

Goal: In groups of two or three, decide on a toothpick bridge design and start making a toothpick bridge (we'll finish next class.) Your goal is to make the strongest bridge made only out of toothpicks and glue that spans a 10 inch gap and holds the most weight.

Requirements:

- Bridge must be longer than 10 inches and shorter than 12 inches.
- Bridge must be free standing.
- Bridge must be between 2 and 4 inches wide.
- Bridge must be between 1 and 4 inches tall. Upper height must be a structural part of bridge (not just spikes pointing up.)
- Bridge needs a flat 2 inch square platform on the top in the middle to be used for applying weight from above.
- Bridge is made of only toothpicks and glue. You may cut or break the sticks.
- You may not fill gaps between sticks with glue.
- Glue is only used to hold pieces together, never as a freestanding structural element
- Bridge will consist of 50 toothpicks or less.
- If you use more than half of one long glue stick of hot glue (as determined by weight) your group's starting grade will be 80%. In other words, go easy on the glue.

Before you get your toothpicks, please follow the process below. Everyone needs their notebook, and writes things down. Work together as a team.

Part 1: about 5 minutes

Alone with your Maker notebook, brainstorm design ideas for ways to build a toothpick bridge. Brainstorming means that you will sketch multiple possible ways to build a bridge that meets the above criteria using just flat toothpicks and hot glue. We're doing this part quietly. Title the page "Toothpick bridge brainstorm" with the date. Do some quick sketches, get down as many ideas as you can in 5 minutes. Everyone has their own drawings in their own notebook.

Part 2: about 5 minutes

Find a group to work with. Groups can be two or three people (no one is alone, and there are no groups larger than three people). If you need help finding a group come talk to me.

Get with your group, share the ideas you sketched. Discuss each other's designs, try to agree on a rough plan. After you have shared your designs and discussed them briefly, move on to part 3.

Part 3: 5 to 10 minutes

As a group sit at a single computer and research toothpick bridge-making as a team. One person controls the machine, you all stand or sit nearby, stay engaged, make suggestions, and contribute. Each person writes some notes in their own notebook under the heading "Research" about things you are seeing that you want to make sure you use in your bridge design. You are looking for ideas and/or design principles that would make for a strong bridge. Each person has their own research notes, even if you all write the same thing.

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Part 4: 5 to 10 minutes

Discuss options and decide as a team what your design will be. Each person draws a rough sketch of your team's design in their own notebook under a heading "Our Design". Make sure your plan meets my specifications listed above (see the bullet points on the other side of this worksheet.) When your whole team is done with this part come up as a group, show me your notebooks, get your bundle of toothpicks and start building.

Part 5: Today and the first 30 minutes of next class.

Build it!

Start building the bridge today in class. All gluing and construction should occur over appropriate surfaces such as a cutting board or newspaper. If you have extra toothpicks I'd be happy to take them back when you're all done. Don't forget that if you use too much hot glue your grade will go down. When you are done with your bridge bring it up to me for review. You should make solid progress building your bridge today and finish building it completely by 30 minutes into the period next class.

Next class we will apply weights and see which bridge is strongest.