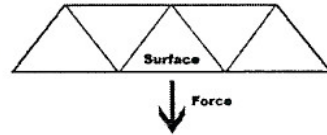


Tips for Building Your Toothpick Bridge

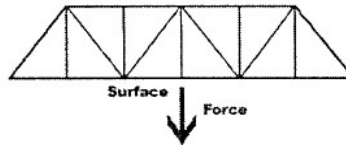
1. START EARLY, PLAN THOROUGHLY, AND WORK STEADILY. Toothpick bridges need time to dry properly.
2. Try different constructions. Suggested bridges -

Toothpick Bridge Designs - Truss Bridges



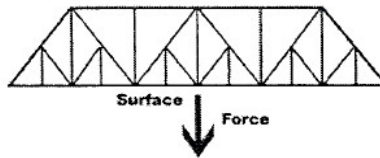
Warren Truss Bridge

A common bridge design was the Warren truss bridge patented by James Warren and Willoughby Monzoni in 1848. The diagonal braces of this design point both towards and away from the midpoint of the bridge. Thus they experience both tension and compression stresses as a load, such as a train, crosses from one end to the other.



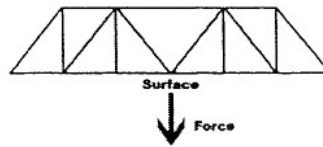
**Warren (vertical support)
Truss Bridge**

Similar to the above Warren Truss Bridge, the vertical supports at greater stability and strength. When building your toothpick bridge, be sure to include these vertical struts. It really makes a difference.



**Warren (subdivided)
Truss Bridge**

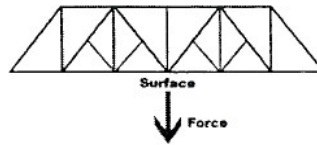
Subdividing your toothpick bridge using smaller pieces of toothpicks will reinforce your design. Be sure to select the best toothpicks as the quality will affect the strength of the toothpick bridge.



Howe Truss Bridge

The Howe Truss Bridge (designed by William Howe) was patented in 1840. The advantages of the Howe Truss Bridge to the railroad companies of the era were that it was easy to prefabricate offsite and to ship by rail.

When building your toothpick bridge using the Howe Truss, be sure to use crossing members to give it strength. Variations of this crossing member design are easily located on the internet.

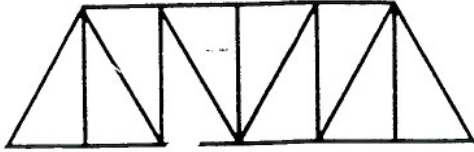


Baltimore Truss Bridge

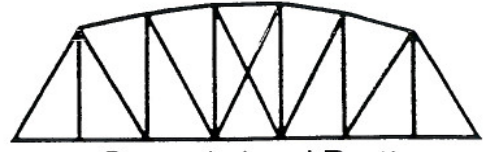
As you can see, the Baltimore truss bridge is a simple modification to other standard truss bridges. The smaller struts have been added to increase the support and improve the load distribution across the structure. When building your toothpick bridge, be sure to glue the smaller struts perpendicular to the main cross beam.

3. Be creative and have tenacity when building your toothpick bridge, but keep track of time. You may have to consider letting go of an idea so that your final design can be thoroughly tested.
4. Continually monitor the mass of your toothpick bridge during construction. Wet glue weighs more than dry glue and makes weaker joints. Be sure to complete your bridge several days before it is due in order for the glue to thoroughly dry.
5. The spacing between the intersections of toothpicks greatly affects the strength of your toothpick bridge.
6. Test each toothpick BEFORE you use it. When using flat toothpicks to build your bridge, roll the toothpick between your fingers first to see if it can stand a little pressure without breaking.
7. Good glue joints make for good strength. To reduce drying time, do initial gluing with SMALL drops of glue (applied with an extra toothpick). You can go back later and reinforce these small drops with more glue after everything dries.
8. Your toothpick bridge's strength is also dependent on its vertical height. However, this is not to say "the higher the better", as there are limits.
9. Design your toothpick bridge to use the strengths of each toothpick as much as possible.

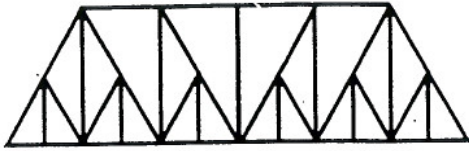
TRUSS BRIDGE DESIGNS



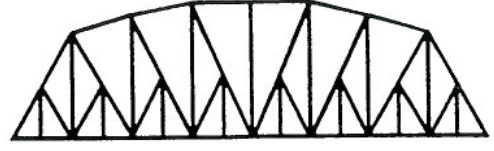
Pratt



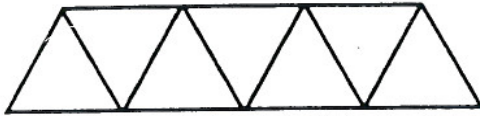
Curved chord Pratt



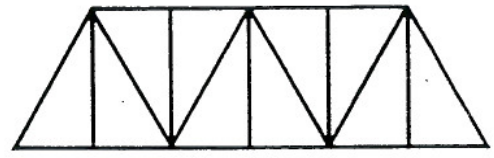
Baltimore (Pratt)



Pennsylvania (Pratt)



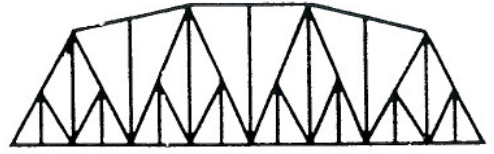
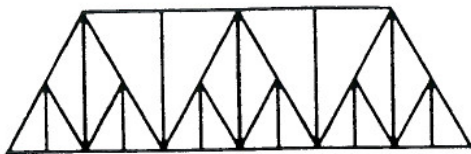
Warren
(without vertical supports)



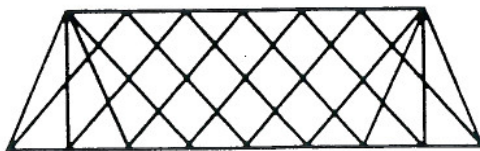
Warren
(with vertical supports)



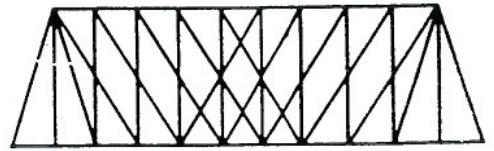
Quadrangular Warren



Subdivided Warren types



Lattice



Whipple