Science Curriculum Intent

At the Kingsway School, we believe that the study of science is important because science allows us to develop new technologies, solve practical problems, and make informed decisions

The foundations of science are built on an understanding of:

- cells and systems, plants and the environment, and variation and inheritance in biology
- particles and matter, chemical reactions, and earth and atmosphere in chemistry
- forces and motion, energy, and waves in physics.

The core knowledge is science is both deep and broad, it more than covers the national curriculum. They will apply this when completing practical science safely, collecting data, making predictions, drawing conclusions, applying concepts and ideas in different contexts or when they draw links across different years and subjects.

Our classrooms support our learners to achieve by fostering high academic aspiration, nurturing curiosity, and encouraging critical thinking.

As part of the science curriculum, learners are provided with a range of high quality academic texts with the aim of explicitly teaching scientific vocabulary, modelling fluent reading, encouraging reading of scientific articles, and encouraging a culture of reading.

We support pupils to be compassionate and keep each other safe by modelling safe and compassionate behaviours, explicitly teaching pupils how to stay safe in a science lab and how to keep others safe by reducing risk.

Through the science curriculum will run a golden thread of wellbeing where we teach the pupils about their body and how to stay safe, that could be reproduction and relationship, disease or drugs.

During their time in science the pupils will collect and reflect on experimental data; they analyse, interpret and evaluate. By doing this, we encourage our students to think critically, morally and ethically about science, understand the world that they live in, and to develop skills that will support them for their futures.

Our curriculum creates young people who have a deep understanding of the world around them, are compassionate, can keep themselves safe, hold themselves to a high moral standard, respect and celebrate differences and can engage with big issues in our society.

Subject: **Year 9 Science**

Year 9 Curriculum Intent: The intent of the Year 9 curriculum is to build on knowledge acquired in both Year 7 and Year 8 and prepare pupils for the final steps before undertaking GCSE science. They will increase the depth and breadth of their knowledge and build strong links in learning to consolidate prior learning and secure the foundations for GCSE science. Pupils will continue to study the different areas of science:

- in Biology - Variation and Inheritance.
- in Chemistry - Chemical reactions.
- in Physics - Forces and Motion and Energy.
- and across all three sciences - how to Work Scientifically.

Pupils will be taught key knowledge and skills in both theory and practical science. They will learn about the scientific method, how to keep safe and how to draw valid conclusions from data.

	Year 9, Term 1, Biology Scheme 1a: Variations and Inheritance	**Year 9, Term 1, Chemistry** Scheme 1b: Chemical Reactions	**Year 9, Term 1, Physics** Scheme 1ci: Energy	**Year 9, Term 1, Physics** Scheme 1cii: Force & Motion
Acquire	Variation, natural selection and the effect on biodiversity. Genetic material.	Define exothermic reactions Define endothermic reactions Define rate of reaction Name the factors which affect rate	Can name the eleven different energy resources used to generate electricity. Can simply describe how the energy resources can be used to provide electricity. Can state pros and cons of each energy resource.	State the equation that links: force, distance and work done, Define the term centre of mass. Find the centre of mass of a regularly shaped 2D object. Define the term moment. State how a force affects the extension of a spring.
Apply	Plotting bar charts or line graphs to show discontinuous or continuous variation data. Use evidence to explain why a species has become extinct or changed over time. Explain how a lack of biodiversity effects an ecosystem.	Draw and label reaction profiles graphs for exothermic and endothermic reactions including overall energy change and activation energy Know that bond breaking is endothermic Know that bond forming is exothermic Write sentences to explain how different factors affect rate of reaction Complete and analyse required practical on energy changes	How to write an evaluation of energy resources.	Calculate the extension of a spring after a force is applied. Describe how to find the centre of mass of an irregularly shaped 2D object. Estimate and explain the location of mass in a 3D object. Use primary data to find the link between force applied and extension.
Vocabulary	Extinct Competition Evolution Biodiversity Continuous Discontinuous	energy exothermic endothermic activation energy thermal decomposition combustion energy level diagram cell	Renewable Non-renewable Fossil fuel Biomass Hydroelectric Geothermal Generator	Extension Elastic Inelastic Centre of mass Moment Pivot

