Subject Curriculum Map: Science Physics A level

Exam board: AQA – 100% terminal Examination

Curriculum intent: A level Physics aims to consolidate and extend learning of themes from the GCSE course and develop these further, piquing interest in new and exciting areas of research (such as theoretical and quantum physics and cosmology), deepening understanding of established topics (such as electricity and forces) and strengthening the links between key concepts, leading on to larger overarching topics that may span across a number of other subject areas such as Chemistry, Maths, PE, Technology and Engineering. The course has a mandatory component of assessed practicals (and an assessed lab book) which must satisfy exam board criteria to allow awarding of the A level with 'practical endorsement' desired by universities nationally. This programme allows students to develop practical, analysis and evaluative skills as well as introduce statistical analysis necessary for university undergraduate study.

Curriculum Implementation- the course is delivered as 9 lessons fortnightly with 2 specialist Physics specialist teachers. This is divided into a 5 lesson split for teacher A (3 theory and a double practical session over the fortnight) and a 4 lesson split for teacher B (4 theory lessons). The Year curriculum is designed to build on and extend concepts from GCSE such as forces (Kinetic energy and gravitational potential energy) Motion equations (distance time graphs, acceleration, projectile motion) but with an introduction to complex and newer areas of Science such as Cosmology and wave particle duality. We have built in assessment points to allow feedback for students and parents on progress and address weaknesses early on in the course and put in place support if needed.

Curriculum impact: students will deepen their understanding of an extensive list of the applications of Physics in the real world and understanding the fundamental laws of nature that govern the functioning of the universe. Students will improve their scientific research techniques (physical and analytical) applying higher GCSE level Mathematical skills (minimum 40% application of maths skills) and acquire new skills in statistical mathematics. Students will gain increased knowledge and understanding of the impact of forces and energy on day to day life such as automotive design, efficiency of engines and appliances, fundamental laws and their role in the formation and functioning of the universe. Students will appreciate the impact and importance of physicists and their roles in medicine and the NHS (imaging, treatments, diagnosis and engineering). Students will develop independent learning techniques, including research and essay writing to prepare them for university based assessments.

A level Physics	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
1. Knowledge and understanding	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below
2. Themes and Concepts	12: Waves and optics, matter and radiation 13: Motion in a circle and SHM and fields	12: Optics and quantum phenomena 13: thermal physics and gases and capacitors and mag fields	12: Electric current and forces and equilibrium 13: Astrophysics and telescopes and EM induction	12: DC Circuits, motion, electric current and forces and equilibrium 13: Cosmology, radioactivity and nuclear energy	12: Work, energy and power, Newton's laws 13: Exam preparation and revision	12: Force and momentum. Material physics 13: Study leave
3. Subject specific skills	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below
4. SMSC	See points below highlighted in pink	See points below highlighted in pink	See points below highlighted in pink	See points below highlighted in pink	See points below highlighted in pink	See points below highlighted in pink
5. Skills For life	Practicals: Teamwork, problem solving, communication, building resilience	Practicals: Teamwork, problem solving, communication, building resilience	Practicals: Teamwork, problem solving, communication, building resilience	Practicals: Teamwork, problem solving, communication, building resilience	Practicals: Teamwork, problem solving, communication, building resilience	Practicals: Teamwork, problem solving, communication, building resilience
a. Numeracy	See points below highlighted in green	See points below highlighted in green	See points below highlighted in green	See points below highlighted in green	See points below highlighted in green	See points below highlighted in green
b. Literacy	See points below highlighted in yellow	See points below highlighted in yellow	See points below highlighted in yellow	See points below highlighted in yellow	See points below highlighted in yellow	See points below highlighted in yellow
6. FBV	Working mutually with others demonstrating tolerance and respect	Working mutually with others demonstrating tolerance and respect	Working mutually with others demonstrating tolerance and respect	Working mutually with others demonstrating tolerance and respect	Working mutually with others demonstrating tolerance and respect	Working mutually with others demonstrating tolerance and respect
7. Key assessment focus, suggested assessments	See assessment points highlighted in red	See assessment points highlighted in red	See assessment points highlighted in red	See assessment points highlighted in red	See assessment points highlighted in red	See assessment points highlighted in red

