Faculty: SCIENCE

School's Curriculum Vision:

Hope Academy is a family, guided by Christian love, in which we serve our whole community with empathy and compassion, helping every member to flourish so all can pursue a rich and full life.

Our curriculum is designed to encourage a love of life-long learning, guided by the ultimate Christian value of love. We work to ensure that our curriculum makes our school's vision a reality and that every member of our Hope family can flourish and be the best that they can be.

Subject Vision: Through their enjoyment of science, students will better appreciate how science plays a role in our developing world and how we collectively contribute towards its progress.

The four key elements of science education underpinning the Science KS3 and KS4 curriculum, adapted from the National Curriculum and Edexcel Specification, are outlined below:

1: Factual and conceptual understanding
All pupils should:

- Have the opportunity to acquire factual knowledge
- Be supported to make links between topics of study
- Be supported to represent concepts using objects, pictures, models and analogies
- Finish their secondary science education with an appreciation of how scientific understanding evolves over time

The Science curriculum maps the factual knowledge requirements of secondary science under a set of big ideas, which are then divided into units of study that build sequentially over time. The sequence is narrated clearly to teachers in order that they can effectively support pupils to make links to previous learning. Pictures, models and analogies are embedded into the lesson design and used to support the introduction of key knowledge across the curriculum, and scientific enquiry skills are integrated into every unit.
The history of science supports the introduction of new concepts. Pupils will learn about a diverse range of scientists and how their research has contributed to current scientific understanding. Pupils will finish the programme with an understanding of the wide range of STEM careers in which people continue to work on developing our scientific understanding of the world around us.

2: Mathematics, practical and enquiry skills
All pupils should:

- Be provided with plenty of opportunity to understand the nature, processes and methods of science ('working scientifically')
- Develop procedural knowledge in order to show a wide range of practical skills
- Be able to evaluate experimental design such that they are able to recognise good and bad science
- Be able to think numerically
- Be supported to embed relevant mathematics skills from the programme of study for mathematics
- Develop their use of scientific vocabulary, including the use of scientific nomenclature and units and mathematical representations.

The Science curriculum supports pupils to develop their mathematics, practical and enquiry skills against a series of 100 skills statements. These have been developed from the National Programme of Study practical and maths skills descriptors. The statements have been grouped into four categories:

1. 1-10: Development of scientific thinking
2. 11-51: Experimental skills and strategies
3. 52 – 86: Evaluation, Data Analysis and Maths skills
4. 87-90: Units and quantities

These skills have been linked to science content across the five years. Skills are explicitly taught where they are introduced to pupils for the first time and then embedded a minimum of three times across different units. This ensures that pupils finish their secondary education having practised each skill in different contexts.

3: Language and communication
All pupils should:

- Be familiar with, and use, technical terminology accurately and precisely
- Build up an extended specialist vocabulary
- Be able to present scientific information accurately
- Critique scientific information they are exposed to in their daily lives
- Have the opportunity to hear high quality scientific language being used
- Have the opportunity to practice articulating scientific concepts clearly and precisely

The Science curriculum promotes pupil dialogue using talk tasks that are integrated into every lesson. These talk tasks aim to uncover key misconceptions and provide pupils with the opportunity to discuss scientific ideas. Pupils are supported to develop their scientific vocabulary using Frayer organisers, etymology, glossaries and exposure to scientific texts. Extended reading opportunities are embedded across the curriculum, with a reading comprehension focus promoted. Science is communicated using a wide range of forms, with pupils being exposed to information presented using symbols, models, graphs, tables and diagrams.

4: Application of knowledge and skills
All pupils should:

- Be able to use knowledge and skills in new contexts to answer questions, solve problems and explain observations
- Relate scientific explanations to phenomena in the world around them
- Start to use modelling and abstract ideas to develop and evaluate explanations

Our curriculum has been designed to incorporate the essential substantive and disciplinary knowledge needed to help students use science to explain the material world. The Department for Education states that 'it is vitally important that students develop a secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Insecure, superficial understanding will not allow genuine progression: pupils may build up serious misconceptions, and/or have significant difficulties in understanding higher-order content' (DfE, 2015).

This Science curriculum outlines the key knowledge that must be secure by the end of each unit and provides diagnostic end-of-unit assessment to check the strength of this understanding in all pupils. Content previously taught is constantly reviewed through pre-unit quizzes and connect tasks. This supports pupils to activate prior knowledge, see the connections between what they are learning and create meaning from their knowledge (Green, 2017).

