Key points to learn:

• Particle diagrams for solids, liquids and gases are:





- All substances have internal energy due to the position and movement of the particles
- Gases have the highest internal energy, followed by liquids. Solids have the lowest.

Page 31 KS3 Physics revision guide

Key points to learn:

- Density depends on how much matter is contained within a particular volume. It is defined as **mass per unit volume**.
- The equation to calculate density is:

- If in a fluid, substances with a lower density than the fluid will float and substances with a higher density will sink
- Solids have a higher density than liquids and liquids have a higher density than gases. Ice is an exception to this.
- The density of water is 100kg/m³ or 1 g/cm3.
- Page 31 KS3 Physics revision guide Year 7 Physics Matter

$$density = \frac{mass}{volume}$$



Key points to learn:



- Diffusion is when a substance moves from an area of high concentration to an area of low concentration.
- Diffusion only takes place in liquids and gases as the particles can move freely.
- Diffusion happens faster at higher temperatures because the average speed of the particles increases
- Diffusion is hindered by Brownian motion where air particles collide with the particles of the substance and they move in random directions



Key points to learn:

- Temperature describes how hot or cold and object is and it is usually measured in °C.
- Heat is a form of energy and is measured in joules (J). Another name for heat energy is thermal energy.
- Objects with more mass store more thermal energy at the same temperature.
- Energy will be transferred from a warmer to a cooler object until they reach the same temperature (thermal equilibrium).



Key points to learn:

- Thermal energy travels through solid objects by conduction
- Substances expand when heated and contract when cooled.
- During expansion the internal energy of the substance increases.
- During contraction the internal energy of the substance decreases.

Page 13 KS3 Physics revision guide



Key points to learn:



- Liquids and gases are examples of fluids.
- Heat energy in liquids and gases can be transferred through convection currents.
- When a fluid is heated the particles gain energy and the fluid becomes less dense so the fluid rises. The opposite happens when a fluid is cooled.

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Key points to learn:

- A change of state is caused by the increase/decrease of energy in particles. This affects their movement and spacing.
- Temperature remains constant when a change of state takes place as the energy is used to change the potential energy of the particles, not their kinetic energy



• Melting and boiling points are fixed temperatures, but evaporation can take place at lower temperatures than boiling point.

Page 30 KS3 Physics revision guide

