



Science at The Hinckley School

<p><u>Curriculum Vision</u></p> <p>We aim to deliver a curriculum that</p> <p>.... develops students' ability to work, think and communicate like a scientist</p> <p>.... encourages student curiosity</p> <p>.... is inclusive to all</p> <p>.... provides opportunities to experience science 'hands-on'</p> <p>.... enhances students' science capital</p>	<p><u>Subject Intent</u></p> <p><i>Science helps us understand, and connect to, the world we inhabit.</i></p>
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Year 7

	Biology	Chemistry	Physics	Working scientifically
	<i>CELLS What are living things made from and how do they reproduce?</i>	<i>PARTICLES What are all substances made of?</i>	<i>FORCES and ENERGY How do objects interact?</i>	SCIENTIFIC INVESTIGATIONS <i>How do scientists investigate ideas?</i>
Autumn	Microscopes and beyond	Particle model	Contact forces	
Spring	Plant reproduction	Elements and the periodic table	The Universe	
Summer	Human reproduction		Energy	
Endpoints	<ul style="list-style-type: none"> Label and explain the function of organelles in plant, animal and bacterial cells. Describe the increasing complexity shown by cells, tissues, organs and organ systems. Describe sexual reproduction in plants and animals. 	<ul style="list-style-type: none"> Draw particle diagrams for the three states of matter and use these to explain their properties Understand what happens at particle level when a substance changes state Describe the structure of an atom State that an element is a substance made up of only one type of atom. Explain how elements are organised in the Periodic Table 	<ul style="list-style-type: none"> State the types of forces and categorise them as contact or non-contact Describe how forces can change the shape of an object or cause it to move Describe the role gravity plays in the existence of our universe. Name the different types of energy store. Describe how energy can be transferred between energy stores. 	<ul style="list-style-type: none"> Accurately make measurements of length, time and volume Follow a set of instructions to complete a multistep experiment Identify the independent, dependent and control variables in an investigation Record results in an appropriate table Plot a simple scatter graph of whole number values Describe a trend in data in simple terms



Year 8

	Biology	Chemistry	Physics	Working scientifically
Term	BIOLOGICAL SYSTEMS How do living things survive?	SUBSTANCES What are the different types of substances and how are they formed?	ENERGY TRANSFER How is energy transferred between energy stores?	DESCRIBING EXPERIMENTS How do scientists share the details of their experiments?
Autumn	Breathing and respiration	Separating mixtures	Heating and cooling	
Spring	Nutrition and digestion	Types of reaction	Electricity	
Summer	Plants and photosynthesis	Acids and alkalis	Magnetism	
Endpoints	<ul style="list-style-type: none"> Describe the respiratory system and the effects disease and life style have on it Describe the digestive system and the importance of a balanced diet Know the key word equations for photosynthesis and respiration and where they take place Describe the structure of a leaf and how it is adapted for photosynthesis and gaseous exchange. 	<ul style="list-style-type: none"> Understand the difference between an element, a compound and a mixture Choose an appropriate method to separate a mixture Classify a chemical reaction as combustion, decomposition, oxidation or neutralisation Identify if a reaction is endothermic or exothermic 	<ul style="list-style-type: none"> Describe the processes of conduction, convection and radiation as means by which energy is transferred. Describe current, potential difference and resistance qualitatively. Represent the magnetic field around a bar magnet and in an electromagnet using magnetic field lines. 	<ul style="list-style-type: none"> Name common laboratory equipment and glassware Draw scientific diagrams of apparatus Outline a stepwise method for a planned experiment Accurately make measurements of mass Accurately describe observations Understand the difference between repeatable and reproducible results Identify anomalous results and record a mean



Year 9

	Biology	Chemistry	Physics	Working scientifically
Term	ECOSYSTEMS AND EVOLUTION Why are living things different?	EARTH CHEMISTRY How do we extract useful substances from the Earth?	PHYSICS IN ACTION How can we use an understanding of energy and forces to explain observations?	EVALUATING RESULTS What do scientists consider when looking at the results of an experiment?
Autumn	Interdependence	Earth Structure	Pressure	
Spring	Variation, evolution and inheritance	Atomic structure (GCSE)	Light and sound	
Summer	Cell Biology (GCSE)	Earth's resources (GCSE)	Energy (GCSE)	
Endpoints	<ul style="list-style-type: none"> Describe how living things interact in an ecosystem and how they are affected by their environment Explain the causes of differences between living things Describe the differences between chromosomes, genes and DNA. Explain how organisms have evolved over time. 	<ul style="list-style-type: none"> Describe the structure of the Earth Know that rocks can be classified into one of three types; igneous, metamorphic or sedimentary, and that they are continually changing as a result of chemical and physical processes Understand how metals can be extracted from their ores by displacement Describe the impact of human activity on the Earth and suggest ways in which this can be minimised 	<ul style="list-style-type: none"> Describe pressure as the effect of a force acting over an area and use this knowledge to explain everyday phenomena. Draw and label a simple waveform and link amplitude with volume and frequency with pitch. Describe light as a transverse wave Explain observations when light is shone on a material using simple ray diagrams (absorption, diffuse scattering, reflection and refraction). 	<ul style="list-style-type: none"> Use scientific knowledge to make a prediction Apply sampling techniques Identify the most suitable graph for presenting data (discrete and continuous) Understand the meaning of the terms random and systematic error Evaluate methods and suggest improvements and further investigations



GCSE AQA Combined Science (Trilogy) or AQA Separate Biology, Chemistry or Physics

Year 10

Term	Biology	Chemistry	Physics
Autumn	Cell Biology Organisation	Bonding, structure and properties of matter Chemical changes II	Particle model of matter Waves
Spring	Infection and response	Energy changes Rate and extent of chemical change	Atomic structure Electricity
Summer	Bioenergetics	Organic chemistry	Electricity cont.

