EMMANUEL COLLEGE
THE SCIENCE DEPARTMENT
Year 9

Year 9	Autumn, Half-Term 1	Autumn, Half-Term 2 and Spring, Half-Term 1	Spring, Half-Term 2
Unit Title	Forces 1	Energy 1	Domestic Electricity
Key Question(s)?	What impact do different forces have on objects?	What is energy and how is it transferred?	How do we safely transfer electricity in our homes?
Threshold Concepts	Momentum = mass × velocity [p=mv] When a force acts on an object that is moving, or able to move, a change of momentum occurs. For a given braking force, the greater the speed of the vehicle, the greater the stopping distance. A force that stretches (or compresses) a spring does work and elastic potential energy is stored in the spring.	There are changes in the way energy is stored when a system changes. The amount of energy stored in or released from a system as its temperature changes can be calculated using the equation: change in thermal energy = mass × specific heat capacity × temperature change Whenever there are energy transfers in a system only part of the energy is usefully transferred. The rest of the energy is dissipated so that it is stored in less useful ways. This energy is often described as being 'wasted'.	Most electrical appliances are connected to the mains using three-core cable. Everyday electrical appliances are designed to bring about energy transfers. The amount of energy an appliance transfers depends on how long the appliance is switched on for and the power of the appliance.
Link to Prior Learning	Forces and the effect of forces were introduced in a dedicated topic in Year 7.	The idea of energy stores and energy pathways was first introduced in a Year 7 topic on energy and electricity.	The principles of electrical circuits were introduced in a topic on energy and electricity in Year 7.
Year 9	**Summer, Half-Term 1**	**Summer, Half-Term 2 (Sets 1 and 2 only)**	
Unit Title	Particles	Atomic Structure	
Key Question(s)?	What is the particle model?	What makes up an atom?	
Threshold Concepts	The particle model is widely used to predict the behaviour of solids, liquids and gases and this has many applications in everyday life.	The basic structure of an atom is a positively charged nucleus composed of both protons and neutrons surrounded by negatively charged electrons.	

		In an atom the number of electrons is equal to the number of protons in the nucleus. Some atomic nuclei are unstable. The nucleus gives out radiation as it changes to become more stable. This is a random process called radioactive decay.	
Link to Prior Learning	This links into work done on the particle model in the Year 7 topic on matter.	This links into a Chemistry topic covered at the start of Year 9 on the structure of an atom.	
Knowledge and Sequencing Rationale	Forces 1 introduces practical measurements and mathematical skills early on, where we move from the concrete to the abstract models of forces and their mathematical representations. Understanding forces can help to explain how many other physical processes come about. Energy 1 introduces energy stores and thermal energy and connects this with real-world energy issues resources, introducing reasoned thinking skills and practical skills. Electricity 1 introduces current flow and potential difference and links this to every-day application and follows from energy transfer concepts introduced previously. Particle model of matter introduces kinetic theory, which underpins thermal energy. Following this with atomic structure for the triple group is a natural extension as we consider energy stores even smaller than individual particles. Early introduction of this topic also explains some concepts in the electricity topic.		