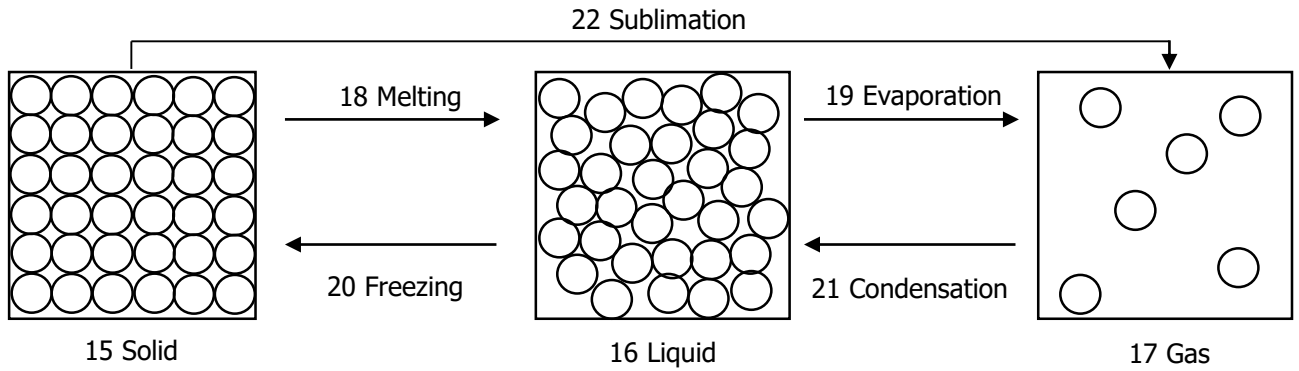
Physics 3: Particle Model of Matter

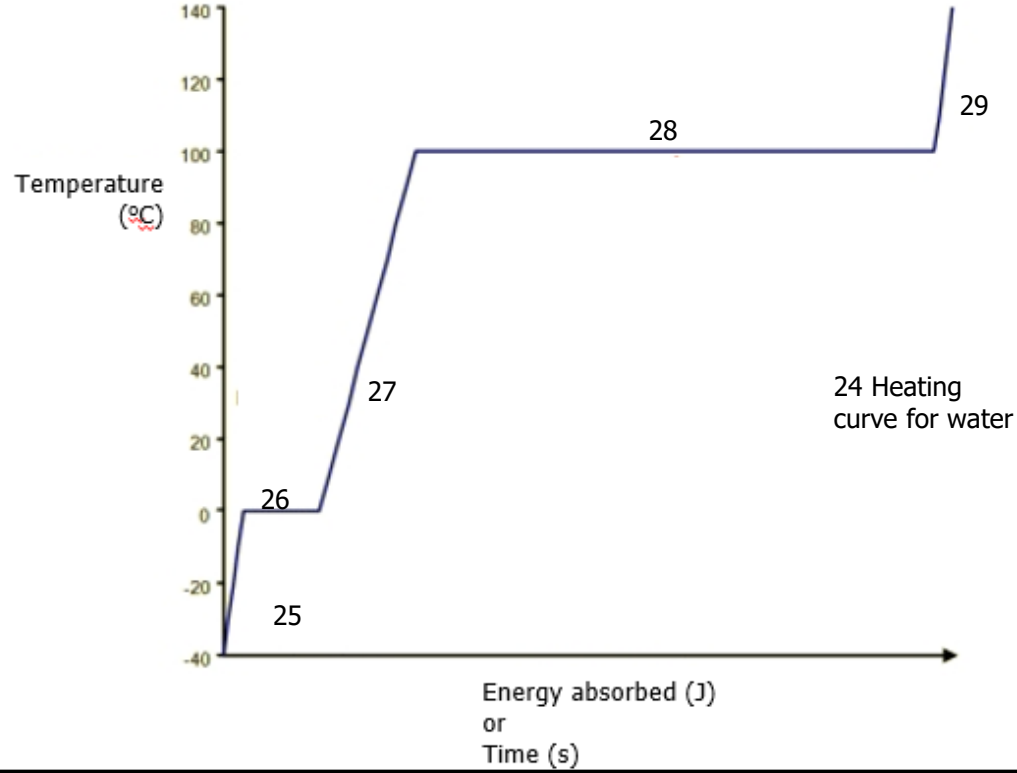
Section 1: Key Terms

1 Density	How much **mass** a substance contains **compared to its volume**. Solids are usually dense because the particles are closely packed.
2 State of matter	The way in which the **particles are arranged** – solid, liquid or gas.
3 Change of state	When a substance **changes from one state of matter** to another (e.g. melting is the change from a solid to a liquid). Energy changes the state, not the temperature.
4 Physical change	A change that can be **reversed** to recover the original material. **E.g. a change of state.**
5 Chemical change	A change that **creates new products**. It **cannot be revered**. E.g. a chemical reaction.
6 Internal energy	The **energy stored** inside a system **by the particles** (atoms and molecules) that make up the system. Internal energy is the **total kinetic energy and potential energy of all the particles.**
7 Kinetic energy	**Energy stored** within **moving objects** (e.g. particles).
8 Potential energy	**Energy stored** in **particles** because of their **position.** The **further apart** particles are, **the greater the potential energy.**
9 Specific heat capacity	The specific heat capacity of a substance is the **amount of energy** required to **raise the temperature of one kilogram** of the substance **by one degree Celsius**. Equation in P1
10 Temperature	The **average kinetic energy** of the **particles**.
11 Specific latent heat	The **amount of energy** required to **change the state of one kilogram** of the substance with **no change in temperature**.
12 Latent heat of fusion	**Energy required** to change state from **solid to liquid**.
13 Latent heat of vaporisation	**Energy required** to change state from **liquid to vapour**.
14 Gas Pressure	The **force** exerted by gases on surface as the **particles collide** with it. **As temperature increases, gas pressure increases** if the volume stays constant.



Section 2: Equations to learn

Calculation	Equation	Symbol equation	Units
23 Density	Density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{v}$	Density = kilograms / metre^3 (kg/m^3) Mass = kilograms (kg) Volume = metres^3 (m^3)



24 Heating curve for water

Section 3: Explaining a heating curve

25 Solid	Particles are closely packed, fixed and arranged in regular layers. As more energy is absorbed the kinetic energy and therefore the internal energy of the material increases.
26 Melting	Temperature doesn't change. Energy is used to weaken the forces between particles. As more energy is absorbed the potential energy and therefore the internal energy of the material increases.
27 Liquid	Particles are touching but no longer arranged regularly. They are above to move. As more energy is absorbed the kinetic energy and therefore the internal energy of the material increases.
28 Evaporation	Temperature doesn't change. Energy is used to weaken the forces between particles. As more energy is absorbed the potential energy and therefore the internal energy of the material increases.
29 Gas	Particles move randomly. As more energy is absorbed the particles move more quickly and the temperature increases.

24 Change of state energy	Energy = mass x Specific latent heat	E= mL	Energy E, in joules J Mass m = kilograms (kg) L = specific latent heat in joules per kilogram, J/kg