SCIENCE CURRICULUM AREA STAFF

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SCIENCE CURRICULUM INTENT

The Science curriculum is designed to increase our pupils' knowledge, skills and understanding of the physical world around them, and to help them appreciate the relevance of Science in their everyday lives.

Our curriculum has been built on the principles of interleaved learning: pupils will revisit and augment previous knowledge on a short, medium and long-term basis. We will also provide students with the skills they need to succeed in life; critical thinking, logical deduction, language skills, mathematical skills and the ability to analyse and interpret data.

The curriculum will also prepare students to achieve their full potential in GCSE Science through outstanding teaching, effective discipline in line with whole-school policy, accurate monitoring and meaningful intervention.

The Science curriculum will embrace other subjects' curriculums in order to fit in with the whole school vision of providing a coherent and accessible education for students of all abilities and interests.

The Science curriculum is designed to develop personal qualities and cultural capital in all students in a wider context by giving them an understanding of (amongst other things): health issues (e.g. obesity, smoking, cancer treatments); moral issues (e.g. genetic modification); and environmental issues (e.g. nuclear and fossil fuels, global warming) whilst being sensitive of their cultural needs.

SCIENCE CURRICULUM OVERVIEW

Year 7: Science

Autumn Term

Autumn 1

TOPIC: Introduction to Science, Electromagnets Part 1, Organisms Part 1
WEEKS: 10

KNOWLEDGE	ASSESSMENT
L1 Safety L2 Dissolving salt L3 Crystallisation L1 Circuit symbols L2 Voltage and current L3 Batteries L4 Series circuits L5 Parallel circuits L6 Introduction to resistance L7 Investigating resistance L8 Charging up L1 Levels of organisation L2 The Skeleton L3 Joints	Baseline Assessment (MCQ) Electromagnets Part 1 (EQ) Organisms Part 1 (BA)

Spring Term

Spring 1

TOPIC: Forces Part 1
WEEKS: 7

KNOWLEDGE	ASSESSMENT
L1 Introduction to forces L2 Balanced and unbalanced forces L3 Understanding speed L4 Investigating average speed L5 Speed L6 Distance-time graph L7 Exploring distance-time graphs L8 Understanding gravity L9 Understanding gravitational fields	Forces Part 1 (EQ) **MID-YEAR EXAM WHOLE-SCHOOL ASSESSMENT DATA COLLECTION POINT**

Summer Term

Summer 1

TOPIC: Ecosystems Part 1
WEEKS: 6

KNOWLEDGE	ASSESSMENT
L1 Food chains L2 Food webs L3 Disruptions to food chains and webs L4 Ecosystems L5 Competition L6 Flower structure L7 Pollination L8 Fertilisation and germination L9 Seed dispersal	Energy Part 1 (EQ) Ecosystems Part 1 (BA)

L4 Muscles L5 Preparing slides L6 Observing cells L7 Plant and animal cells L8 Specialised cells L9 Movement of substances L10 Bacterial cells					
		SKILLS		**SKILLS**	
Draw scientific diagrams. Draw and analyse tables. Use a Bunsen burner safely. Follow a method. Calculate resistance using the formula: resistance (Ω) = potential difference (V) ÷ current (A) Draw and construct circuit diagrams. Use a light microscope to observe and draw cells.		Use the formula: speed = distance (m)/time (s) or distance-time graphs, to calculate speed. Use the formula: weight (N) = mass (kg) x gravitational field strength (N/kg).		Construct food webs from food chains.	
Autumn 2		**Spring 2**		**Summer 2**	
TOPIC: Matter Part 1 **WEEKS: 5**		**TOPIC: Genes Part 1, Reactions Part 1, Energy Part 1** **WEEKS: 9**		**TOPIC: CREST Science Project** **WEEKS: 6**	
KNOWLEDGE	**ASSESSMENT**	**KNOWLEDGE**	**ASSESSMENT**	**KNOWLEDGE**	**ASSESSMENT**
L1 The particle model L2 States of Matter L3 Melting and freezing L4 Boiling	Matter Part 1 (BA)	L1 Variation L2 Continuous and discontinuous variation L3 Adapting to change	Genes Part 1 (EQ)	Dependent on project brief selected.	Science Project

