



The Sutton Academy

Knowledge Rich Curriculum Plan

SCIENCE- Physics Year 10

Particle Model of Matter

Lesson/Learning Sequence	Intended Knowledge: <i>Students will know that...</i>	Prior Knowledge: <i>In order to know this, students need to already know that...</i>	Working Scientifically	Tiered Vocabulary and Reading Activity
Lesson: Changes of State	- Students will know that when a substance changes state, mass is conserved - Students will know that changes of state are physical changes, which differ from chemical changes because the material recovers its original properties if the change is reversed - Students will know that the energy is stored inside a system by the particles, and that this energy is called internal energy - Students will know that internal energy is the total kinetic energy and potential energy of all the particles that make up a system - Students will know that heating changes the energy stored within the system by increasing the energy of the particles that make up the system. This change will either raise the temperature of the system or produce a change of state	<i>Students need to already know that:</i> <i>melting: solid --> liquid</i> <i>freezing: liquid --> solid</i> <i>Evaporate: liquid --> gas</i> <i>Condense: gas --> liquid</i> <i>Sublimate: solid --> gas</i> <i>Students need to already know that particle diagrams can be used to represent solids, liquids and gases</i>		Tier 2 Volume: The amount of space that a substance or object occupies measured in mm³, cm³ or m³. Tier 3 Internal Energy: the total kinetic energy and potential energy of all the particles in a system
Lesson: Density	- Students will know that density is defined by the equation: density = mass ÷ volume - Students will know that the units of density are kilograms per metre cubed - Students will know how to recognise/ draw particle diagrams for solids, liquids and gases - Students will know that generally solids are more dense than liquids, which are more dense than gases - Students will know how to explain the differences in density of substances using the particle model Students will know how to explain the differences in density between different states of matters in terms of the arrangement of atoms or molecules.	<i>Students need to already know that density is a measure of how the amount of mass a substance has in a given volume</i> <i>Students need to already know that the units of volume are metres cubed</i> <i>Students need to already know that particle diagrams can be used to represent solids, liquids and gases</i> <i>Students need to already know that the units of mass are kilograms</i>	Using formula from the equation sheet	Tier 2 Tier 3 Density: a measurement of mass per unit volume

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Lesson: Density required practical	- Students will know how to practically measure the density of a regular shape - Students will know how to practically measure the density of an irregular shape	<i>Students need to already know that a balance is used to measure mass</i> <i>Students need to already know how to calculate volume of shapes</i> <i>Students need to already know how to measure volumes of liquids</i>	Measuring mass and volume Recording data accurately.	Tier 2 Tier 3 Density: a measurement of mass per unit volume
Lesson: Particle Motion in Gases	- Students will know that the molecules of a gas are in constant random motion - Students will know that the temperature of a gas is related to the average kinetic energy of the molecules of the gas. - Students will know that changing the temperature of a gas at constant volume will change the pressure exerted by the gas. - Students will know how to explain the motion of the molecules in a gas relating it to the temperature and the pressure Students will know how to explain qualitatively the relation between temperature and pressure (at constant volume)	<i>Students need to already know that the particles in a gas are able to move freely within their container.</i>		Tier 2 Random: Happening without method or conscious decision Tier 3 Pressure: continuous physical force exerted on or against an object by something in contact with it
Lesson: Pressure in gases (Triple only)	- Students will know that gases can be compressed or expanded by pressure changes. - Students will know that gas pressure produces a net force at right angles to the wall of the container. - Students will know how to use the particle model to explain how increasing the volume (at constant temperature) can decrease the pressure. - Students will know that for a mixed mass of gas at constant temperature: $\text{pressure} \times \text{volume} = \text{constant}$ $pV = \text{constant}$ - Students will know that the unit for pressure is pascals, Pa	<i>Students need to already know that the particles in a gas are able to move freely within their container.</i>	Using formula from equation sheets	Tier 2 Tier 3 Pressure: continuous physical force exerted on or against an object by something in contact with it

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	- Students will know that work is the transfer of energy by a force - Students will know that doing work on a gas increases the internal energy of the gas, leading to an increase in the temperature of the gas - Students will know how to use the equation: pressure x volume = constant			