Northampton International Academy

Primary and Secondary Science Curriculum Overview

Why Teach Science?

"Science and everyday life cannot and should not be separated".

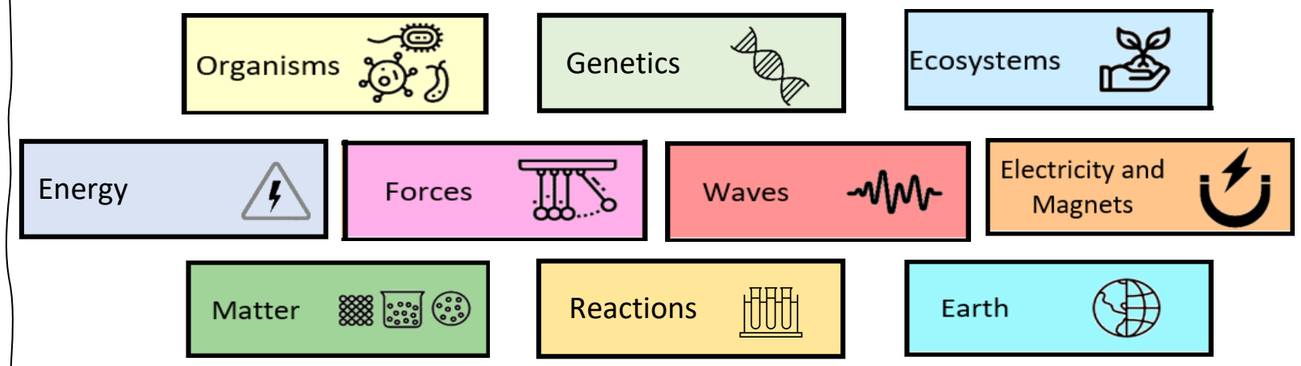
Rosalind Franklin

Our mission is to make Science enjoyable and accessible to all of our pupils. This will develop curious pupils who:

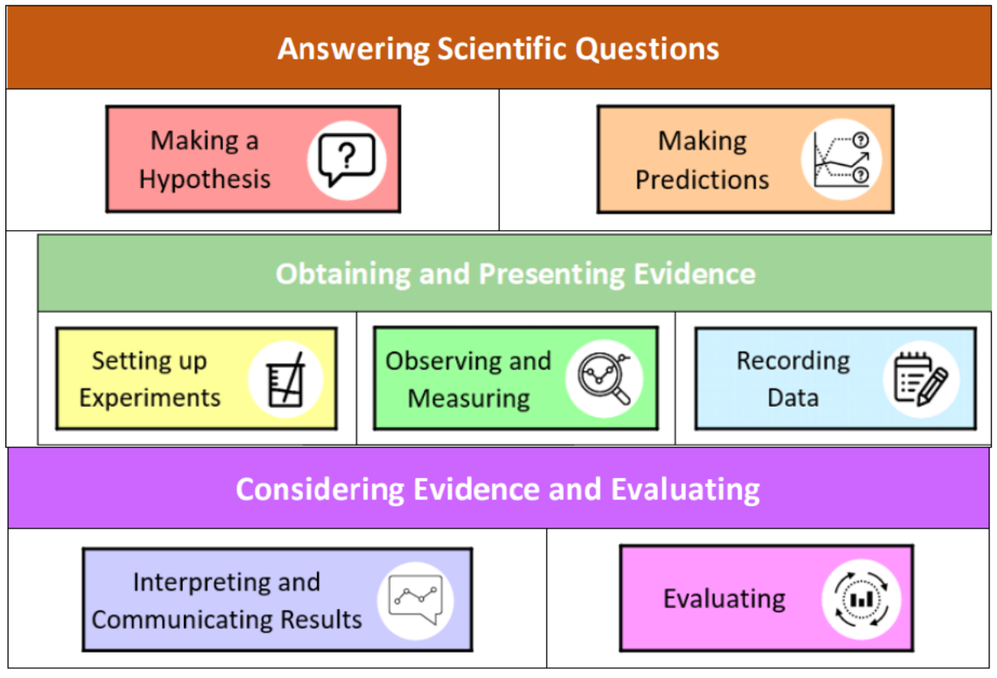
- Have an understanding of the word around them and an appetite to continue to develop that understanding.
- Ask important questions about the moral role of Science in society and to question the validity of
- data in the media.
- Have the skills and the knowledge in our students to ensure outcomes in public exams remain high and who are inspired to study Science related subjects at KS5 and beyond.