L5 More changes of state L6 Diffusion L7 Gas Pressure L8 Inside particles L9 Pure substances and mixtures L10 Solutions L11 Solubility L12 Filtration L13 Evaporation and distillation L14 Chromatography		L1 Physical and chemical changes L2 Safety using acids and alkalis L3 Indicators and pH L4 Acid strengths L5 Neutralisation L6 Making salts L7 Elements L8 Chemical reactions L9 Metals and acids L10 Metals and oxygen L11 Metals and water L12 Displacement of metals L1 Food and fuels L2 Energy resources L3 Energy and power L4 Energy adds up L5 Energy dissipation L6 Efficiency	Reactions Part 1 (BA)		**END OF YEAR EXAM WHOLE-SCHOOL ASSESSMENT DATA COLLECTION POINT**
SKILLS		**SKILLS**		**SKILLS**	
Use techniques to separate mixtures		Plot bar charts or line graphs to show discontinuous or continuous variation data. Use data and observations to determine the pH of a solution and explain what this shows. Calculate the cost of home energy usage, using the formula: cost =		Problem Solving Independent Thinking Decision Making Practical Skills Reflective Practice Reporting and Communicating Research Creativity	

		power (kW) x time (hours) x price (per kWh). Calculate the useful energy and the amount dissipated, given values of input and output energy			

Year 8: Science

Autumn Term		Spring Term		Summer Term	
Autumn 1		**Spring 1**		**Summer 1**	
TOPIC: Earth Part 1, Organisms Part 2, Matter Part 2 **WEEKS: 10**		**TOPIC: Genes Part 2** **WEEKS: 7**		**TOPIC Ecosystems Part 2** **WEEKS: 6**	
KNOWLEDGE	**ASSESSMENT**	**KNOWLEDGE**	**ASSESSMENT**	**KNOWLEDE**	**ASSESSMENT**
L1 The structure of the Earth L2 Sedimentary rocks L3 Igneous and Metamorphic rocks L4 The rock cycle L5 Ceramics L6 The night sky L7 The Solar system L8 The Earth L9 The Moon and changing ideas L1 Gas Exchange L2 Breathing L3 Drugs L4 Alcohol	Earth Part 1 (EQ) Organisms Part 2 (BA)	L1 Natural selection L2 Charles Darwin L3 Extinction L4 Preserving biodiversity L5 Inheritance L6 DNA L7 Genetics L8 Genetic modification	Genes Part 2 (EQ) **MID-YEAR EXAM WHOLE-SCHOOL ASSESSMENT DATA COLLECTION POINT**	L1 Aerobic respiration L2 Anaerobic respiration L3 Fermentation investigation L4 Biotechnology L5 Photosynthesis L6 Rate of photosynthesis investigation L7 Structure of the leaf L8 Stomata investigation L9 Photosynthesis investigation L10 Plant minerals L11 Plant minerals investigation	Reactions Part 2 (EQ) Ecosystems Part 2 (BA)

L5 Smoking L6 Nutrients L7 Food Tests (Part 1) L8 Food Tests (Part 2) L9 Unhealthy Eating L10 Digestive System L1 Elements L2 Atoms L3 Compounds L4 Chemical formulae L5 Polymers L6 The periodic table L7 The elements of group 1 L8 The elements of group 7 L9 The elements of group 0					
SKILLS		**SKILLS**		**SKILLS**	
Evaluate models. Make deductions. Use particle diagrams to classify a substance as an element, mixture or compound and as molecules or atoms. Name simple compounds using rules: change non-metal to –ide; mono, di, tri prefixes; and symbols of hydroxide, nitrate, sulfate and carbonate.		Predict and explain the changes in a population over time.		Practically test for the presence of starch.	
Autumn 2		**Spring 2**		**Summer 2**	