The curriculum ensures a secure understanding of key blocks of knowledge and concepts using carefully designed lessons that build knowledge sequentially. This is done at pace in order that pupils can experience a diverse and knowledge-rich curriculum. To prevent insecure understanding, diagnostic checks based upon key misconceptions are embedded into every lesson, and these are used to inform the review of key content in subsequent lessons. This supports pupils to develop a comprehensive understanding of the science they learn at secondary school.

References:

Department for Education (2015) National curriculum in England: science programmes of study, Available at: https://www.gov.uk/government/publications/national-curriculum-in-england-science-programmes-of-study (Accessed March 2021)

Green, J (2017) Building a great curriculum - what knowledge do we need?, Available at: https://arkonline.org/blog/building-great-curriculum-whatknowledge-do-we-need (Accessed: March 2021)

Harlen, W (2010) Principles and Big Ideas of Science Education, ASE, Available at: https://www.ase.org.uk/bigideas (Accessed: March 2021)

Harlen, W (2015) Working with Big Ideas of Science Education, ASE, Available at: https://www.ase.org.uk/bigideas (Accessed: March 2021)

Subject Curriculum Mapping – Overview

KS3 CURRICULUM		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 7	**Topic**	B1.1 Cells	P1.1 Contact Forces	C1.2 Elements, Atoms and Compounds	B1.3 Interdependence	C1.3 Mixtures	P1.4 Electric Circuits: Current and Voltage
		C1.1 Particles	B1.2 Reproduction	P1.2 Gravity		P1.3 Energy Transfers	
	National Curriculum references & links	• Cells and organisation • The particulate nature of matter & the particle model	• Forces & Describing motion • Reproduction	• Atoms, elements, and compounds • Space physics	• Relationships in an ecosystem	• Pure and impure substances • Energy in matter • Energy changes and transfers	• Current electricity Static electricity
	Summative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews		1 x Summative assessment - MCQ & extended Qs		1 x Summative assessment - MCQ & extended Qs		1 x Summative assessment - MCQ & extended Qs
	Formative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs
	Reading & Literacy: *References to key texts/books throughout the year that students are exposed to* - Literary Canon Overview 2023-24 SCIENCE.docx Reading opportunities are built into the curriculum through: 1. The big idea at the start of each topic 2. Knowledge organisers 3. Frayer Organisers 4. Vocab Breakdowns 5. Reading activities 6. Scientist is spotlight 7. Science specific glossary						

KS3 CURRICULUM		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 8	**Topic**	B2.1 Tissues and Organs	P2.1 Movement and Pressure	C2.2 Changing Substances	B2.3 Life Diversity	P2.3 Electric Circuits: Resistance	P2.4 Light
		C2.1 Acids and Alkalis	B2.2 Respiration and Photosynthesis	P2.2 Magnetism	C2.3 Earth Systems	B2.4 Nutrition	
	National Curriculum references & links	• The skeletal and muscular systems • Gas exchange systems • Chemical reactions	• Physical changes • Pressure in fluids • Gas exchange systems • Health • Cellular respiration • Photosynthesis	• Chemical reactions • Magnetism	• Relationships in an ecosystem • Earth and atmosphere	• Current electricity • Nutrition and digestion	• Observed waves Light waves
	Summative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews		1 x Summative assessment - MCQ & extended Qs		1 x Summative assessment - MCQ & extended Qs		1 x Summative assessment - MCQ & extended Qs
	Formative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs
	Reading & Literacy: *References to key texts/books throughout the year that students are exposed to* - Literary Canon Overview 2023-24 SCIENCE.docx Reading opportunities are built into the curriculum through: 8. The big idea at the start of each topic 9. Knowledge organisers 10. Frayer Organisers 11. Vocab Breakdowns 12. Reading activities 13. Scientist is spotlight 14. Science specific glossary						

