Physics Progression Framework

		Key areas			
Organisers	**Experiences and outcomes**	**National 3**	**National 4**	**National 5**	**Higher**
Energy sources and sustainability	By contributing to an investigation on different ways of meeting society's energy needs, I can express an informed view on the risks and benefits of different energy sources including those produced from plants. SCN 4-04a *By investigating renewable energy sources and taking part in practical activities to harness them, I can discuss their benefits and potential problems. SCN 3-04b* *I can use my knowledge of the different ways in which heat is transferred between hot and cold objects and thermal conductivity of materials to improve energy efficiency in buildings or other systems. SCN 3-04a*	Energy sources: • Identification of different energy sources • Renewable and non-renewable sources • Advantages and disadvantages to society/environment of different energy sources Energy transfer: • Conduction of heat • Convection of heat • Radiation of heat	Generation of electricity: • Advantages/ disadvantages of forms of energy generation and distribution • Energy efficiency issues related to generation, distribution and use of electricity Electrical power as a measure of the energy transferred electrically by an appliance every second.	Conservation of energy (including potential and kinetic energy). Specific heat capacity. Electrical power (use of appropriate relationships to determine the power, voltage, current and resistance in electrical circuits).	Monitoring and measuring A.C. Use of appropriate relationships involving current, potential difference, power and resistance to analyse circuits.
Electricity	Through investigation, I can understand the relationship between current, voltage and resistance. I can apply this knowledge to solve practical problems. SCN 4-09a By contributing to investigations into the properties of a range of electronic components, I can select and use them as input and output devices in practical electronic systems. SCN 4-09b	Electricity: • Production of electricity • Domestic electricity and safety • Simple electrical circuits	Practical electrical and electronic circuits: • Qualitative factors that affect resistance • Use of the appropriate relationships between voltage, current and resistance in calculations for series circuits	Voltage (definition, with formula). Ohm's law — graphical analysis. The relationship between temperature and resistance of a conductor.	Electrical sources and internal resistance. Capacitors — charge/ discharge and applications. Electrons at work — conductors, semi-conductors and insulators.

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		Key areas			
Organisers	**Experiences and outcomes**	**National 3**	**National 4**	**National 5**	**Higher**
	Using my knowledge of electronic components and switching devices, I can help to engineer an electronic system to provide a practical solution to a real life situation. SCN 4-09c *Having measured the current and voltage in series and parallel circuits, I can design a circuit to show the advantages of parallel circuits in everyday application.* *SCN 3-09a*		• Practical applications of series and parallel circuits • Identification and use a range of electrical and electronic components to construct practical electronic circuits and systems	Practical electrical and electronic circuits and their applications.	p-n junctions and their applications.
Processes of the planet	I have developed my understanding of the kinetic model of a gas. I can describe the qualitative relationships between pressure, volume and temperature of gases. SCN 4-05a *By contributing to experiments and investigations, I can develop my understanding of models of matter and can apply this to changes of state and the energy involved as they occur in nature.* *SCN 3-05a*		Gas laws and the kinetic model: • Kinetic model of a gas • Applications of the kinetic model of a gas using knowledge of pressure, volume and temperature (for a fixed mass of gas)	Gas laws and the kinetic model: • Pressure, force and area • Pressure, volume and temperature using qualitative kinetic theory • Kelvin temperature and absolute zero	The standard model of fundamental particles and interactions.
Forces	I can use appropriate methods to measure, calculate and display graphically the speed of an object, and show how these methods can be used in a selected application. SCN 4-07a By making accurate measurements of speed and acceleration, I can relate the motion of an object to the forces acting upon it and apply this knowledge to transport safety. SCN 4-07b	Forces: • Link between force and energy • Applications of forces • Forces can change the shape, speed and direction of an object	Speed and acceleration. Relationship between forces, motion and energy: • Application of Newton's laws • Unbalanced forces and acceleration • Weight and mass quantitative	Velocity and displacement (vectors and scalars). Velocity-time graphs. Acceleration. Newton's laws: • Action/ reaction forces • Free-fall and terminal velocity	Motion — equations and graphs. Forces, energy and power. Collisions, explosions and impulse. Gravitation.

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	I can help to design and carry out investigations into the strength of magnets and electromagnets. From investigations, I can compare the properties, uses and commercial applications of electro-magnets and supermagnets. SCN 4-08a *By contributing to investigations of energy loss due to friction, I can suggest ways of improving the efficiency of moving systems. SCN 3-07a* *I have collaborated in investigations into the effects of gravity on objects and I can predict what might happen to their weight in different situations on Earth and in space. SCN 3-08a*		Satellites. Electromagnetism: • Relationship between electricity and magnetism • Practical applications of magnets and electromagnets	Projectile motion/ satellites. Electrical charge carriers and electric fields (including definition of electric current — with formula).	Gravity and mass. Forces on charged particles (including particle accelerators).
Vibrations and waves	By carrying out a comparison of the properties of parts of the electromagnetic spectrum beyond the visible, I can explain the use of radiation and discuss how this has impacted upon society and our quality of life. SCN 4-11b	Wave properties. Sound (making and hearing).	Wave characteristics: • longitudinal and transverse waves Sound: • Sound wave characteristics • Sound pollution and associated risks to health • Applications of ultrasound	Wave parameters and behaviours.	

Physics Progression Framework

		Key areas			
Organisers	**Experiences and outcomes**	**National 3**	**National 4**	**National 5**	**Higher**
	By exploring the refraction of light when passed through different materials, lenses and prisms, I can explain how light can be used in a variety of applications. SCN 3-11a *By exploring radiations beyond the visible, I can describe a selected application, discussing the advantages and limitations. SCN 3-11b*	Light: • Light travels in straight lines • Reflection of light • Convex and concave lenses • Optical instruments Colour (spectrum and mixing). Electromagnetic radiation (range and safety).	Electromagnetic spectrum: • Applications and hazards associated with electromagnetic radiations Nuclear radiation: • Natural and artificial sources — associated medical and industrial applications	Light (refraction). Electromagnetic spectrum (relative frequency, energy — qualitative, and wavelength of bands). Nuclear radiation: • Alpha, beta and gamma radiation • Ionisation, absorption, and shielding • Background radiation, half-life, and equivalent dose • Fission and fusion — qualitative	Refraction of light — (critical angle — quantitative). Interference and diffraction. Wave/particle duality. Spectra. Applications of the Doppler effect (light) — expansion of the universe. Nuclear reactions — quantitative.
Space	By researching developments used to observe or explore space, I can illustrate how our knowledge of the universe has evolved over time. SCN 4-06a *By using my knowledge of our solar system and the basic needs of living things, I can produce a reasoned argument on the likelihood of life existing elsewhere in the universe. SCN 3-06a*	Solar system: • Our planet Earth • Sun and moon • Our solar system	Cosmology: • Space exploration • Solar system and universe • Conditions to sustain life on other planets • Technologies developed through space exploration	Space exploration (use of the electromagnetic spectrum to gather information about astronomical objects). Cosmology: • Light year • Age of universe	Special relativity. The expanding universe. Hubble's law. 'Big bang' theory.