Curriculum Map
Year 10

Physics

Learning Aims and Curriculum Intent:

Students will build on the Physics covered in the Junior Science and Y9 Physics curriculum and start to further develop their skills as 'physicists'.

Students will continue to learn and build on the fundamental ideas involved in astrophysics, forces, motion, waves, energy, and to meet radioactivity.

Term	Content, Key Questions and Knowledge	Skills	Assessment
Michaelmas	• **Electricity** - Understand that electricity is a fundamental part of our modern society and is used to power a wide range of devices and systems, from small household appliances to large industrial machinery - Understand that Kirchhoff's laws are fundamental principles used in electrical circuit analysis, and that these laws are essential for understanding and analysing the behaviour of electrical circuits • **Forces and motion** - Understand that forces are a fundamental concept in physics that describe the interactions between objects and the resulting motion (or deformation) - Understanding that using Newton's Laws of motion allows us to explain and predict how objects behave in various situations - Understand that for an object to be in a state of equilibrium (not accelerating or rotating), the sum of the moments acting on it must be equal to zero	**Mathematical** - Graph plotting - Analysing I-V graphs - Using simple formulas (V=IR, F=ma, SUVATs) in calculations - Using powers of ten prefixes - Algebra, rearranging equations **Practical** - Setting up simple series and parallel circuits - Using digital meters and taking readings - Investigating charging different rods and using them to attract/repel others - Analysing the forces acting on the two supports of a beam as a load moves from one support to the other - investigate the motion of everyday objects such as toy cars or tennis balls **Problem solving** - Analysing motion-time graphs - Using Explicit Practice to analyse longer problems - Use the linear air-track and light gates to collect data to determine the gravitational field strength (g) **Research** - Find out about uses and potential dangers of static electricity - Find out why gravitational field strength, g, varies on other planets and the Moon from that on the Earth **Technical literacy** - Writing succinct explanations and descriptions - Using bullet points to write a logical progression of ideas	Summative - End of topic tests Explicit Practice - Assessment of decoding, retrieval, analysis and feedback in problem solving Mini quizzes - Low-stakes 10-mark multiple choice progress quizzes Mini tests at halfway point of each topic

Lent	• **Electromagnetism** - Understanding magnetism and its importance in everyday life, how magnetic poles behave, that permanent and induced magnets have magnetic fields, and that these can be shown using a compass and the concept of magnetic field lines - Understanding the relationship between electricity and magnetism, that currents have magnetic effects and how solenoids can enhance these effects • **Waves** - Understand the fundamental nature, properties, and behaviour of waves, that waves are disturbances that transfer energy without transferring matter which are characterized by oscillations that propagate through a medium or empty space - Understand that there are various types of waves, including mechanical waves and electromagnetic waves, and that these waves exhibit specific properties, such as amplitude frequency, wavelength, and period. - Understand the conditions when waves undergo interactions such as reflection, refraction and total internal reflection.	**Mathematical** - Drawing diagrams e.g. magnetic fields, transverse waves, longitudinal waves - Graph drawing e.g. strength of electromagnets (no. of paperclips/no. of turns) - Using and rearranging simple formulas (f=1/T and v=fλ) in calculations - Converting units e.g km to m, minutes to s, - Using prefixes e.g. kHz **Practical** - Investigate the properties of magnets and magnetic fields - Investigate the magnetic fields around a straight wire, coil, and solenoid - Investigate the interaction between magnetic fields and electric currents - Build a simple motor from a kit - investigate the refraction of light, using rectangular blocks, semi-circular blocks and triangular prisms - determine the speed of sound in air **Problem solving** - Use the right-hand rule to determine the direction of magnetic forces - Complete the path way for a ray of light passing through a prism **Research** - Everyday uses of electromagnets - Uses and dangers of EM waves **Technical literacy** - Describe how to use a compass to plot the magnetic field pattern of a magnet, current carrying wire, circular coil, and solenoid - Describe what happens when a current carrying wire is placed parallel or perpendicular in a magnetic field - Explain how the force on a conductor in a magnetic field causes the rotation of the coil in an electric motor	Summative - End of topic tests Explicit Practice - Assessment of decoding, retrieval, analysis and feedback in problem solving Mini-quizzes - Low-stakes 10-mark multiple choice progress quizzes Mini-tests at halfway point of each topic
Trinity	• **Radioactivity and nuclear physics** - Understand that atoms are the of subatomic particles, including protons, neutrons, and electrons - Understand that nuclear radiation refers to the release of particles or electromagnetic waves from the nucleus of an atom, and that this occurs during radioactive decay		Summative - End of year exam Explicit Practice - Assessment of decoding, retrieval, analysis and feedback in problem solving Mini quizzes - Low-stakes 10-mark multiple choice progress quizzes Mini tests at halfway point of each topic

What consolidation looks like in this subject	Using the strategy of '*explicit practice'* requires students to do regular retrieval practice every time they are given a set of problems to solve. This, along with in-built interleaving of mini quizzes from previous topics, means they have consolidation built in to their learning automatically. Independently, students use their textbook/other resources to supplement notes and summarise them from the lesson content, undertake regular retrieval quizzes, seek support when required, and engage with super-curricular resources.
Examples of Homework	Isaac Physics questions, problem solving using explicit practice, revision for interleaved mini-tests, research and presentation on uses and dangers of ionising radiation, practical write-ups
Key terminology	Electricity, current, potential difference, voltage, resistance, Kirchhoff's laws, direct/alternating current, electron, series/parallel, electrostatic, charge, attract/repel, speed, average speed, acceleration, resultant force, terminal velocity, air resistance, drag, weight, Newton's laws, equilibrium, moments, work done, kinetic, gravitational potential, thermal, electromagnetism, magnetism, magnetic poles, permanent magnet, induced magnets, field line, compass, solenoid, waves, energy transfer, oscillations, transverse, longitudinal, mechanical, electromagnetic, amplitude, frequency, wavelength, period, reflection, refraction, total internal reflection, radioactivity, nuclear physics, atoms, subatomic particles, protons, neutrons, electrons, nuclear radiation, nucleus, radioactive decay, alpha, beta, gamma, half-life

Super-curricular enrichment and scholarly extension	**Read:** Astronomy: A Self-Teaching Guide by Dinah L. Moche Destination: Space by Seymour Simon Starfinder: The Complete Beginner's Guide to Exploring the Night Sky by Carole Stott The Astronaut Instruction Manual by Mike Mongo Forces and Motion: From High-speed Jets to Wind-up Toys by Tom DeRosa and Carolyn Reeves **Watch:** Crashcourse physics https://youtu.be/OoO5d5P0Jn4 Fuseschool stopping distances https://youtu.be/HTANxqGQcfI **Listen:** The infinite monkey cage https://www.bbc.co.uk/programmes/b00snr0w Sound/echoes https://www.brainson.org/episode/2019/04/23/forever-echo-can-a-sound-wave-go-on-forever The brightest supernova: https://www.bbc.co.uk/programmes/w3ct4sc9 **Visit:** The Science Museum, London The Royal Observatory, Greenwich The National Space Centre, Leicester The RAF Museum, Hendon The Winchester Science Centre and Planetarium	
Useful websites	Isaac Physics https://isaacphysics.org/ Khan Academy https://www.khanacademy.org/science/physics BBC Bitesize - Physics https://www.bbc.co.uk/bitesize/subjects/zrkw2hv Physics Classroom https://www.physicsclassroom.com S-cool - GCSE Physics https://www.s-cool.co.uk/gcse/physics Physics & Maths Tutor https://www.physicsandmathstutor.com/physics-revision	
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