KS4 Science Long Term Plan

Brookvale Academy

Science Intent:

Our Key Stage 4 Science curriculum provides pupils with the knowledge, skills and qualifications they need for their next stage of education, employment or training. Learning is carefully sequenced across Biology, Chemistry and Physics, building on prior knowledge and developing pupils' understanding of key scientific concepts over time. Through the curriculum, pupils are encouraged to demonstrate our values of curiosity, challenge and confidence as they explore and explain the world around them.

Pupils follow a qualification pathway that is matched to their needs and starting points. Most pupils work towards **AQA GCSE Combined Science: Trilogy**, while pupils requiring additional support study the **AQA Entry Level Certificate in Science**. There is flexibility within this model, allowing pupils to move between pathways where appropriate as their confidence, engagement and attainment develop, ensuring all pupils access an appropriately ambitious curriculum.

Through practical investigations and the study of real-world scientific issues, pupils develop their ability to think and work scientifically. They learn to make predictions, plan and carry out investigations, analyse and evaluate evidence, identify patterns and communicate conclusions using appropriate scientific vocabulary. Opportunities to work independently and collaboratively help pupils develop confidence, creativity and resilience in their learning.

Science also supports the development of numeracy skills through measuring, calculating, interpreting graphs and analysing data. Pupils are encouraged to apply their learning to everyday situations and explore how science influences areas such as health, technology, energy and the environment, fostering **curiosity** and helping them understand the role science plays in society.

Alongside academic success, the curriculum develops wider employability skills including communication, teamwork, problem-solving, resilience and independence. By encouraging pupils to show character when faced with challenge and to take pride in their achievements, Science helps prepare them for meaningful next steps in education, training and employment. Lessons are structured, inclusive and supportive, ensuring all pupils can engage successfully with the curriculum and make progress from their individual starting points.

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Pathway ONE

Priorities: Increased attendance, develop positive relationships, Develop simple learning behaviours

In **Pathway 1**, Science is used to support pupils in re-engaging with education by prioritising attendance, positive relationships and the development of simple learning behaviours. Lessons are practical, highly structured and success-focused, helping pupils build confidence through participation, following routines, listening to others and completing achievable scientific tasks. Through regular encouragement and positive relationships with staff and peers, pupils develop the foundations for learning while working towards appropriate accredited outcomes, including AQA Entry Level Science qualifications.

Pathway TWO

Priorities: Increased attendance, improved engagement and participation in lessons, develop wider relationships, progress in literacy/numeracy

In Pathway 2, Science supports pupils to improve attendance, engagement and participation through practical, relevant and increasingly independent learning experiences. Lessons encourage pupils to work collaboratively, develop positive relationships with a wider range of peers and adults, and engage confidently in discussion and investigation. Science provides regular opportunities to strengthen literacy through scientific reading, writing and vocabulary, and numeracy through measuring, calculating, interpreting graphs and analysing data. Pupils work towards appropriate accredited qualifications, including AQA Entry Level Science and GCSE qualifications, preparing them for their next steps in education, training or employment.

Pathway THREE

Priorities: consistently high attendance, consistently positive engagement and participation in lessons, appropriate positive social interactions, Academic progress.

In **Pathway 3**, Science supports pupils to maintain high levels of attendance, engagement and participation while making strong academic progress. Lessons provide opportunities for pupils to think critically, work independently and collaboratively, and apply their scientific knowledge to increasingly complex concepts and investigations. Pupils are expected to demonstrate positive social interactions, resilience and responsibility in their learning. Through studying towards AQA GCSE Combined Science: Trilogy, or moving onto this pathway, pupils develop the knowledge, skills and qualifications needed for successful progression to further education, training and employment.

