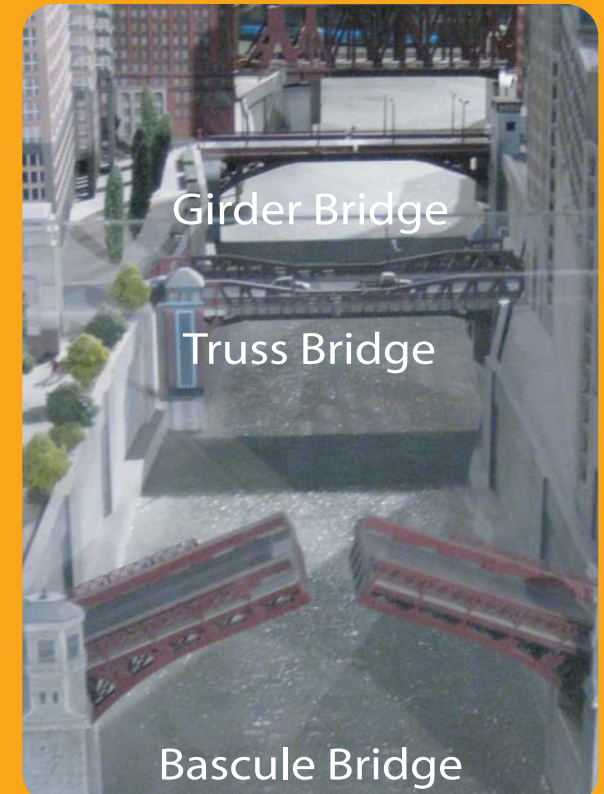
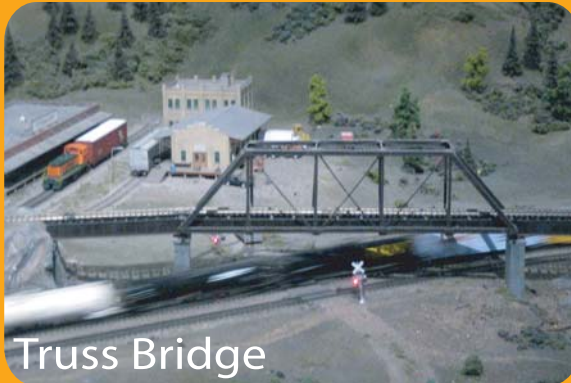
You don't know how?
Flip the pages for some
ideas...



MUSEUM OF SCIENCE AND INDUSTRY

design and build a bridge

Did you spot them?



This bridge deck breaks. Be the engineer! Build a stronger bridge!

Bridges carry trains and cars across gorges, valleys and rivers. There are so many different types of bridges that an engineer can build!

build and test your bridge

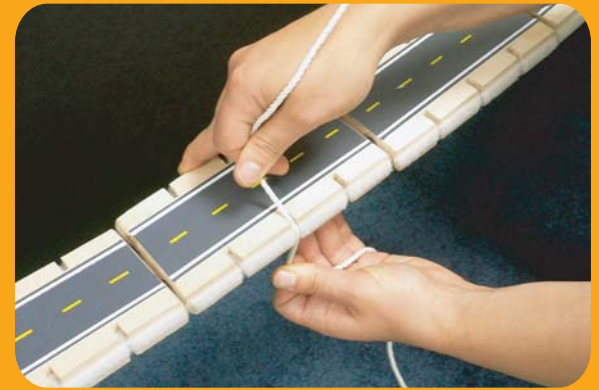


Use rope, dowels and posts to build your bridge.

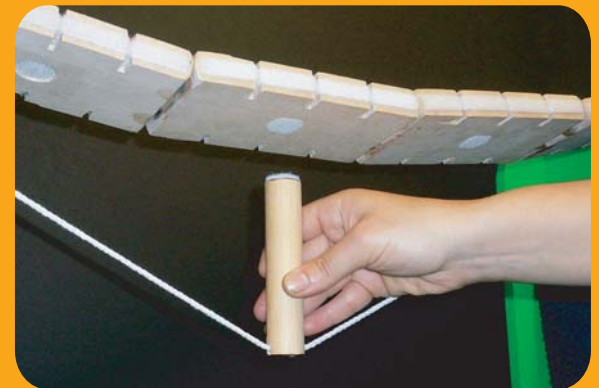
Use weights to test your bridge.



If your bridge breaks when you test it, make a stronger bridge!

