



## How Strong is a Paper Table?

**Recommendations:** For students grades 3 to 8. Indoor or outdoor activity. Adult supervision recommended.

**Purpose:** Take on a challenge that seems near impossible at first glance and overcome it using engineering and design.

### Materials:

- 8 (*or more*) sheets of newspaper
- 1 piece of cardboard for the tabletop
- Masking Tape
- Scissors
- Heavy book such as a textbook
- Paper and writing utensil

### How It Works:

**Step 1:** Look around your home at various tables and chairs to get an idea of structural designs that are used to support weight. Truly think about the challenge: how can you make paper strong enough to support weight? What shape will you make your tabletop? Will the legs be long or short to better support the table?

**Step 2:** Using paper and pencil, sketch some design ideas/blueprints for making your own table out of paper.

**Step 3:** Make your design come to life! Cut the piece of cardboard into the shape you want for the tabletop. Support your cardboard tabletop with paper legs and test it out with a heavy book.

**Try it on your own first**, then check out the tips below:

**Tip:** Rolling one piece of paper into a tube will make it stronger. To roll it tightly, start at the corner and pinch as you roll across to the opposite corner. Tape the final edge so that it doesn't unroll.

Tip: Engineers give a lot of thought to the shapes they build with. Some shapes, such as squares, distribute the weight to different parts of a frame. Other shapes, such as triangles, spread the weight to evenly to nearly every part of the frame.

Tip: Height can increase instability. If reinforcing the legs doesn't work, consider reducing the height of the table.

Tip: Roll additional tubes of paper to create support rods extending from table leg to the underside of the tabletop.

**Step 4:** Test the strength of your paper table by seeing if it can hold the weight of the textbook. If it can't, learn from it! When engineers solve a problem, they try different ideas, learn from mistakes, and try again. Study the problems and then redesign. If things don't work out, it's an opportunity to improve!

### **Conclusion:**

With manipulation of density and form, seemingly weak materials can take significantly more weight and force. Consider taking what you've learned and attempting more complex structures like a house or bridge. For inspiration, check out this cathedral in New Zealand that was re-built using paper materials after an Earthquake: <https://www.youtube.com/watch?v=pal4HTTRDqY>

### **Resources:**

*Ontario Curriculum:*

Grade 3: Strong and Stable Structures, Forces Causing Movement

Grade 5: Forces Acting on Structures and Mechanisms

Grade 7: Form and Function

Grade 8: Systems in Action

PBS Kids Design Squad:

<https://pbskids.org/designsquad/build/paper-table/>