



# TOOTHPICK BRIDGE DIY

In this episode, the campers have to find a way to build a bridge from one place to another, and they learned about how brainstorming can connect ideas to come up with a solution to a problem.

**HAVE YOU EVER BUILT A BRIDGE YOURSELF AND TESTED IT TO SEE IF IT COULD HOLD UP TO A HEAVY WEIGHT?**

**Activity:** Build a Toothpick and Gummy Candy Bridge.

**Safety Tip!** Toothpicks can be sharp, and this bridge will need to be tested, so it might just collapse and break! Please be careful and consider wearing some safety goggles as you are testing, and work with a trusted adult if you can. Remember, engineering is a hands-on process, and it can get messy! Stay safe!



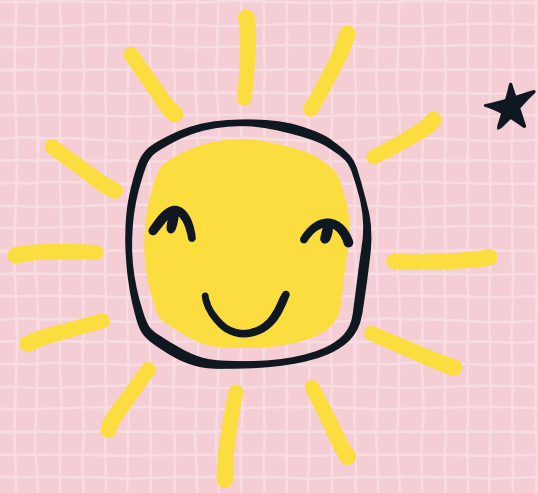
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### FUN FACT:

Engineers solve problems using a systematic, iterative process called the engineering design process.



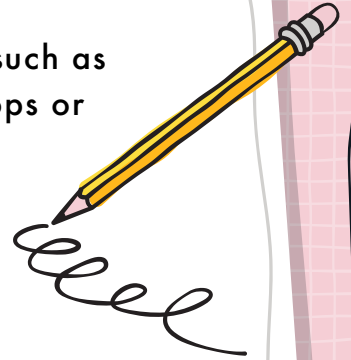


## YOU WILL NEED:

1. Sturdy gummy candy such as gummy bears or gum drops or erasers.
2. Toothpicks
3. A Book

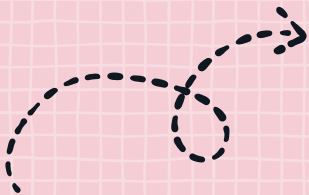
### OPTIONAL:

Scratch paper and pencil to draw out your designs.



## STEP 1:

Get Curious about how you might build a bridge that sits on a table top and holds the weight of a large book. What kinds of shapes can you make with toothpicks, using the gummy candy to hold the toothpicks together?



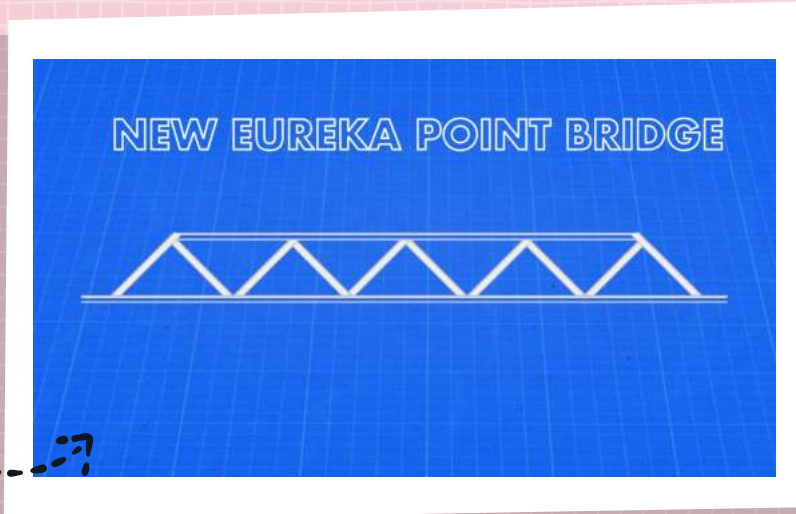
## STEP 2:



Brainstorm the shapes and size that you want to try first, adding gummies to each toothpick end to create the whole bridge, with no extra materials. Engineers explore materials to figure out what they are capable of. Experiment with the toothpicks and candy before you start your build. For this bridge experiment, start by creating a few basic shapes with toothpicks and gummies. Examples might be triangles rectangles or squares. Find out which of the shapes is the strongest by pushing down on them and rocking them side to side. Make sure to stand the shapes upright! While you do this, make observations about the strength of each shape.

