LESSON: Pins & Pressures

OBJECTIVE: To introduce the effect of pressure over surface area

## Materials

Balloon pump, drawing pins, 12" latex balloons

## Instructions

1. Inflate the balloon to 12 inches using a balloon pump and tie a knot in the end of the balloons
2. Place 1 drawing pin on the desk
3. Place the balloon onto the pin and apply some gentle pressure
4. Note the point at which the balloon bursts
5. Inflate a second balloon using a balloon pump and tie a knot in the end of the balloon
6. Now place 50 drawing pins on the desk
7. Place the balloon onto the pins and apply pressure
8. The balloon should not burst very easily

## Calculations

Pressure = force / area

1 drawing pin = 0.1 mm$^2$ surface area sharp tip

10 drawing pins = 1mm$^2$ surface area sharp tip

50 drawing pins = 5 mm$^2$ surface area sharp tip

If you apply 10N of force:

Pressure on balloon with 1 pin = 10 N /0.1 mm2 = 100 N / mm$^2$

If you apply a 10N force on 50 pins

Pressure on balloon with 50 pins = 10 N /5 mm2 = 0.2 N / mm$^2$

## Conclusion

A single pin creates a pressure of 100N / mm$^2$. 50 pins create a pressure of 0.2 N / mm$^2$. With 1 pin, the balloon is much more likely to burst due to the immense pressure the balloon experiences per mm$^2$. With 50 pins, the balloon experiences much less pressure, hence, the pressure is spread out over all the pins.

This tells us that the greater surface area, the lower the pressure experienced by the balloon per pin if the same force is applied.

Need some free balloons for your lessons? Contact us on info@partysafe.eu. Please keep the fun in balloons and dispose of them correctly. For more information and educational resources, please visit www.partysafe.eu.