SCIENCE

Programme of Study: 2023-4

Science Curriculum Vision:

In Science we aim for our students to be big thinkers; to be scientifically literate; to be able to make accurate inferences from the data they are provided with every day and to make informed choices that will create a better future for themselves and our global community.

Discovery - KS3:

Curriculum intent:

In Science we aim for our students to be big thinkers; to be scientifically literate; to be able to make accurate inferences from the data they are provided with every day and to make informed choices that will create a better future for themselves and our global community.

Science at KS3

We aspire for our students to discover a love of Science at the very start of their career at King's Academy Easthampstead Park that we, as their teachers, will strive to nurture and grow.

Students will study Biology, Chemistry and Physics topics that provide an excellent foundation for further study, whilst enthusing the students about the scientific process itself. In designing our curriculum, we have included all the aspects that make Science fantastic; whether it be investigating, observing, experimenting or testing out ideas and critically thinking about them. The way scientific ideas flow through the course will support our students in building a deep understanding of Science.

Students will be taught topics from all three disciplines in each block of learning and will be assessed on the breadth of their knowledge through a written test that will cover aspects of all three. The sequencing of the topics is such that key ideas develop in depth and complexity over time. For example, students first meet the particle model soon after they begin in year 7. They will then begin to classify particles as atoms, elements and compounds. They learn how elements are organised in the Periodic table in year 8 and then how particles transform through the rock cycle later that year.

Year 9 Science is an exciting time as students begin to work scientifically in more demanding contexts that expect an increasing depth of understanding. We will guide students to see the links between the traditional Biology, Chemistry and Physics disciplines so they can transfer and apply scientific ideas in a range of situations. For example, the scientific idea of Energy underpins all three disciplines and we will explore this explicitly at the start of the year. As the year progresses, Biology, Chemistry and Physics are taught in spiraling blocks so the curriculum is continually interleaving content.

Our students will be confident "do-ers" of Science. They will practice using apparatus and techniques through regular practical work. We have identified key skill areas that students will master over time. We will encourage the development of skills through regular opportunities for working scientifically in lesson time. We

will talk, read and write about Science and represent Science both mathematically and visually through models. Our teachers will lead by example and demonstrations will generate opportunities for students to question and be questioned. Students will be able to work resiliently and independently, but also learn from each other in group or whole-class activities. Communication skills will be assessed each time. These include; use of scientific conventions, scientific vocabulary and numerical manipulation.

The key skill areas are:

1. Scientific explanations and interpretation
2. Planning
3. Carrying out
4. Presenting scientific data
5. Evaluating evidence and arguments
6. Communication

Home Learning

Students shall be provided with topic summary sheets. Students' engagement with and recall of the information on these sheets will be assessed as part of class time activities. Teachers will be explicit with the students which parts of the information will be assessed and when.

Tassomai is the main home learning tool in Science. It provides students with daily, low stakes quizzes that require students to retrieve knowledge on targeted topics or across the Science curriculum. All students are expected to complete the "Daily Goal" on Tassomai 3 days a week. Where a topic area is less well understood, students will be directed to BBC Bitesize for more support. Students also have access to extra resources on Active Learn which supports our curriculum closely. Students are provided with end of month breakdowns of their usage to take home to parents.

Curriculum map

	Term 1	Term 1-2	Term 2-3	Term 3-4	Term 4-5	Term 5-6
Year 7	Introduction to Science	Block 1: 7A 7G 7I	Block 2: 7B 7H 7J	Block 3: 7C 7E 7L	Block 4: 8B 7F 7K	Projects: 7D 8E 8L End of Year 7 Revision
Students learn how to:	Working Scientifically is	7A Cells, Tissues, Organs and Systems 7G The Particle Model	7B Sexual Reproduction in Animals 7H Atoms, Elements and Compounds	7C Muscles and Bones 7E Mixtures and Separation 7L Sound	8B Plants and their Reproduction 7F Acids and Alkalis 7K Forces	7D Ecosystems 8E Combustion 8L Earth and Space

	introduced	7I Energy	7J Current Electricity			
Assessment	Bunsen Burner Certificate	Low-Stakes Quick quiz assessment at end of each topic End of Block Test	Low-Stakes Quick quiz assessment at end of each topic End of Block Test	Low-Stakes Quick quiz assessment at end of each topic End of Block Test	Low-Stakes Quick quiz assessment at end of each topic End of Block Test	End of Year 7 Test Low-Stakes Quick quiz assessment at end of each topic