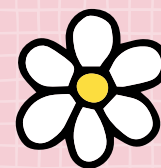
## STEP 3:

Design your bridge with a drawing on paper. You can follow the design as you build, even laying the toothpicks and candies right on top of the flat drawing. This will help you build sides, a top, a bottom, etc. depending on your design.



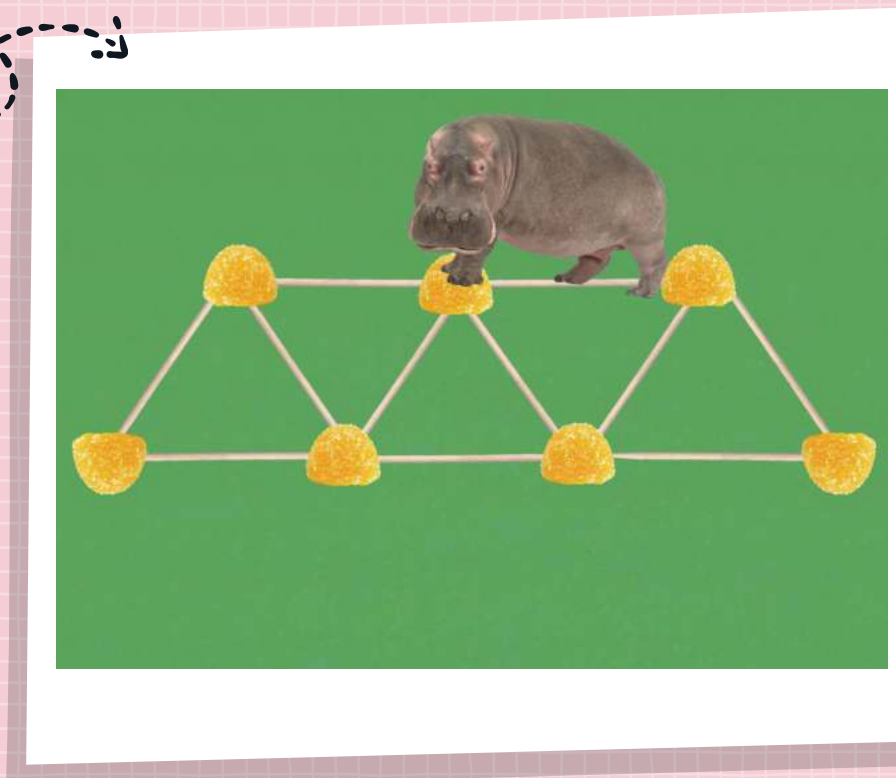
## STEP 4 :

Build your bridge by putting it together one part at a time, laying the pieces of the bridge out on the table as you construct it, and then putting all of the pieces together. Try one design at a time.



## STEP 5:

Test your bridge by carefully placing a book on top of it. The bridge might collapse, and it might hold strong! If your bridge doesn't hold the weight of a large book the first time, brainstorm new shapes that might be stronger. Engineers often work in teams to get better ideas, and they always change their designs to improve them!



## STEP 6:

Use the Engineering Design process by following the steps to explore possible designs, brainstorm ideas, build your project, test it out, and make changes to improve it. If your bridge holds the book up, see if it can hold up more. You can keep working to make stronger and stronger bridges with each cycle through the steps of engineering. Have fun campers!



## TIP:



Try experimenting with building different shapes [cubes, triangles, pyramids] to build a toothpick bridge strong enough to hold up a large book without falling. To test the load bearing strength of each shape, try laying a book flat on top of the bridge to see what happens. Each basic shape has special characteristics. Think about bridges you've seen before, do you notice a pattern in the shapes that they use?

