



SUPER POWER: Compressive Strength!

SUPER COLUMNS

LAB NOTES...

What's going on?

Compression means being squashed or pushed inwards, so compressive strength is the ability to withstand a large force, such as a heavy weight, without breaking. **Engineers and architects need to think about compressive strength when they design and build new buildings.**

In this experiment, you probably found that even though all of the shapes were made of the same material, the circular columns could hold more weight than either the flat walls or the triangular columns. The edges of the corners tend to be the weak point which is why the round columns with no corners can support a lot of weight without collapsing. We say that cylindrical columns have high 'compressive strength' and their shape can take a lot of weight without breaking. You may have seen columns holding up heavy structures like balconies on old buildings.

TO MAKE YOUR SUPER COLUMNS...

BUILD TIME
15
MINS

1. Watch the video of Nanogirl making her super columns!
2. Measure and draw two identical rectangles on the card, 25 cm long and 13 cm high, then cut them both out. These will be the floor and roof of your building.
3. Make your flat walls. Take one piece of paper, bring the long edges together and fold in the middle. Open the paper out, and cut up the centre fold to make two long rectangles.
4. Lay the paper rectangles on top of your piece of card and make a fold in the paper where they line up with the edge of the card.
5. Next, make some triangular columns. Take a fresh sheet of paper, bring the short edges together and fold in the middle. Fold in half again the same way, then fold in half once the other way.
6. Cut along the last fold you made then open both pieces of paper out, and you should have two long rectangles divided into four sections.
7. For each one, bend the paper into a triangle shape with the outside two sections overlapping to make a tab. Secure it in place with tape.
8. Next, make some circular columns. Take a fresh sheet of paper, bring the long edges together and fold in the middle. Open the paper out, and cut up the centre fold to make two long rectangles.
9. Roll each into a tube about the same width as the triangular columns and tape to secure.
10. Test each of your structures. Start by laying the 'floor' rectangle down on a flat surface.
11. Take the flat wall samples and stand them up their sides to make two walls with their folded tabs running along the short side of the floor. You might need some tape to help them stay upright.
12. Balance the cardboard roof on top of the paper.
13. If it holds the roof, add some weight to the roof one at a time until the structure collapses!
14. Test out the different shapes - which one can hold the most weight?

YOU WILL NEED

- Cardboard
- Ruler
- Pencil
- Tape
- Scissors
- 3 x sheet plain paper
- Small, heavy items to use as weights

Which shape could hold the most weight?

Does the size and height of the columns make a difference to how much weight it can hold? Try making some narrower or wider columns, or very tall ones!

Can you think of another shape that might be able to hold a lot of weight? Do you think a square column would be better or worst than a triangular one?

Why not build a secret lab for your mini-me with your favourite shape of column.