The 10 Big Ideas of the Science Curriculum

Curriculum maps detail the sequencing of substantive knowledge from the disciplines of biology, chemistry and physics to enable pupils to build schemata of important concepts over time through ten 'big ideas'.



Scientific Disciplinary Knowledge and Enquiry Skills



Learning for Life and Careers

Employability skills

Learning Science develops many high-level employability skills such as:

- Demonstrating scientific and technical knowledge
- Communication skills
- The ability to work in a team
- Developing a logical thought process and problem-solving skills
- Project and time management
- Numeracy and the ability to critically analyse data
- Using current technology and software to present research and relevant data

Linking the curriculum to careers

Science is absolutely integral to our society and there will always be traditional roles for Scientists in many areas such as conservation, medicine, pharmacy, engineering, developing green technologies, space exploration and many, many more. There are also many problems facing society in the coming years such as combating climate change, loss of biodiversity and managing an increasing human population and there is no doubt that Scientists will play an integral role in managing and solving these problems in the future. However, perhaps the most exciting thing about learning Science is that you are potentially preparing for careers in areas of research that are unknown today. Even in the last decade we have witnessed major Scientific break throughs including:

- Using fluorescent molecules to observe and develop molecules at the nanoscale level.
- Observing and studying supermassive black holes.
- The ability to edit genetic codes and develop RNA vaccines for diseases such as Covid-19.
- Developing "deep learning technology" that can mimic a human brain and develop the use of A.I.
- Advances in genetic testing allowing us to unravel ancient migrations and trace the origins and evolution of humanity.

It is exciting to even just imagine what sort of technologies our students could be researching and developing in decades to come.

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Secondary Science Curriculum Map – Key Stage 3 Topics by Term

Organisms	Genetics	Ecosystems	Matter	Reactions	Earth	Energy	Forces	Waves	Electricity & Magnets

	Year 7		Year 8		Year 9	
Autumn 1	Electricity, current, potential difference, and resistance. ***Electricity & Magnets***	The structure of the earth, rock formation. Gravity and seasons. ***Earth***	Substances as elements, compounds, and mixtures. Structure of the Periodic table. ***Matter***	Digestive system. Gases and lungs. ***Organisms***	Cells and transport *(B1.1)* Atoms and the Periodic Table *(P1.1/C1.1, C1.2)* ***Organisms***	***Matter***
Autumn 2	State of matter. Mixtures of substances. ***Matter***	The functions of organelles. Cells, organisms, and organs. ***Organisms***	Magnets, Earth's magnetic field. Static electricity. ***Electricity & Magnets***	Properties of waves and echolocation. ***Waves***	Bonding and structure (C2) Changes of State *(P1.2)* ***Matter***	
Spring 1	DNA, genetic information ***Genetics***	Forces interaction, motion, scientific measurement. ***Energy***	Classify reactions, exothermic or endothermic. Common reaction types (combustion, thermal decomposition, oxidation). ***Reactions***	Process of respiration, including how it differs from breathing and how exercise affects it. ***Ecosystems***	Conservation of energy, importance of energy stores and transfers (P1) ***Energy***	
Spring 2	Classify reactions as either chemical or physical. Common reactions (acid). ***Reactions***	Organisms' reliance on each other. Plants and animals' reproduction. ***Ecosystems***	Forces and their affects Scientific measurement. ***Forces***	Variation and natural selection Evolution. ***Genetics***	Enzymes, metabolism, and digestion *(B1.2, B2)* Link organelles and adaptations of cells to their functions *(B2)* Substances traveling between cells. ***Organisms***	
Summer 1	Energy transfer. ***Energy***	Properties of waves. Light and sound. ***Waves***	Materials, such as metals, extracted from the Earth ***Earth***	Energy generation. Scientific measurement. ***Energy***	Current, affects and resistance *(P2.1, P2.2)* Electricity transportation *(P2.3)* ***Electricity & Magnets***	
Summer 2	Muscles and Bones Scientific Investigations ***Organisms***		Motion and Forces Scientific Investigations ***Forces***		Bonding and Property of Materials – C2.2 / C2.3 ***Matter***	
	Revisiting Targeted intervention and Practical Skills EoY Assessment **Disciplinary Skills project**		Revisiting Targeted intervention and Practical Skills EoY Assessment **Disciplinary Skills project**		**Disciplinary Skills project**	

