Physics Curriculum Intent

Department Philosophy: Our overarching aim is to develop highly motivated and independent learners who have a real curiosity about how Physics fits into the world around them. They will have excellent core knowledge of the fundamentals of classical Physics and will be able to express this clearly and concisely, both verbally and in writing. Students will learn the practical skills required to investigate how the world around them works for themselves; they will be able to set up valid experiments where they make and record measurements which will then be analysed through the use of equations and graphs to produce conclusions. They will also be able to evaluate their experiments, in order to improve the accuracy and precision of their results in the future. Finally, perhaps the greatest skill that the study of Physics can offer is that of problem solving; students will learn how to manipulate equations, convert units and complete calculations with ease in order to solve real-world mathematical problems.

By the end of Key Stage 4 our students will know:	**By the end of Key Stage 5 our students will know:**
1. *How to use mathematics effectively in Physics, including manipulating equations and drawing vectors diagrams.* 2. *How to use basic SI units correctly, including conversions & the selection of the correct number of significant figures to report an answer to.* 3. *How to follow a method to collect valid data, and then communicate this using graphs and mathematical processes.* 4. *How to explain physical processes logically and clearly, using the correct scientific vocabulary.* 5. *How to describe and analyse motion using equations and graph.* 6. *The basic properties of all waves, how these can be applied to sound and light and how to draw and analyse optical ray diagrams.* 7. *The key properties & uses of the electromagnetic spectrum and the role of electromagnetic radiation in global warming.* 8. *The basic principles behind radioactivity (including statistical approaches to describing them mathematically) and some uses and dangers of radioactive materials.* 9. *The evolution of stars and the Universe, and the role that evidence has to play in the construction/disproving of theories in Physics* 10. *How forces affect the world around us, including an understanding of Newton's three laws of motion, momentum conservation and the principle of moments.* 11. *The principle of the conservation of energy and how energy transfers in closed systems can be described both verbally and mathematically.* 12. *The particle model of matter, including an understanding of spring behaviour, density, kinetic theory and state changes.* 13. *How pressure can be calculated and changed in solids, liquids and gases.* 14. *How current, voltage and resistance varies for basic components in series and parallel circuits.* 15. *The basic principles behind static electricity, magnetism and electromagnetic induction, and how these can be applied to real-life through motors, generators & transformers.*	16. *How to describe forces and motion mathematically through the application of mechanics.* 17. *Kirchhoff's laws and how these can be applied to all electric circuits.* 18. *Material behaviours for fluids and solids.* 19. *The basics of wave phenomena and how these are integral to wave-particle duality.* 20. *The underlying principles of electric, gravitational and magnetic fields.* 21. *The similarities and differences between circular motion and simple harmonic motion.* 22. *The structure of the atom including the standard model and the particle detection methods used to discover this.* 23. *The exponential nature of decay in radioactive materials and capacitors.* 24. *The basic principles of thermodynamics and kinetic theory.* 25. *Introductory ideas in astrophysics and cosmology.* 26. *How to manipulate equations and convert units, which will allow them to solve complex multi-step problem.* 27. *The SI system and Physics conventions, including how to present data correctly in tables and graphs and how to present solutions and derivations clearly.* 28. *How to design, carry out, analyse and evaluate experiments and investigations* 29. *How to determine constants & relationships through graphical methods and assess the accuracy of their results* 30. *How to logically apply their knowledge to unfamiliar situations, allowing them broaden their understanding of the wider reaching applications of Physics in the real world.*