8. Homework/Independent Learning	Homework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research.	Homework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research.	Homework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research.	Homework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research.	Homework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research.	Homework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research.
	See points below highlighted in purple for IL.	See points below highlighted in purple for IL.	See points below highlighted in purple for IL.	See points below highlighted in purple for IL.	See points below highlighted in purple for IL.	See points below highlighted in purple for IL.
9. Special events/ Visits/ Extra-curricular		Science Live lecture trip	Science week assembly	Keele University, required practicals and astrophysics		

Knowledge and Understanding:

Year 12

Lesson	Title and content	Additional Info	**Literacy/Numeracy/ICT / SMSC links**
1	Inside the atom	Simple model - particles and SI units AMU Isotopes and isotopic data	Definitions of keywords
2	Stable and unstable nuclei	Strong nuclear force - role and attraction/repulsion range Alpha and Beta decay Neutrino hypothesis	Calculating changes in mass
3	Photons	Recall what is meant by a photon Calculate energy of a photon Estimate light source photon emission	Calculating energy of photons

4	Particles and antiparticles	State particles and antiparticles Comparison of particle and antiparticle masses, charge and rest energy in MeV Annihilation and pair production	History of Science
5	Particle interactions	Describe four fundamental interactions: gravity, electromagnetic, weak nuclear, strong nuclear Identify exchange particles Draw Feynmann diagrams Describe weak nuclear force and electron capture	History of Science
6	Revision	End of chapter questions	
7	Test		
8	Particle zoo	Explain how we can find new particles State whether we can predict new particles Describe strange particles	Definitions of keywords
9	Particle sorting	Identify different classifications of particles Recognise hadrons Recognise leptons	Calculating rest energy
10	Leptons at work	Consider whether leptons are elementary Distinguish between different types of neutrinos Evaluate the importance of lepton numbers	Future of the universe
11	Quarks and Anti-quarks	Define strange particles Define quarks and explain how we know they exist Explain the quark changes in beta decay Explain why there could be no antimesons	Definitions of keywords
12	Conservation rules	State conservation rules for particle interactions Explain what is sometimes and never conserved	Probing the universe
13	Revision	Chapter 2 practice questions	
14	Test		

15	Photoelectric effect	Explain the photoelectric effect Define a photon Discuss how the photon model was established	Definitions of keywords
16	Photoelectricity	Explain why Einstein's photon model was revolutionary Define a quantum Explain why an electron can't absorb several photons to escape from a metal	Albert Einstein and science in world war 2
17	Electron collisions	Explain what is meant by ionisation of an atom Explain what is meant by atom excitation Explain what happens inside an atom when it becomes excited	Calculating ionisation levels
18	Energy levels	Explain what energy levels are Explain what happens when excited atoms de-excite Explain how a fluorescent tube works	Calculating energy levels within nuclei
19	Energy levels and spectra	Define a line spectra Explain why atoms emit characteristic line spectra Calculate the wavelength of light for a given electron transition	The bohr model of the atom
20	Wave-particle duality	Explain why we say photons have a dual nature Describe how we know that matter particles have a dual nature Discuss why we can change the wavelength of a matter particle but not that of a photon	Definitions of keywords
21	Revision	Chapter 3 practice questions	
22	Test		
23	Waves and vibrations	Explain the difference between transverse and longitudinal waves Define a polarised wave Describe a test to identify waves	Definitions of keywords

24	Measuring waves	Explain amplitude Explain wavelength Calculate the frequency from the period Calculate the phase difference	Calculations involving wavelengths, frequency, and amplitude
25	Wave properties	Explain what causes waves to refract Demonstrate the direction waves bend during refraction Explain what is meant by diffraction	Waves and medical instruments
26	Wave properties	Explain how two waves produce reinforcement Describe phase difference when waves cancel Explain why total cancellation is rarely achieved	Waves and medical instruments
27	Stationary and progressive waves	Describe conditions needed to form stationary waves Deduce whether waves are formed by superposition Explain why nodes are in fixed positions	Modelling a stationary waves
28	Stationary waves on strings	Explain what conditions must be satisfied to form stationary waves Describe the simplest possible stationary wave pattern Compare the frequencies of higher harmonics with the first harmonic frequency	Music and physics
	Required practical 1	Investigation into the variation of the frequency of stationary waves on a string (or wire) with length, tension, and mass per unit length of string	
29	Oscilloscopes	Describe how an oscilloscope is used Interpret waveforms on an oscilloscope	Using oscilloscopes with computers
30	Revision	Chapter 4 practice questions	
31	Test		

