

Topic	Sub topic	Title and content	Additional Info	Literacy/Numeracy/ICT/SMSC links	Alleyne's Skills for life
Forces		Forces – Intro + Scalars and Vectors	Identify scalars and vector Distance and displacement Describe different forces - contact and non-contact (HT) Vector diagrams and resolving vectors	SMSC- Scalars, Vectors and using directions	Literacy
		Resultant forces	Describe the interaction between pairs of objects which produce a force on each object Calculate the resultant force (HT) Draw free body diagrams	Numeracy- Calculation of resultant force	Numeracy
		Weight	Define weight Define centre of mass Calculate weight using the equation $w = m \times g$ Explain the relationship between weight and mass	SMSC- Weight and mass in the home	Literacy; Numeracy
		Peer assessed task			
		Work done	Define work done Calculate work done using the equation $w.d. = \text{force} \times \text{distance}$ One joule of work is done when a force of one newton causes a displacement of one metre 1 joule = 1 newton-metre conversion Describe the energy transfer involved when work is done.	Numeracy- Calculation of work done	Numeracy
		Hooke's Law	Give examples of forces when stretching, bending and compressing Explain why more than one force is needed when changing the shape Describe elastic and plastic deformation Draw and label force vs extension graph Use the equation $\text{Force} = \text{spring constant} \times \text{extension}$	SMSC- Hooke's law in real life	Numeracy
		Required practical 5	Hooke's Law Investigate the relationship between force and extension for a spring.	Literacy - following a method	Leadership; Problem solving; Teamwork
		Energy in a Spring	Describe the difference between a linear and non-linear relationship between force and extension Calculate a spring constant in linear cases Interpret data from an investigation of the relationship between force and extension Calculate work done in stretching (or compressing) a spring (up to the limit of proportionality) using the equation: $\text{elastic potential energy} = 0.5 \times \text{spring constant} \times \text{extension}^2$	SMSC- Uses of springs within society	Empathy
		Revision			
		Forces 1 Test			
		Feedback			Independence
		Newton's Laws	Define Newton's First and Third Law (HT only) The tendency of objects to continue in their state of rest or of uniform motion is called inertia.	SMSC- Newton's Laws in the real world	Communication
	Scientific Literacy Task	Scientific Literacy Task	Scientific Literacy Task	Literacy	

		$F = ma$	<p>Explain Newton's Second Law</p> <p>To estimate the speed, accelerations and forces involved in large accelerations for everyday road transport.</p> <p>To use the symbol that indicates an approximate value or approximate answer ~ (HT only) Students should be able to explain that:</p> <p>Inertial mass is a measure of how difficult it is to change the velocity of an object</p> <p>Inertial mass is defined as the ratio of force over acceleration.</p>	Numeracy- Calculating forces and accelerations	Numeracy
		Required practical 6 Demo the air track	Investigate the effect of varying the force on the acceleration of an object of constant mass, and the effect of varying the mass of an object on the acceleration produced by a constant force.		Leadership; Problem solving; Teamwork
		Velocity	<p>Speed vs Velocity</p> <p>Typical speed values for walking, running, cycling and speed of sound</p> <p>To make measurements of distance and time and then calculate speeds of objects.</p> <p>Use the equation speed = distance / time</p> <p>To calculate average speed for non-uniform motion.</p> <p>Introduce terminal velocity</p>	Numeracy- Calculating velocity	Numeracy
		Peer assessed task			
		Acceleration	Average acceleration can be calculated using the equation: acceleration = change in velocity / time taken	Numeracy- Calculating acceleration and deceleration	Numeracy
		SUVAT (HIGHER)	<p>Use the equation:</p> $\text{final velocity}^2 - \text{initial velocity}^2 = 2 \times \text{acceleration} \times \text{distance}$ <p>Near the Earth's surface any object falling freely under gravity has an acceleration of about 9.8 m/s^2</p>	Numeracy- Mechanics calculations	Numeracy
		Kinetic Energy	<p>To calculate the amount of energy associated with a moving object</p> <p>The kinetic energy can be calculated using the equation kinetic energy = $0.5 \times \text{mass} \times \text{speed}^2$</p>	Numeracy - using equation to calculate KE	Numeracy
		Gravitational Potential Energy	<p>To calculate the energy of a raised object</p> <p>GPE can be calculated using the equation g.p.e. = mass \times gravitational field strength \times height</p>	Numeracy - using equation to calculate GPE	Numeracy
		GPE to KE + prac	<p>To combine the KE and GPE equation</p> <p>To explain the relationship between GPE and KE</p>	Numeracy - combining and manipulating equations	Leadership; Problem solving; Teamwork
		Revision			
	Forces 2 Test				
	Feedback			Independence	
Partic e		Change of State + Properties	<p>Recognise/draw simple diagrams to model the difference between solids, liquids and gases.</p> <p>To describe how, when substances change state mass is conserved.</p> <p>Changes of state are physical changes which differ from chemical changes</p>	Literacy - description of the 3 states - adjectives	Communication