<table>
<tr><td colspan="2">TOPIC: Waves Part 1
WEEKS: 5</td><td colspan="2">TOPIC: Electromagnets Part 2, Forces Part 2, Reactions Part 2
WEEKS: 9</td><td colspan="2">TOPIC: CREST Science Project
WEEKS: 6</td></tr>
<tr><td>KNOWLEDGE</td><td>ASSESSMENT</td><td>KNOWLEDGE</td><td>ASSESSMENT</td><td>KNOWLEDGE</td><td>ASSESSMENT</td></tr>
<tr>
<td>L1 Sound waves and speed
L2 Loudness and amplitude
L3 Frequency and pitch
L4 The ear and hearing
L5 Light
L6 Reflection
L7 Refraction
L8 The eye and vision
L9 Colour</td>
<td>Matter Part 2 (EQ)

Waves Part 1 (BA)</td>
<td>L1 Magnets and magnetic fields
L2 Electromagnets
L3 Investigating the strength of electromagnets
L4 Using electromagnets

L1 Analysing equilibrium
L2 What a drag!
L3 Investigating friction
L4 Understanding stretch and compression
L5 Hooke's Law
L6 Hooke's Law II
L7 Turning forces
L8 Turning forces calculations
L9 Pressure in fluids
L10 Pressure in liquids
L11 Stress in solids

L1 Atoms in chemical reactions
L2 Combustion
L3 Thermal decomposition
L4 Conservation in mass
L5 Exothermic and endothermic reactions</td>
<td>Electromagnets Part 2 (EQ)

Forces Part 2 (BA)</td>
<td>Dependent on project brief selected.</td>
<td>Science Project

END OF YEAR EXAM WHOLE-SCHOOL ASSESSMENT DATA COLLECTION POINT</td>
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		L6 Energy level diagrams L7 Bond energies			
SKILLS		**SKILLS**		**SKILLS**	
Analyse waveform diagrams. Construct ray diagrams to show how light reflects off mirrors, forms images and refracts.		Investigate how to increase the strength of an electromagnet. Sketch the forces acting on an object, and label their size and direction. Use the formula: fluid pressure, or stress on a surface = force (N)/area (m^2). Write word equations from information about chemical reactions.		Problem Solving Independent Thinking Decision Making Practical Skills Reflective Practice Reporting and Communicating Research Creativity	

Year 9: Science (catch up curriculum to ensure full KS3 coverage- New HoD move over from Collins to 5 Year AQA)

Autumn Term		Spring Term		Summer Term	
Autumn 1		**Spring 1**		**Summer 1**	
TOPIC: Genes Part 1 (L1-L3), Reactions Part 1 Retrieval Practice, Energy Part 1, Genes Part 2 **WEEKS: 10**		**TOPIC: Earth Part 1, Waves Part 1 (Light)** **WEEKS: 7**		**TOPIC: B1 Transition Units** **WEEKS: 6**	
KNOWLEDGE	**ASSESSMENT**	**KNOWLEDGE**	**ASSESSMENT**	**KNOWLEDGE**	**ASSESSMENT**