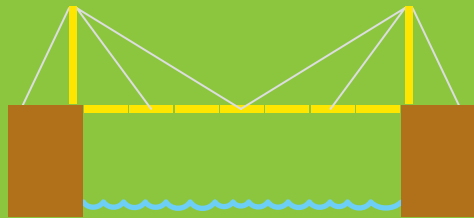
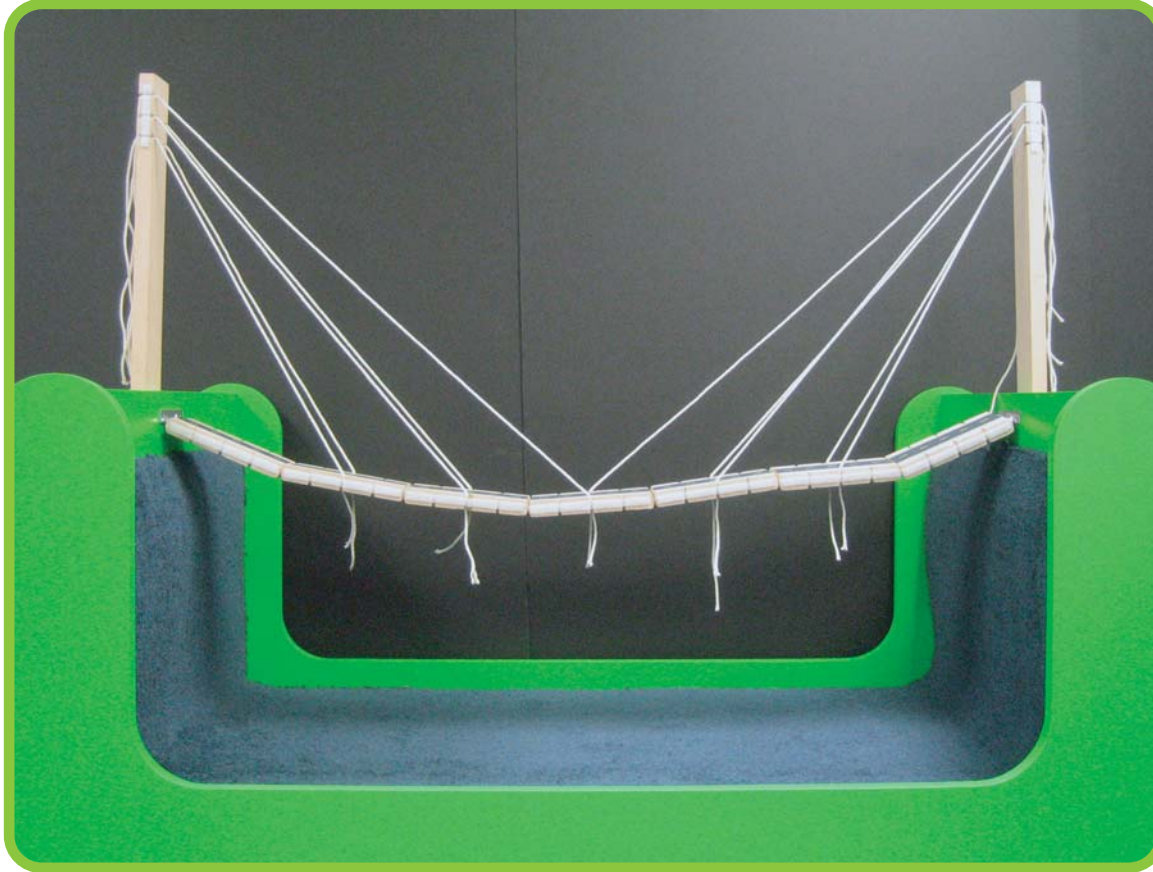


Wedge the rope in the notch. Pull on it to adjust its length.



Stick the dowel to the bottom of the block. Pull the rope until it pushes the dowel up.

