Questacon at HOME

Activity sheet

Sticks and Rubber Bands

Background

Around us there are many tall buildings and interesting sculptures, but how do they stay up?! In this activity, we will use sticks and rubber bands to create our own structures. Tinkering is a great way to discover how to build structures that might be large, complex, strong or have moving parts. It will also provide a deeper understanding of balance, joints, and geometry.

Materials

- A bag of rubber bands (thick rubber bands are best)
- Sticks of all shapes and sizes! Check your backyard for sticks and get a bundle to work with, but make sure they don't have any sharp points or edges! Or, if you can, try grabbing some dowel rods.

Safety

This activity uses sticks or rods, which can become a safety hazard if not handled sensibly. Adult supervision is recommended for young tinkerers.

Procedure

Find a suitable place to build: Before you start building make sure that you have a suitable location to build in. Some good places could be the backyard, the living room, or even a park!

Start building: Start by connecting two sticks together. Place a rubber band around the end of both the sticks and keep looping it until it becomes tight. Next, separate the other end of the sticks and add a third stick to create a triangle.

Follow your imagination: Once you have the hang of connecting sticks, try building more shapes and structures. Follow your curiosity and see what weird, interesting and cool things you can build. For more inspiration and challenges check out the "What's Next" section at the end of the document.

Activity sheet

Tips & tricks

- Start with smaller shapes like triangles and squares before trying more complex ones.
- If you're struggling to make a shape stand up or be strong, see if you can add sticks to break it up into smaller shapes. For example, a square can easily be turned into 2 or 4 triangles.
- It can be tricky to attach one stick to the middle of another. Try wrapping the rubber bands around the sticks a couple of times. This will Increase the tension in the rubber band and hold the joint tighter.

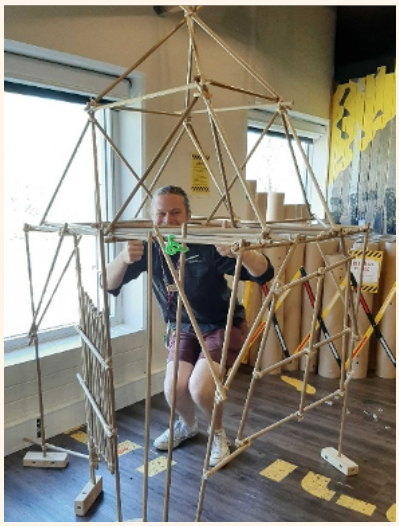
What's the Science?

Rubber bands possess a property known as elasticity; this means that they can be stretched and pulled and will return to their original shape when released. Anything elastic has a type of energy known as elastic potential energy, which is stored when the elastic is stretched and released when it is let go (which is why we can send them flying around!). This energy is what will hold the sticks together when you wrap the rubber bands around them. The tighter you pull/stretch them, the more elastic potential energy you build up and the stronger the join will be!

To build tall structures you need stability and strength. Triangles are the strongest shape and are frequently used in construction - just think of a roof angle or the pyramids. The internal angles of a triangle must always sum to 180 degrees. To change an angle in a triangle, you must also change the length of its sides. Since the rubber bands cannot easily move along the length of the sticks, the triangle's side lengths cannot change, meaning the shape is stable and strong.

What questions could I ask?

- Can you build it taller? What do we need to do to make it stable enough?
- Could you make it stronger? What do we need to change to do this?
- Could you make a different shape?
- Why do you think it fell over? What can we do to stop that from happening next time?



What's next?

Challenges can be a great way to test what you've learnt while tinkering around.

- **Bridge building** - try setting a distance goal for your bridge to accomplish and a weight that it needs to be able to support.
- **Limited materials** - try using only 10 sticks and 5 rubber bands, and see how tall you can build your structure.
- **Change it up** - can you change your tower or bridge into a fort?
- **Small-scale** – instead of using sticks outside, you could use paddle pop sticks or chopsticks to make a miniature structure.