

## PRIMARY

## KEY STAGE 3

## KEY STAGE 4

## KEY STAGE 5

### Curriculum Intent

**Students will leave KBA with a secure understanding of how to achieve validity within Science. Students will understand the world around them and have the skills to be able to question information and data that is presented to them.**

**Students will understand key concepts and issues related to waves, energy, forces, electricity, particles, space, magnetism, cells, ecology, biological reactions, inheritance, health, body systems, atoms, the Earth, reactions, chemical quantities and separating techniques.**

**Our curriculum aims to show students that scientists are needed in every walk of life and are not just confined to a laboratory. Our curriculum is inclusive and aims to challenge preconceptions about science qualifications and foster positive attitudes within our students.**

**Science education at KBA forms an important entitlement for all young people within the academy, therefore our progressive curriculum is inclusive to all to ensure every student throughout all key stages is provided with the opportunity to develop mastery in both substantive and disciplinary Science.**

### **1. How do you ensure consistent delivery of the subject across all key stages?**

Full schemes of learning are produced for all key stages these are fully resource to allow teachers to focus on subject knowledge and pedagogy. Teachers have regular CPD focussing on subject knowledge and pedagogy, including Rosenshine's Principles and TLAC strategies, in science. The curriculum is mapped to ensure progression from EYFS all the way through to Y13.

### **2. How does the curriculum cater for disadvantaged, SEND and other minority group students?**

Best practice is shared amongst the department and across the academy chain focusing on scaffolding and modelling. All students receive the same content with the scaffolding needed to reach mastery.

### **3. How does the curriculum embed prior knowledge and aid long-term retention of knowledge?**

Knowledge organisers and SENECA are consistently used for homework tasks to review previous topics throughout the year, to exclusively focus on previous topics. Spaced starters have now been further developed to take into account Ebbinghaus's forgetting curve to review the previous lesson, previous topic and previous year's learning. In KS1 and KS2 entry and exit quizzes are completed to monitor the retention of knowledge in a similar way.

# PRIMARY

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p><b>EYFS:</b> Children in early years settings follow the national curriculum that highlights seven areas of learning and development that must shape educational programmes. This includes understanding the world and involves guiding children to make sense of their physical world and their community through opportunities to explore, observe and find out about people, places, technology and the environment. Children learn and explore changes in the environment, metamorphosis, growth of self and plants, concepts of floating and sinking and magnets.</p>					
Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Biology Plants <i>Identifying and naming common plants and describing basic structures</i></p>	<p>Biology Needs of animals <i>Animals need water, food and air to survive and to have offspring</i></p>	<p>Chemistry Rocks <i>Comparisons of types of rocks and how fossils are formed</i></p>	<p>Biology Classifying organisms <i>Introduction to classifying animals and their environment</i></p>	<p>Chemistry Separating mixtures <i>Identifying and separating mixtures; difference between reversible and non-reversible changes</i></p>	<p>Physics Electricity <i>Investigating variations in series and parallel circuits, and how electricity is generated</i></p>
<p>Biology / Physics Seasonal changes <i>Observing changes across four seasons and describing associated weather</i></p>	<p>Chemistry Uses of everyday materials <i>Comparisons of an object's material with its use; impact of bending, twisting on solid objects</i></p>	<p>Physics Light <i>Relationship between light and how we see; the formation of shadows</i></p>	<p>Biology Food &amp; digestion <i>The human digestive system and simple food chains</i></p>	<p>Biology, Chemistry, Physics Energy <i>Introducing the concept of energy stores and energy transfers, and relating this to prior knowledge</i></p>	<p>Biology Evolution <i>Fossils; introduction to the idea that adaptation may lead to evolution</i></p>
<p>Chemistry Everyday materials <i>Distinguishing objects from the material it's made from, and describing simple properties</i></p>	<p>Biology Living things &amp; their habitats <i>Basic introduction to habitats and micro-habitats, and simple food chains</i></p>	<p>Biology Living organisms <i>The role of muscles and skeletons; the importance of nutrients</i></p>	<p>Chemistry Particle model and states of matter <i>States of matter in relation to particle arrangement</i></p>	<p>Biology Life cycles <i>Life cycles of a mammal, amphibian, insect and bird, and some reproduction processes</i></p>	<p>Physics Light <i>How light travels and is reflected, and how this allows us to see</i></p>
<p>Consolidation and review</p>	<p>Chemistry Solids, liquids and gases <i>Understanding how the same substances can exist as solids, liquids and gases</i></p>	<p>Biology Plants <i>The key features of flowering plants and what they need to survive</i></p>	<p>Physics Sounds <i>Relationship between strength of vibrations and volume of sound</i></p>	<p>Biology Human development <i>Human development to old age</i></p>	<p>Biology Further classification <i>Further classification of living organisms based on characteristics</i></p>
<p>Biology Animals <i>Identifying and naming fish, amphibians, reptiles, birds and mammals; carnivores, herbivores and omnivores</i></p>	<p>Biology Plant growth <i>Plants grow from seeds, and require water, light and a suitable temperature</i></p>	<p>Physics Forces &amp; motion <i>Introducing pushes and pulls; opposing forces, and balanced forces</i></p>	<p>Physics Electricity <i>Simple series circuits</i></p>	<p>Physics Forces <i>Gravity, air and water resistance and friction; introduction to pulleys</i></p>	<p>Biology Functions of the human body <i>Human circulatory system; transport of nutrients within the body</i></p>
<p>Biology Humans <i>Human body parts and senses</i></p>	<p>Consolidation and review</p>	<p>Physics Friction &amp; magnetism <i>Contact and non-contact forces, including friction and magnetism</i></p>	<p>Chemistry Properties of materials <i>Considering physical and chemical properties</i></p>	<p>Physics Earth and space <i>Movements of planets and the Moon, and relationship to day and night</i></p>	<p>Chemistry Physical and chemical changes <i>Identifying physical and chemical changes</i></p>
Working Scientifically		Working Scientifically		Working Scientifically	

