

Paper Table Challenge

Your challenge

Design and build a table out of newspaper tubes.
Your table must be at least six (6) inches tall and strong enough to hold a heavy book.

Materials

- 1 piece of cardboard
- heavy book
- 3 ft. masking tape
- 8 sheets of newspaper

Brainstorm and Design

Look at your materials and think about the following questions:

1. How can you make a strong tube out of a piece of newspaper?
(This challenge uses tubes because it takes more force to crumple paper when it's shaped as a tube.)
2. How can you arrange the tubes to make a strong table?
3. How can you support the table legs to keep them from tilting or twisting?
4. How level and big does the table top need to be to support a heavy book?



Build, Test, Evaluate, & Design

Use only the materials given to build your table. Then test it by carefully setting a heavy book on it. When you test, your design may not work as planned. If things don't work out, it's an opportunity – not a mistake! When engineers solve a problem, they try different ideas, learn from mistakes, and try again. Study the problems and then redesign.

- If the tubes start to unroll – re-roll them so they are tighter. A tube shape lets the load (book) push on every part of the paper, not just one section of it. Whether they're building tables, buildings, or bridges, **load distribution** is a feature engineers think carefully about it.
- If the legs tilt or twist – find a way to stabilize and support them. Also check if the table is lopsided, too high, or has legs that are damaged or not well braced.
- If a tube buckles when you add weight – support or reinforce the weak area, use a wider or thicker-walled tube, or replace the tube if it's badly damaged. Changing the shape of a material affects its strength. Shapes that spread a load well are strong. Dents, creases, and wrinkles put stress on some areas more than others making a material weaker.
- If the table collapses – make its base as sturdy as possible. A table with a lot of triangular supports tends to be quite strong. A **truss** is a large, strong support beam. It is built from short boards or metal rods that are arranged as a series of triangles. Engineers often use trusses in bridges, buildings, and towers.