cable-stayed bridge

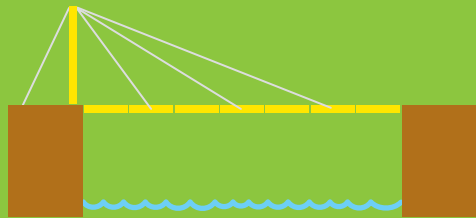
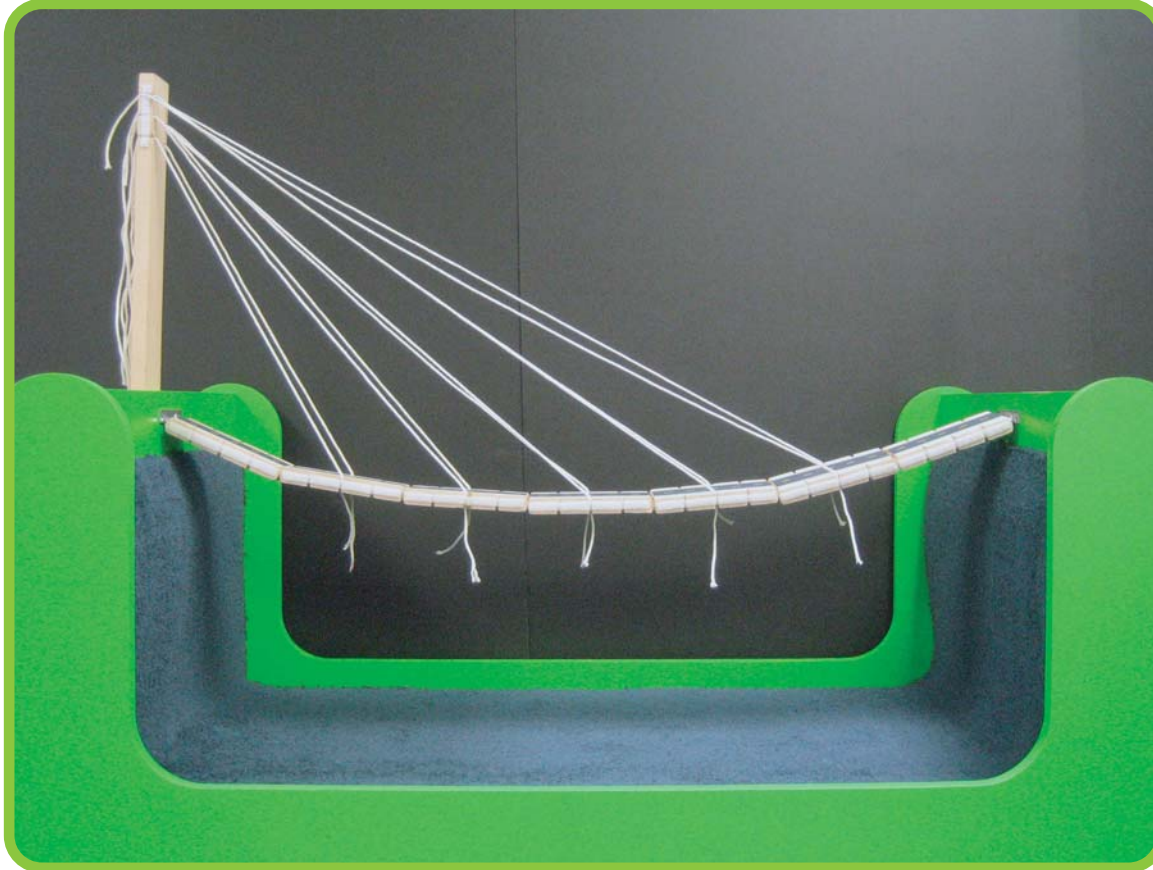


Use rope to connect the bridge deck directly to the two towers.



The Zakim Bunker Hill Bridge in Boston opened in December 2003. It is one of the widest bridges in the world - it carries 8 lanes of Interstate 93 plus 2 service access lanes. The bridge is a major landmark now. It often appears as a backdrop in TV interviews and in Hollywood films, two of which are Spielberg's *War of the Worlds* and Scorsese's *The Departed*.