## KEY STAGE 3

	1 <sup>st</sup> Half of the year (Sep – Jan)	2 <sup>nd</sup> Half of the year (Jan-July)	Disciplinary knowledge
7	<ul style="list-style-type: none"> <li>• Intro into Science</li> <li>• Cells, Tissues and Organs</li> <li>• Particles</li> <li>• Energy</li> <li>• Reproduction and Variation</li> <li>• <i>Working Scientifically Investigation Week</i></li> </ul>	<ul style="list-style-type: none"> <li>• Chemical Reactions</li> <li>• Forces and Motion</li> <li>• Light and Space</li> <li>• Digestion + Nutrition</li> <li>• Materials and the Earth</li> <li>• <i>Working Scientifically Investigation Week</i></li> </ul>	
	Mid-Year Assessment – Particles, Cells & Energy	End of Year Assessment Year 7 UL Paper 1 - Particles, Cells & Energy Year 7 UL Paper 2 - Reproduction & Variation, Chemical Reactions, Forces & Motion	
8	<ul style="list-style-type: none"> <li>• Ecological Relationships and classification</li> <li>• Materials and the Earth</li> <li>• The Periodic table</li> <li>• Electricity Recap</li> <li>• Forces Recap</li> <li>• <i>Working Scientifically Investigation Week</i></li> </ul>	<ul style="list-style-type: none"> <li>• Biological systems and processes</li> <li>• Matter</li> <li>• Reactivity</li> <li>• Sound Waves</li> <li>• <i>Working Scientifically Investigation Week</i></li> </ul>	
	Mid-Year Assessment – Ecology, Digestion & Nutrition, Periodic table and Light & Space	End of Year Assessment Year 8 UL Paper 1 - Dig & Nut, Periodic table, Light & Space plus any Year 7 units Year 8 UL Paper 2 – Ecology, materials and the Earth, Electricity and magnetism plus any year 7 units.	
9	<ul style="list-style-type: none"> <li>• Energetics and Rates</li> <li>• Forces in Action</li> <li>• Plants, photosynthesis and respiration</li> </ul>	<ul style="list-style-type: none"> <li>• Cell Biology</li> <li>• Atomic Structure &amp; Bonding</li> <li>• Changes in Energy Stores</li> <li>• Energy Transfer &amp; The Particle Model</li> <li>• Organisms and Disease</li> <li>• The Periodic Table</li> </ul>	
	Mid-Year Assessment – Photosynthesis, Reactivity, Energetics, Matter, Forces in Action plus any year 7 & 8 topics.	End of Year Assessment Year 9 UL Paper 1 and Paper 2 – any year 7, 8 or 9 units may be assessed, with a focus on KS3 fundamentals.	

\*Please note that not all groups will follow the same order of topics due to restraints on equipment. Although the rota may differ for half of each band, the curriculum has been fully sequenced to ensure knowledge is progressive.

