Forces	4. Pressure

CONCEPT 1

LESSON GUIDE

PRESSURE ON A SOLID

PRECISE LEARNING POINTS

KNOW »

I know that a force applies pressure to a surface.

APPLY »»

I can apply my knowledge of pressure to explain how it can change depending on the force applied and the area of contact.

EXTEND »»»

I can extend my knowledge of pressure to use the following equation: pressure = force / area

NOTES

Pressure is force per unit of area.

This means that if you are standing on a paving slab, your weight (measures in Newtons) is applying a force downwards (due to gravity) on the part of the paving slab that is beneath your feet. After a while you will probably find that if you stay like this for a long period of time, your feet will start to hurt. That is because you are applying quite a lot of pressure onto a small area. If you were to lie down on the same slab, your weight would then be spread out over a much larger area. This would hurt far less.

This idea has lots of real life applications. A drawing pin is the most commonly used.

If you were to attempt to push a drawing pin into a wall without the large flat end you would find this very painful. This is because you are applying a large force to a very small area, therefore causing there to be a large amount of pressure on your thumb. The large flat end of a drawing pin means that you can apply the same amount of force to a much larger area, therefore reducing the pressure on your thumb and allowing you to create a high pressure on the pin end to drive it into the wall.

Large area
Low pressure

Small area
High pressure
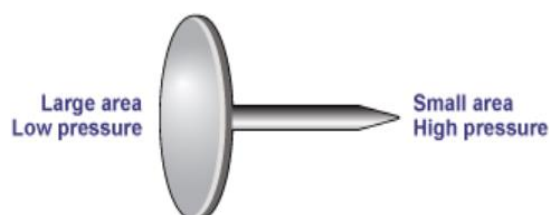
Pressure can be calculated using the following equation:

$$Pressure = \frac{force}{area}$$

pressure in **Pascals**
force in **Newtons**
area in **metres squared** (m²)

Example: Calculate the pressure applied to the floor if a 10N box is placed on the floor. The area of the bottom of the box is 0.25m^2.

Pressure = Force ÷ Area
Pressure = 10 ÷ 0.25
Pressure = 40 Pa