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Glue on this side

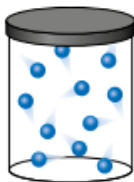
# Pressure

1	I can state that pressure in liquids increases with depth
2	We can calculate the amount of pressure on an object using a simple formula: <div>Pressure = force ÷ area</div>
3	I can describe the effect of changing pressure on an object and describe ways of increasing or decreasing pressure.
4	I can state that atmospheric pressure decreases with an increase in height due to decrease in weight of air.
5	I explain some applications of increasing or decreasing pressure and I can explain the effects of pressure on an object in terms of pressure.
6	I can calculate density when given a simple formula: <div>Density = mass ÷ volume</div>

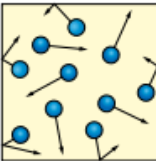
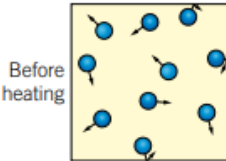
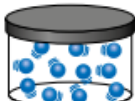
	Keyword	Definition
1	Atmospheric pressure	The pressure caused by the Mass of the air above a surface.
2	Fluid	A substance with no fixed shape, a gas or a liquid.
3	Gas pressure	The force exerted by air particles when they collide with a surface.
4	Incompressible	Cannot be compressed (squashed).
5	Liquid pressure	The pressure produced by collisions of particles in a liquid.
6	Pa = N/m <sup>2</sup>	Pascals (Pa) and Newtons per metres squared (N/m <sup>2</sup> ) are equal and are both units of pressure.
7	Pressure	The ratio of force to surface area in either Pa or N/m <sup>2</sup> and how it causes stresses in solids.

Pressure in gases

**Collisions** between gas particles and their container produce **gas pressure**.



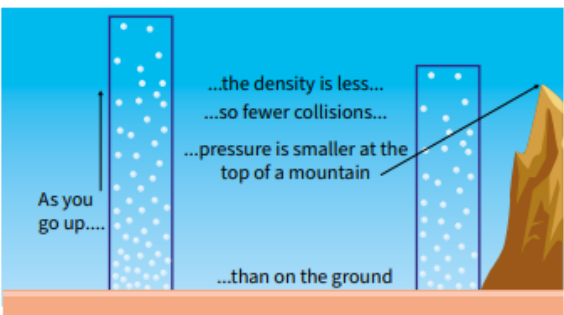
If you **compress** (squash) a gas into a smaller volume there will be more collisions, and so a higher pressure.



If you heat a gas, the particles will have more energy. This means they will move more quickly and collide with the container more often, so the pressure will be greater.

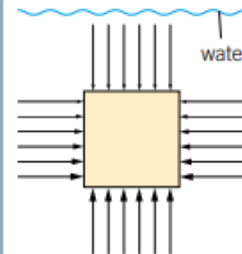
**Atmospheric pressure** is the pressure acting on us from the air around us.

- The higher above sea level the lower the atmosphere pressure.
- This is because the air is less dense the higher you go above sea level, so there are fewer collisions between air particles.



Pressure in liquids

- Solids and liquids are **incompressible**, because all the particles are touching already. This means they pass pressure on.
- The pressure at the bottom of a liquid is bigger than at the top, because the weight of the water pushing down increases with depth.



Objects float because of **upthrust**. Liquid pressure produces this upthrust. In the example, the object floats because the upthrust acting on the bottom of it is stronger than the forces acting on the top.

Pressure in solids

- Pressure is the force exerted on a surface because of weight, and is measured in **newtons per metre squared** or **Pascal (Pa)**. Where  $1 \text{ N/m}^2 = 1 \text{ Pa}$ .
- For small areas you can use centimetres instead.
- Pressure explains why studded boots help you grip grass, or why snowshoes help you walk in snow.

