Year 12

Physics

Half Term 1 (Winter 1)

Topic 1		Topic 2			Topic 3	
Module title	Introductory topic	**Module title**	P1 - Matter and Radiation		**Module title**	P2 - Quarks and Leptons
Teaching hours	10 hours	**Teaching hours**	10 hours		**Teaching hours**	10 hours
Domains	Working scientifically	**Domains**	Structure of the atom		**Domains**	Sub-atomic particles Structure of the atom Energy
Textbook		**Textbook**	Kerboodle; pp. 4-26		**Textbook**	Kerboodle; pp. 18-28
Key Concepts		**Key Concepts**			**Key Concepts**	
SI units. Unit derivations. Significant Figures. Equation transposition. Measurements – Vernier Calliper, Screw Gate Micrometer. Uncertainty and Errors. Graphs. Estimation.		Structure of the atom, isotopes. Strong and weak nuclear forces. Radioactive decays. Photons, calculating the energy of a photon. Idea of matter and antimatter, pair production. Feynman diagrams for particle interactions, introduction to the exchange particles. Decay and electron capture.		BASELINE GCSE PHYCS PAPER - 4 HOURS	Finding and predicting new particles. Particle classification; hadrons, leptons. Particle family tree. Conservation rules (Lepton, Baryon, Charge). Quark structure. Strangeness in particles. Quark Feynman diagrams. Predicting particle structure from information.	
Declarative knowledge covered		**Declarative knowledge covered**			**Declarative knowledge covered**	
None		Atomic structure Photon energy calculations Strong and weak force diagrams Exchange particles			Conservation rules Quark structure Particle classification	
Procedural knowledge covered		**Procedural knowledge covered**			**Procedural knowledge covered**	
Converting units Using vernier callipers/screw gate micrometer Graph rules and lines of best fit		Drawing Feynman diagrams			Applying the conservation rules (BQLS)	
Key Experiments/Demos		**Key Experiments/Demos**			**Key Experiments/Demos**	
Practical: Determine g from a pendulum		Practical: Determination of Planck's constant				
Retrieval focus	GCSE Content	**Retrieval focus**	GCSE Content		**Retrieval focus**	Matter and Radiation
Skills focus	Errors	**Skills focus**	Modifying experiment to investigate (CPAC2)		**Skills focus**	None
Assessment	Experimental graph Teacher during the practical	**Assessment**	P1 Homework P1 End of topic assessment		**Assessment**	P2 Homework P2 End of topic assessment

Year 12					
Physics					
Half-Term 2 (Winter 2)					
Topic 4		Topic 5		Topic 6	
Module title	P3 - Quantum Phenomena	**Module title**	P4 - Waves	**Module title**	P5 - Optics
Teaching hours	10 hours	**Teaching hours**	14 hours	**Teaching hours**	15 hours
Domains	Quantum Physics Atomic Structure Energy	**Domains**	Wave types (GCSE)	**Domains**	Waves Quantum Phenomena
Textbook	Kerboodle; pp. 30-44	**Textbook**	Kerboodle; pp. 50-66	**Textbook**	Kerboodle; pp. 68-92
Key Concepts		**Key Concepts**		**Key Concepts**	
Photoelectric effect and work function Stopping potential Ionisation and energy levels Excitation, de-excitation, and fluorescence Energy levels and spectra (absorption and emission) Wave particle duality		Types of waves (transverse and longitudinal) Polarisation Measuring waves, phase difference. Reflection, refraction, diffraction. Superposition, constructive and destructive interference. Stationary and progressive waves Wave harmonics.		Refraction of light, Snell's law. Refractive index, dispersion. Total internal refraction, critical angle and modal dispersion. Young's double slit interference. Coherence, light sources, fringes. Diffraction, light and water. Single slit diffraction, diffraction grating.	
Declarative knowledge covered		**Declarative knowledge covered**		**Declarative knowledge covered**	
Photoelectric effect (equation) Calculating kinetic energy of photoelectrons Calculating stopping potential Determining the energy of photons due to excitation Using absorption spectra to identify elements De Broglie equation.		Types of waves, polarisation process. Wave equation. Superposition, and understanding of why it happens. Stationary waves and how they form. Identifying wave harmonics.		Snell's Law Refractive index Modal dispersion Young's single and double slit. Diffraction, single slit and grating. LASER safety	
Procedural knowledge covered		**Procedural knowledge covered**		**Procedural knowledge covered**	
Using energy level diagrams.		How to use an oscilloscope.		Using diffraction grating.	
Key Experiments/Demos		**Key Experiments/Demos**		**Key Experiments/Demos**	
Demo: Photoelectric effect. Demo: Emission of photons (different gases) Demo: Using spectroscopes to observe emission spectra.		CPAC 1 – Stationary Waves (CP2, CP4) Practical: Finding the wavelength of light Practical: Simple wave types. Practical: Formation of stationary waves.		CPAC 2a – Young's slits (CP2 CP4) CPAC 2b - Diffraction (CP2, CP4) Practical: Investigating the refractive index of liquids Practical: Speed of sound using an Oscilloscope	
Retrieval focus	Quarks and Leptons	**Retrieval focus**	Quantum Phenomena	**Retrieval focus**	Waves
Skills focus	None	**Skills focus**	Using Oscilloscopes	**Skills focus**	Modifying experiments
Assessment	P3 Homework P3 End of topic Assessment	**Assessment**	P4 Homework P4 End of topic Assessment	**Assessment**	P5 Homework P5 End of topic Assessment