		battery fuel cell rechargable catalyst		
Assessment	Blue Sheet Assessment of biology Variation & inheritance topics taught in KS3 and working scientifically.	Blue Sheet Assessment of chemistry Chemical reactions topics taught in KS3 and working scientifically.	Blue Sheet Assessment of physics Energy topics taught in KS3 and working scientifically.	Blue Sheet Assessment of physics Force & motion topics taught in KS3 and working scientifically.
	Term 2, Biology Scheme 2a: Cells and Systems	**Year 9, Term 2, Chemistry** Scheme 2b: C1 Atomic Structure and Periodic Table	**Year 9, Term 2 & 3, Physics** Scheme 2c: P1 Energy	
Acquire	Eukaryotic and prokaryotic cells, specialised cells, mitosis. Diffusion, Osmosis and Active Transport, Effect of surface area on the cell transport process.	The names and properties of subatomic particle and working out numbers of subatomic particles Electron structure and how shells are filled up Separation methods and techniques Know what a group is. Know what a period is. Know the separation between metals and nonmetals on the periodic table	Name the 5 energy stores Name the 4 energy pathways / transfers Recall the kinetic energy equation Recall the units for energy, mass, velocity, spring constant, extension, height, specific heat capacity, temperature, power, & time. Recall the equation for gravitational potential Define specific heat capacity Recall the equation P=E/t Define power State that work done = energy transferred Recall the law of conservation of energy Define closed system State how energy can be dissipated State how unwanted energy transfers can be reduced Define thermal conductivity Recall the equations for efficiency Name the main energy resources available to use on Earth Define renewable resource State the uses of energy resources	

			Recognise the main energy source available in a given situation Name renewable and non-renewable energy resources State the environmental impacts of energy resources
Apply	Explain how surface area to volume ratio varies depending on the size of an organism. Rearrange the IAM equation to find magnification or actual size of a cell. Make a specimen slide safely, view a slide, draw accurate observations and calculate the magnification used. Calculate and compare surface area: volume ratios. Explain how the small intestine and lungs in mammals, and roots and leaves in plants, are adapted for exchange of substances. Describe and explain how an exchange surface is made more effective. Apply knowledge of osmosis to unfamiliar situations and make predictions.	Draw diagrams with correctly labelled parts of atom Draw diagrams with correctly filled shells for atoms and ions Write clear descriptions of how mixtures are separated Describe the properties of groups of elements, group 1, 7 and 0 Demo of alkali metals in water and descriptions of reactions	Use an equation to find an unknown variable Apply the principle of conservation of energy to qualitative descriptions of energy transfers Write methods for experiments. Accurately plot axes & graphs Draw lines of best fit and use them to find tangents and gradients. Describe how to experimentally find the specific heat capacity of a substance (RP1)
Vocabulary	Prokaryotic Eukaryotic Mitochondria Ribosome Differentiation Magnification Resolution Diffusion Osmosis Active Transport Concentration gradient Passive Partially permeable	sub atomic atomic theory plum pudding model electron shells energy levels group period relative mass charge filtration distillation chromatography	System Elastic potential store Chemical store Gravitational potential store Thermal store Kinetic store Specific heat capacity Delocalised Thermal conductivity Efficiency
Assessment	Blue Sheet Assessment B1 - Cells & Systems End of topic test - B1 Cells & Systems	Blue Sheet Assessment C1 - Atomic Structure & Periodic Table End of topic test - C1 - Atomic Structure & Periodic Table	Blue Sheet Assessment P1 - Energy End of topic test - P1 Energy

	Term 3, Biology Scheme 3a: B4 Bioenergetics.	**Term 3, Chemistry** Scheme 3b: C5 Energy Changes		
Acquire	Photosynthesis; equation, factors affecting photosynthesis.Uses of glucose (CROPS). Aerobic and anaerobic respiration. Metabolism.	Define exothermic and endothermic in terms of energy released or absorbed. Identify activation energy and overall energy change on an energy profile diagram.		
Apply	Explain the gases released from a plant at different times of the day. Explain graphs describing limiting factors and how these factors affect photosynthesis. Calculate cardiac output.	Construct energy profiles for exo and endothermic reactions, identify and explain the meaning of activation energy. Use bond energies to calculate overall energy changes in terms of bonds being broken and formed during a reaction.		
Vocabulary	Photosynthesis Stomata Chloroplast Endothermic Exothermic Aerobic respiration Anaerobic respiration Mitochondria	energy exothermic endothermic activation energy thermal decomposition combustion energy level diagram cell battery fuel cell rechargable catalyst		
Assessment	Blue Sheet Assessment B4 - Bioenergetics End of topic test - B4 Bioenergetics	Blue Sheet Assessment C5 - Energy Changes End of topic test - C5 - Energy Changes		