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GCSE Pathway

Year 10

Autumn 1			Autumn 2			Spring 1			Spring 2			Summer 1			Summer 2	
B1	B2	B4	C1	C2	C3	P1	P2	P3	B3	C4	C5	P4	C9	C10	B5	B7
B1 Cells B1.1 Cell structure and transport 1. Animal and plant cells 2. Prokaryotic cells 3. Specialised animal cells 4. Specialised plant cells 5. Microscopy 6. Diffusion 7. Osmosis B1.2 Cell division 1. Chromosomes 2. Growth and differentiation 3. Stem cells 4. Ethics of stem cells **B2 Organisation** B2.1 Digestive system 1. Organisation 2. Digestive system 3. Macromolecules 4. Food tests 5. Enzymes 6. Non-specific digestion			**C1 Atomic structure and the periodic table** Atomic structure 1. Elements and compounds 2. Separating mixtures 3. Paper chromatography 4. Atomic structure 5. Models of the atom 6. Ions and isotopes 7. Electron structure Periodic table 1. Group 1 2. Group 7 3. Models of the periodic table **C2 Bonding Structure and properties of matter** 1. Particle model 2. Ions			**P1 Energy** P1.1 Conservation and dissipation of energy 1. Energy stores 2. Energy transfers 3. Work done 4. GPE 5. Kinetic energy 6. Wasted energy 7. Efficiency 8. Application P1.2 Energy transfer by heating 1. Good and poor conductors 2. Measure SHC 3. Insulating the home P1.3 Energy resources 1. Renewable energy 2. Non-renewable energy 3. Pros and cons of energy systems			**B3 Infection and response** B3.1 Communicable diseases 1. Communicable diseases 2. Bacterial diseases 3. Viral diseases 4. Fungal diseases B3.2 Preventing and treating disease 1. Non-specific defense 2. Vaccination 3. Antibiotics 4. Drug examples 5. Medicinal development **C4 Chemical Changes** 4.1 Chemical changes 1. Reactivity series 2. Displacement reactions 3. Redox reactions 4. pH scale 5. Metal acid reaction			**P4 Atomic structure** 1. Development of the atom 2. Rutherford's Alpha scattering experiment 3. Isotopes and decay 4. Nuclear radiation **C9 Chemistry of the atmosphere** 1. The atmosphere 2 Greenhouse effect 3. Climate change 4. Carbon footprint and it's reduction 5. Pollutants **C10**			**B6 inheritance Variation and evolution** B6.1 Reproduction 1. Structure of DNA 2. Reproduction 3. Genetic inheritance 4. Punnett squares 5. Genetic diseases B6.2 Variation and evolution 1. Variation 2. Evolution 3. Selective breeding 4. GM organisms B6.3 Genetics and evolution 1. Natural selection 2. Extinction 3. Classification 4. Antibiotic resistance **B7 Ecology**	

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B2.2 Circulatory system 1. Gas exchange 2. Blood 3. Blood vessels 4. The heart 5. CHD 6. Health issues and lifestyle 7. Cancer B2.3 Organising plants 1. Plant organs 2. Xylem and phloem 3. Transpiration **B4 Bioenergetics** B4.1 Photosynthesis 1. Photosynthesis 2. Factors affecting photosynthesis 3. Required practical B4.2 Respiration 1. Aerobic respiration 2. Factors affected by exercise 3. Anaerobic respiration 4. Metabolism	3. Ionic bonding 4. Covalent bonding 5. Properties of covalent bonding 6. Giant covalent structures 7. Metallic bonding **C3 Quantitative Chemistry** 1. Relative formula mass 2. Percentage by mass 3. Balancing equations 4. Concentration	**P2 Electricity** P2.1 Electric circuit 1. Circuit symbols 2. Current 3. Potential difference 4. Resistance P2.2 Electricity in the home 1. Mains electricity 2. Wiring a plug 3. Power 4. Electrical devices **P3 Particle model of matter** 1. Density 2. Particle model 3. Internal energy 4. Gas pressure	6. Neutralisation reactions 7. Making a pure dry salt 4.2 Electrolysis 1. Electrolysis 2. Extraction using Electrolysis **C5 Energy changes** 1. Exothermic and endothermic reactions 2. Energy diagrams 3. Distillation and chromatography 4. Chromatography analysis	**The Earths resources** 1. Finite and renewable resources 2. Potable water 3. Waste water 4. Life Cycle Assessments	B7.1 Ecosystems 1. Ecosystems 2. Competition 3. Animal adaptations 4. Plant adaptations 5. Sampling B7.2 Food chains 1. Food chains 2. Food webs 3. Carbon cycle 4. Predator prey cycles B7.3 Biodiversity 1. Deforestation 2. Land use 3. Pollution and waste management 4. Maintaining biodiversity
Assessment: End of unit test	**Assessment:** End of unit test	**Assessment:** End of unit test	**Assessment:** End of unit test	**Assessment:** Mock Paper 1	**Assessment:** End of unit test

