

Keyword	Definition
<b>Particle</b>	A term for a small piece of matter. For example atoms.
<b>Matter</b>	A substance which is made up by atoms or molecules.
<b>Internal Energy</b>	The total kinetic energy and potential energy of the particles in an object.
<b>Specific Heat Capacity</b>	The amount of energy needed to raise the temperature of 1kg of substance by 1°C.
<b>Thermal Conductivity</b>	A measure of how well a material conducts energy when it is heated.
<b>Conduction</b>	The transfer of heat through a material by transferring kinetic energy from one particle to another.
<b>Convection</b>	The transfer of thermal energy through a moving liquid or gas.
<b>Infrared Radiation</b>	Electromagnetic radiation emitted from a hot object.
<b>Pressure</b>	The force exerted per unit of area. Pressure = force ÷ area
<b>Density</b>	The amount of mass that 1cm <sup>3</sup> of a substance has.
<b>Density (formula)</b>	Density = mass ÷ volume $\rho = m \div v$

**Calculating Pressure**

Pressure = Force ÷ Area

$$P = \frac{F}{A}$$

Labels: N (Force), m<sup>2</sup> (Area), N/m<sup>2</sup> (Pressure)

**Conduction**

Heat energy is conducted from the hot end of an object to the cold end. In metals, there are 'free electrons'. This is when electrons in a metal can leave their atoms and move through the structure. When the metal is heated, the particles gain kinetic energy and energy is transferred from the hot part of the metal to the cooler parts because of the movement of the free electrons.

**Convection**

Liquids and gases are fluids because they can be made to flow. Liquids and gases expand when they're heated. The fluids in hot areas are less dense than in cold areas, so the particles rise into the colder area. The fluids then cool, and become more dense. Therefore, the cold fluids fall into the warmer areas. In this way, convection currents that transfer heat from place to place are set up.

**Forces between particles:**

**Solid:** There are strong forces of attraction between the particles in a solid. Therefore, particles can only vibrate in a fixed position.

**Liquid:** There are weaker forces of attraction between the particles in a liquid. Therefore, the particles are close together, and are able to move around each other.

**Gas:** The forces of attraction between the particles are overcome. Therefore, the particles are far apart and move quickly in all directions.

Solid	Liquid	Gas
The particles vibrate in a fixed position.	The particles are close together and move around each other.	The particles are far apart and move quickly in all directions.
The particles cannot move from place to place.	The particles are arranged in a random position.	The particles are arranged in a random way.
Particles have a fixed shape and cannot flow.	The particles flow and take the shape of the bottom of their container.	The particles flow and completely fill their container.
The particles cannot be compressed (squashed)	The particles cannot be compressed.	The particles can easily be compressed.

**Density:**  
1kg of a gas has a larger volume than 1kg of a solid. There is empty space between particles in a gas, but in a solid, they're tightly packed together.

**Calculating Density:**  
**Density = Mass ÷ Volume**  
**Density = 20g ÷ 200cm<sup>3</sup>**  
**Density = 0.1g/cm<sup>3</sup>**

**Specific heat capacity**

- This is the amount of energy needed to raise the temperature of 1kg of a material by 1°C

$$E = m \times c \times \theta$$

Labels: Energy (J), Mass (kg), Specific heat Capacity (J °C<sup>-1</sup> kg<sup>-1</sup>), Change in temperature (°C)

**Internal Energy:**  
The internal energy is the total amount of kinetic energy and potential energy of all the particles in the system.

**Further Reading:**

<https://www.bbc.co.uk/bitesize/guides/ztttd2p/revision/1>  
<https://www.bbc.co.uk/bitesize/guides/z2gjt4/revision/5>  
<https://www.bbc.co.uk/bitesize/guides/zssbgk7/revision/1>

<p><b>Conduction</b></p> <p>Energy is transferred by direct contact</p>	<p><b>Convection</b></p> <p>Energy is transferred by the mass motion of molecules</p>	<p><b>Radiation</b></p> <p>Energy is transferred by electromagnetic radiation</p>
---	---	---