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Secondary Science Curriculum Map – Key Stage 4 Topics by Term

Organisms	Genetics	Ecosystems	Matter	Reactions	Earth	Energy	Forces	Waves	Electricity & Magnets

	Year 10 *(Combined Science)*			Year 10 *(Separate Sciences)*			Year 11 *(Combined Science)*			Year 11 *(Separate Sciences)*		
	Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics
Autumn 1	B3 Infection and Response	C3- Quantitative Chemistry	P3- Particle Model of Matter	B3 Infection and Response	C3- Quantitative Chemistry	P3- Particle Model of Matter	**B5- Homeostasis**	C7 - Organic Chemistry	P5 - Forces	B5- Homeostasis – part 2	C7 - Organic Chemistry	P5 - Forces completion
	Organisms	***Matter***	***Elect & Magnets***	***Ecosystems***	***Reactions***	***Elect & Magnets***	***Ecosystems***	***Reactions***	***Forces***	***Ecosystems***	***Reactions***	***Waves***
Autumn 2	B3 Infection and Response	C4- Chemical Changes	P3- Particle Model of Matter	B4- Bioenergetics	C4- Chemical Changes	P3- Particle Model of Matter	**B5- Homeostasis**	C8- Chemical Analysis	P5 - Forces	B6 - Inheritance	C7 - Organic Chemistry	P7 - Electromagnets
	Organisms	***Matter***	**Waves**	***Organisms***	***Energy***	***Elect & Magnets***	***Ecosystems***	***Reactions***	***Forces***	***Ecosystems***	***Reactions***	***Elect & Magnets***
Spring 1	B4- Bioenergetics	C4- Chemical Changes and C5- Energy Changes	P4- Atomic Structure & Radiation	B5- Homeostasis	C4- Chemical Changes and C5- Energy Changes	P4- Atomic Structure & Radiation	B6 - Inheritance	C9 - Chemistry of the Atmosphere	P6 - Waves	B6 - Inheritance	C8 - Chemical analysis	P6 - Waves
	Ecosystems	***Reactions***	***Waves***	***Organisms***	***Reactions***	***Elect & Magnets***	***Organisms***	***Reactions***	***Waves***	***Organisms***	***Reactions***	***Waves***
Spring 2	B7- Ecology	C6- Rate and Extent of Chem Changes	P4- Atomic Structure & Radiation	B5- Homeostasis part 1	C6- Rate and Extent of Chem Changes	P5 Forces	B6 - Inheritance	C10 - Using Resources	P7- Electromagnets	B7- Ecology recap	C10- Using resources	P6 - Waves
	Genetics	***Reactions***	***Waves***	***Ecosystems***	***Reactions***	**Forces**	***Organisms***	***Earth***	***Elect & Magnets***	***Organisms***	***Reactions***	***Waves***
Summer 1	B7- Ecology	C9 - Atmosphere Chemistry		B7- Ecology	C9 - Atmosphere Chemistry	P5 Forces	Revise required practical's	Revise required practical's	Revise required practical's	Revise required practical's	Revise required practical's	Revise required practical's
	Ecosystem	***Reactions***	***Waves***	***Genetics***	***Reactions***	***Forces***	***Disciplinary skills***	***Disciplinary skills***	***Disciplinary skills***	***Disciplinary skills***	***Disciplinary skills***	***Disciplinary skills***
Summer 2	Revisiting Targeted intervention and Practical Skills Examinations			B7- Ecology	C9 - Atmosphere Chemistry	P8 - Space	Revisiting Targeted intervention and Practical Skills Examinations					
	Disciplinary skills			***Ecosystem***	***Reactions***	***Waves***						

