Curriculum plan: Science seperate

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INTENT:

"Look deep into nature, and then you will understand everything better"

Albert Einstein

The intent of the science department is to convey to students that science underpins everything.

At The King's, we study:

- **Physics** to be able to understand the fundamental principles that govern all Energy and matter in the Universe. Physics gives us tools to understand nature from the scale of a sub-a-tomic particles up to the inter-galactic scale of the universe;
- **Chemistry** to be able to understand the nature of substances: how they are composed, their behaviors, and their physical and chemical properties. Chemistry allows us to identify unknown substances, monitor concentrations and synthesize new chemicals. Above all, chemistry is about finding solutions to the problems that concern us and our surroundings;
- **Biology** to be able to understand life and thereby understand ourselves. Biology allows us an understanding od the amazing complexity of many life processes and mechanisms. Biology encourages us to seek out reasons for strange, surprising and sometimes usual observations.

Science provides some incredibly challenging topics helping to gauge an awareness of topical issues and their impact on the climate, earth as well as human growth.

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Please click on the icons to access our online portal where you can learn more about each topic

Half term points

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
10	**Cell Division** **Learning to include:** **B2 Cell Division** • mitosis • growth and differentiation • stem cells  **Organisation** **Learning to include:** **B3 Organisation and the digestive system** • tissues and organs • the human digestive system • the chemistry of food • catalysts and enzymes • the factors affecting	**Organisation** **Learning to include:** **B4 Organising animals and plants** • the blood • the structure of blood vessels • the structure and function of the heart • helping the heart • breathing and gaseous exchange • transport system in plants • evaporation and transpiration of classification 	**Infection and response** **Learning to include:** **B5 Communicable diseases** • health and disease • preventing infections • viral diseases • bacterial diseases • diseases caused by fungi and protists • the human defence response • growing bacteria • plant diseases and defence **B6 Preventing and treating disease** • vaccinations • antibiotics and painkillers • discovering and developing drugs • making and using monoclonal antibodies 	**Infection and response** **B7 Non-communicable disease** • cancer • smoking and the risk of disease • diet, exercise and diseases • alcohol and other carcinogens 	**Bioenergetics** **Learning to include:** **B9 Respiration** • aerobic respiration • the body's response to exercise • anaerobic respiration • metabolism and the liver 	**Required Practical Revision Biology paper 1** **Learning to include:** • Microscopy • Microbiology • Osmosis • Enzymes • Food test • Photosynthesis **Maths Skills Review**

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	Energy **Learning to include:** **P2 Energy transfer by heating** • conduction • infrared radiation • specific heat capacity • heating and insulating buildings	**Electric Circuits** **Learning to include:** **P4 Electric circuits** • current and charge • potential difference and resistance • component characteristics • series and parallel circuits	**Electricity in the home** **Learning to include:** **P5 Electricity in the home** • alternating current • cables and plugs • electrical power and potential difference • electrical current and energy transfer	**Atomic structure** **Learning to include:** **P7 Radioactivity** • atoms and radiation • the discovery and changes to the nucleus • alpha, beta and gamma radiation • activity and half-life • nuclear radiation in medicine • nuclear fission • nuclear fusion • nuclear issues	**Revisiting prior learning: Energy** **Learning to include:** **P1 Conservation and dissipation of energy** • changes in energy and energy conservation • energy and work • gravitational potential energy • kinetic and elastic energy stores • energy dissipation • energy efficiency • energy and power	**Required Practical Revision Chemistry paper 1** **Learning to include:** • Making salts • Electrolysis • Temperature changes **Maths Skills Review**
	Electricity **Learning to include:** **P3 Energy resources** • energy demands • renewable energy: wind, water, sun and earth • energy and the environment	**Quantitative chemistry** **Learning to include:** **C4 Chemical calculations** • relative masses and moles • equation and calculations • from masses to balanced equations • expressing concentrations yield and atom economy	**Chemical changes** **Learning to include:** **C5 Chemical changes** • the reactivity series • displacement reactions • extracting metals • making salts • neutralisation and the pH scale	**Chemical changes** **Learning to include:** **C6 Electrolysis** • introduction to electrolysis • changes at the electrodes • the extraction of aluminium electrolysis of aqueous solutions	**Atomic structure and the periodic table** **Learning to include:** **C1 Atomic structure** • atoms • chemical equations • methods of separation • history of the atom and its structure • ions, atoms and isotopes • electronic structure	

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	The periodic table **Learning to include:** **C2 The periodic table** • the development of the periodic table • group 1 • group 7 • explaining trends • the transition elements **Structure, bonding and matter** **Learning to include:** **C3 Structure and bonding** • states of matter • atoms and ions • bonding: ionic and covalent • giant ionic and giant covalent structures • metallic bonding • nanoparticles and their application			**C7 Energy changes** **Learning to include:** **C7 Energy changes** • exothermic and endothermic reactions • using energy transfers • reaction profiles • bond energy calculations • chemical cells and batteries • fuel cells	**Chemistry of the atmosphere** **Learning to include:** **The Earth's atmosphere** • history of our atmosphere • our evolving atmosphere • greenhouse gases • global climate change atmospheric pollutants	

