

# ACTIVITY



## CUPS & STICKS

### A STRUCTURAL DESIGN CHALLENGE

**Description:** With a few simple materials, children can engage in various structural design activities that will challenge their problem-solving skills, promote persistence, and foster creativity.

### WHAT TOOLS AND MATERIALS DO I NEED?

- Lots of paper or plastic cups (all the same size, 3-5 oz. are best)
- Lots of sticks (such as craft sticks, popsicle sticks, or coffee stirrers)
- 1 small block such as a toy block, piece of wood, Lego<sup>(R)</sup> piece, or small container/lid
- Measurement tool (e.g., ruler or length of string or thread)
- Small objects that could be placed in a cup to serve as weights (e.g., beads, pieces of candy, paper clips, marbles, pennies)

### WHAT SHOULD I DO?

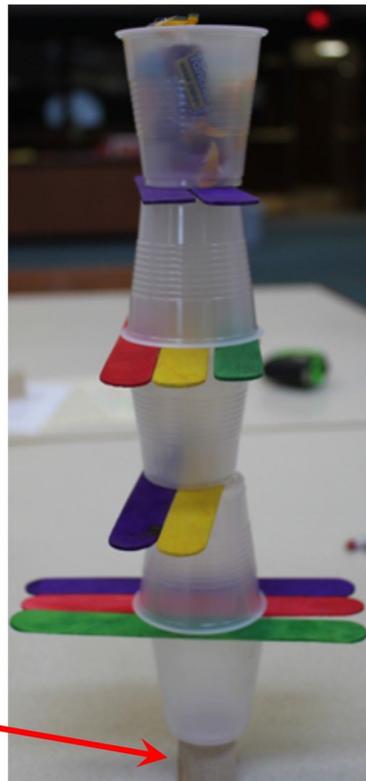


1. **Assemble the materials** on a table or the floor where the child/children can easily work.
2. **Explain the initial problem.**

**Design & build a tall, sturdy tower. You can use only the cups and sticks provided. You cannot change the shape or size of the cups and sticks. Cups should not be nested together either.**

3. **Pose questions** or make comments when the child reaches a stumbling block and cannot seem to move forward. For example:
  - Why do you suppose it keeps falling down?
  - How can you make it more stable?
  - What other stacking pattern can you try?
  - How can you make it even taller?
4. **Measure the height** of the tower with a ruler if you have one. If you don't, use a length of string or thread to assess the height. Compare various solutions and heights.
5. If the child is still showing interest, **increase the challenge**.

**Design & build the tallest tower you can using only the cups and sticks provided. This time, your tower needs to balance on top of the object provided (i.e., toy block, piece of wood, Lego<sup>(R)</sup> piece, or small container/lid.) Remember that you cannot change the shape or size of the cups and sticks. Cups should not be nested either.**



Note that cups are balancing on a small wooden block

6. **See picture to the left for example.** This tower is balancing on a small toy block of wood. You can use any object as a base for the tower to balance upon.
7. Again, **use questioning** to help encourage the child to be persistent in solving the problem. Point out that most new inventions have many failures before the best solution is found.
8. **Try adding weights.** Ask the child to put some small objects (e.g., beads, pennies, paper clips) on top of the tower. How many can it hold before it collapses?

9. **Discuss** the problem and solutions.

- Why was it harder to build the structure when it had to balance on a small object?
- Compare how your body feels when you balance on one leg versus two legs. What can you do to keep better balance when you are on one foot? Try applying that idea to your structure.
- Which problem was easier to solve and why?
- Were the sticks more helpful in one problem than the other? Why?
- Why do people think about balance when designing structures?

**Grade Level:** Pre-K - 4

**Age Level:**

PreK 3-5 yrs (preschool)

5-6 yrs (kindergarten)

6-8 yrs (primary)

9-11 yrs (elementary)

**Tags:**

Creative Thinking

Engineering

Independent Activity

Mathematics

Parent-Led Activity

Problem-Solving

Science

STEM

Student Success Skills

**Developer:**

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