	Term 1	Term 2	Term 3	Term 4-5	Term 5-6
Year 8	Block 1: 8A 8F 8K	Block 2: 8C 8G 9J	Block 3: 8D 8H 8I	Block 4: 9B 9E 8J	Projects: 9A 9F 9I End of Year 8 Revision
Students learn how to:	8A Food and Nutrition 8F The Periodic Table 8K Energy Transfers	8C Breathing and Respiration 8G Metals and their Uses 9J Force Fields and Electromagnets	8D Unicellular Organisms 8H Rocks 8I Fluids	9B Plant Growth 9E Making Materials 8J Light	9A Genetics and Evolution 9F Reactivity 9I Forces and Motion
Assessment	Low-Stakes Quick quiz assessment at end of each topic End of Block Test	Low-Stakes Quick quiz assessment at end of each topic End of Block Test	Low-Stakes Quick quiz assessment at end of each topic End of Block Test	Low-Stakes Quick quiz assessment at end of each topic End of Block Test	End of Year 8 Test Low-Stakes Quick quiz assessment at end of each topic

Year 9 Curriculum map

	Term 1	Term 2-3	Term 3-4	Term 5-6
Year 9	Block 1: Intro to Energy B4 C5 P1	Block 2: Year 9 B2 C1 P2	Block 3: Year 9 B3 C2 C3a	Block 4: P7

Students learn how to:	B4 Bioenergetics C5 Energy Changes P1 Energy	B2 Organisation C1 Atomic Structure and the Periodic Table P2 Electricity	P2 Electricity B3 Infection and Response C2 Bonding, structure, and the properties of matter C3a Quantitative Chemistry (Part 1)	P7 Force Fields and Electromagnets Revision
Assessment	Low-stakes quizzes every 3-4 lessons End of Block 1 Test	Low-stakes quizzes every 3-4 lessons End of Block 2 Test	Low-stakes quizzes every 3-4 lessons End of Block 3 Test	Low-stakes quizzes every 3-4 lessons End of Block 4 Test End of Year 9 Exam

Cross curricular linking: Year 7 7A History- Ancient Civilisations, PE Anatomy; 7G Geography - air pressure, pollution, Art - modelling;7I Geography and DT - energy sources, environment; 7B PSCHE/Citizenship; 7H Geography - the atmosphere, HIstory - development of ideas; 7J DT - electronics; 7C PE- fitness, exercise, breathing, Art - anatomy, PSCHE/Citizenship - drugs; 7F Geography - liming fields, pollution; 7K PE - sports. DT - presentation skills; 8E History - the Industrial Revolution; 7L Music - instruments, DT - soundproofing; Numeracy and Literacy skills to be taught explicitly throughout and highlighted in assessments	Cross curricular linking: Year 8 8A Art and English - advertising, PE - energy from food; 8I History - development of ideas, English - debating an issue; 8B Art - plants for textiles and dyes, decoration, English - plant poetry; 8G History - Bronze and Iron Age, DT - metal work; 8J Drama - stage lighting, Art - use of colour, ICT - graphics; 8H Geography - geological maps, mining; 8K DT - design of buildings and appliances, Geography - coping with different environments; 9B Geography - The Green Revolution; Geography - use of compasses Numeracy and Literacy skills to be taught explicitly throughout and highlighted in assessments

Destiny: Years 10 and 11

Curriculum intent:

In Science we aim for our students to be big thinkers; to be scientifically literate; to be able to make accurate inferences from the data they are provided with every day and to make informed choices that will create a better future for themselves and our global community.

Science at KS4

Examination board: AQA

Specification title: Trilogy

Assessment objectives:
AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures.
AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.
AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures.

Throughout Science at KS4 we want students to increasingly question the natural world around them.

In years 10 and 11, topics have been grouped into blocks of Biology, Chemistry and Physics. Students will rotate through the topics within each block and the breadth of their knowledge will be assessed through a written test at the end. The sequencing of the topics has been designed to allow thinking skills to develop over time, to provide increasingly abstract cognitive demand and to facilitate progression into Science subjects at KS5.

Alongside the demands of preparing for their GCSE qualifications, students and teachers will celebrate curiosity within the classroom. In our planning, we will provide opportunities for problem-solving and putting resilience into practice. Teachers will use precise questioning in class to test conceptual knowledge and skills, and assess students regularly to identify those students with gaps in learning, so that all students keep up.