32	Refraction of light	Explain what we mean by rays State Snell's Law Comparing glass to air and air to glass refraction	Determining angles
33	Refraction of light	Explain what happens to speed during refraction Relate refractive index to speed Explain why a prism splits light	Determining angles
34	Total internal reflection	State the conditions needed for TIR Relate the critical angle to refractive index Explain why diamonds sparkle	Keywords and definitions
35	Double slit interference	State the conditions needed to form a bright fringe Describe Young's double slit experiment Describe how to increase fringe spacing	Derivation of formula
36	Interference	Identify coherent sources Explain why slits are used instead of light sources Describe roles of diffraction and interference in Young's slit	The dangers of using lasers
	Required practical 2	Investigation of interference in Young's slit experiment	
37	Diffraction	Explain why diffraction is needed in optical instruments Compare single slit diffraction to Young's fringes Describe the effect of single slit pattern on brightness	Interference in day to day life
38	Diffraction grating	Explain why diffraction grating diffracts monochromatic light Explain the effect of changing the grating Determine the grating spacing	Analysing stars through computational methods
	Required practical 2	Investigation of diffraction by a diffraction grating.	

39	Revision	Chapter 5 practice questions	
40	Test		
41	Density	Define density and state the unit Calculate the density	Eureka! And other famous experiments through history
42	Springs	Discuss the limit of a f-e graph Define the spring constant and it's unit Calculate energy stored in a spring	Determining the spring constant using graphs
43	Deformation of solids	Relate stress to force and strain to extension Describe Young's modulus Define tensile Explain why we use stress and strain	Definitions of keywords for stress strain graphs
44	Stress and strain	Predict whether a wire has reached its elastic limit Describe the effect when plastic limit is passed Compare deformation of wire to other materials	Material physics and plastic bags
	Required practical 4	Determination of Young's modulus by a simple method	
45	Revision	End of chapter questions	
46	Test		

Lesson	Title and content	Additional Info	**Literacy/Numeracy/ICT/SMSC links**
1	Current and charge	Define an electric current Calculate charge flow Define charge carriers	Definitions of current and charge

2	P.D. and power	Define PD Calculate electrical power Explain energy transfers	Definitions of voltage and potential difference
3	Resistance	Describe electrical resistance Discuss Ohms' Law Explain what a superconductor is	Calculations using Ohms law
	Required practical 5	Determination of resistivity of a wire using a micrometer, ammeter and voltmeter	
4	Components and their characteristics	Describe how current varies with PD State characteristics of a diode Describe the use of a thermistor	Circuits in day to day life
5	Revision	End of chapter questions	
6	Test		
7	Circuit Rules	State rules for series and parallel circuits State the principles behind these rules Describe how we use rules in circuits	Circuits and traffic management
8	Resistance and circuit rules	Calculate resistance in series and parallel Apply Ohm's law to series and parallel circuits	Calculations using Ohms law
9	Power	Define and calculate power from Ohms Law Explain power loss due to heating Apply power equations to a series of calculations	Power loss in the national grid
10	EMF and internal resistance	Define emf of a source Apply concept of internal resistance to power loss Define and calculate internal resistance of a source	Using graphs to determine internal resistance