cable-stayed bridge

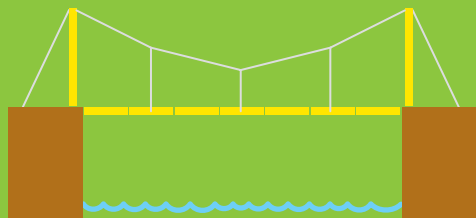
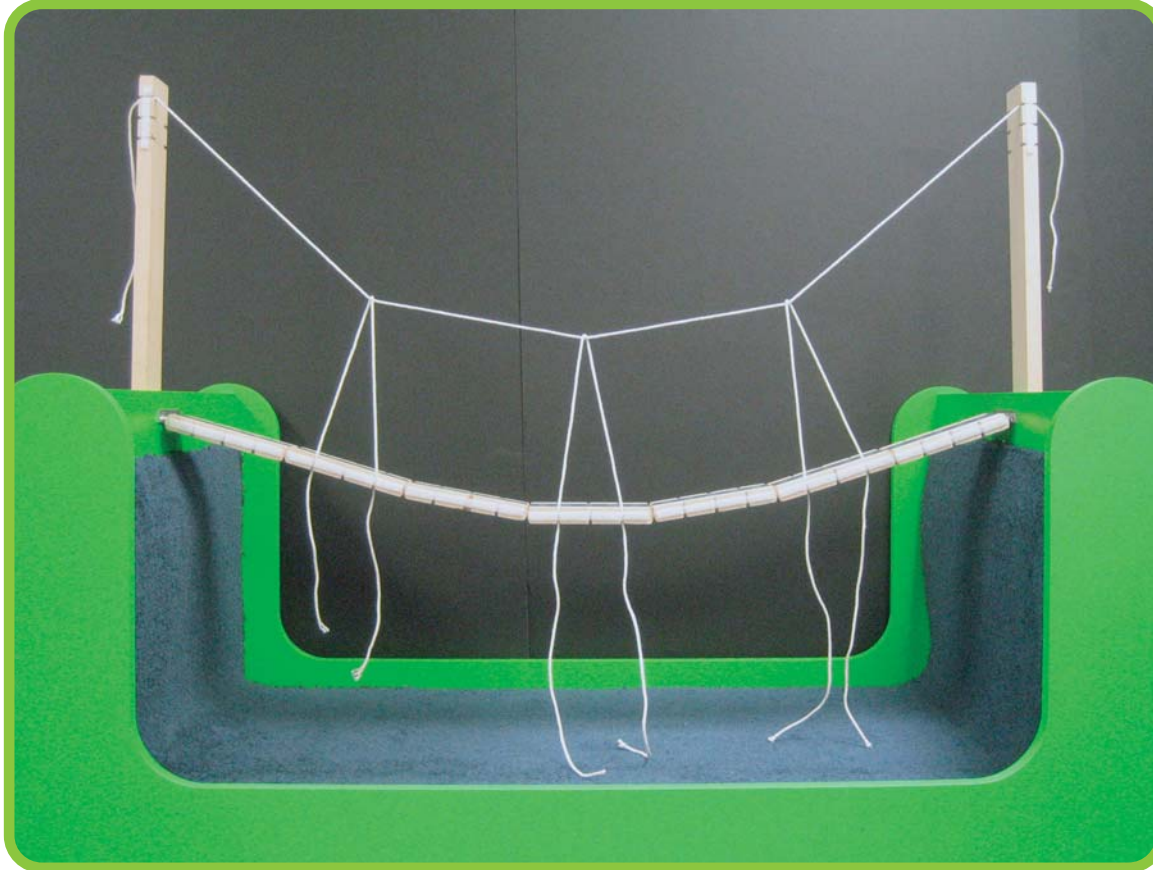


Use only one tower. Connect the bridge deck directly to it.



This cable-stayed bridge uses asymmetric design and the tower needs to be especially big and deep in the ground. This was not an enough challenge for the Spanish engineer and architect Santiago Calatrava. For the Alamillo Bridge in Seville he decided to use a cantilever tower. The tower is tilted because it uses its weight to oppose the pull of the cables from the other direction.

suspension bridge

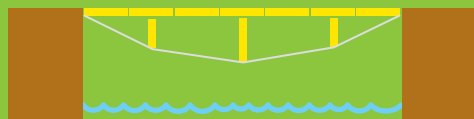


Use rope to connect the deck to rope suspended from the towers.



The suspension bridge is the most often used design for long bridges. When it opened in 1937, the Golden Gate Bridge was the longest suspension bridge in the world. It quickly became the symbol of the city of San Francisco and today it is one of the most photographed bridges ever. Why is the bridge painted in orange? The color makes it visible in fog.