It is expected that students will build upon the scientific enquiry skills they developed at KS3. They will take part in “required practicals” that will eventually form the basis of assessment at GCSE. Questions in the written exams will draw on the knowledge and understanding students have gained by carrying out the practical activities. Many questions will also focus on investigative skills and how well students can apply what they know to practical situations often in novel contexts. Communication skills will be assessed each time. These include; use of scientific conventions, scientific vocabulary and numerical manipulation.

The key skill areas are:

1. Scientific explanations and interpretation
2. Planning
3. Carrying out
4. Presenting scientific data
5. Evaluating evidence and arguments
6. Communication

We intend for our students to become ambassadors for Science. Our teachers will encourage this through fostering links with other STEM subjects (Science, Technology, Engineering and Mathematics), guiding them to paths into further study and an increasing range of extra-curricular opportunities with our partners in the community and the Enterprise program currently in place in school.

Home Learning

Students shall be provided with knowledge organisers. Students’ engagement with and recall of the information on these sheets will be assessed as part of class time activities. Teachers will be explicit with the students which parts of the information will be assessed and when.

Tassomai is the main home learning tool in Science. It provides students with daily, low stakes quizzes that require students to retrieve knowledge on targeted topics or across the Science curriculum. All students are expected to complete the “Daily Goal” on Tassomai at least 5 days a week. Where a topic area is less well understood, students will be directed to GCSEPod and Seneca for more support. Students also have access to extra resources on Kerboodle which supports our curriculum closely. Students are also provided with end of month usage breakdown sheets that they are to bring home to parents/carers.

Years 10 and 11 Curriculum map:

	Term 1	Term 2-3	Term 4	Term 5-6
Year 10	Block 1: Year 10 Biology	Block 2: Year 10 Physics and Chemistry	Block 3: Year 10 Chemistry and Physics	Block 4: Year 10 Chemistry and Biology
Students learn how to:	B1 Cell biology B5 Homeostasis	P3 The Particle Model P4 Atomic Structure C4 Chemical Changes	C4 Chemical Changes C7 Organic Chemistry P5a Forces	C8 Chemical Analysis C10 Using Resources B7 Ecology
Assessment	Low-stakes quizzes every 3-4 lessons End of Block 1 Test	Low-stakes quizzes every 3-4 lessons End of Block 2 Test	Low-stakes quizzes every 3-4 lessons PPEs Biology Paper 1 Chemistry Paper 1 Physics Paper 1	Low-stakes quizzes every 3-4 lessons End of Block 2 Test

	Term 1	Term 1-2	Term 2-3	Term 3	Term 4-5
Year 11	Block 1: Year 11 Physics	Block 2: Year 11 Biology	Block 3: Year 11 Chemistry	PPEs	Targeted Revision Programme
Students learn how to:	P5b Motion	B6 Inheritance, Variation and Evolution	C6 The rate and extent of chemical change C7 Organic Chemistry C9 Chemistry of the atmosphere	Revision and Directed Improvement and Reflection Time	Revision and Directed Improvement and Reflection Time

Assessment	Low-stakes quizzes every 3-4 lessons	Low-stakes quizzes every 3-4 lessons EBacc PPEs: Biology Paper 2 Chemistry Paper 1 Physics Paper 2	Low-stakes quizzes every 3-4 lessons	PPEs Biology Paper 1 Chemistry Paper 2 Physics Paper 1	Low-stakes quizzes every 3-4 lessons Past Exam Papers marked in class

EPCS 6:

<u>Science A-level minimum requirements</u>
Level 55 or above in GCSE Science - Combined or Two Separate Sciences
Level 5 or above in GCSE Mathematics
Level 5 or above in GCSE English Language

EPCS 6: <u>CHEMISTRY</u>

Programme of Study: 2023-24

Exam board(s) and Specification(s) details: OCR A (H432)

Curriculum map:

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6

Year 12	Foundations in Chemistry: Atoms, Moles,	Electrons, Bonding and structure	Periodic Table	Energy	Organic Chemistry	Organic Analysis and synthesis
Students learn how to:	Atoms and reactions; reacting masses, volume and gas calculations	Shells, orbitals, bonding, intramolecular forces, shapes	Periodicity, Group 2 and 7 elements,	Enthalpy, Equilibrium, Kinetics	Basic Organic, isomers, alkanes, alkenes, alcohols, haloalkanes, reaction mechanism	Infra-red and mass spectroscopy; practical techniques
Assessment	End of topic test	End of topic test	End of topic test	End of topic test	End of topic test	Full AS mock paper
Year 13	Aromatic Chemistry; Organic Reactions; polymers	Analysis, Chromatography, NMR spectroscopy; combined techniques	Kinetics; Equilibrium; Acids and bases	Thermodynamics; Redox;	Transition metals Revision and Exam practice using past papers	
Students learn how to:	Structure of and reactions of benzene, Reactions of carbonyls, condensation polymers	Analysis by tlc, NMR spectroscopy to determine structure of organic compounds	Orders of reactions; Kp, pH of strong and weak acids, pH of buffers	Lattice Energy, Born Haber cycles, SEP, redox titrations,	transition metals Review difficult topics and use mark schemes effectively to maximise their grade	
Assessment	End of topic test	Organic Paper 2 mock	End of topic test	Physical Chemistry Paper 2 mock	Paper 3 mock	

