

DOWELS AND RUBBER BANDS I

Duration: 30-60 minutes

Institution: NYSCI

Skill level/Age Level: 7 and up

Group size: 2-30 children in groups of 2-5

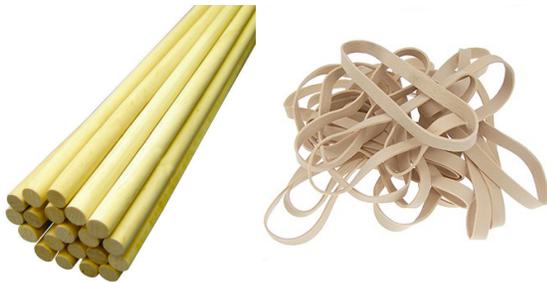
INTRODUCTION

Kids build structures with 3-foot dowels and rubber bands. There are many ways to build and to make things stand up, but making things stable is not a trivial task. You can make things that are very big—even big enough for several children to get inside.

MATERIALS AND TOOLS

Essential Materials:

- Wooden dowels— $\frac{3}{8}$ inch diameter, 36 inches long
- A good starting estimate is about 25-30 dowels per working groups of kids. So for a class of 20 you'll probably want 150 dowels
- You can use these dowels over and over, but some do break from time to time. So it's good to have some extra on hand.
- 1 pound of rubber bands—size 64
- You can reuse the rubber bands, too, but they'll need replacing before the dowels. If you just work with one large class at a time, a pound of rubber bands will last for a while.



Optional Materials:

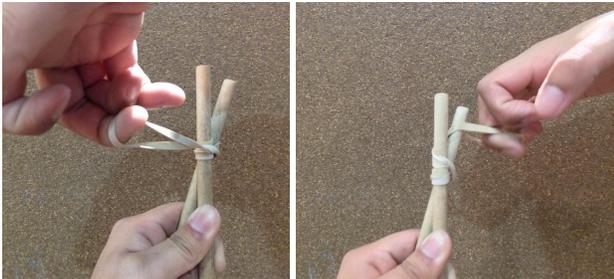
- Sheets/tablecloth/fabric—If you have space to leave these up for a while, you might consider bring out fabric to stretch over the structures and turn them into playhouses and forts.

SET UP

- Clear a bunch of space—each group needs at least 6'x6'. More space is better. This can be done outside.
- Build something yourself and have it there for the kids to see—it really helps to have an example to show kids what's possible. Don't worry about making your construction perfect. In fact, simplistic but crazy looking is just about perfect. Anything more complicated than a tripod is fine.

HOW TO OR STEP-BY-STEP (STYLE: HEADING 1)*Loop...*

1. Invite kids to look at the structure you made, and tell them that today they're building with dowels and rubber bands. They can build things big enough to get inside, if they want.

*...Wrap...**...Loop*

2. Show them one way to use the rubber bands to attach the dowels. We usually say, "Let me show you our favorite way of wrapping the rubber bands. I call it the loop-wrap-loop method." This implies that there are many ways to do it. They might find a favorite that's different from ours.
 - a. LOOP the rubber band over one of the dowels
 - b. WRAP the rubber band around the dowels to hold them together
 - c. LOOP the other end of the rubber band on one of the dowels
 - d. Don't worry about making the rubber band tight. You just need the rubber stretched a little to make it grippy.
3. Challenge them to build a stable structure.
 - a. The word "stable" works better than "strong". When you say "strong", many kids think they should use two dowels on every edge, and they run out too quickly.
 - b. You can tune the challenge differently, if you want to

- i) Build something that stands on its own.
 - ii) Build something you can get inside.
 - iii) Build something you can stand inside.
 - iv) Build something that will house your entire group and won't fall over in a hurricane (you can be the "hurricane" and test the structure by wiggling it).
 - v) Build a freestanding stable cube.
 - vi) Build something all the way to the ceiling
 - vii) Build a sculpture of a particular object (we've made a swan, a turkey, and a superhero).
 - viii) Make an arch that you can walk underneath (major challenge!).
4. Facilitate the building.
 5. Allow the groups to share their work. They can show off their creation and talk about some things they tried.

FACILITATION TIPS PROMPTS AND QUESTIONS

- Your most important role as a facilitator is often to make sure that everyone has the materials they need.
- Encourage children to look at other structures to get ideas. Both the structures of real buildings, and the dowel structures of the other groups. Designers learn from other designers.
- Ask questions like, "Which part of your structure is the most stable?" "What shapes do you have there?" and "Where will the next stick go?"
- Eventually, they will likely need a stick that is longer than the 3-foot dowels. When you see that it might come in handy, show them how to overlap 2 dowels and use the loop-wrap-loop method on both of the overlapped ends.



- MAIN IDEA—if you want something stable, you need to incorporate triangles and diagonals. With dowels and rubber bands, every other shape is wiggly.

SAFETY TIPS

- Once children see that they can build with the materials, there isn't generally a problem with either "sword-fighting" or with shooting rubber bands. If that starts to happen, a simple "Those are just for building," is almost always enough to redirect them away from misusing the materials.
- Encourage caution while de-constructing—especially when a whole group of children are working on opposite sides of a structure. Yanking dowels free from

the rubber bands can cause the whole structure to jerk suddenly and hit someone on the other side.

MATERIALS SOURCES

- Wooden Dowels—We use birch dowels, 36”x3/8”. It’s a standard size available at hardware stores, but call ahead to be sure they have enough. Or, buy online at <http://www.wood-dowel.com> (\$20.00 for a bundle of 50 dowels, plus shipping.)
- Rubber bands—we use size 64 rubber bands with our 3-foot dowels. It’s a standard size at office supply stores.

KEYWORDS

- Large-scale
- Structure
- Building
- Needs space
- Geometry