## KEY STAGE 4

	<b>1<sup>st</sup> Half of the year (Sep – Jan)</b>	<b>2<sup>nd</sup> Half of the year (Jan-July)</b>	<b>Disciplinary knowledge</b>
<b>10</b>	<ul style="list-style-type: none"> <li>• Chemical Changes and energy changes</li> <li>• Quantitative Chemistry</li> <li>• Electricity</li> <li>• Generating Electricity</li> <li>• Infectious Disease</li> </ul>	<ul style="list-style-type: none"> <li>• Nuclear Radiation</li> <li>• Rates of Reaction</li> <li>• Inheritance</li> <li>• Reactions in Biology</li> <li>• Ecology</li> </ul>	
	<b>Mid-Year Assessment - One full paper – Chemistry</b>	<b>End of Year Assessment – Paper 1 mock exam. Three full papers.</b>	
<b>11</b>	<ul style="list-style-type: none"> <li>• Organic Chemistry</li> <li>• Forces</li> <li>• Chemical Analysis</li> <li>• Controlling the body</li> </ul>	<ul style="list-style-type: none"> <li>• Waves</li> <li>• Magnetism and Electromagnets</li> <li>• Earth and resources</li> <li>• PHYSICS ONLY – Space Physics</li> </ul>	
		<b>March Mock Exams - Paper 2 mock exams. Three full papers.</b>	
		<ul style="list-style-type: none"> <li>• Revision for final exams</li> </ul>	
	<b>November Mock Exams - Paper 1 mock exams. Three full papers.</b>	<b>ACTUAL GCSE EXAMS. 6 papers (75 mins for combined science, 105 minutes for separate science)</b>	

\*Please note that not all groups will follow the same order of topics due to restraints on equipment. Although the rota may differ for half of each band, the curriculum has been fully sequenced to ensure knowledge is progressive.

## KEY STAGE 4 – Triple Science

	1 <sup>st</sup> Half of the year (Sep – Jan)			2 <sup>nd</sup> Half of the year (Jan-July)			Disciplinary knowledge
10	<b>Biology</b>	<b>Chemistry</b>	<b>Physics</b>	<b>Biology</b>	<b>Chemistry</b>	<b>Physics</b>	
	<ul style="list-style-type: none"> <li>Infectious disease</li> <li>Reactions in Biology</li> </ul>	<ul style="list-style-type: none"> <li>Chemical changes and energy changes</li> <li>Quantitative Chemistry</li> <li>Start rates of reaction</li> </ul>	<ul style="list-style-type: none"> <li>Electricity</li> <li>Generating Electricity</li> </ul>	<ul style="list-style-type: none"> <li>Controlling the body</li> <li>Inheritance</li> </ul>	<ul style="list-style-type: none"> <li>Rates of Reaction</li> <li>Organic Chemistry</li> </ul>	<ul style="list-style-type: none"> <li>Finish Generating electricity</li> <li>Nuclear radiation</li> <li>Magnetism and electromagnets</li> </ul>	
	<b>Mid-Year Assessment - One full paper – Chemistry</b>			<b>End of Year Assessment – Paper 1 mock exam. Three full papers.</b>			
11	<b>Biology</b>	<b>Chemistry</b>	<b>Physics</b>	<b>Biology</b>	<b>Chemistry</b>	<b>Physics</b>	
	<ul style="list-style-type: none"> <li>Ecology</li> </ul>	<ul style="list-style-type: none"> <li>Chemical Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Force and Motion</li> <li>Waves</li> </ul>		<ul style="list-style-type: none"> <li>The Earth and Resources</li> </ul>	<ul style="list-style-type: none"> <li>Space</li> </ul>	
	<b>November Mock Exams - Paper 1 mock exams. Three full papers.</b>			<b>March Mock Exams - Paper 2 mock exams. Three full papers.</b>			
				<ul style="list-style-type: none"> <li>Revision for final exams</li> </ul>			
			<b>ACTUAL GCSE EXAMS. 6 papers (75 mins for combined science, 105 minutes for separate science)</b>				

\*Please note in year 10 the number of lessons for each specialism may differ each year depending on the timetable. Therefore, content may be taught at different rates, so topic in Sep-Jan might be pushed into Jan-July (visa-versa). The curriculum has still been fully sequenced to ensure knowledge is progressive.

