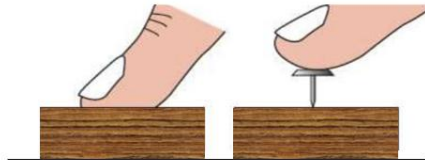


Pressure Knowledge Organiser

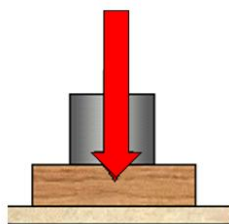
Topic Overview

Pressure on solid surfaces

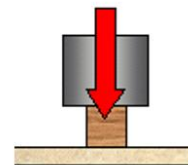
- Whenever an object rests on a solid surface, the surface pushes back against the object, balancing the weight.
- The effect that the force of gravity has on the surface depends on the size of the force and the area it is acting over. Look at the diagram below:



- The drawing pin will sink into the wood as it has a small surface area which concentrates the force.
- The finger won't sink in as it has a large surface area which spreads out the force.
- The effect of a force over an area is called **pressure**.
- Pressure can be increased by:



Increasing the size of the force



Decreasing the area

- Since pressure is a measure of how spread out a force is, it can be calculated using this equation:

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

- The units for force and area are used to give the units for pressure.
- Look at the example questions below:

A tracked excavator has a weight of 210,000N. The area in contact with the ground is 4m²

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}} = \frac{210,000\text{N}}{4\text{m}^2} = 52,500\text{N/m}^2$$

A man weighs 880N and his shoes have an area of 500cm². What pressure does he put on the floor?

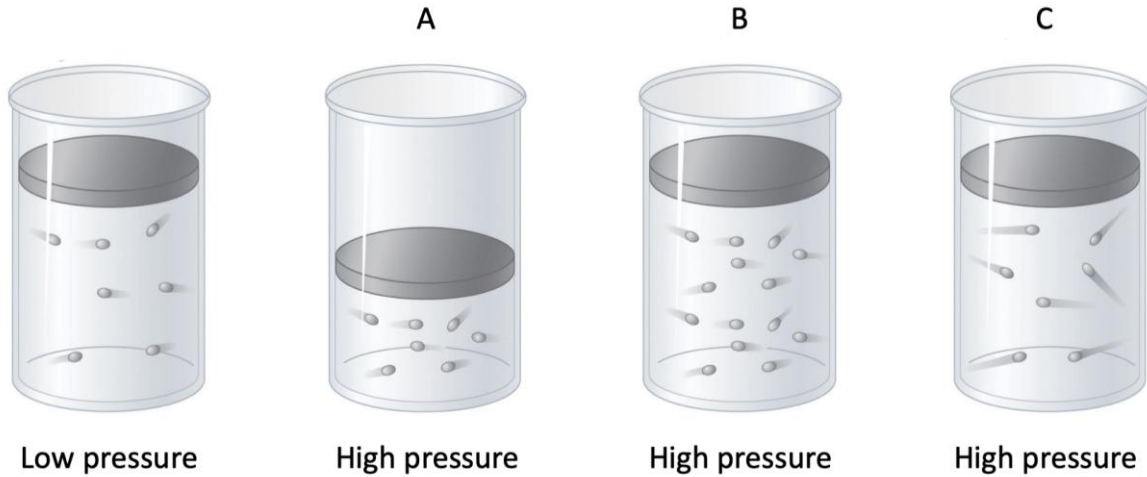
$$\text{Pressure} = \frac{\text{Force}}{\text{Area}} = \frac{880\text{N}}{500\text{cm}^2} = 1.76\text{N/cm}^2$$

- Sometimes pressure is measured in Pascals (Pa)
 - 1 Pa is the same as 1 N/m²,
 - 1000 Pa equals 1 kilopascal (kPa).

Pressure in fluids

- Fluids are liquids and gases.
- The particles in fluids are moving at random, this means they can **collide** into surfaces such as the wall of the container they are in – this is what causes **pressure**.