Year 12					
Physics					
Half-Term 3 (Spring 1)					
Topic 7		Topic 8		Topic 9	
Module title	P6 - Forces in Equilibrium	**Module title**	P7 - On the Move	**Module title**	P8 - Newton's Laws of motion
Teaching hours	15 hours	**Teaching hours**	13 hours	**Teaching hours**	11 hours
Domains	Newtonian Physics Kinematics	**Domains**	Newtonian Physics Kinematics Momentum Projectile Motion	**Domains**	Newtonian Physics Newton's Laws Impulse Newton's Laws
Textbook	Kerboodle; pp. 96-117	**Textbook**	Kerboodle; pp. 118-135	**Textbook**	Kerboodle; pp. 138-151
Key Concepts		**Key Concepts**		**Key Concepts**	
Vectors and Scalars Balanced Forces Moments Stability Force Triangles		Equations Speed Acceleration Kinematics Equations Free-fall Projectile Motion		Newton's Laws Resultant Force Terminal Speed Stopping Distances Vehicle Safety	
Declarative knowledge covered		**Declarative knowledge covered**		**Declarative knowledge covered**	
Decomposing Vectors		Kinematics Equations		Newton's Laws Braking and Stopping distances	
Procedural knowledge covered		**Procedural knowledge covered**		**Procedural knowledge covered**	
Interpreting changing situations in moment calculations		Interpreting kinematics graphs Kinematics proofs		Pulley Problems Slope Problems Lift Problems	
Key Experiments/Demos		**Key Experiments/Demos**		**Key Experiments/Demos**	
Virtual Lab: Vector Addition (PhET) Practical: Testing three forces in equilibrium (Coplanar Forces) Practical: Using the principle of moments to determine density Practical: Finding the centre of mass Practical: Calculating the weight of a metre rule CPAC 0 – Investigating the bridge crane		CPAC 3 – Calculation of g by freefall (CP1, CP4, CP5) Practical: Acceleration – using a stop watch / light gates Demo: Shooting a Monkey Virtual Lab: Projectile Motion (PhET)		Practical: Investigating Newton's second law of motion Practical: Terminal Velocity of cake cases Practical: Testing Friction Web Quest: Car Safety	
Retrieval focus	Optics	**Retrieval focus**	Forces in Equilibrium	**Retrieval focus**	On the Move
Skills focus	Experiment methodology; ensuring objects are perpendicular.	**Skills focus**	Precision of equipment in experiments	**Skills focus**	Improving experiment methodology
Assessment	P7 Homework P7 End of topic Assessment	**Assessment**	P8 Homework P8 End of topic Assessment	**Assessment**	P9 Homework P9 End of topic Assessment