	Required practical 6	Investigation of emf and internal resistance of electric cells and batteries by measuring the variation of the terminal pd of the cell with current in it	
11	Potential divider	Describe and explain the function of a potential divider Apply the potential divider to a series of calculations Use a potential divider to create sensor circuits	Sensor circuits in everyday life
12	Test		
13	Vectors and Scalars	Define a vector quantity Describe how to represent vectors Resolve vectors	Definitions of keywords in mechanics
14	Balanced forces	Explain why direction needs to be considered Demonstrate overall effect of forces Explain the parallelogram of forces	Resolving vectors
15	Principle of moments	Describe conditions needed for turning Explain how to increase the turning effect Explain how to balance a turning force Explain the need for centre of mass	Turning forces and the repercussions
16	Moments	Describe support force on a pivot Calculate force on multiple supports Explain what is meant by a couple	Turning forces and the repercussions
17	Stability	Explain the difference between unstable and stable equilibrium Assess when an object will topple Explain why lower CoM makes something more stable	Centre of mass and car designs

18	Equilibrium rules	Explain conditions needed for equilibrium Explain what condition must affect turning effects Predict forces in equilibrium	Resolving vectors
19	Statics calculations	State the important principles that apply to a body in equilibrium Calculate statics forces	Calculations and statistics
20	Revision	End of chapter questions	
21	Test		
22	Speed and velocity	Explain how displacement differs from distance Explain the difference between instantaneous and average speed Describe when to use velocity or speed	Using graphs to determine characteristics of motion
23	Acceleration	Describe acceleration and deceleration Explain uniform acceleration Explain why acceleration is a vector	Definitions of keywords in mechanics
24	Constant acceleration	Distinguish between u and v Calculate displacement Use SUVAT	Manipulating SUVAT equations
25	Free fall	Define free fall Explain how velocity changes for falling objects Discuss effect of mass on falling	Felix Baumgartner and free fall
	Required Practical 3	Determination of g by freefall	
26	Motion graphs	Distinguish between distance-time and displacement-time graphs Describe and use gradient and area of a v-t graph	Using graphs to determine characteristics of motion
27	SUVAT	Calculate motion if velocity reverses Break down motion into stages Explain how to use stages for calculations	Manipulating SUVAT equations

28	Projectile motion	Explain why acceleration is vertically downwards Identify horizontal component Describe effect of gravity on horizontal speed	Mechanics and rockets
29	Projectile motion	Projectile-like motion Describe effect of zero gravity Describe effect of air resistance on projectile motion	Behaviour in zero gravity
30	Revision		
31	Test		
32	Force and Acceleration	Describe effect of resultant forces Describe effect of force on moving objects Explain difference between weight and mass	Applying Newton's laws of motion
33	F = ma	Apply F = ma to opposing forces Explain why forces in a lift vary Describe where F = ma cannot be applied	Data loggers and motion
34	Terminal speed	Explain why drivers reach a terminal speed Explain effect of drag Explain what determines speed of a falling object	The physics of parachutes
35	On the road	Describe stopping, thinking and braking distance Discuss factors affecting stopping distance	Mechanics and car design
36	Vehicle Safety	Describe the force on a moving body when stopped suddenly Explain how to make deceleration smaller Discuss design features to improve safety	Mechanics and car design
37	Revision	End of chapter questions	
38	Test		

39	Momentum and impulse	Calculate momentum Describe link between Newton's Laws Define impulse and calculate it from a graph	Definitions and keywords for momentum
40	Impact forces	Describe effect of reducing time on impact force Calculate change in momentum Describe effect of bouncing on momentum	Calculating changes in motion
41	Conservation of momentum	Consider the loss of momentum Define conservation of momentum State conditions needed to conserve momentum	Fundamental laws of nature
42	Elastic and inelastic collisions	Distinguish between elastic and inelastic collisions Describe the things conserved in elastic collisions Discuss whether prefect elastic collisions exist	The physics of car crashes
43	Explosions	Describe energy changes in an explosion State the effect on momentum Describe consequences of objects following an explosion	Energy changes during explosions
44	Revision	End of chapter questions	
45	Test		
46	Work and energy	Define energy and it's unit Discuss dissipation of energy Define work	Keywords and definitions in energy
47	KE and PE	Describe work done when raising an object Describe energy changes during falling Describe effect on KE of doubling velocity	Equating types of energy and calculations

