KS5 Curriculum Overview (PHYSICS)

Year 12

TERM 1 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
Topic 1 Working as a physicist **1.1 Working as a physicist** 1. Units 2. Estimation **Topic 2 Mechanics** **2.1 Motion** 1. Velocity & acceleration 2. Motion graphs 3. Adding forces 4. Moments **Topic 4 Materials** **4.1 Fluids** 1. Fluids, density and upthrust 2. Fluid movement 3. Drag act 4. Terminal velocity	**Math Links** Recognise and make use of appropriate units in calculations, estimate results, make order of magnitude calculations, use algebra to re-arrange and solve equations, recognise the importance of the straight line graph as an analysis tool for the verification and development of physical laws by experimentation, Determine the slope and intercept of a linear graph, calculate the area under the line on a graph, use geometry and trigonometry. Units of measurement, visualising and representing 3D forms and finding volumes of rectangular blocks, cylinders and spheres. Calculating areas of circles, use of standard form and ordinary form, substituting numerical values into algebraic equations.	**Career links** Engineering, avionics, aerospace, materials scientist, flight management analyst, meteorologist, armed forces. **British Values** **Tolerance –** acceptance of differing opinions on how to answer questions and resolve challenges. **Individual Liberty –** within Core practical activities all students have to work independently. **Rule of Law –** Students have to follow strict safety guidance to ensure their own safety and for the safety of others. **Democracy –** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. **Mutual respect -** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.
TERM 2 TOPIC/s	***Key Skills/Subject Links**	***Career links & BV**
Topic 2 Mechanics **2.1 Motion** 4. Moments 5. Newton's laws of motion 6. Kinematics equations 7. Resolving vectors 8. Projectiles **Topic 4 Materials** **4.2 Solid material properties** 1. Hooke's law 2. Stress, strain and the Young modulus 3. Stress-strain graphs	**Math Links** Units of measurement, using Pythagoras' theorem and the angle sum of a triangle, using sin, cos and tan in physical problems, changing the subject of an equation, plotting two variables from experimental data and understanding that $y = mx + c$ represents a linear relationship, standard form, solving algebraic equations, substituting numerical values into algebraic equations. Calculating areas of circles, making order of magnitude calculations, determining the slope of a linear graph, estimate by graphical methods, the area between a curve and the x-axis and recognizing the physical significance of the area.	**Career links** Astronomer, astrophysicist, engineering, avionics, aerospace, materials scientist, flight management analyst, meteorologist, armed forces, architect, structural engineer, car manufacture, geophysicist. **British Values** **Tolerance –** acceptance of differing opinions on how to answer questions and resolve challenges. **Individual Liberty –** within Core practical activities all students have to work independently. **Rule of Law –** Students have to follow strict safety guidance to

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TERM 3 TOPIC/s	***Key Skills/Subject Links**	***Career links & BV**
Topic 2 Mechanics **2.2 Energy** 1. Gravitational potential and kinetic energies 2. Work and power **2.3 Momentum** 1. Momentum 2. Conservation of linear momentum **Topic 3 Electric circuits** **3.1 Electrical quantities** 1. Electrical current 2.Electrical energy transfer 3. Current-voltage relationships 4. Resistivity 5. Conduction and resistance 6. Semiconductors	**Math Links** Units of measurement, using sin, cos and tan in physical problems, changing the subject of an equation, plotting two variables from experimental data and understanding that y = mx + c represents a linear relationship, solving algebraic equations, substituting numerical values into algebraic equations, using angles in regular 2D and 3D structures. Calculating areas of circles, use of standard form and ordinary form, determining the slope of a linear graph.	**Career links** Astronomer, astrophysicist, engineering, avionics, aerospace, materials scientist, flight management analyst, meteorologist, armed forces, electrician, electrical engineer, geophysicist, archaeologist, surveyor, architect, structural engineer, car manufacture. **British Values** **Tolerance –** acceptance of differing opinions on how to answer questions and resolve challenges. **Individual Liberty –** within Core practical activities all students have to work independently. **Rule of Law –** Students have to follow strict safety guidance to ensure their own safety and for the safety of others. **Democracy –** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. **Mutual respect -** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.
TERM 4 TOPIC/s	▪ ***Key Skills/Subject Links**	***Career links & BV**

