

Build a Paper Table

THE CHALLENGE

Build a table using newspaper as legs and a cardboard top that will hold a heavy book.

Criteria

- 1 piece of cardboard (8 ½ x 11 inches); you will measure and draw for the teacher to cut
- Heavy book (such as a dictionary)
- Clear tape, you will obtain strips of tape from the teacher as needed
- 8 sheets of newspaper

Constraints

- Table must be 8 inches high
- Table must be free-standing
- Finished table must be completed within the given time/day limitation

BRAINSTORM & DESIGN

Look at your materials and think about the questions below. Then sketch your ideas in your engineering notebook.

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, stable table?
3. How can you support the table legs to keep them from tilting or twisting?
4. How level and big does the table's top need to be to support a heavy book?

BUILD, TEST, EVALUATE & REDESIGN

Use the materials 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.

For example, if:

- the tubes start to unroll—Re-roll them so they are tighter. A tube shape lets the load (i.e., the 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.
- 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.
- 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 that put stress on some areas more than others make a material weaker.
- the table collapses—Make its base as sturdy as possible. Also, 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.

PRESENT

Your team will present the final test to the teacher. Ensure that you have completed prior tests.