48	Power	State physical quantities involved in power Explain how to develop more power when climbing Explain why lightbulbs vary in power with the same voltage	The national grid and fuel consumption
49	Energy and efficiency	State the force needed for mechanical energy transfer State wasted energy Discuss efficiency	James Joule and the history of energy
50	Revision	End of chapter questions	

Year 13

Lesson	Title and content	Additional Info	**Literacy/Numeracy/ICT/SMSC links**
1	Uniform circular motion	Identify characteristics of uniform circular motion Calculate the speed of object in UCM Define the terms angular displacement and angular speed	Defining key terminology for uniform motion
2	Centripetal Acceleration	Describe the term centripetal force and acceleration Calculate centripetal force and acceleration Explain why objects in uniform circular motion are experiencing an acceleration	Why gravity keeps satellites in orbit
3	On the road (application)	Apply concepts of centripetal force and acceleration to car safety Describe the effect of these forces on passengers Identify the forces that provide centripetal force on banked tracks	Safe driving
4	At the fairground (application)	Describe the forces involved in fairground rides that demonstrate uniform circular motion Perform calculations involving centripetal forces for fairground rides	Designing fairground rides

5	Test		
	Feedback		
6	Oscillations	Explain the term oscillation Define the terms period, frequency and amplitude Describe the phase difference between two oscillating objects	Defining key terminology for harmonic motion
7	Simple harmonic motion	State the two fundamental conditions about acceleration that apply to simple harmonic motion Describe how displacement, velocity and acceleration vary with time Describe phase difference between displacement, velocity, and acceleration	Application of sin function

	Required Practical 7/8 Simple harmonic motion		
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8	Sine Waves	State the equation that relates displacement to time Calculate the velocity for a given displacement State the conditions for these equations to apply	Relating waves to circular motion through graphs
9	Apps of SHM	Apply concepts of simple harmonic motion to a mass spring system Describe how the period of a mass spring system depends on mass and length	Why we use springs in day to day life
10	Energy and SHM	Describe how kinetic energy and potential energy vary with displacement Explain the effects of damping on the characteristics of the system	Calculating energy transfers in SHM
11	Resonance	State the conditions for resonance to occur Distinguish between free and forced vibrations Explain why a resonant system reaches maximum amplitude	Designing bridges safely

12	Test		
	Feedback		
13	Internal energy and temperature	Define internal energy State the lowest temperature possible Demonstrate first law of thermodynamics	Definitions and keywords for gases
14	Specific heat capacity	Explain what is meant by heating up and cooling down State which materials heat up and cool down the fastest Define and measure specific heat capacity	Energy transfers within the home
15	Latent heat	Define latent heat Measure latent heat Explain why temp remains constant when changing state	Global warming and the melting sea ice
16	Test		
	Feedback		
17	Experimental gas laws	State the experimental gas laws Calculate pressure with temperature and volume Define isothermal change Calculate work in an isobaric process	Using data loggers to verify gas laws
	Required practical Boyle's law and Charles' law		
	Required practical Boyle's law and Charles' law		
18	Ideal gas laws	Define an ideal gas Discuss whether experimental gas laws can be combined Distinguish between molar and molecular mass	History of classical physics

19	Kinetic theory (RMS)	Explain the increase in gas pressure when compressed or heated Describe the behaviour of a gas Discuss what the mean kinetic energy of a gas depends upon	Defining equations through statistical mechanics
20	Test		
	Feedback		
21	Ray diagrams	Use ray diagrams to show how light travels through lenses Describe the features of concave and convex lenses	Mapping waves as straight lines
22	Lenses and Telescopes	Describe and explain how a two lens astronomical telescope functions Calculate the angular magnification of a telescope from focal lengths	The history of astronomy through the ages
23	Refracting Telescopes a Reflectors	Describe and explain how a reflecting telescope functions Explain the occurrence of aberrations when forming and image	Key terminology for telescopes
24	CCDs	Describe and explain how a charged coupled device functions Compare CCDs to the human eye in terms of efficiency	The problems in glass production
25	Non-Optical Telescopes	Compare optical and non-optical telescopes Quantify and calculate the resolving power of optical and non-optical telescopes	Using computers to analyse stars
26	Revision for Test	End of chapter questions	
27	Test		
28	Feedback		