truss bridge

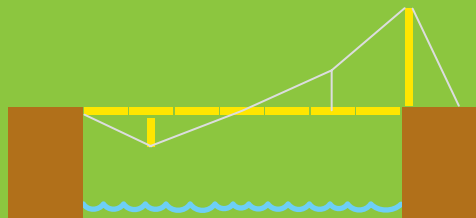
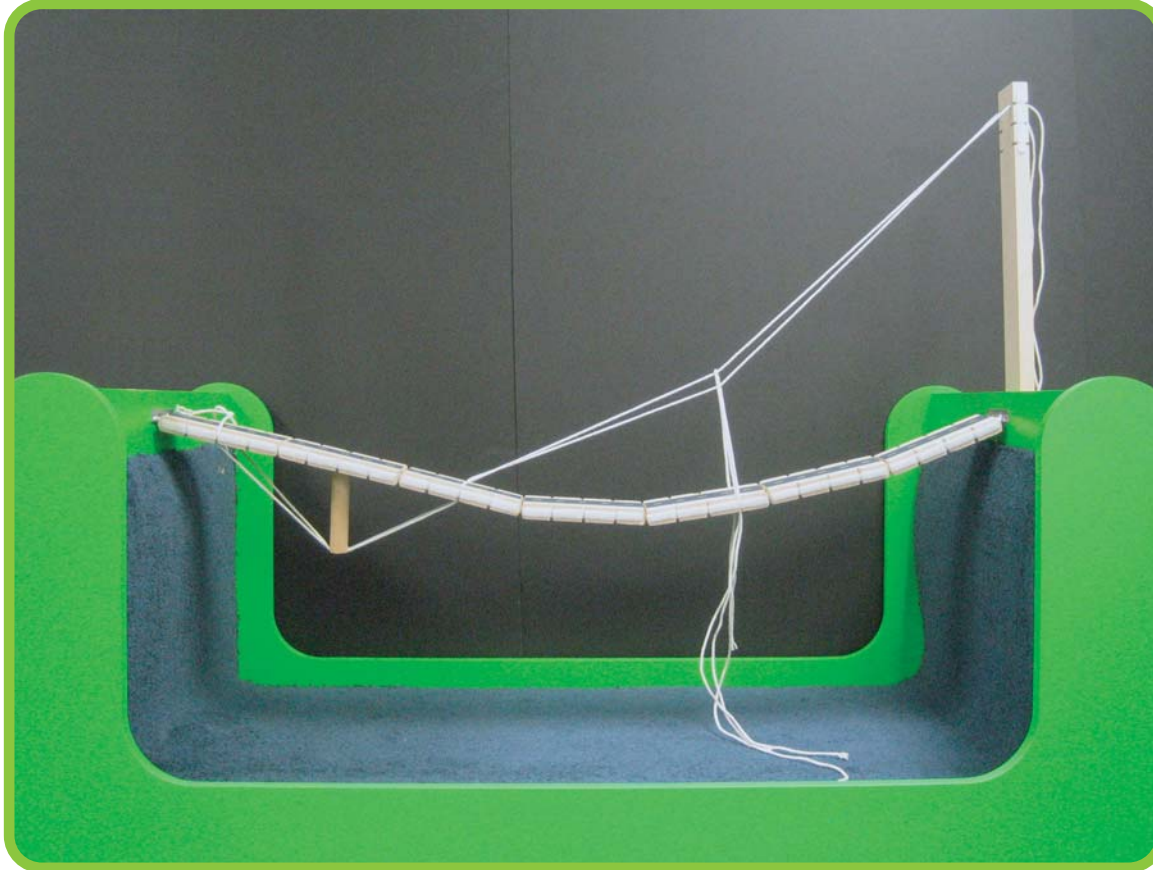


Place the dowels
between the
deck and the
rope.

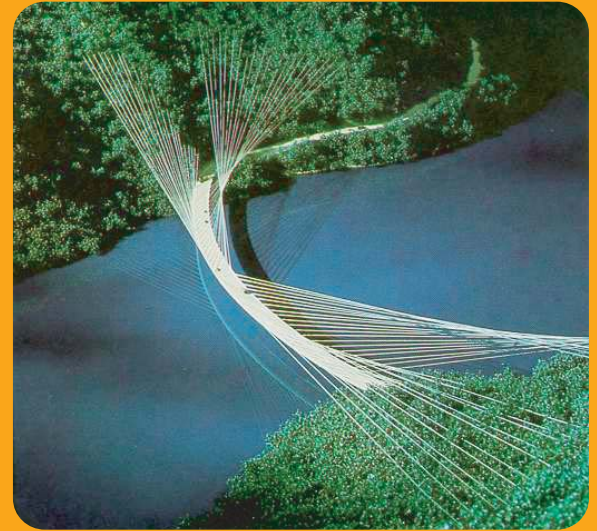


Trusses are made of small elements connected in triangles. When you place the weight on the deck, the truss wants to bend down and pushes on the rope. The rope wants to stretch so it pushes the deck blocks in. This makes the truss rigid and strong. In general, trusses use less material but take more space than solid beams of the same strength. Can you see this in the Burlington Northern Railroad in Schwana, WA?

design your own bridge



Combine the rules from the previous bridge types.



The Ruck-a-Chucky bridge was designed by T. Y. Lin and D. Allan Firmage for a competition. The design uses the basic rule of a cable-stayed bridge. But instead of in towers, the cables from the road deck are anchored in the slopes of the gorge. How did the engineers come up with this idea? A few simple rules and a lot of imagination...