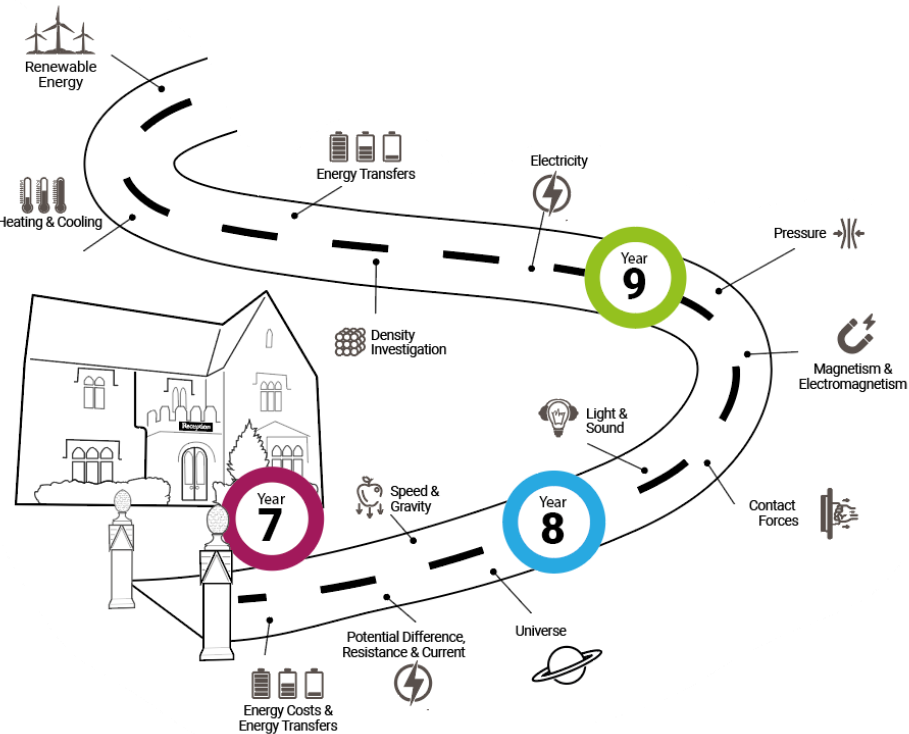
$$\text{pressure (N/m}^2\text{)} = \frac{\text{force (N)}}{\text{area (m}^2\text{)}}$$

Careers:  
Engineer  
Mechanic  
Pilot  
Diver  
Marine Biologist

Future Learning:  
At GCSE you will learn a force is a push or pull that acts on an object due to the interaction with another object.

Why?  
Engineers analyse forces when designing a great variety of machines and instruments, from road bridges and fairground rides to atomic force microscopes. Recent developments in artificial limbs use the analysis of forces to make movement possible.

Prior Knowledge From KS2:  
At KS2 you should understand what a force is and compare how things move on different surfaces - notice that some forces need contact between two objects, but magnetic forces can act at a distance



Topic	1 Point	2 Points	4 Points	6 Points	10 Points
<b>Calculating Pressure</b> 	Write down the units of pressure.	Draw the formula triangle for calculating pressure on a solid. (Include units).	Design leaflet for a KS2 audience, explaining how we can use a formula triangle to calculate pressure, area and force.	Design a poster to explain why a person wearing a stiletto heel exerts more pressure on the ground than an elephant standing on one leg.	Research the scientist that figured out the basic pressure calculation (Blaise Pascal) and write a short essay on the studies he carried out.
<b>Pressure in gasses</b> 	State what happens to the speed of gas molecules when the temperature goes down.	Draw a labelled diagram to explain what happens to gas molecules as the temperature goes down.	Design a lab leaflet explaining why pressurised gasses they can be heavy and why are potentially dangerous.	Write a short paragraph explaining why an inflated balloon will deflate if you put it into a freezer.	A student wants to investigate how the volume of a fixed amount of air in a balloon changes with temperature. Write a plan for their investigation.
<b>Pressure in Liquids</b> 	State why liquids are classed as incompressible.	Describe what happens to a polystyrene cup as you submerge it into the depths of the ocean.	Draw a labelled diagram of a dam, explaining why it is wider at its base than at its top.	A primary school student says that "Heavy things sink and light things float"; Using the example of a ferry, explain to them why this is not true (Clue - Density)	Using your knowledge of the effects of pressure in liquids, design a vessel to take you down to the bottom of the ocean and back.