29	The Parallax Problem	Define and Derive units of measurement in astrophysics Classify stars from there apparent and absolute magnitude	Defining the parallax angle
30	Magnitude of Stars	Define and Derive units of measurement in astrophysics Classify stars from there apparent and absolute magnitude	Determining magnitude of stars using logarithmic scales
31	Black Body Radiation	Explain how the wavelengths of light emitted by an object change with temperature Define and describe and object known as a black body emitter	Heat emission within the home
32	H-R Diagram	Deduce the characteristics of stars through comparison with the sun Explain the key features of a H-R diagram	Ancient Greece and history of cosmology
33	Fusion and the Life of Stars	Describe the stages involved in the fusion of Hydrogen to Helium Describe and explain the forces involved for nuclear fusion to occur	Solving the worlds energy crisis through nuclear fusion
34	Life Cycle of a Star	Identify the stages in a stars life cycle Describe and explain the birth, life, and death of a star	The life cycle of the sun and the death of the Earth
35	Supernovae and Black holes	Define properties of Supernovae and Black holes Perform calculations to determine the event horizon radius for a black hole	Cosmological scales and masses involved in black holes
36	Doppler Effect	Understand and describe Hubble's law Apply the Doppler effect equation and perform calculations	Defining the Doppler effect
37	Distance Ladder and Quasars	Describe the properties and characteristics of Quasars Use and apply formula to calculate properties of Quasars	Cosmological scales, using prefixes and suffixes
38	Detecting Exoplanets	Describe two methods for detecting the presence of exoplanets Calculate and determine properties of exoplanets	Finding a new home outside the solar system
39	Revision for Test	End of chapter questions	
40	Test		
41	Feedback		

Lesson	Title and content	Additional Info	**Literacy/Numeracy/ICT/SMSC links**
1	Gravitational field strength	Illustrate a grav. Field Explain gravitational field strengths Define radial and uniform fields	Mapping gravitational fields
2	Gravitational potential	Define gravitational potential Calculate gravitational potential Explain the existence of zero gravitational potentials	The potential paradox
3	Newton's laws	Describe Newton's Laws of gravity Explain the inverse square law Application of point masses in gravitational fields	Defining Newton's Laws of gravity
4	Planetary fields (radial fields)	Describe the shape of a graph of g against r for points outside the surface of a planet Compare this graph with graph v against r Explain the significance of the gradient in a v/r graph	Planetary interactions in space
5	Satellite motion	State the conditions for orbits Describe the relationship between velocity and radius of orbit Explain geostationary orbits	Kerbal space program and satellite motion
6	Test		
	Feedback		
7	Field patterns	Describe the shape of field patterns Illustrate field strength using field lines	Mapping electrical fields

8	Electric field strength	Describe how we measure strengths of electric fields Discuss whether electric field strength is scalar or vector Explain why e is force per unit charge	Using data loggers to determine field strength
9	Electric potential	Explain why potential is work done per unit charge Calculate electric potential between two points Calculate change in electric potentials Explain why potential is measured in volts	Potential and circuits in day to day life
10	Coulomb's law	Describe how the force between two point charges depends on distance Calculate the force between two charged objects Explain what the sign of force indicates	Keywords and definitions in electrical fields
11	Point charges	State the equation that gives field strength near a point charge State the equation that gives the potential associated with a point charge Explain why E is equal to zero inside a charged sphere	Calculations involving point sources
12	Test		
	Feedback		
13	Capacitance	Describe in terms of electron flow charging a capacitor State the potential difference of a capacitor depends on the charge on the plates Discuss uses of capacitors	Backup power supplies
14	Energy and capacitors	Explain why a capacitor stores energy Describe the form of energy that is stored by a capacitor Describe what happens to the amount of energy stored if the charge is doubled	Dielectrics and multiferroic materials
15	Charging and discharging capacitors	Describe and interpret the shape of Q-t charging and discharging curves Explain which circuit components you would change to make the charge/discharge slower Define the time constant of a capacitor resistor circuit	Using logs to explain discharge

