EMMANUEL COLLEGE
CORE KNOWLEDGE

What I will know and understand by the end of Year 10.

Topics marked (P) are triple physics only

	This year in Physics we will be answering these key questions:	This links to:	Key Vocabulary:	
1	**Electric Circuits** • What are the causes and effects of static electricity? (Physics only) • How can a cell light up a bulb? • How do we quantify the power of an electrical device? • How does resistance change for some components? • What factors affect the resistance of semiconductor components?	Building on 1P in year 7, students already know that current carries charge around a circuit and some basic circuit symbols. In this unit, we will extend these ideas to quantify more aspects of electric circuits and to consider how different resistive components affect the current around the circuit.	• Current • Charge • Potential difference • Resistance • Energy	• Thermistor • Ohmic • Diode • Electron
2	**Atomic Structure** • How accurate are our models of the atom? • How can atoms change by nuclear decay? • What are the properties of nuclear radiation? • How long does radioactivity last? • What are the uses and dangers of nuclear radiation? • How can we harness nuclear energy? (P)	Building on the particle model of matter, we will delve deeper into the structure of individual atoms, considering the origin of our models of the atom and how these models have developed over time. There are strong overlaps with Chemistry at this point but in Physics we will consider how the nucleus of (unstable) isotopes might change by decay, fission or fusion, rather than the chemical properties of atoms.	• Nucleus • Proton • Neutron • Electron • Alpha • Beta	• Gamma • Ionising • Irradiated • Contaminated • Fission • Fusion
3	**Forces Affecting Motion** • How can we use graphs to describe motion? • How much energy does a moving object store? • How do forces affect the motion of objects? • What factors affect the distance travelled by a car during an emergency stop? • How do objects move under the force of gravity? • Why do falling objects reach a top speed?#	In Year 9, students learned about how forces allow objects to affect each other and we quantified the forces of gravity and the tension in a spring. In this unit, we build on these ideas to consider how they might affect an object's motion. Motion graphs were seen in Y7 but will need to be carefully practiced.	• Newtons • Kilograms • Resultant Force • Equilibrium • Air Resistance • Weight	• Acceleration • Kinetic energy • Terminal velocity • Displacement • Stopping distance • Reaction time
4	**Electromagnetic Waves** • What is the Electromagnetic Spectrum? • What are the uses and dangers of the electromagnetic spectrum? • How does electromagnetic radiation transfer thermal energy? • How are colours transmitted and reflected? (P) • How does light reflect and refract? • What image is produced by a lens? (P)	Having established the basic wave terminology in Year 9, mechanical waves, this unit extends those ideas into the realm of electromagnetic radiation, which was briefly considered in Year 8. We will be using our knowledge in application to communications, medicine and global temperature.	• Frequency • Period • Wave speed • Amplitude • Wavelength • Electromagnetic	• Reflect • Refract • Prism • Focal point • Ionising • Transverse
5	**Mains Electricity** • What is mains electricity like? • How do we connect to mains electricity in our homes? • What are the risks of mains electricity? • How does the National Grid work? • How do transformers affect the current and potential difference of electricity?	There are strong links between this topic and topic 1, and many of the key ideas here are borrowed from that unit. Students will be building on their understanding of current, power and potential difference around a circuit. This unit also links to our ideas about energy that have been woven into the course.	• Current • Potential difference • Live, neutral, earth • Fuse • transformer	• Alternating current • Direct current • Short-circuit • Power • dissipated
6	**Problem Solving with Electricity** • How do we solve problems in series and parallel circuits? • How is a potential divider used to split up the potential difference? • How can we answer questions about electric circuits involving equations? • How does the national grid increase its efficiency and power at the same time?	This short unit at the end of the year provides opportunity for students to practice their understanding of electric circuits that they have built up through the year, in the context of series and parallel circuits.	• Series • Parallel • Power • Resistance	• Potential divider • Efficiency • Transformer • National grid

Target Grade:		AP1:		AP2:		AP3:	

EMMANUEL COLLEGE
CORE KNOWLEDGE

What I will know and understand by the end of Year 11.

Topics marked (P) are triple physics only

	This year in Physics we will be answering these key questions:	This links to:	Key Vocabulary:	
1	**Natural Energy Resources** • How are non-renewables used to supply our energy needs? • How can we use nuclear fission and fusion for energy? • What are the renewable energy resources and how do they compare? • How does electricity supply and demand vary and how can home owners change their electricity usage? • How much energy does it take to heat up our homes and workplaces? • How do we stay warmer for longer?	The work in this unit grows increasingly synoptic, drawing on much of the work already studied. Energy resources draws on many of the previous topics (core physics, forces between atoms, the particle model of matter, forces affecting motion, electromagnetic waves and mains electricity) to analyse how we gather and use the energy our world relies on. There are opportunities for students to use analysis and evaluation skills throughout, applying quantitative techniques to the content they have seen before.	• Kinetic energy • Gravitational potential energy • Renewable • Nuclear fission • Fossil fuel • Power • Insulation	• Conductivity • Specific heat capacity • Electric current • Geothermal • Hydroelectric
2	**Further Forces** • How is resultant force calculated for angled forces? • Why does a falling object have a maximum speed? • What are the equations of motion? • How can we use the language of momentum to predict the motion of an object? • How do temperature and volume affect pressure in a gas?	Students have studied these ideas in forces before but here we apply a more mature mathematical approach to weight, mass, Newton's laws, motion graphs, speed and acceleration. We also introduce the new language of momentum for solving problems that would otherwise have been solved using energy or Newton's laws. The final part of this unit links to our work on the particle model of matter covered in year 9.	• Resultant force • Velocity • Parallelogram • Vector • Scalar • Resolve • Equilibrium • Accelerate • Terminal velocity	• Momentum • Pressure • Temperature • Volume • Inversely proportional
3	**Electromagnetism** • How do magnets interact? • How can we make and use electromagnets? • What is the motor effect? • How does the DC motor work? (H) • What is electromagnetic induction? (P) • How do transformers work? (P)	In 4P in Year 8, students were introduced to some of the basics of magnetism and electromagnetism. Recapping and building upon this, we will extend these ideas to the motor effect and electromagnetic induction. This can then be applied to electromagnetic devices and transformers, which have appeared in our mains electricity topic already.	• Repel • Attract • Compass • Magnetic field • Current • Potential difference, • Solenoid	• Electromagnet • Flemming • Commutator • Induce • Alternator • Dynamo • Transformer
4	**Space Physics (P)** • What is our solar system like? • How do stars Evolve? • How do orbits work? • Is the universe expanding? • Where did the elements on earth originate?	Students have been introduced to the objects in our solar system in the 4P topic in Year 8, and now we look at their origin, evolution and their futures, taking into account the different models and evidence available.	• Solar system. • Milky Way • Gravitational attraction. • Satellite • Asteroid • Nebula • Fusion • Main sequence	• Element • Universe • Supernova • Protostar • Red supergiant • Neutron star • Black hole • Orbit • Red-shift

Target Grade:		AP1:		AP2:		AP3:	