

# Family Popsicle Bridge Challenge

Family Worksheet: \_\_\_\_\_

## Design Your Own Bridge

You are part of a team of engineers who have been given the challenge to design a bridge out of up to 100 small Popsicle sticks and white school glue. Bridges must be able to hold the most weight. The bridge must span at least 13 inches in length. But, it must not be longer than 15 inches because when it has been constructed, it will be placed on a placeholder that has a gap of 12 inches. There needs to be a 2 inch by 2 inch gap for a weight hanging plate to be placed on the base (the "road" section) of your bridge. In addition to meeting the structural requirements, the bridge will be judged on its aesthetics as well, so be creative! And, you are encouraged to use the fewest number of popsicles possible to achieve your goal.

### ★ Planning Stage

Meet as a team and discuss the problem you need to solve. Then develop and agree on a design for your bridge. You'll need to determine how many small Popsicle sticks you will use (up to 100) -- and the steps you will take in the manufacturing process. Think about what patterns might be the strongest...but you are also being judged on the aesthetics of your bridge! Draw your design in the box below, and be sure to indicate the number of sticks you anticipate using. You may choose to revise your teams' plan after you reviewed and researched what bridge structures hold the most weight

## Bridge Design Sketch

Number of popsicle sticks you anticipate using:

### ★ Construction Phase

Build your bridge. During construction you may decide you need additional sticks (up to 50 total sticks may be used) or that your design needs to change. This is ok -- just make a new sketch and revise your materials list.

### ★ Aesthetic Vote

A few teachers will cast a vote about the look of each bridge. The scale is 1 - 5 -- (1: not at all appealing; 2: not appealing; 3: neutral/average; 4: somewhat appealing; 5: very appealing). This number is averaged to generate a score for each bridge. This score is not based on how well the bridge might hold weight, but on how it looks.

### ★ Testing Phase

Each team will test their bridge to see if it can withstand the required weight for at least one full minute. Be sure to watch the tests of the other teams and observe how their different designs worked.

### ● Evaluation Phase

Evaluate your teams' results, complete the evaluation worksheet, and submit your findings to Ms. Petrillo. *\*form is attached separately to this packet*

## **Rules:**

### **Small Wooden Popsicle Sticks:**

- Max 100 pieces
- Sticks may be cut
- You may not laminate sticks
- No sandwiching of sticks more than 3 if its used as a joint or 2 if used as a beam
- They must be the standard size popsicle sticks size and not the jumbo size ones
- Must use only white school glue (if use of other glues-the bridge will only be used for the aesthetics part)
- Must have a 2 inch by 2 inch gap for a weight hanging plate to be placed on the base (the "road" section) of your bridge

### **Length:**

- The bridge must span at least 13 inches in length. But, it must not be longer than 15 inches

### **Acceptable Joints:**

- Butt, Miter, & Gusset

### **Unacceptable Joints:**

- Pinned, Notched

## **Dates to remember!!**

**Dec 1st** - Turn in participation slips

**Dec 10th** - Bridges need to be turned into Ms. Petrillo

**Dec 13th-17th** - Weight bearing test will be conducted by the student & bridges will be displayed to be judged by selected teachers for aesthetics

# Family Popsicle Bridge Challenge Evaluation

**1. Did you succeed in creating a bridge that held the most weight for a full minute? If not, why did it fail?**

**2. Did you decide to revise your original design while in the construction phase? Why?**

**3. How many Popsicle sticks did you end up using? Did this number differ from your plan? If so, what changed?**

**4. What design elements of other bridges did you like the best? (May answer after all are posted)**

**5. Do you think that engineers have to adapt their original plans during the construction of systems or products? Why might they?**

**6. If you had to do it all over again, how would your planned design change? Why?**

**7. Do you think you would have been able to complete this project easier if you were working alone? Explain...**