P3 Particle Model of Matter

Density	Know the equation for density = mass/volume (ρ =M/V) SI units (kg, m^3, kg/m^3)	Green	Amber	Red
Required practical activity 5:	**use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids**. Volume should be determined from the dimensions of regularly shaped objects, and by a displacement technique for irregularly shaped objects. Dimensions to be measured using appropriate apparatus such as a ruler, micrometer or Vernier callipers.	Green	Amber	Red
Particle model and states of matter	Use the particle model to explain: • The different states of matter • The comparative densities of each state	Green	Amber	Red
Changes of state	Explain changes of state in terms of behaviour and hence rearrangement of particles.	Green	Amber	Red
Internal Energy	Define internal energy as the sum of the kinetic energies and potential energies of all the particles (atoms and molecules) that make up a system. Supplying heat energy to a material increases the internal energy of the system by either increasing: • the Kinetic Energy of the particles (increasing their temperature) or • their Potential Energy (changing their state).	Green	Amber	Red
Specific Heat capacity	If the **temperature** of a system increases, the increase depends on the **mass** of the substance heated, the **type of material** and the **energy input to the system**. The following equation applies: change in thermal energy = mass × specific heat capacity × temperature change ($\Delta E = m\, c\, \Delta \theta$) Specific Heat capacity is the amount of energy required to raise the temperature of 1kg by 1^0C Any heating causes an increase in the KE of particles and hence the internal energy.	Green	Amber	Red
and Specific Latent heat	If a change of state happens: The energy needed for a substance to change state is called **latent heat** (latent means ***hidden*** and shows that the energy doesn't raise the temperature). When a change of state occurs, the energy supplied changes the potential energy of the particles as they ***separate***, but not the kinetic energy. The **specific latent heat** of a substance is the amount of energy required to **change the state of one kilogram** of the substance with **no change in temperature**. energy for a change of state = mass × specific latent heat ($E = m\, L$)	Green	Amber	Red

	Interpret Cooling and heating graphs in terms of changes in internal energy and changes of state. Differentiate between fusion (solid to liquid) and vaporisation (liquid to gas).			
Particle Model and Gas Pressure	Using a particle model, you should be able to: • explain how the motion of the molecules in a gas is related to both its temperature and its pressure • explain qualitatively the relation between the temperature of a gas and its pressure at constant volume.	Green	Amber	Red
Pressure in Gases (Physics only)	Use the particle model to explain how **increasing the volume** in which a gas is contained at **constant temperature** can lead to a **decrease in pressure**. **Boyle's Law** For a fixed mass of gas held at a constant temperature: Pressure × volume = constant (p V = constant) Carry out calculations using the above relationship.	Green	Amber	Red
Increase in Pressure (Physics only)	Work is the transfer of energy by a force. Doing work on a gas (i.e. applying a force and moving it through a distance) increases the internal energy of the gas and can cause an increase in the temperature of the gas. Be able to explain how, in a given situation e.g. a bicycle pump, doing work on an enclosed gas leads to an increase in the temperature of the gas and hence the pressure it exerts on the surface of its container.	Green	Amber	Red