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Secondary Science Curriculum Map – Key Stage 5 Topics by Term

Organisms	Genetics	Ecosystems	Matter	Reactions	Earth		Forces	Waves	Electricity & Magnets

	Year 12			Year 13		
	Biology	Chemistry	Physics	Biology	Chemistry	Physics
Autumn 1	Basic Components of Living Organisms (C2) Exchange surfaces and breathing (C7) Transport in animals (C8) *Organisms*	Atoms, Ions and Compounds (C2) Amount of Substance (C3) Acids and Redox (C4) *Matter*	Foundations of Physics (C2) Motion (C3) Forces in Action (C4) *Forces*	Neuronal Communication (C13) Genetics of Living Systems (C19) Patterns of Inheritance (C20) *Organisms* *Genetics*	Rates of Reactions (C18) Equilibrium (C19) *Reactions*	Ideal Gases (C15) Circular Motion (C16) Oscillations (C17) *Forces* *Energy*
Autumn 2	Biological Molecules (C3) Transport in Plants (C9) *Organisms* *Ecosystems*	Electrons and Bonding (C5) Shapes of Molecules and Intermolecular Forces (C6) Periodicity (C7) *Matter*	Work, Energy, and Power (C5) Materials (C6) *Forces* *Energy*	Hormonal Communication (C14) Manipulating Genomes (C21) *Organisms* *Genetics*	Acids, Bases and pH (C20) Buffers and Neutralisation (C21) Enthalpy and Entropy (C22) *Reactions* *Energy*	Gravitational Fields (C18) Stars (C19) Cosmology (C20) *Earth* *Forces*
Spring 1	Enzymes (C4) Plasma Membranes (C5) Classification and Evolution (C10) *Organisms* *Ecosystems*	Basic Concepts of Organic Chemistry (C11) Alkanes (C12) Alkenes (C13) *Earth* *Reactions*	Laws of Motion and Momentum (C7) Charge and Current (C8) *Forces*	Homeostasis (C15) Cloning and Biotechnology (C22) *Organisms*	Redox and Electrode Potentials (C23) Transition Metals (C24) *Reactions*	Capacitance (C21) Electric Fields (C22) Magnetic Fields (C23) *Electricity & Magnets*
Spring 2	Cell Division (C6) Communicable Diseases (C12) Organisms	Alcohols (C14) Haloalkanes (C15) Spectroscopy (C17) *Reactions*	Energy, Power, and Resistance (C9) Electrical Circuits (C10) Electricity & Magnets	Respiration (C18) Ecosystems (C23) Organisms *Ecosystems*	Aromatic Chemistry (C25) Carbonyls and Carboxylic Acids (C26) Amines, Amino Acids and Proteins (C27) Reactions	Particle Physics (C24) Radioactivity (C25) Matter Waves
Summer 1	Biodiversity (C11) PAG catchup/refine Ecosystems	Reactivity Trends (C8) Enthalpy (C9) Reactions Energy	Waves 1 (C11) Waves 2 (C12) Waves	Energy for Biological Processes (C17) Plant responses (C16) Populations and Sustainability (C24) Organisms	Organic Synthesis (C28) Chromatography and Spectroscopy (C29) Reactions	Nuclear Physics (C26) Medical Imaging (C27) Waves Energy
Summer 2	Neuronal Communication (C13) Revisiting Genetics	Reaction Rates and Equilibrium (C10) Organic Synthesis (C16) Reactions	Quantum Physics (C13) Thermal Energy (C14) Waves Energy	**Revisiting** **Targeted intervention and Practical Skills** **A Level Examinations**		