



BUILD A BRIDGE CHALLENGE

Bridges are important structures that allow us to stay connected and use land that may otherwise be inaccessible. There are many different types of bridges used for different purposes. Your challenge is to design and build a bridge that will suspend your favorite toy or stuffed animal over a 1-foot gap.

WHAT YOU'LL NEED:

- 10 Popsicle sticks
- 10 straws
- 5 index cards
- Tape
- Recycled materials: paper towel or toilet paper tubes, plastic bottles, cardboard boxes, newspaper, and more!

KEY ACTIVITY TERMS:

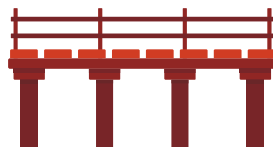
- **Structural Engineer** - an engineer who designs buildings, roads, bridges, towers, and other structures that support or resist loads. This is YOU for this activity!
- **Force** - a push or a pull. The bridge will exert an upward force, or push, on your stuffed animal or toy.
- **Gravity** - an invisible force that pulls objects toward the center of the Earth. Gravity will pull down on the toy and the bridge.
- **Tension** - the force of stretching something or when something is stretched. The roadbed of the bridge will experience tension as it is pulled between the two sides of the gap it spans.

INSTRUCTIONS:

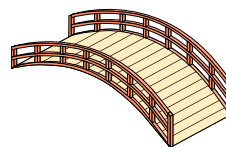
1. Spend a few minutes thinking about the different bridges you've seen around the playground or your town.



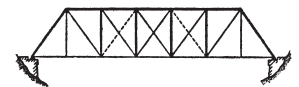
Suspension Bridge



Beam Bridge



Arch Bridge



Truss Bridge

Consider the following:

- Which of these types of bridges will you create?
- What are the strengths and weaknesses of the materials you have?
- What patterns can you form with them to create the strongest structure?
- If your bridge has to span a gap that is 1 foot wide, how long should your bridge be overall?

DID YOU KNOW?

There are over 120 ft of suspension bridges at the Gathering Place. How many have you walked across?

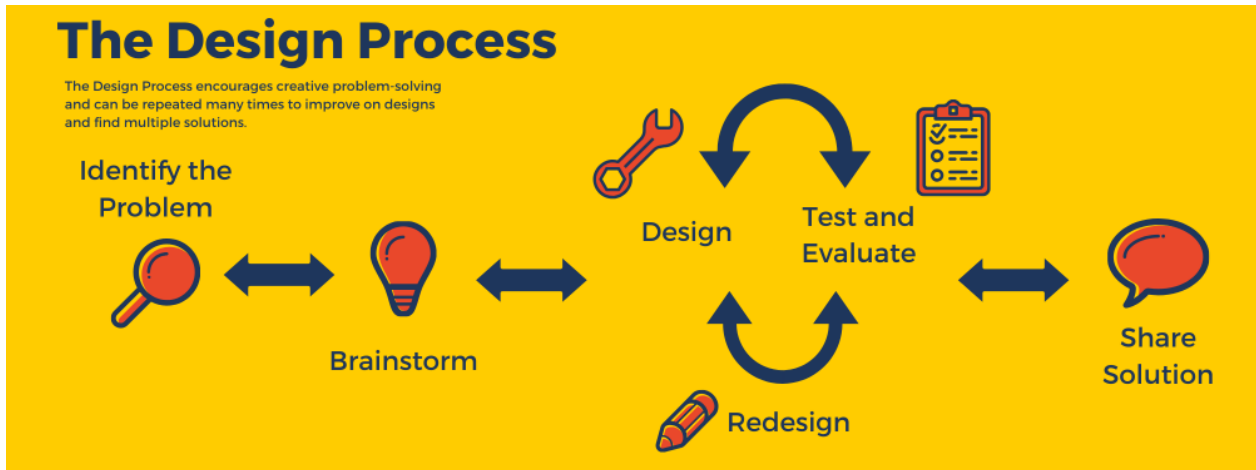
VISIT OUR FAMILY NIGHT WEBSITE:



<https://tulsastem.org/family-night/>



BRIDGE BUILDING CON'T



2. Use the steps of the Engineer Design Process to complete your challenge.

- Sketch your plan on a piece of paper and think about which materials you'd like to use and how many.
- Build the bridge! Remember, you can only use the straws, popsicle sticks, and index cards available, but you don't have to use them all. You also can cut or bend these items however you want.
- Test it -- Place two surfaces 1 foot apart. (Chairs work great!) Place your toy or stuffed animal in the middle to see if it can support the weight for a full 2 minutes.
- Now is your chance to improve your design! Did it successfully support the weight? Great! See if you can redesign your bridge to be longer and carry even more weight. If it can't support the toy, how can you improve your design?

READ ALL ABOUT IT!

Secret Engineer: How Emily Roebling Built the Brooklyn Bridge

by Rachel Dougherty

The Science of Bridges and Tunnels: The Art of Engineering

by Ian Graham

Iggy Peck, Architect
by Andrea Beaty

MORE TO EXPLORE:

- Engineer Design Process explained: <https://youtu.be/fxJWin195kU>
- Engineers are the inventors and problem-solvers of the world. Learn more about different types of engineering specialties: <https://bit.ly/33VANzg>
- What makes bridges so strong? Learn how they can be strong enough to support cars and truck: <https://youtu.be/oVOnRPefcno>

NOW THINK ABOUT:

- How similar was your design to your bridge once it was built?
- Did you make any changes to your design during the building phase? Why or why not?
- Did you use all the parts provided to you? Were any of the parts used only to increase the length of the bridge?
- What other materials would have helped with this challenge?
- What do engineers have to think about when they are designing and building structures like bridges?

SHOW US YOUR CREATION

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