Year 12					
Physics					
Half-Term 4 (Spring 2)					
Topic 10		Topic 11		Topic 12	
Module title	P9 - Force and Momentum	**Module title**	P10 - Work, Energy and Power	**Module title**	P11 - Materials
Teaching hours	10 hours	**Teaching hours**	8 hours	**Teaching hours**	11 hours
Domains	Newtonian Physics Collisions Momentum Newton's Laws	**Domains**	Energy Stores Power Efficiency	**Domains**	Density Hooke's Law Deformation Young's Modulus
Textbook	Kerboodle pp. 154-167	**Textbook**	Kerboodle pp. 170-181	**Textbook**	Kerboodle pp. 184-193
Key Concepts		**Key Concepts**		**Key Concepts**	
Momentum and Impulse Impact Forces Principle of conservation of momentum Elastic and Inelastic Collisions Explosions		Work and Energy Kinetic Energy Potential Energy Power Efficiency		Density calculations Hooke's Law Springs in series/parallel Energy stored in a spring Deformation of solids	
Declarative knowledge covered		**Declarative knowledge covered**		**Declarative knowledge covered**	
Momentum Linking momentum and Forces		Work Equation Kinetic Energy Equation Potential Energy Equation Power Equation Efficiency Equation		Density equation Density of alloys Hooke's Law Young's Modulus	
Procedural knowledge covered		**Procedural knowledge covered**		**Procedural knowledge covered**	
Modifying methods to fit the experiment (Rebound) Interpreting force and time graphs		Interpreting changes of efficiency Kinetic to potential energy transfers		Interpreting stress/strain graphs Interpreting loading/unloading curves Ideas of Hysteresis	
Key Experiments/Demos		**Key Experiments/Demos**		**Key Experiments/Demos**	
Practical: Testing conservation of momentum Practical: Investigating Collisions Practical: Rebounding tennis ball		Practical: Investigating the GPE of a table tennis ball Practical: Muscle Power / Electrical Power		Practical: Determine the density of an unknown object. Practical: Investigating Springs (Springs in series/parallel) Practical: Deforming Strawberry Laces CPAC 4 – Young's Modulus (CP1, CP4, CP5)	
Retrieval focus	Newton's Laws of Motion	**Retrieval focus**	Force and Momentum	**Retrieval focus**	Work, Energy and Power
Skills focus	Modifying methods to fit the experiment (Rebound speed)	**Skills focus**	Written interpretations of efficiency changes.	**Skills focus**	
Assessment	P10 Homework P10 End of topic Assessment	**Assessment**	P11 Homework P11 End of topic Assessment	**Assessment**	P12 Homework P12 End of topic Assessment

Year 12

Physics

Half-Term 5 (Summer 1)

