# 8I Fluids

## 1. The Particle Model

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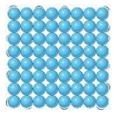
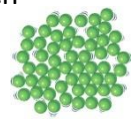
| **States of Matter** | The three forms that a substance can be in; solid, liquid or gas. |
| **Solid Properties** | Do not flow, fixed shape, fixed volume, cannot be compressed |
| **Liquid Properties** | Can flow, no fixed shape, fixed volume, cannot be compressed |
| **Gas Properties** | Can flow, no fixed shape, no fixed volume, can be compressed |
| **Particle Theory** | Used to explain the different properties and observations of solids, liquids and gases. |
| **Solid Particle Properties** | Fixed arrangement of particles held closely together that cannot move over each other but vibrate.  |
| **Liquid Particle Properties** | Held closely together but not in a fixed arrangement and can move over each other.  |
| **Gas Particle Properties** | Far apart from each other and free to move about in all directions.  |
| **Diffusion** | The movement of particles spreading out and mixing with each other without anything moving them. |
| **Brownian Motion** | An erratic movement of small specks of matter caused by being hit by the moving particles that make up liquids or gases. |
| **Expanding** | Materials expand when heated because the particles vibrate more, taking up more space. |
| **Contract** | Materials contract when cooled because the particles vibrate less and take up less space. |
| **Density** | The mass of a certain volume of a material. $density = \frac{mass}{volume}$ |

## 3. Pressure in Fluids

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| **Fluids** | Liquids and Gases |
| **Pressure** | The force of particles hitting things- comes from all directions in gases and liquids. |
| **Pressure Units** | **Pascals (Pa)** One pascal is the force of one newton on every square metre. |
| **Atmospheric Pressure** | The pressure of the air- 100,000 Pa |
| **Tyres** | Contain air under high pressure because they are pumped with extra air causing more particles to hit the inside walls. |
| **Temperature** | Pressure in fluids increases as you increase temperature because particles move faster and hit the walls of the container harder. |
| **Volume** | If you compress a gas into a smaller volume the pressure increases because the particles hit the walls more. |
| **Pressure From Above** | As you go down the ocean there is more water above you so pressure increases. As you go up a mountain there is less air above you so pressure decreases. |

## 4. Floating and Sinking

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| **Upthrust** | The force of water pushing upwards. |
| **Weight** | The amount of force with which gravity pulls on a mass. |
| **Water** | The density of water is 1 $g/cm^3$ |
| **Floating** | If something has a density less than water it will float in water. |
| **Sinking** | If something has a density greater than water it will sink in water. |
| **Air** | The density of air at sea level is around 0.001 $g/cm^3$ |
| **Hot Air Balloons** | Fly because the overall density of the balloon is less than the air around it. |