Year 11

Term	Biology	Chemistry	Physics
Autumn	Homeostasis and response	Chemistry of the atmosphere Quantitative chemistry	Forces
Spring	Inheritance, variation and evolution	Chemical analysis Using resources and electrolysis	Magnetism and electromagnetism
Summer	Ecology	Using resources and electrolysis cont.	Space (Physics only)

Assessment Objectives & Learning Aims	Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experiment procedures.
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Key Stage 5: A-level Biology (OCR A)

Term	Year 12	Year 13
Autumn 1	<ul style="list-style-type: none"> - Cell Structure - Biological Molecules 	<ul style="list-style-type: none"> - Neuronal Communication - Hormonal Communication - Excretion as an Example of Homeostasis
Autumn 2	<ul style="list-style-type: none"> - Nucleic Acids - Enzymes - Biological Membranes - Cell Division, Diversity and Differentiation 	<ul style="list-style-type: none"> - Respiration - Photosynthesis - Plant and Animal Responses
Spring 1	<ul style="list-style-type: none"> - Biological Membranes Continued - Cell Division, Diversity and Differentiation Continued - Exchange Surfaces - Transport in Plants - Transport in Animals 	<ul style="list-style-type: none"> - Cellular Control - Patterns of Inheritance - Manipulating Genomes - Cloning & Biotechnology
Spring 2	<ul style="list-style-type: none"> - Transport in Animals Continued - Communicable Diseases - Biodiversity 	<ul style="list-style-type: none"> - Patterns of Inheritance Continued - Cloning & Biotechnology Continued - Populations & Sustainability
Summer 1	<ul style="list-style-type: none"> - Classification & Evolution - Transitioning into yr13: Communication & Homeostasis 	<ul style="list-style-type: none"> - Revision
Summer 2	<ul style="list-style-type: none"> - Transitioning into yr13: Ecosystems 	<ul style="list-style-type: none"> - Revision
Assessment Objectives & Learning Aims	<p>AO1: Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures</p> <p>AO2: Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:</p> <ul style="list-style-type: none"> - In a theoretical context - In a practical context - When handling qualitative data - When handling quantitative data <p>AO3: Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:</p> <ul style="list-style-type: none"> - make judgements and reach conclusions - develop and refine practical design and procedures 	



Key Stage 5: A-level Chemistry (AQA)

Term	Year 12	Year 13
Autumn 1	<ul style="list-style-type: none"> Amount of substance Atomic structure 	<ul style="list-style-type: none"> Thermodynamics Optical isomerism Aldehydes and ketones
Autumn 2	<ul style="list-style-type: none"> Bonding Energetics 	<ul style="list-style-type: none"> Rate equations Acids and bases Carboxylic acids and derivatives
Spring 1	<ul style="list-style-type: none"> Kinetics Introduction to organic chemistry Alkanes 	<ul style="list-style-type: none"> Transition metals Reactions of aqueous solutions Aromatic chemistry Amines Polymers Amino acids, proteins and DNA
Spring 2	<ul style="list-style-type: none"> Chemical equilibria, Le Chatelier's principle and K_c Oxidation, reduction and redox equations Halogenoalkanes 	<ul style="list-style-type: none"> Nuclear magnetic resonance spectroscopy Chromatography Properties of period 3
Summer 1	<ul style="list-style-type: none"> Group 2, the alkaline earth metals Group 7, the halogens Periodicity Alkenes Alcohols 	<ul style="list-style-type: none"> Organic synthesis Electrode potentials and electrochemical cells Equilibrium constant K_p for homogeneous systems
Summer 2	<ul style="list-style-type: none"> Periodicity Organic analysis 	
Assessment Objectives & Learning Aims	<p>AO1: Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures</p> <p>AO2: Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:</p> <ul style="list-style-type: none"> In a theoretical context In a practical context When handling qualitative data When handling quantitative data <p>AO3: Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:</p> <ul style="list-style-type: none"> make judgements and reach conclusions develop and refine practical design and procedures 	



Key Stage 5: Physics (OCR Physics A)

Term	Year 12	Year 13
Autumn 1	<ul style="list-style-type: none"> • Forces • Electrical Circuits - 1 	<ul style="list-style-type: none"> • Astrophysics and Cosmology • Gravitational Fields
Autumn 2	<ul style="list-style-type: none"> • Motion • Electrical Circuits - 2 	<ul style="list-style-type: none"> • Circular motion • Thermal Physics • Oscillations
Spring 1	<ul style="list-style-type: none"> • Work Energy and Power • Waves -1 	<ul style="list-style-type: none"> • Electric and Magnetic Fields • Capacitors
Spring 2	<ul style="list-style-type: none"> • Materials • Waves -2 	<ul style="list-style-type: none"> • Nuclear and Particle Physics
Summer 1	<ul style="list-style-type: none"> • Newton's laws of motion and momentum 	<ul style="list-style-type: none"> • Radioactivity • Medical Imaging
Summer 2	<ul style="list-style-type: none"> • Quantum Mechanics 	<ul style="list-style-type: none"> • EXAM prep
Assessment Objectives & Learning Aims	<ul style="list-style-type: none"> • To develop their interest and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject. • To develop essential knowledge and understanding of different areas of the subject and how they relate to each other. • To understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society. • To understand the fundamental mathematical relationships that govern natural phenomena and apply the laws of Physics in a logical and methodical way to solve problems. • To be curious to investigate theories and explore new ideas. 	