	Gas Particle Model and Brownian	Describe that molecules of a gas are in constant random motion and temperature of the gas is related to the average kinetic energy Changing the temperature of a gas, held at constant volume, changes the pressure exerted by the gas. Brownian motion in gases	SMSC - safety when using aerosols (flammability)	Communication
	Scientific Literacy Task	Scientific Literacy Task	Scientific Literacy Task	Literacy
	Pressure	Describe how atmospheric pressure, decreases with increase of height as weight of air above decreases with height Describe how pressure in liquids increases with depth; upthrust effects, floating and sinking Describe pressure measured by ratio of force over area – acting normal to any surface	Literacy - description of key words	Communication
	Density	Explain the differences in density between the different states of matter in terms of the arrangement of atoms or molecules Density = mass / volume	Numeracy - calculation of density	Numeracy
	Required practical 4	make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids	Numeracy - calculation of density	Leadership; Problem Solving; Teamwork
	Revision			
	Particle Model 1 Test			
	Feedback			Independence
	Internal Energy and Specific Heat Capacity	Energy is stored inside a system called internal energy. Internal energy is the total kinetic energy and potential energy of all the particles Heating changes the energy stored within the system by increasing the energy. If the temperature of the system increases, the increase in temperature depends on the mass of the substance heated, the type of material and the energy input to the system. Introduce equation but no rearranging	SMSC - how internal energy links to heating in homes	Numeracy
	Required practical 1	investigation to determine the specific heat capacity of one or more materials.	SMSC - working together	Leadership; Problem Solving; Teamwork
	Peer assessed task	Specific heat capacity		
	Latent Heat + Graph	The energy needed for a substance to change state is called latent heat. 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. Specific latent heat of fusion – change of state from solid to liquid Specific latent heat of vaporisation – change of state from liquid to vapour	Numeracy - graphs	Numeracy
	Latent Heat of Water Practical	Class practical with full write up - variables, types of error, uncertainty	Numeracy - uncertainty	Leadership; Problem Solving; Teamwork
	Cooling Curves	Interpret heating and cooling graphs that include changes of state. Distinguish between specific heat capacity and specific latent heat	Numeracy - graphs	Numeracy
	Revision			
	Particle Model 2 Test			
	Feedback			Independence

Forces		Distance-Time graph	To draw distance–time graphs from measurements and extract and interpret lines and slopes of distance–time graphs, translating information between graphical and numerical form. To determine speed from a distance–time graph.	Numeracy- Calculating velocity using graphs	Numeracy	
		Velocity-Time graph	Draw velocity–time graphs from measurements and interpret lines and slopes to determine acceleration (HT only) interpret enclosed areas in velocity–time graphs to determine distance travelled (or displacement) (HT only) measure, when appropriate, the area under a velocity–time graph by counting squares	Numeracy- Calculating acceleration and area using graphs	Numeracy	
		Terminal Velocity	Terminal velocity definition Terminal velocity graph linking to acceleration and forces Terminal velocity of objects in fluids	Literacy - describing the forces when falling	Literacy	
		Peer assessed task				
		Reaction time	Explain methods used to measure human reaction times and recall typical results Interpret and evaluate measurements from simple methods to measure the different reaction times of students Evaluate the effect of various factors on thinking distance based on given data.	Numeracy - interpreting data from results	Communication; Resilience	
		Stopping distance	Define stopping distance Explain the factors which affect the distance required for road transport vehicles to come to rest in emergencies, and the implications for safety explain the dangers caused by large decelerations (Triple only) estimate the forces involved in the deceleration of road vehicles in typical situations on a public road. Estimate how the distance required for road vehicles to stop in an emergency varies over a range of typical speeds	SMSC- Car safety	Communication; Resilience; Empat	
		Scientific Literacy Task		Scientific Literacy Task	Scientific Literacy Task	Literacy
		Momentum (HIGHER)	Momentum is defined by the equation: momentum = mass × velocity Conservation of momentum describe and explain examples of momentum in an event, such as a collision	SMSC- Car safety	Communication; Resilience; Empat	
		Revision				
		Forces 3 Test				
	Feedback			Independence		
Forces Application		Hooke's Law investigation	Plan a practical to investigate the effect difference between springs in series and parallel - this could be a computer room lesson Complete a full practical write -up investigating whether arrangement affects spring constant Use relevant equations to calculate spring constant Analyse data calculating means, uncertainties and percentage errors(H) (Higher/triple students could calculate energy, work done)	Literact - instrcutions and evaluation	Leadership; Problem solving; Teamv	
		Wind turbine investigation	Plan a practical to investigate the effect of wind speed on power - this could be a computer room lesson Complete a full practical write -up Use relevant equations to calculate power	Numeracy - means	Leadership; Problem solving; Teamv	