L1 Physical and chemical changes L2 Safety using acids and alkalis L3 Indicators and pH L4 Acid strengths L5 Neutralisation L6 Making salts L7 Elements L8 Chemical reactions L9 Metals and acids L10 Metals and oxygen L11 Metals and water L12 Displacement of metals L1 Food and fuels L2 Energy resources L3 Energy and power L4 Energy adds up L5 Energy dissipation L6 Efficiency L1 Natural selection L2 Charles Darwin L3 Extinction L4 Preserving biodiversity L5 Inheritance L6 DNA L7 Genetics L8 Genetic modification **SKILLS**	Genes Part 1 (EQ) Reactions Part 1 (EQ) Energy Part 1 (BA) Genes Part 2 (EQ)	L1 The structure of the Earth L2 Sedimentary rocks L3 Igneous and Metamorphic rocks L4 The rock cycle L5 Ceramics L6 The night sky L7 The Solar system L8 The Earth L9 The Moon and changing ideas L1 Light L2 Reflection L3 Refraction L4 The eye and vision L5 Colour **SKILLS**	Earth Part 1 (EQ) Waves Part 1 (EQ) **MID-YEAR EXAM WHOLE-SCHOOL ASSESSMENT DATA COLLECTION POINT**	Cells **SKILLS**	B1 Transition (BA)

Plot bar charts or line graphs to show discontinuous or continuous variation data. Use particle diagrams to represent oxidation, displacement and metal-acid reactions. Calculate the cost of home energy usage, using the formula: cost = power (kW) x time (hours) x price (per kWh). Evaluate the social, economic and environmental consequences of using a resource to generate electricity, from data. Calculate the useful energy and the amount dissipated, given values of input and output energy. Use a diagram to show how genes are inherited. Explain how a change in the DNA (mutation) may affect an organism and its future offspring.		Make deductions from observation data of planets, stars and galaxies. Construct ray diagrams to show how light reflects off mirrors, forms images and refracts.		Use prefixes centi, milli, micro and nano. Recognise, draw and interpret images of cells. Use models and analogies to develop explanations of how cells divide Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatments. Recognise, draw and interpret diagrams that model diffusion. Recognise, draw and interpret diagrams that model osmosis.	
Autumn 2		**Spring 2**		**Summer 2**	

TOPIC: Reactions Part 2 WEEKS: 5		TOPIC: Energy Part 2, Earth Part 2, Waves Part 2 WEEKS: 9		TOPIC: C1 Transition Unit WEEKS: 6	
KNOWLEDGE	**ASSESSMENT**	**KNOWLEDGE**	**ASSESSMENT**	**KNOWLEDGE**	**ASSESSMENT**
L1 Atoms in chemical reactions L2 Combustion L3 Thermal decomposition L4 Conservation in mass L5 Exothermic and endothermic reactions L6 Energy level diagrams L7 Bond energies	Reactions Part 2 (BA)	L1 Work, energy and machines L2 Energy and temperature L3 Energy transfers - particles L4 Energy transfers - Radiation and insulation L1 Global warming L2 Carbon cycle L3 Climate change L4 Extracting metals L5 Recycling L1 Sound waves, water waves and energy L2 Radiation and energy L3 Modelling waves	Energy Part 2 (EQ) Earth Part 2 (BA) Waves Part 2 (EQ)	Atomic Structure	C1 Transition (BA) **END OF YEAR EXAM WHOLE-SCHOOL ASSESSMENT DATA COLLECTION POINT**
SKILLS		**SKILLS**		**SKILLS**	
Predict whether a chemical reaction will be exothermic or endothermic given data on bond strengths.		Use data to evaluate proposals. Compare and contrast sound and light waves.		Safe use of a range of equipment to separate chemical mixtures. Use SI units and the prefix nano. Recognise expressions in standard form. Visualise and represent 2D and 3D forms including	

				twodimensional representations of 3D objects. Explain how testing a prediction can support or refute a new scientific idea.	

SCIENCE CURRICULUM SEQUENCING

The curriculum has been designed around 10 key concepts at KS3. This allows students to be introduced to a breadth of core principles and develop an understanding of the foundation knowledge of the subject. The disciplinary knowledge or skills aspect of the curriculum is designed to allow students to be introduced to the key skills and enquiry processes associated with becoming a 'good scientist.' These skills are introduced in KS3 and used throughout the entire KS4 curriculum as part of the departments' delivery of science. The order of these units has coincided with the seasons so that students can experience their learning in the field where appropriate.