KS3 CURRICULUM		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 9	**Topic**	B3.1 Growth and Differentiation	P3.1 Acceleration	B3.2 Human Interaction	P3.2 Heating	C3.3 Using Resources	P3.4 Home Electricity
		C3.1 The Periodic Table		C3.2 Introduction to Quantitative Chemistry	B3.3 Genetics	P3.3 Sound and Waves	
	National Curriculum references & links	• Cells and organisation • The Periodic Table • Materials	• Forces and motion	• Relationships in an ecosystem • Energetics	• Changes in systems • Inheritance, chromosomes, DNA, and genes	• Earth and atmosphere • Sound waves • Energy and waves	• Current electricity
	Summative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews		1 x Summative assessment - MCQ & extended Qs		1 x Summative assessment - MCQ & extended Qs		1 x Summative assessment - MCQ & extended Qs
	Formative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs	1 x Formative Mastery Quiz per unit - MCQs & extended Qs
	Reading & Literacy: *References to key texts/books throughout the year that students are exposed to* - Literary Canon Overview 2023-24 SCIENCE.docx Reading opportunities are built into the curriculum through: 15. The big idea at the start of each topic 16. Knowledge organisers 17. Frayer Organisers 18. Vocab Breakdowns 19. Reading activities 20. Scientist is spotlight 21. Science specific glossary						

Combined

KS4 CURRICULUM		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 10 Combined	**Topic**	B1: Key concepts C2: Separation techniques C3: Atomic structure C4: The periodic table P2: Forces and motion	B2: Cells and control C5: Ionic bonding C6: Covalent bonding C7: Types of substance P3: Conservation of energy	B3: Genetics C8: Acids and alkalis P4: Waves	B4: Natural selection and genetic modification C8: Acids and alkalis P5: Light and the EM spectrum	B5: Health, disease and development of medicine C9: Calculations involving masses P6: Radiation	B6: Photosynthesis C10: Electrolysis C11: Obtaining and using metals C13: Groups in the periodic table P8: Forces and their effects
	GCSE Specification Points	B1.01-B1.17 C1.01 – C1. C2.01 – C2.12 P2.01 - P2.13 P2.14 – P2.31	B2.01 – B2.14 C1.21 – C1.42 P3.01 – P3.14	B3.01 – B3.23 C3.01 – C3.21 P4.01 – P4.10 (P4.17)	B4.01 – B3.14 C3.01 – C3.21 P5.01 – P5.24	B5.01 – B5.25 C1.43 – C1.53 P6.01 – P6.32	B6.01- B6.13 C3.22 – C3.30 C4.01 – C4.12 C6.01 – C6.16 P8.01 – P8.14 P9.9.01 – P9.05
	Summative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews		3 x Summative assessment (incorporating MCQ & extended Qs)		3 x Summative assessment (incorporating MCQ & extended Qs)	End of year assessment – modified Paper 1 for each discipline	
	Formative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments	4 x Formative diagnostic assessments	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments
	Reading & Literacy: *References to key texts/books throughout the year that students are exposed to* - Literary Canon Overview 2023-24 SCIENCE.docx						

KS4 CURRICULUM		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 11 Combined	**Topic**	B5: Health, disease and the development of medicine C10: Electrolysis C11: Obtaining materials P6: Radioactivity	B6: Photosynthesis B7: Animal coordination and homeostasis C14: Rates of reaction C12: Dynamic equilibrium C13: Groups in the periodic table P8: Work done P9: Electricity	B8: Exchange and transport in animals C15: Heat energy changes in Chemical reactions P10: Magnetism and motor effect	B8: Exchange and transport in animals B9: Ecosystems and material cycles C16: Fuels C17: Earth and the early atmosphere P111: Electromagnetic induction P12: Particle model		
	GCSE Specification Points	B5.01 – B5.20 C3.22 – C3.31 C4.01 – C4.12 P6.01 – P6.32	B6.01 – B6.13 B7.01 – 7.17 C7.01 – C7.08 C4.14 – C4.17 C6.01 – C6.16 P8.01 – P8.14 P9.01 – 9.05 P10.01 – P10.42	B8.01 - B8.12 C7.09 – C7.16 P12.01 – P12.13	B8.10 – B8.12 B9.01 – B9.15 C8.01 – C8.26 P13.01 – P13.10 P14.01 – P14.15 P15.01 – P15.06		
	Summative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews		3 x Summative assessment (incorporating MCQ & extended Qs)		3 x Summative assessment (incorporating MCQ & extended Qs)	End of year assessment – modified Paper 1 for each discipline	
	Formative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments	4 x Formative diagnostic assessments	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments
	Reading & Literacy: *References to key texts/books throughout the year that students are exposed to* - Literary Canon Overview 2023-24 SCIENCE.docx						

