



# BRILLIANT BALLOONS!

CLASS: 4<sup>th</sup> – 5<sup>th</sup>

90 mins

PHYSICS



## Learning Objectives - WALT (We are learning to...)

1. How Balloons work!
2. Pressure distribution
3. Materials and elasticity

## Curriculum links Energy and Forces

- **Science** – Learning about pressure, tension, and force distribution
- **Engineering** – Materials and their properties

## What is happening?

What happens when you blow up a balloon and stick a thumbtack into it? It pops! Balloons tend to pop when the air pressure inside is stronger than the actual material of the balloon itself. Sticking a pin into a balloon will weaken the material in one concentrated area and cause it to pop!

If we lay out lots of pins on a table and press the balloon down on it, it will not pop! This is because the pressure is now spread out over a much wider area. The force of you pushing down is now spread out over lots of pins meaning the tensions is less on each pin. If you used the same force to push down on onw pin, you'd pop the balloon!

This is the same physics behind someone lying on a bed of nails, standing on one nail may hurt you, but people can lie on beds of nails as their body weight is spread out evenly....just don't try this at home!

## Shopping List!

Balloons  
Thumbtacks  
Tape

## Procedure

First, blow up a balloon, if you let go of it, it will shoot off around the room!  
This is because of all the pressure built up inside.

A balloon blown up has more pressure inside it, so if you press it down onto a thumbtack on the table, it's going to pop! This is because the pressure of the pin is all forced on one point and causes the material to break.

Let us try with more thumbtacks, lay them all out on the table (make sure they are all upright). Blow up another balloon and place it on the pins. Start gently pressing it down...it will not pop! The weight is being spread out over all the points, but if you have one, all the weight is on that one point, so it pops!

We can also disperse the tension on the surface of the balloon by adding some tape to it! Stick a piece of tape to the balloon before trying to stick a pin in it. If you stick the pin in where the tape is you'll notice it won't pop! The tape helps spread the tension around, so it is not all on one point, which is why balloons pop in the first place.