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	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
11	**Homeostasis and response** **Learning to include:** **The human nervous system** • the principles of homeostasis • the structure and function of the nervous system • reflex actions • the brain • the eye and problems **Hormonal coordination** • principles of hormonal control • controlling blood glucose • treating diabetes • negative feedback • human reproduction and artificial control of fertility • infertility treatment • plant hormones and their response **Homeostasis in action** • controlling body temperature • removing waste products • the human kidney • dialysis kidney transplants	**Homeostasis and response** **Learning to include:** **B13 Homeostasis in action** • controlling body temperature • removing waste products • the human kidney • dialysis • kidney transplants	**Inheritance, variation and evolution** **Learning to include:** **Reproduction** • Types of reproduction • cell division in sexual reproduction • DNA and the genome • inheritance • genetic disorders and screening for genetic disorders • protein synthesis • gene expression **Variation and evolution** • Variation • natural selections • selective breeding • genetic engineering • cloning **Genetics and evolution** • history of genetics • theory of evolution • evidence for evolution • fossils and extinction • classification the new system of classification	**Ecology** **Learning to include:** **Adaptations, interdependence and competition** • the importance of communities • distribution and abundance • competition in animals and plants • adaptations in animals and plants **Organising an ecosystem** • feeding relationships • materials cycling • the carbon cycle **Biodiversity and ecosystems** • the human population explosion • land, water and air pollution • deforestation and peat destruction • global warming • trophic levels • food production and security biomass transfer	**Required Practical Revision Biology P2** **Learning to include**: • Reaction time • Plant responses • Field investigations • Decay  **Maths Skills Review**	**Grade range end point:** 9-1

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	Forces	Forces	Waves	Waves	Solar system/ Red shift	
	Learning to include: **Forces in balance** • vectors and scalars • forces between objects • resultant force • levers and gears • centre of mass • parallelogram of force • resolution of force • moments and equilibrium **Motion** • speed-distance time graphs • velocity and acceleration • analysing motion graphs **Forces and motion** • Force and acceleration • Weight and terminal velocity • Force and braking • Momentum • Forces and elasticity • Impact forces • Safety first **Forces and pressure** • pressure and surfaces • pressure in liquids at rest • atmospheric pressure up thrust and flotation	L	**Learning to include:** **P13 Electromagnetic waves** • The electromagnetic spectrum • Light, infra-red, microwaves and radio waves • Communication • UV, X-rays and gamma rays • Using X-rays in medicine	**Learning to include:** • reflection and refraction of light • light and colour • lenses **Magnetism and Electromagnetics** **Learning to include:** **P15 Electromagnetism** • electromagnetism • magnetic fields • magnetic fields with electric currents • the motor effect • the generator effect • transformers	**Learning to include:** **P16 Space** • formation of the solar system • the life history of a star • planets, satellites and orbits • the expanding universe • the beginning and future of the universe **Revisit prior learning from Y10** **P1 -3 Energy** **P4 & P5 Electricity** **Required Practical Revision Physics paper 2** **Learning to include**: • Force and extension • Acceleration • Waves • Light • Radiation and absorption **Maths Skills Review**	

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The rate and extent of chemical change

Learning to include:
C8 Rates and equilibrium
- rates of reaction
- collision theory
- factors that affect rates of reactions
- reversible reactions
  dynamic equilibrium

Organic chemistry

Learning to include:
C9 Crude oil and fuels
- hydrocarbons
- fractional distillation
- burning hydrocarbons
  cracking hydrocarbons

Organic chemistry

Learning to include:
C10 Organic reactions
- reaction of alkenes
- structure and uses of organic molecules

Learning to include:
C11 Polymers
- additional polymerisation
- condensation polymerisation
- Natural polymers
- DNA

Chemistry of the atmosphere

Learning to include:
C13 The Earth's atmosphere
- history of our atmosphere
- our evolving atmosphere
- greenhouse gases
- global climate change
- atmospheric pollutants

Chemical analysis

Learning to include:
C12 Chemical analysis
- pure substances and mixtures
- analysing chromatograms
- testing for gases: positive and negative ions
- instrumental analysis

Using resources

Learning to include:
C14 The Earth's resources
- Finite and renewable resources
- water safe to drink
- treating waste water
- extracting metals from ores

Learning to include:
C15 Using our resources
- rusting
- alloys and their uses
- properties of polymers
- glass, ceramics and composites
- the Haber process
- making fertilisers in the lab and in industry

Required Practical Revision Chemistry paper 2

Learning to include:
- Rates of reaction
- Chromatography
- Identifying ions
- Water purification

AQA Realising potential AQA Realising potential AQA Realising potential YouTube

Maths Skills Review

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