EPCS 6: PHYSICS

Programme of Study: 2023-24

Exam board(s) and Specification(s) details: AQA 7408

Curriculum map:

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 12						
Students learn about:	3.1 Measurement and errors 3.1.1 Use of SI units and their prefixes 3.1.2 Limitation of physical measurement 3.1.3 Estimation of physical quantities 3.4 Mechanics and materials 3.4.1 Force, energy and momentum	3.4 Mechanics and materials 3.4.1 Force, energy and momentum	3.4 Mechanics and materials 3.4.2 Materials 3.3 Waves 3.3.1 Progressive and stationary waves	3.3 Waves 3.3.1 Progressive and stationary waves 3.3.2 Refraction, diffraction and interference 3.5 Electricity 3.5.1 Current electricity	3.5 Electricity 3.5.1 Current electricity	3.2 Particles and radiation 3.2.1 Particles 3.2.2 E/m radiation and quantum phenomena Review and revision planning
Assessment	End of topic test	PPE	End of topic test	End of topic test	End of topic test	PPE. End of topic test

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 13						
Students learn about:	3.6 Further mechanics 3.6.1 Periodic motion 3.6.2 Thermal physics	3.7 Fields and their consequences 3.7.1 Fields 3.7.2 Gravitational fields	3.7 Fields and their consequences 3.7.3 Electric fields 3.8 Nuclear physics 3.81 Radioactivity	3.9 Astrophysics 3.9.1 Telescopes 3.9.2 Classification of stars 3.9.3 Cosmology	Review and revision	
Assessment	End of topic tests	End of topic tests	End of topic tests PPE (Paper 1,2,3,3a)	End of topic tests		

EPCS 6: BIOLOGY

Programme of Study: 2023-24

Exam board(s) and Specification(s) details: AQA AS and A-level Biology 7401, 7402

Curriculum map:

	Term 1	**Term 2**	**Term 3**	**Term 4**	**Term 5**	**Term 6**
Year 12						
Students learn how to:	3.1 Biological Molecules 3.1.1 Monomers and polymers 3.1.2 Carbohydrates 3.1.3 Lipids 3.1.4 Proteins RP1-Enzyme Controlled Reactions- Trypsin or amylase 3.2 Cells 3.2.1 Cell structure Microscopy practical work- graticule & biological drawing	3.1 Biological Molecules 3.1.5 Nucleic acids are important information-carrying molecules 3.1.6 ATP 3.1.7 Water 3.1.8 Inorganic ions 3.2 Cells 3.2.3 Transport across cell membranes	3.3 Organisms exchange substances with their environment 3.3.1 Surface area to volume ratio 3.3.2 Gas exchange Dissection of gas exchange surfaces- fish, lungs 3.2 Cells 3.2.4 Cell recognition and the immune system	3.3 Organisms exchange substances with their environment 3.3.3 Digestion and absorption 3.3.4 Mass transport RP5- Dissection of Heart Viewing Xylem & Phloem tissue	3.4 Genetic information, variation and relationships between organisms. 3.4.1 DNA, genes and chromosomes. 3.4.2 Protein synthesis. 3.4.3 Genetic diversity can arise as a result of mutation or during meiosis 3.4.4 Genetic	3.4 Genetic information, variation and relationships between organisms. 3.4.5 Species and taxonomy. 3.4.6 Biodiversity within a community 3.4.7 Investigating diversity Revision of key year 1 concepts

	3.2.2 All cells arise from other cells RP 2- Mitosis- preparing & observing root tip squash.	RP3- Use of calibration curve to estimate water potential RP4- Factors affecting membrane permeability			diversity and adaptation RP 6- Aseptic technique to investigate the effect of antimicrobials	
Assessment	Mid-Point Test End of topic test Req Practical	Mid-Point Test End of topic test PPE Req Practical	Mid-Point Test End of topic test Req Practical	PPE	Exams	