		Analyse data calculating means, uncertainties and percentage errors(H) (Higher/triple students could calculate speed, current and energy transfer)		
Atomic Structure	Atomic Structure and Mass/atomic number/isotopes	Atomic structure Atoms radius of about 1×10^{-10} metres and the radius of a nucleus is less than 1/10 000 of the radius of an atom. Most of the mass of an atom is concentrated in the nucleus Atomic number and Mass number Isotopes and Ions Relate differences between isotopes to differences in conventional representations of their identities, charges and masses	Numeracy - atomic number and mass calculations	Numeracy
	Atomic Models	New experimental evidence may lead to a scientific model being changed or replaced. Models needed: John Dalton, JJ Thomson, Rutherford, Bohr (Chadwick's discovery but not experiment) Rutherford's Scattering experiment Movement of electrons between energy levels	Literacy - comprehension task describing the development of the atomic model	Literacy
	Scientific Literacy Task	Scientific Literacy Task	Scientific Literacy Task	Literacy
	Alpha Beta Gamma	Radioactive decay. Activity and Count-rate Structure and properties of alpha particles, beta particles and gamma rays is limited to their penetration through materials, their range in air and ionising power. Apply knowledge to the uses of radiation and evaluate the best sources of radiation to use in a given situation	SMSC - benefit and risk of radiation use	Empathy
	Peer assessed task			
	Contamination (+ Uses/Risks Triple)	Radioactive contamination and hazards Irradiation Compare the hazards associated with contamination and irradiation Understand that it is important for the findings of studies into the effects of radiation on humans to be published and shared with other scientists for peer review.	SMSC - irradiation and contamination on health	Empathy
	Nuclear decay equations	Use the names and symbols of common nuclei and particles to write balanced equations that show single alpha (α) and beta (β) decay. The emission of a gamma ray does not cause the mass or the charge of the nucleus to change.	Numeracy - balancing equations	Numeracy
	Half-Life	Radioactive decay is random. Explain the concept of half-life and how it is related to the random nature of radioactive decay. Determine the half-life of a radioactive isotope from given information. (HT only) Students should be able to calculate the net decline, expressed as a ratio, in a radioactive emission after a given number of half-lives.	Numeracy - half life graphs	Numeracy
	Revision			
	Atomic Structure Test			
Feedback				
ion Applicat Forces	Pendulums	Plan a practical to investigate the effect difference length of pendulum has on time period - this could be a computer room lesson		Leadership; Problem solving; Teamw Resilience; Creativity

			Complete a full practical write -up investigating whether length affects time Use relevant equations to calculate time period Analyse data calculating means, uncertainties and percentage errors(H) (Higher/triple students could calculate GPE, KE and efficiency)		
		Velocity in a circle	Plan a practical to investigate the effect mass has on circular velocity - this could be a computer room lesson Complete a full practical write -up investigating whether mass affects velocity (there's a worksheet) Use relevant equations to calculate velocity Analyse data calculating means, uncertainties and percentage errors(H) (Higher/triple students could calculate centripetal acceleration and centripetal force)		Leadership; Problem solving; Teamwork Resilience; Creativity