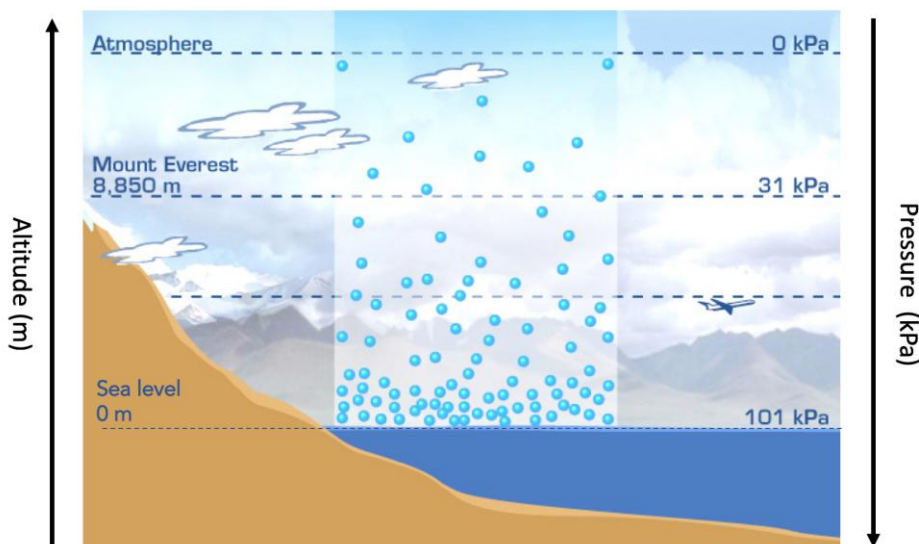
- Each particle only applies a very small force, however, the more collisions there are, the higher the pressure.
- You can increase the number of collisions and therefore the pressure by:
 - A. Reducing the volume of the container
 - B. Increasing the number of particles
 - C. Increasing the temperature (particles have more energy and so move more)



- Very large pressures can be generated; however, you can usually only see the effects of pressure in fluids when the pressures inside and outside an object are different e.g. when you put marshmallows into a vacuum.

Atmospheric pressure

- The closer you are to sea-level, the higher the pressure.
- This is because the weight of the particles above pushes the particles at sea-level closer together.
- As we saw earlier, when there are more particles, there are more collisions, and this makes the pressure higher.

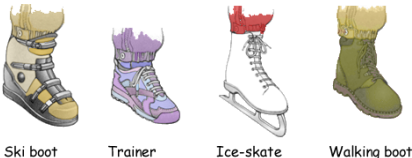




- The same is true in water, the deeper you go, the higher the pressure.

Floating and sinking

- Buoyancy is the force that pushes up on objects in fluids. It is caused by particles in a liquid colliding with the object. Weight is the force of gravity acting on an object. When objects float the weight and buoyancy force are equal.

Pressure Key Fact Test 1-10

No	Questions	Answers	<input checked="" type="checkbox"/>
1	What do we call the measurement of how spread out a force is?	Pressure	
2	Which two measurements do you need to know in order to calculate pressure?	Force AND area	
3	How does increasing the area the force is applied over affect the pressure?	It reduces the pressure	
4	Which shoe would have the greatest pressure?  <small>Ski boot Trainer Ice-skate Walking boot</small>	The ice-skate (smallest area)	
5	Does a snowshoe create a high or low pressure? 	Low (because they spread out your weight)	
6	How does increasing the size of the force affect the pressure applied?	It increases the pressure	
7	Does the empty or full box create the biggest pressure? 	The full box (it is heavier)	
8	What is the equation for pressure?	Pressure = $\frac{\text{Force}}{\text{Area}}$	
9	What is 1 Pascal equal to?	1 N/m ²	
10	How many Pascals are in 1kPa?	1000	

Pressure Key Fact Test 11-20

No	Questions	Answers	<input checked="" type="checkbox"/>
11	What causes pressure in fluids?	Particles colliding with a surface	
12	How can the volume of a container be changed to increase the pressure?	You should decrease the volume (make the container smaller)	
13	How can the number of particles be changed to increase the pressure?	You should increase the number of particles	
14	How can the temperature be changed to increase the pressure?	You should increase the temperature (make it hotter)	
15	What do we call the height you are above the Earth?	Altitude	
16	What altitude is sea-level?	0 metres	
17	What do we call the pressure caused by the weight of the air above a surface?	Atmospheric pressure.	
18	What is atmospheric pressure measured in?	Kilopascals (kPa)	
19	What happens to atmospheric pressure as the altitude increases?	It decreases.	
20	What happens to pressure as you go deeper underwater?	It increases	