Topic 13		Topic 14		Revision for Y12 Mock Exams		
Module title	P12 - Electric Current	**Module title**	P13 - DC Circuits	**Module title**	Revision for Y12 Mock Exams	**END OF YEAR 12 EXAM (AS PAPER) – 4 HOURS**
Teaching hours	12 hours	**Teaching hours**	13 hours	**Teaching hours**	10 hours	
Domains	Direct Current Electricity Charge Resistance	**Domains**	Kirchoff's Laws Resistance Potential Difference Potential Divider	**Domains**	All covered	
Textbook	Kerboodle pp. 202-211	**Textbook**	Kerboodle pp. 214-227	**Textbook**	N/A	
Key Concepts		**Key Concepts**		**Key Concepts**		
Current Charge Potential Difference Power Resistance Resistivity Characteristics of components		Kirchoffs Laws Current Potential Difference Resistance Electromotive Force Internal Resistance Potential Divider		Recap AS work for the end of year exams. Examination technique		
Declarative knowledge covered		**Declarative knowledge covered**		**Declarative knowledge covered**		
Linking Current, Charge, Potential Difference and Resistance Qualitative process of changing resistance of components Linking resistance to temperature. Superconductivity		Summing resistors Uses of potential dividers – sensors Sensitivity in circuits		N/A		
Procedural knowledge covered		**Procedural knowledge covered**		**Procedural knowledge covered**		
Constructing circuits Problem solving circuits Electrical Safety		Utilising Kirchoff's Laws in questions Calculating circuit values		N/A		
Key Experiments/Demos		**Key Experiments/Demos**		**Key Experiments/Demos**		
CPAC 5 – Resistivity (CP1, CP2) Practical: Building simple circuits (and troubleshooting) Practical: Characteristics of light-emitting diodes Practical: IV Characteristics Practical: Investigating the characteristics of a thermistor		CPAC 6 – EMF and Internal Resistance (CP2, CP3) Practical: Investigating resistors Practical: Conservation of energy in a circuit Practical: Investigating cell combinations Practical: Application of potential dividers and sensor circuits		N/A		
Retrieval focus	Materials	**Retrieval focus**	Electric Current	**Retrieval focus**	DC Circuits	
Skills focus	Experimental safety	**Skills focus**	Graphing and analysis	**Skills focus**	Interpreting exam questions	
Assessment	P12 Homework P12 End of topic Assessment	**Assessment**	P13 Homework P13 End of topic Assessment	**Assessment**	End of Year Assessment (AS Papers)	

Year 12					
Physics					
Half-Term 6 (Summer 2)					
Topic 17		Topic 18		Topic 19	
Module title	Motion in a circle	**Module title**	Simple Harmonic Motion	**Module title**	Thermal Physics
Teaching hours	6 hours	**Teaching hours**	16 hours	**Teaching hours**	7 hours
Domains	Motion Velocity Forces	**Domains**	Springs Circular Motion Waves	**Domains**	Energy Forces States of Matter
Textbook	Kerboodle pp. 4-11	**Textbook**	Kerboodle pp. 16-31	**Textbook**	Kerboodle pp. 36-45
Key Concepts		**Key Concepts**		**Key Concepts**	
Angular displacement and speed Centripetal force Objects on banked tracks Friction Support Forces		Phase difference Acceleration in simple Harmonic Motion Application of Simple Harmonic Motion to Circular Motion Systems undergoing Simple Harmonic Motion Energy changes within Simple Harmonic Motion Systems Resonance		Internal energy and its distribution Laws of thermodynamics Specific Heat Capacity Latent Heat	
Declarative knowledge covered		**Declarative knowledge covered**		**Declarative knowledge covered**	
Centripetal Force proof Application of Centripetal force to specific situations		Definitions for simple harmonic motion Energy transfer within Simple Harmonic Systems		Inversion tube experiment Continuous flow heating	
Procedural knowledge covered		**Procedural knowledge covered**		**Procedural knowledge covered**	
Building equations for centripetal force in different situations: Bridge Roundabout Rollercoaster Swing, Big Wheel		Linking waves and circular motion Factors that change the frequency of an oscillator		Converting temperature scales Interpreting temperature time graphs	
Key Experiments/Demos		**Key Experiments/Demos**		**Key Experiments/Demos**	
Practical: Investigating circular motion		CPAC 7a – SHM (mass) (CP2, CP4) CPAC 7b – SHM (length) (CP2, CP4) Practical: Investigating Oscillations Practical: The simple pendulum Practical: The oscillations of a loaded spring Demo: Barton's Pendulums Practical: Damped Oscillations, and Resonance		Practical: Investigating the specific heat capacity of a metal Practical: Investigating the specific latent heat of fusion for ice	
Retrieval focus	DC Circuits	**Retrieval focus**	Motion in a circle	**Retrieval focus**	Simple Harmonic Motion
Skills focus	Plotting graphs, and using y=mx+c to determine meaning of gradient.	**Skills focus**	Measurement uncertainties and errors	**Skills focus**	Percentage uncertainty in final value
Assessment	P17 – Homework P17 – End of topic assessment	**Assessment**	P18 – Homework P18 – End of topic assessment	**Assessment**	P19 – Homework P19 – End of topic assessment