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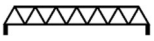
Idea Lab at Home

Seattle is a city of hills and water

What does a bridge make possible?

Seattle is connected by nearly 150 bridges, ranging from big ones, like the I-90 Floating Bridge and the West Seattle Bridge, to smaller ones like the Fremont Bridge or the South Park Bridge. Each of these bridges is unique, designed for the different purposes and landscapes they traverse, and built at different points in Seattle's history.

Almost all bridge designs involve some combination of:

- Beams 
- Arches 
- Trusses 
- Suspensions 

Each of these forms deals with forces like compression (squeezing inward or shortening) and tension (pulling, expanding, or lengthening) in different ways, and work differently to spread out and transfer these forces.

Leonardo da Vinci Emergency Bridge

Da Vinci INVENTIONS

Currently on view at MOHAI

Created by Grande Experiences, *Da Vinci — Inventions* brings to life the genius of Leonardo da Vinci as an inventor, artist, scientist, anatomist, engineer, architect, and more.

Several of his observational drawings explored the ways water moves, and da Vinci designed several inventions for moving over, under, and through water.

One such idea was for a bridge that is portable, temporary, and requires no fasteners.

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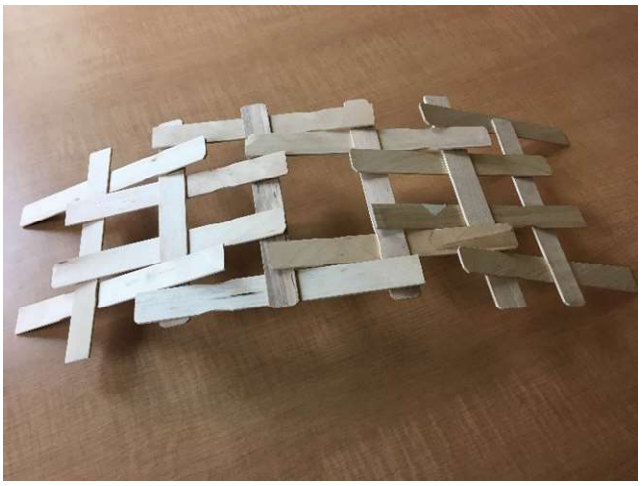
Build Your Own da Vinci Bridge

Watch the video introduction on the MOHAI YouTube Channel!



What you'll need:

- 18 wooden paint stirrers OR 18 jumbo popsicle sticks

What you'll do:

- First, take a look at the above photo. How do you think this bridge is constructed or put together? What is preventing it from falling apart?
- Included are two different versions of step-by-step instructions for assembling the bridge. The technique is essentially the same, but one version might be easier for you to follow than the other.
- Want a big challenge? Try figuring out how to build the bridge without looking at the instructions!
- After building, test your bridge! How does it respond to weight? How would you adjust the design to make it sturdier?

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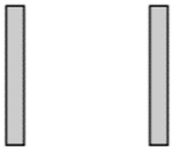
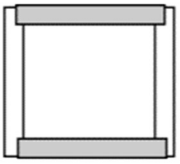
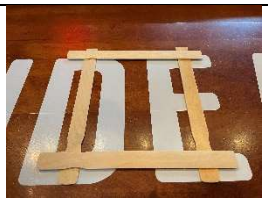
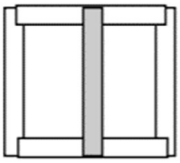
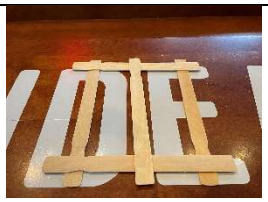
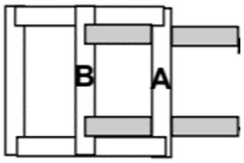
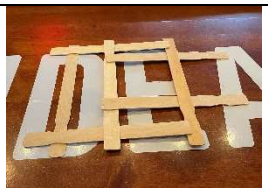
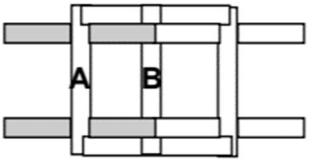
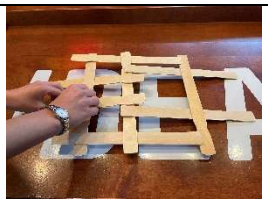
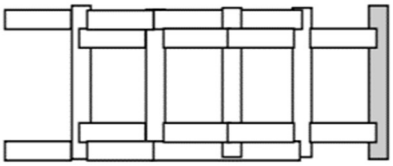
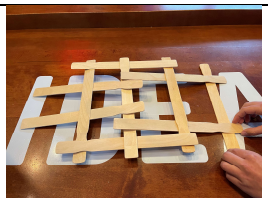
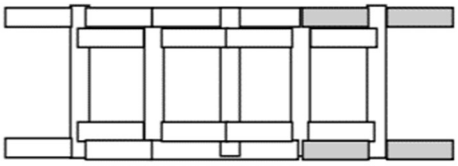
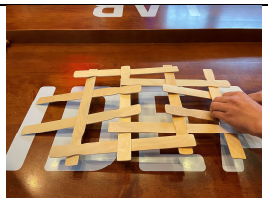
Version 1: Build your bridge from the center outward!