Topic 5 Waves and the particle nature of light **5.1 Basic waves** 1. Wave basics 2. Wave types **5.2 The behaviour of waves** 1. Wave phase and superposition 2. Stationary waves 3. Diffraction 4. Wave interference	**Math Links** Units of measurement, translating information between degrees and radians, translating information between graphical, numerical and algebraic form, plotting two variables from experimental data and understanding that y = mx + c represents a linear relationship, standard form, changing the subject of an equation, solving algebraic equations, substituting numerical values into algebraic equations.	**Career links** Acoustic engineer, musician, space scientist, armed forces, communications, surveyor, architect, seismologist. **British Values** **Tolerance –** acceptance of differing opinions on how to answer questions and resolve challenges. **Individual Liberty –** within Core practical activities all students have to work independently. **Rule of Law –** Students have to follow strict safety guidance to ensure their own safety and for the safety of others. **Democracy –** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. **Mutual respect -** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.
TERM 5 TOPIC/s	▪ ***Key Skills/Subject Links**	***Career links & BV**
Topic 5 Waves and the particle nature of light **5.3 Optics** 1. Refraction 2. Total internal reflection (TIR) 3. Lenses 4. Image formation 5. Polarisation **5.4 Quantum Physics** 1. Wave particle duality 2. The photoelectric effect 3. Electron diffraction and interference 4. Atomic electron energies	**Math Links** Units of measurement, standard form, changing the subject of an equation, solving algebraic equations, substituting numerical values into algebraic equations, determining the slope and intercept of a linear graph (y = mx + c), use of ratios and similar triangles, identifying uncertainties in measurements.	**Career links** Optical physicist, optometrist, chemical engineer, materials engineer, artificial intelligence developer, meteorologist, armed forces, architect, structural engineer, medical physicist. **British Values** **Tolerance –** acceptance of differing opinions on how to answer questions and resolve challenges. **Individual Liberty –** within Core practical activities all students have to work independently. **Rule of Law –** Students have to follow strict safety guidance to ensure their own safety and for the safety of others. **Democracy –** When completing pair and team challenges realizing that they have to listen

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TERM 6 TOPIC/s	▪ ***Key Skills/Subject Links**	***Career links & BV**
Rollover **Topic 6 Further Mechanics** **6.1 Further momentum** 1. Energy in collisions 2. More collisions **Topic 7 Electric and magnetic fields** **7.1 Electric fields** 1. Electric fields 2. Milikan's oil drop experiment 3. Radial electric fields 4. Coulomb's law	**Math Links** Use of trigonometric functions, use of Pythagoras' theorem, changing the subject of an equation, substituting values into algebraic equations, visualizing and representing 2D forms. Recognising and use of appropriate units, identifying uncertainties in measurements, solving quadratic equations,	**Career links** Crash analyst, road traffic officer, military, police, and scientific research. **British Values** **Tolerance –** acceptance of differing opinions on how to answer questions and resolve challenges. **Individual Liberty –** within Core practical activities all students have to work independently. **Rule of Law –** Students have to follow strict safety guidance to ensure their own safety and for the safety of others. **Democracy –** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. **Mutual respect -** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.

KS5 Curriculum Overview (PHYSICS)