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Year 11

Autumn 1			Autumn 2			Spring 1			Spring 2		Summer 1		Summer 2	
P5	P6	P7	C6	C7	C8	B5	Revision and Mock Exam	Revision and past papers	Revision and past papers	Revision and past papers	GCSE Exams and revision	GCSE Exams and revision	GCSE Exams and revision	
Recap P1 and P2 **P5 Forces** P5.1 Forces in balance 1. Scalars and vectors 2. Contact forces 3. Resultant force 4. Gravity 5. Work done (recap of P1.1) 6. Elasticity 7. Hooke's Law 8. Hooke's Law practical P5.2 Motion 1. Distance, displacement and speed 2. Velocity 3. Distance time graphs P5.3 Forces and motion 1. Newton's first and second law 2. Newton's Third Law			**Recap C1** **C6 Rate and extent of Chemical Change** 1. Rate of reaction 2. Rate of reaction graphs 3. Collision theory 4. Measuring rate of reaction RP 5. Energy change recap 6. Catalysts 7. Reversible reactions **C7 Organic chemistry** 1. Hydrocarbons 2. Combustion 3. Gas tests 4. Fractional distillation 5. Cracking **C8 Chemical analysis** 1. Gas tests 2. Chromatography			**Recap B1 and B2** **B5 Homeostasis and response** B5.1 The nervous system 1. Homeostasis 2. Control systems 3. Nervous system 4. Reflex arc 5. Ruler drop test RP B5.2 Hormonal coordination 1. Endocrine system 2. Glucoregulation 3. Diabetes 4. Reproductive system 5. Reproductive hormones 6. Contraceptives			Paper 1 revision		Paper 2 revision			

3. Stopping distance **P6 Waves** 1. Waves 2. Wave frequency 3. Uses of EM waves 4. Dangers of EM waves **P7 Electromagnetic spectrum** Magnetic fields Electromagnets Investigating electromagnets	3. Chromatography analysis				
Assessment: End of unit test	**Assessment:** End of unit test	**Assessment:** January Mock Exam Full mock	Practise Past papers	GCSE and past paper practise	GCSE

Entry Level Pathway

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Year 10

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Biology: The human body	**Biology: The human body**	**Chemistry: Elements mixtures and compounds**	**Chemistry: Elements mixtures and compounds**	**Energy Forces and the structure of matter**	**Energy Forces and the structure of matter**
3.1.1 What is the body made of? 3.1.2 How the body works	3.1.3 How the body fights disease 3.1.4 How the body is coordinated	3.3.1 Atoms, elements and compounds 3.3.2 How structure affects properties 3.3.3 Separating mixtures	3.3.4 Metals and alloys 3.3.5 Polymers	3.5.1 Energy, energy transfers and energy resources 3.5.2 Forces and work	3.5.3 Speed and stopping distances 3.5.4 Atoms and nuclear radiation
Teacher Derived Assessment	**Externally Set Assessment**	**Teacher Derived Assessment**	**Externally Set Assessment**	**Teacher Derived Assessment**	**Externally Set Assessment**

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Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Chemistry in our world	**Chemistry in our world**	**Electricity Magnetism and waves**	**Electricity Magnetism and waves**	**Biology: Environment evolution and inheritance**	**Biology: Environment evolution and inheritance**
3.4.1 Reactions of acids 3.4.2 Energy and rate of reaction	3.4.3 Earth's atmosphere 3.4.4 Fuels and human impacts on the atmosphere 3.4.4 Fuels and human impacts on the atmosphere	3.6.1 Electrical current 3.6.2 Domestic electricity	3.6.3 Magnetism and electromagnetism 3.6.4 Different types of waves 3.6.5 Electromagnetic waves	3.2.1 What are the feeding relationships between living organisms? 3.2.2 What determines where particular species live?	3.2.3 How life has developed on Earth
Teacher Derived Assessment	**Externally Set Assessment**	**Teacher Derived Assessment**	**Externally Set Assessment**	**Teacher Derived Assessment**	**Externally Set Assessment**