1. Place two beams (paint sticks) parallel to each other like railroad tracks		
2. Place two more beams on top of the first two to form a square		
3. Put the next beam on top of and in the middle of the square, parallel to the first two		
4. Carefully weave two new beams under beam A and over beam B		
5. Repeat on the other side		
6. To make the bridge longer, add another cross beam under the end		
7. Then slide two new beams under and over the new beams A and B 8. Repeat the pattern		

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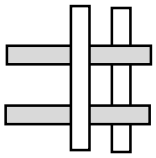
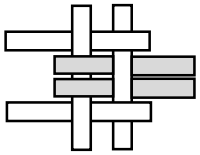
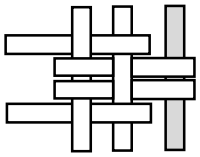
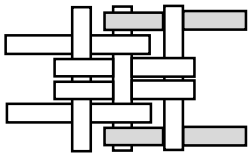
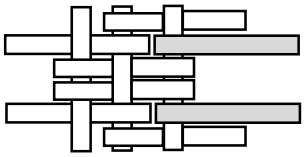
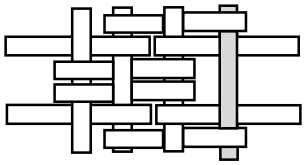
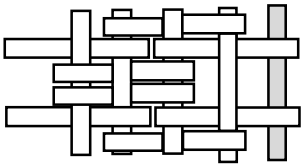
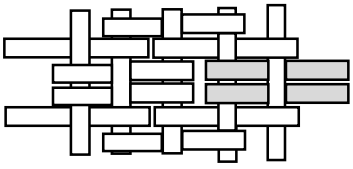
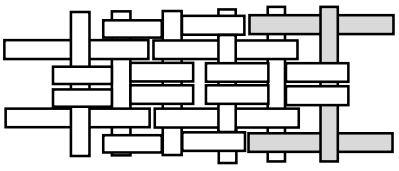
Version 2: Build your bridge left to right!

1. Weave two horizontal beams under and over two vertical beams	
2. Add two new horizontal beams on the right side by weaving them under the right beam and over the left beam	
3. Add a new vertical beam by sliding it underneath the right ends of the inner-most horizontal beams	
4. Weave two new horizontal beams under and over the right two vertical beams, and sandwiching all other existing horizontal beams	
5. Lay two new horizontal beams on top and just inside the last two horizontal beams	
6. Weave a new vertical beam under the outermost and over the innermost horizontal beams	
7. Slide a new vertical beam under the right end of the bridge	
8. Weave two new horizontal beams under the outermost and over the next vertical beams	
9. Finish the pattern, sliding a new vertical beam underneath the ends and weaving two new horizontal beams under and over the vertical beams	

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View of the 14th Avenue South Bridge over the Duwamish River, Seattle, circa 1930. MOHAI, 1955.970.500.55.1

Explore further:

MOHAI Minutes is a series of quick videos that take you on a time-traveling journey to some of Seattle's most fascinating historic spots.

Learn a little bit about some of Seattle's many bridges with "Bridges of Seattle" https://youtu.be/zB6kUokwFKY

- How have bridges affected different local communities in Seattle?
- This is an old episode - some of the bridges that were mentioned are closed or have been demolished, while others have been repaired. How might that have changed the areas around them?
- Want some more? Build a model of a Seattle bridge out of toothpicks and playdough and test it to see how well it would hold up to an earthquake or daily traffic.