

Challenge - which paper column is the strongest?

Some background

We are going to test the strength of paper, folded in differently shaped columns, by piling books on top. This is very similar to how columns are used to support buildings and other structures.

The shapes are



What to do

Use regular copy paper, not card stock for this challenge.

Fold each paper into the three shapes and secure with tape.

Slowly pile books on top of each shape.

Make sure you use the same books for each column

Questions

- 1) Which shape held the most book?
- 2) Which shape held the least books?
- 3) How many books could your strongest column hold?
- 4) What happens if you roll the paper tighter? (It will be stringer but you may have stability issues)

For parents

The cylinder can support the most books because it's walls don't have any edges. The force of the books cannot become concentrated in a particular area. The load is distributed evenly. In other words, all parts of the cylinder are sharing the load of the books. All parts of the cylinder, therefore, contribute to its overall strength until, finally, it collapses.

The square and triangle deform more easily. They shift the weight of the books to their edges and corners, which deforms their walls and leads to a quick collapse.

What shape are the columns in (parking) buildings?

Early architects in several ancient civilizations used columns in architecture including the ancient Egyptians, Persians, Greeks and Romans.