Separate Science

KS4 CURRICULUM		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 10 Separates	**Topic**	B1: Key concepts C2: Separation techniques C3: Atomic structure C4: The periodic table C5: Ionic bonding C6: Covalent bonding P2: Forces and motion	B2: Cells and control B3: Genetics C7: Types of substance C8: Acids and alkalis P3: Conservation of energy P4: Waves	B4: Natural selection and genetic modification C9: Calculations involving masses P5: Light and the EM spectrum	B5: Health, disease and the development of medicine C10: Electrolysis C11: Obtaining materials C13: Transition metals, corrosion and alloys P6: Radioactivity P7: Astronomy	B6: Photosynthesis C14: Quantitative chemistry P8/9: Energy and Forces 10: Electricity and Circuits	B7: Animal coordination and homeostasis C18: Rates of reaction C15: Fertilisers C12: Dynamic equilibrium C16: Chemical and Fuel cells C17: Groups in the periodic table P9: Electricity P11: Static electricity
	GCSE Specification Points	B1.01-B1.17 C1.01 – C1. C2.01 – C2.12 P2.01 - P2.13 P2.14 – P2.31	B2.01 – B2.14 B3.01 – B3.23 C1.34 – C1.42 C3.01 – C3.21 P3.01 – P3.14 P4.01 – P4.17	B4.01 – B4.13 C1.43 – C1.53 P5.01 – P5.23	B5.01 – B5.25 C3.22 – C3.31 C4.01 – C4.12 C5.01 – C5.07 P6.01 – P6.46 P7.01 – P7.19	B6.01 – B6.16 C5.08 – C5.18 P8.01 – P8.14 P9.01 – P9.09 P10.01 – P10.42	B7.01 – B7.22 C7.01 – C7.08 C5.19 – C5.27 C4.13 – C4.17 C5.25 - C5.27 C6.01 – C6.15 P11.01 – P11.10
	Summative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews		3 x Summative assessment (incorporating MCQ & extended Qs)		3 x Summative assessment (incorporating MCQ & extended Qs)	End of year assessment – modified Paper 1 for each discipline	
	Formative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments	4 x Formative diagnostic assessments	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments
	Reading & Literacy: *References to key texts/books throughout the year that students are exposed to* - Literary Canon Overview 2023-24 SCIENCE.docx						

KS4 CURRICULUM		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 11 Separates	**Topic**	B6: Photosynthesis B7:Animal coordination, control and homeostasis C13: Transition metals, alloys and corrosion C14: Quantitative analysis C18: Rates of reaction P7: Astronomy P8: Work done P9: Electricity P10: Electricity and Circuits	B8: Exchange and transport in animals C12: Dynamic equilibrium C15: Fertilisers C16: Fuel cells C17: Groups in the periodic table C19: Heat energy changes in Chemical reactions P11:Static electricity P12: Magnetism and the motor effect P13: Electromagnetic induction	B9: Ecosystems and material cycles C20/C22: Fuels and alkanes/alkenes P14: Particle model P15: Forces and Matter	B9: Ecosystems and material cycles C21: Earth and the early atmosphere C23: Alcohols and carboxylic acids C24: Polymers C25: Ion identification C26: Bulk materials and nanoparticles		
	GCSE Specification Points	C5.01 – C5.18 C7.01 – C7.08 P7.01 – P7.19 P801 – P8.14 P9.01 – P9.09 P10.01 – P42	B C4.13 – C4.17 C5.15 – C5.27 C6.01 – C6.16 C7.09 – C7.16 P11.01 – P11.10 P12.01 – P12.14 P13.01 – P13.11	C8.01 – C8.17 C9.10 – C9.16 P14.01- P14.20 P15.01 – P15.17	C8.18 – C8.26 C9.26 – C9.34 C9.17 – C9.25 C9.17 – C9.25 C9.01 – C9.09 C9.35 – C9.39		
	Summative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews		3 x Summative assessment (incorporating MCQ & extended Qs)		3 x Summative assessment (incorporating MCQ & extended Qs)	End of year assessment – modified Paper 1 for each discipline	
	Formative Assessment Hope Academy Assessment Model.docx Subject Assessment Model Overviews	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments	4 x Formative diagnostic assessments	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments	3 x Formative diagnostic assessments
	Reading & Literacy: *References to key texts/books throughout the year that students are exposed to -* Literary Canon Overview 2023-24 SCIENCE.docx						