## KEY STAGE 5

<b>BIOLOGY</b>	<b>September – November</b>	<b>December – March</b>	<b>March - June</b>	<b>Disciplinary knowledge</b>
<b>12</b>	<ul style="list-style-type: none"> <li>• Ch 1 Biological molecules (<i>RP 1 – Rate of an enzyme controlled reaction</i>)</li> <li>• Ch 2 Nucleic acids</li> <li>• Ch 3 Cell structure (<i>RP 2 – Root tip squash for mitotic index calculation</i>)</li> <li>• Start Ch 4 Transport across cell membranes</li> </ul>	<ul style="list-style-type: none"> <li>• Ch 4 Transport across cell membranes (<i>RP3 – Water potential of plant tissue</i>) (<i>RP 4 – Permeability of cell surface membranes</i>)</li> <li>• Ch 5 Cell recognition and the immune system</li> <li>• Ch 6 Exchange</li> <li>• Ch 7 Mass transport (<i>RPS – Dissection of animal or plant tissue</i>)</li> </ul>	<ul style="list-style-type: none"> <li>• Ch 8 DNA, genes and protein synthesis</li> <li>• Ch 9 Genetic diversity (<i>RP6 – Aseptic techniques</i>)</li> <li>• Ch 10 Biodiversity <b>June/July</b></li> <li>• Ch 14 Response to stimuli (<i>RP10 – Environmental variable on the movement of animals</i>)</li> </ul>	
	Pupils will be tested on the 1 <sup>st</sup> part of As Biology course, which test skills taught from September - November	Pupils will be tested on the content for As Biology which will be fully covered by this date, which test skills learnt from September to March	Pupils will be tested on Paper 1 and Paper 2, which test skills from though out Year 12	
<b>13</b>	<ul style="list-style-type: none"> <li>• Ch 14 Response to stimuli (<i>RP10 – Environmental variable on the movement of animals</i>) <i>cont.</i></li> <li>• Ch 17 Inherited change</li> <li>• Start Ch 18 Populations and ecosystems</li> <li>• Ch 15 Nervous coordination and muscles</li> <li>• Start Ch 16 Homeostasis (<i>RP11 – Glucose conc. and calibration curve</i>)</li> </ul> <p>NB. Ch 14 Response to stimuli was taught at the end of Year 12</p>	<ul style="list-style-type: none"> <li>• Ch 16 Homeostasis (<i>RP11 – Glucose conc. and calibration curve</i>)</li> <li>• Ch 18 Populations and ecosystems</li> <li>• Start Ch 19 Populations in ecosystems (<i>RP12 – Environmental factor on the distribution of a given species</i>)</li> <li>• Ch 11 Photosynthesis) (<i>RP7 – Chromatography of leaf pigments</i>) (<i>RP8 – Rate of dehydrogenase on chloroplast extract</i>)</li> <li>• Ch 12 Respiration (<i>RP9 – Respiration in single celled organisms</i>)</li> </ul>	<ul style="list-style-type: none"> <li>• Ch 19 Populations in ecosystems (<i>RP12 – Environmental factor on the distribution of a given species</i>)</li> <li>• Ch 13 Energy and ecosystems</li> <li>• Ch 20 Gene expression</li> <li>• Ch 21 Recombinant DNA technology</li> </ul>	
	Pupils will be tested on Paper 1 and some Paper 2 content, which test skills from year 12 and from September to November in Year 13	Pupils will complete a full set of mock (Papers 1, 2 and 3) using the previous summers' exams, which tests skills from both year 12 and 13	<b>ACTUAL A LEVEL EXAMINATION. 3 papers, 2 hours each.</b>	

