



The Sutton Academy

Knowledge Rich Curriculum Plan

SCIENCE- Physics Year 11

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: Momentum (HT only)	- Students will know that momentum is defined by the equation: momentum = mass x velocity $p = m v$ - Students will know that the units of momentum are kg m/s - Students will know how to use the momentum equation to calculate momentum, mass and velocity - Students will know that in a closed system, the total momentum before an event is equal to the total momentum after the event - Students will know how to describe and explain examples of momentum in an event, such as collisions - Students will know how to complete calculations involving an event, such as the collision of two objects (TRIPLE ONLY)	<i>Students need to already know that the unit of mass is kg</i> <i>Students need to already know that the unit of velocity is m/s</i> <i>Students need to already know how to convert units</i>	Using formula from the equation sheet	Tier 2 Tier 3 Momentum: a measure of the tendency of an object to continue moving
Acceleration	- Students will know that acceleration is a measure of the rate of change of velocity - Students will know that the unit of acceleration is m/s^2 - Students will know that an object slowing down is decelerating, and that this is negative acceleration - Students will know that acceleration is calculated using acceleration = change in velocity / time taken - Students will know how to calculate acceleration using both the acceleration equation and the uniform acceleration equation found in the data sheet.	<i>Students need to already know velocity is a vector quantity</i>	Use of formula from the equation sheet	Tier 2 Tier 3 Acceleration: the rate of change in velocity

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Lesson: Newton's second law	- Students will know that the acceleration of an object is proportional to the resultant force acting on an object, and inversely proportional to the mass of the object - Students will know that the equation that links resultant force, mass and acceleration is: Resultant force = mass x acceleration $F = m a$ - Students will know that the unit of acceleration is m/s^2 - Students will know how to explain that inertial mass is a measure of how difficult it is to change the velocity of an object (HT only) - Students will know how to use the resultant force equation to calculate force, mass and acceleration - Students will know how to estimate the speed, accelerations and forces involved in large accelerations for everyday road transport - Students will know how to convert between units	<i>Students need to already know that the unit of force is Newton</i> <i>Students need to already know that the unit of mass is kg</i>	Use of formula from the equation sheet	Tier 2 Proportional: having a constant ratio with another quantity Tier 3 Inertial mass: a measure of how difficult it is to change the velocity of an object
Lesson: Required Practical - Newton's Second Law	- Students will know that in this investigation the independent variable is force, the dependent variable is acceleration and the control variables are mass and the amount of friction - Students will know how to investigate the effect of increasing force on the motion of an object - Students will know how to investigate the effect of varying the mass of an object on the	<i>Students need to already know that the acceleration of an object is proportional to the resultant force applied on the object and inversely proportional to the mass of the object.</i>	Recording data Interpreting Data Interpreting Graphs	Tier 2 Tier 3

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	acceleration of an object produced by a constant force			
Lesson: Forces in Collisions	- Students will know that when a force acts on an object that is moving, or able to move, a change in momentum occurs - Students will know that the equation linking force and change in momentum is: Force = change in momentum ÷ time taken - Students will know that car safety features, such as airbags, seat belts and crumple zones, reduce force by increasing the time taken for a change in momentum - Students will know how to explain how further safety equipment, such as crash mats and cycle helmets, reduce the force felt TRIPLE ONLY: Students will know how to complete calculations involving the change in momentum equation	<i>Students need to already know that the unit of mass is kg</i> <i>Students need to already know that the unit of velocity is m/s</i> <i>Students need to already know how to convert units</i>	Interpreting Data	Tier 2 Tier 3
Lesson: Equations of Motion	- Students will know the symbols and units for acceleration, initial velocity, final velocity and distance - Students will know how to apply the equation for constant acceleration - Students will know that dangers of large deceleration include skidding, brake over-heating, increased forces felt by drivers and passengers	<i>Students need to already know that the units of acceleration are m/s²</i>	Use of formula from the equation sheet	

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Lesson: Newton's Third Law	Students will know that whenever two objects interact, the forces they exert on each other are equal and opposite Students will know how to apply Newton's Third Law to examples of equilibrium situations	<i>Students will already know that forces at equilibrium have a resultant force of 0N.</i>		Tier 2 Tier 3 Equilibrium: when two opposing forces are balanced and cancelling each other out