P1 Module Outline

- Describe how and why the atomic model has changed over time
- Describe the atom as a positively charged nucleus surrounded by negatively charged electrons, with the nuclear radius much smaller than that of the atom and with almost all of the mass in the nucleus
- Recall the typical size (order of magnitude) of atoms and small molecules
- Define density
- Explain the differences in density between the different states of matter in terms of the arrangements of the atoms and molecules
- Apply the relationship between density, mass and volume to changes where mass is conserved
- Describe how mass is conserved when substances melt, freeze, evaporate, condense or sublimate
- Describe that these physical changes differ from chemical changes because the material recovers its original properties if the change is reversed
- Describe how heating a system will change the energy stored within the system and raise its temperature or produce changes of state
- Define the term specific heat capacity and distinguish between it and the term specific latent heat
- Apply the relationship between change in internal energy of a material and its mass, specific heat capacity and temperature change to calculate the energy change involved
- Apply the relationship between specific latent heat and mass to calculate the energy change involved in a change of state
- Explain how the motion of the molecules in a gas is related both to its temperature and its pressure
- Explain the relationship between the temperature of a gas and its pressure at constant volume (qualitative only)
- *Recall that gases can be compressed or expanded by pressure changes and that the pressure produces a net force at right angles to any surface (separate Sciences only)*
- *Explain how increasing the volume in which a gas is contained, at constant temperature can lead to a decrease in pressure*
- ***Explain how doing work on a gas can increase its temperature (Triple only) (Separate Science only)***
- *Describe a simple model of the Earth's atmosphere and of atmospheric pressure (Separate Science only)*
- *Explain why atmospheric pressure varies with height above the surface of the planet (Separate Science only)*
- ***Describe the factors which influence floating and sinking (Triple only) (Separate Science only)***
- ***Explain why pressure in a liquid varies with depth and density and how this leads to an upwards force on a partially submerged object (Triple only) (Separate Science only)***
- ***Calculate the differences in pressure at different depths in a liquid (Triple only) (Separate Science only)***

P1 Formulae to Learn

density (kg/m^3) = mass (kg)/volume (m^3)

Pressure (Pa) = Force (N) / Area (m^2) (separate Science only) Also in P2

P1 Formulae to Use (provided in the exam)

change in thermal energy (J) = mass (kg) x specific heat capacity (J/kg°C) x change in temperature (°C)

thermal energy for a change in state (J) = mass (kg) x specific latent heat (J/kg)

for gases: pressure (Pa) x volume (m^3) = constant (for a given mass of gas and at a constant temperature) (Separate Science only)

pressure due to a column of liquid (Pa) = height of column (m) x density of liquid (kg/m^3) x g (N/kg) (Triple only) (Separate Science only)