<b>CHEMISTRY</b>	<b>September – November</b>	<b>December – March</b>	<b>March - June</b>	<b>Disciplinary knowledge</b>
<b>12</b>	<ul style="list-style-type: none"> <li>• Atomic Structure</li> <li>• Amounts of Substances</li> <li>• Bonding</li> <li>• Energetics</li> <li>• Kinetics</li> <li>• Periodicity</li> <li>• RP (1-3)</li> </ul>	<ul style="list-style-type: none"> <li>• Redox</li> <li>• Group 2 metals</li> <li>• Group 7 Elements – RP(4)</li> <li>• Introduction to Organic Chemistry</li> <li>• Alkanes</li> <li>• Halogenoalkanes</li> </ul>	<ul style="list-style-type: none"> <li>• Alkenes</li> <li>• Alcohol – RP(5+6)</li> <li>• Spectra -IR and Mass Spec</li> <li>• Organic Test tube reactions</li> <li>• Redox</li> </ul>	
	<b>November Mock Exam - Pupils will be tested on the 1<sup>st</sup> part of AS Chemistry course, which test skills taught from September - November</b>	<b>March Mock Exam - Pupils will be tested on the content for AS Chemistry which will be fully covered by this date, which test skills learnt from September to March</b>	<b>End of Year Exam - Pupils will be tested on Paper 1 and Paper 2, which test skills from though out Year 12</b>	
<b>13</b>	<ul style="list-style-type: none"> <li>• Rate Equations</li> <li>• Equilibria</li> <li>• Electrode Potentials</li> <li>• Acids and Bases</li> <li>• Transition Metals</li> <li>• Aqua complexes</li> <li>• Thermodynamics</li> <li>• RP 8/7a/b</li> <li>• RP 9</li> </ul>	<ul style="list-style-type: none"> <li>• RP (5, 10 +11) – To be taught after Nov Mock</li> <li>• Optical Isomers</li> <li>• Aldehydes and Ketones</li> <li>• Aromatic Chemistry</li> <li>• Amines – RP (10)</li> <li>• Biological Molecules</li> <li>• Polymers</li> <li>• Amino acids</li> <li>• NMR</li> <li>• Chromatography – RP(12)</li> </ul>	<ul style="list-style-type: none"> <li>• Revision for final examinations</li> </ul>	
	<b>Pupils will be tested on Paper 1 and some Paper 2 content, which test skills from year 12 and from September to November in Year 13</b>	<b>Pupils will complete a full set of mock (Papers 1, 2 and 3) using the previous summers' exams, which tests skills from both year 12 and 13</b>	<b>ACTUAL A LEVEL EXAMINATION. 3 papers, 2 hours each.</b>	

<b>PHYSICS</b>	<b>September – November</b>	<b>December – March</b>	<b>March - June</b>	<b>Disciplinary knowledge</b>
<b>12</b>	<ul style="list-style-type: none"> <li>• Particles (Chapters 1 &amp; 2)</li> <li>• Straight line motion (Chapter 7)</li> <li>• Projectile Motion (Chapter 8)</li> <li>• Newton’s Laws of Motion (Chapter 9)</li> <li>• Work, Energy and Power (Chapter 10)</li> <li>• Required Practical 3</li> </ul>	<ul style="list-style-type: none"> <li>• Quantum Phenomena (Chapter 3)</li> <li>• Waves (Chapter 4)</li> <li>• Optics (Chapter 5)</li> <li>• Materials (Chapter 11)</li> <li>• Electrical Circuits (Chapter 12)</li> </ul> Required Practical 1, 2, 4, 5	<ul style="list-style-type: none"> <li>• DC Circuits (Chapter 13)</li> <li>• Circular Motion (Chapter 17)</li> <li>• Revision for end of year examinations</li> </ul> Required Practical 6	
	<b>November Mock Exam - Pupils will be tested on the 1<sup>st</sup> part of AS Physics course, which test skills taught from September - November</b>	<b>March Mock Exam - Pupils will be tested on the content for AS Physics which will be fully covered by this date, which test skills learnt from September to March</b>	<b>End of Year Exam - Pupils will be tested on Paper 1 and Paper 2, which test skills from though out Year 12</b>	
<b>13</b>	<ul style="list-style-type: none"> <li>• Simple Harmonic Motion (Chapter 18)</li> <li>• Gravitational Fields Chapter 21)</li> <li>• Electric Fields (Chapter 22)</li> <li>• Thermal Physics and Gas Laws (Chapters 19 &amp; 20)</li> <li>• Radioactivity (Chapter 25)</li> </ul> Required Practical 7, 8	<ul style="list-style-type: none"> <li>• Capacitors (Chapter 23)</li> <li>• Magnetism and Induction (Chapters 24 &amp; 25)</li> <li>• Nuclear Radiation (Chapter 26)</li> <li>• Astrophysics option</li> </ul> Required Practical 9, 10, 11, 12	<ul style="list-style-type: none"> <li>• Revision for terminal examinations</li> </ul>	
	<b>Pupils will be tested on Paper 1 and some Paper 2 content, which test skills from year 12 and from September to November in Year 13</b>	<b>Pupils will complete a full set of mock (Papers 1, 2 and 3) using the previous summers’ exams, which tests skills from both year 12 and 13</b>	<b>ACTUAL A LEVEL EXAMINATION. 3 papers, 2 hours each.</b>	