Year 13

TERM 1 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
Rollover Topics continued. **Topic 6 Further Mechanics** **6.2 Circular motion** 1.Circular motion basics 2. Centripetal force **Topic 7 Electric and magnetic fields** **7.1 Electric fields** 1. Electric fields 2. Milikan's oil drop experiment 3. Radial electric fields 4. Coulomb's law **7.2 Capacitors** 1. Capacitor basics 2. Charging and discharging capacitors 3. Capacitor mathematics **7.3 Electromagnetic effects** 1. Magnetic fields 2. Electric motors **Topic 9 Thermodynamics** **9.1 Heat and temperature** 1. Heat and temperature 2. Internal energy	**Math Links** Use of trigonometric functions, significant figures, use of small angle approximations, changing the subject of an equation, translating information between numerical and graphical forms, determining the slope of a linear graph. Use of calculators to work with exponential and logarithmic functions, calculating the area under a curve, interpreting logarithmic plots, understanding that y=mx + c represents a linear relationship, use of spreadsheet modelling, understanding the slope of a tangent to a curve as a measure of rate of change, use of angles in 2D and 3D structures, distinguishing between instantaneous and average rates of change. Recognising and use of appropriate units, finding arithmetic means, use of ratios, estimating results, substituting numerical values into equations.	**Career links** Sports analyst, astronomer, road traffic officer, military, police, scientific research, and electrician. **British Values** **Tolerance –** acceptance of differing opinions on how to answer questions and resolve challenges. **Individual Liberty –** within Core practical activities all students have to work independently. **Rule of Law –** Students have to follow strict safety guidance to ensure their own safety and for the safety of others. **Democracy –** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. **Mutual respect -** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.
TERM 2 TOPIC/s	***Key Skills/Subject Links**	***Career links & BV**
Topic 9 Thermodynamics **9.1 Heat and temperature (continued)** 3. Heat transfer 4. Ideal gas behavior **Topic 13 Oscillations** **13.1 Oscillations** 1. Simple Harmonic Motion (SHM) 2. SHM Mathematics 3. SHM Energy 4. Resonance and damping **Topic 7 Electric and magnetic fields** **7.3 Electromagnetic effects**	**Math Links** Recognising and use of appropriate units, finding arithmetic means, use of ratios, estimating results, substituting numerical values into equations. Draw and use the slope of a tangent to a curve as a measure of rate of change, use of small angle approximation, changing the subject of a non-linear equation, sketching and interpreting relationships shown graphically, applying the principles of calculus. Use of angles in 2D and 3D structure, distinguish between instantaneous and average rates of change.	**Career links** Materials scientist, engineering, medical physicist. **British Values** **Tolerance –** acceptance of differing opinions on how to answer questions and resolve challenges. **Individual Liberty –** within Core practical activities all students have to work independently. **Rule of Law –** Students have to follow strict safety guidance to ensure their

1. Magnetic fields 2. Electric motors 3. Magnetic forces 4. Generating electricity 5. Alternating current		own safety and for the safety of others. **Democracy –** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. **Mutual respect -** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.
TERM 3 TOPIC/s	***Key Skills/Subject Links**	***Career links & BV**
Topic 11 Gravitational fields **Topic 11.1 Gravitational fields** 1. Gravitational forces 2. Gravitational fields **Topic 12 Space** **Topic 12.1 Space** 1. Starshine 2. Stellar classification 3. Distances to the stars 4. Age of the Universe **Topic 8 Nuclear and particle physics** **8.1 Probing matter** 1. A nuclear atom 2. Electrons from atoms **8.2 Particle accelerators and detectors** 1. Particle accelerators 2. Particle detectors 3. The Large Hadron Collider (LHC)	**Math Links** Solving algebraic equations, changing the subject of a non-linear equation, sketching and interpreting relationships shown graphically, distinguish between instantaneous and average rates of change. Use of angles in 2D and 3D structures, use of small angle approximations. Recognising and use of appropriate units, making order of magnitude calculations, estimating results, substituting numerical values into equations using appropriate units.	**Career links** Nuclear physicist, medical physicist, astronomer, astronaut, research scientist. **British Values** **Tolerance –** acceptance of differing opinions on how to answer questions and resolve challenges. **Individual Liberty –** within Core practical activities all students have to work independently. **Rule of Law –** Students have to follow strict safety guidance to ensure their own safety and for the safety of others. **Democracy –** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. **Mutual respect -** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.
TERM 4 TOPIC/s	▪ ***Key Skills/Subject Links**	***Career links & BV**

Topic 8 Nuclear and particle physics **8.3 The particle zoo** 1. Particle interactions 2. The particle zoo 3. Particles and forces 4. Particle reactions **Topic 10 Nuclear radiation** **10.1 Radioactivity** 1. Nuclear radiation 2. Rate of radioactive decay 3. Fission and fusion 4. Nuclear powerstations **Revision programme.**	**Math Links** Recognising and use of appropriate units, use of standard form, considering orders of magnitude, changing the subject of an equation, substituting numerical values into equations using appropriate units. Use of exponential and logarithmic functions, use of the principles of calculus, use of logarithmic graph plots, calculating surface areas.	**Career links** Nuclear physicist, medical physicist, astronomer, astronaut, research scientist, radiographer. **British Values** **Tolerance –** acceptance of differing opinions on how to answer questions and resolve challenges. **Individual Liberty –** within Core practical activities all students have to work independently. **Rule of Law –** Students have to follow strict safety guidance to ensure their own safety and for the safety of others. **Democracy –** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. **Mutual respect -** When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.
TERM 5 TOPIC/s	▪ ***Key Skills/Subject Links**	***Career links & BV**
Revision programme.		
TERM 6 TOPIC/s	▪ ***Key Skills/Subject Links**	***Career links & BV**
Exam preparation.		