	Required Practical 9 Charging and discharging capacitors		
16	Dielectric	Explain how a dielectric effects a capacitor Define relative permittivity Describe the action of a simple polar molecule in a rotating electric field	Definitions of dielectrics
17	Test		
	Feedback		
18	Currents and magnetic fields	Measure the strength of a magnetic field State factors that affect force on a current carrying conductor Determine the direction of force on a current carrying conductor in a magnetic field	Keywords and definitions for magnetic fields
	Required Practical 10 Current carrying conductor in a magnetic field		
	Required Practical 10 Current carrying conductor in a magnetic field		
19	Moving charges in magnetic fields	Describe what happens to charged particles in a magnetic field Explain why a force acts on a current carrying conductor in a magnetic field State the equation used to find force on a moving charge	Determining motion using equations

20	Orbits in magnetic fields (mass spec)	Describe what happens to direction of force when electrons are deflected by a magnetic field Explain why the moving charges move in a path that is circular State the factors that affect the radius	Determining motion using equations
21	Test		
	Feedback		
22	EM Induction	Describe the conditions for electricity generation State the factors that affect induced emf Discuss whether emf always results in a current	The fundamental laws of nature
	Required Practical 11 Using a search coil to investigate flux density		
	Required Practical 11 Using a search coil to investigate flux density		
23	Laws of EM Induction	Define magnetic flux and magnetic flux linkage Define Faraday's law State and explain Lens' law	Keywords and definitions for EM induction
23	AC Generator	State two features of output voltage waveform that change with rotation of coil Explain why output alternates Explain why it is preferable for generators to have fixed coils and rotating magnets	Generating electricity and fuel consumption
24	AC and Power	Define and alternating current Explain RMS values Calculate power	Electricity in the home

25	Transformers	Explain the function of transformers Describe energy changes in transformers Discuss efficiency of transformers	Power loss in the national grids
26	Test		

	Feedback		
27	Discovery of the nucleus	State the size of an average nucleus Describe how the nucleus was discovered Explain why it was not discovered earlier	Mathematical scales
28	Properties of alpha, beta, gamma	Define alpha, beta, and gamma radiation Explain why nuclear radiation is hazardous Describe the properties of alpha beta and gamma	Defining alpha, beta and gamma
29	Properties of alpha, beta, gamma	Application of inverse square laws to nuclear radiation	The dangers of ionising radiation
	Required Practical 12 Gamma radiation and the inverse square law		
	Required Practical 12 Gamma radiation and the inverse square law		
30	Radioactive decay	State what is meant by activity Define the term half-life Discuss conditions that affect radioactive decay	Half-life and the lingering threats of radiation
31	Decay modes	Discuss N-Z graphs Explain why naturally occurring isotopes do not emit beta+ radiation Describe what happens to unstable nuclei that emit gamma	Interpreting graphs to determine decay modes

32	Uses and risks of radiation	Describe the process of radioactive dating Define radioactive tracers Discuss radioactivity in hospitals Explain why ionising radiation is harmful State factors determining risk of nuclear radiations Discuss the health effects of exposure to ionising radiation	Chernobyl and the dangers of nuclear physics
33	Nuclear Radius (electron diffraction)	Describe how radius of nuclei depends on their mass number Describe the density of a nucleus	Mathematical scales
34	Test		
	Feedback		
35	Energy and mass	Explain E=mc^2 Describe what happens to mass when an object gains or loses energy Calculate energy released in a nuclear reaction	Applications of Einstein's equations
36	Binding mass	Define binding energy State which nuclei are the most stable Explain why energy is released during fission	Applications of Einstein's equations
37	Fission and fusion	Describe how much energy is released in a fission or fusion reaction Explain why small nuclei are not suitable for fission Explain why large nuclei are unsuitable for fusion	Electricity generation in the modern age
38	The thermal nuclear reactor	Explain how a nuclear reactor works	Chernobyl and the dangers of nuclear physics
39	Test		

Key:

SMSC		Mathematical		Assessment point	
Literacy		Independent learning		PSE/Connect	