St Paul's Academy

Science Curriculum Overview

Intent	Implementation	Impact
Our science curriculum is broad, balanced, ambitious, and designed to inspire curiosity while promoting a deep, connected understanding of the biological, chemical and physical world. It enables pupils to think critically, work scientifically and develop the knowledge required to explain, explore and apply complex phenomena.	The curriculum is coherently sequenced to ensure progression of key concepts and practical skills. Lessons combine enquiry-based learning, investigation and explicit teaching of scientific vocabulary. Teachers use retrieval practice, questioning and feedback to embed understanding. Real-world applications, STEM links and cross-curricular connections strengthen engagement and purpose.	Students develop a secure grasp of scientific ideas and the ability to apply them confidently in unfamiliar contexts. They show curiosity, independence and resilience in their learning. Assessment data demonstrate strong progress and high outcomes, with learners well-prepared for further study and future STEM pathways.

St Pauls Academy School
Science Key Stage 4 Curriculum Map – Topics by Term

Substantive Knowledge Skills	Concepts & Models	Scientific Vocabulary	Connections Across Topics	Explanations & Reasoning
Disciplinary Knowledge Skills	Planning & Enquiry	Scientific Communication	Data Handling	Analysis & Interpretation

KS3	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Year 7	**Topic Title:** Enquiry Processes and Forces **KQ:** How do different forces interact to change the motion of objects in our everyday world? **Key Vocabulary** **Tier 1** push, pull, move, speed **Tier 2** friction, gravity, force, acceleration **Tier 3** Contact force, non-contact force, balanced force, unbalanced force	**Topic Title:** Matter **KQ:** What is matter made of, and how do its particles behave in different states? Key Vocabulary **Tier 1** solid, liquid, gas, temperature **Tier 2** Particle, evaporation, condensation, melting, Boiling, freezing **Tier 3** Sublimation, diffusion, solidification, pressure thermal energy	**Topic Title:** Organisms **KQ:** How are living organisms from cells to systems, how does this keep the body functioning? Key Vocabulary **Tier 1** Body, organ, system, function **Tier 2** Tissue, organ system, specialised, structure, function **Tier 3** Cell membrane, cytoplasm, nucleus, vacuole, respiration, diffusion.	**Topic Title:** Organisms and Forces 2 **KQ:** How are forces involved in motion and interaction between objects? **Key Vocabulary** **Tier 1** Interaction, force, speed, health, weight **Tier 2** Function, system, relationship, interaction **Tier 3** **Organisation** Circulatory system, enzyme, absorption, tissue, organ **Forces** Resultant force Friction, Acceleration, Newton	**Topic Title:** **Energy 1** **KQ:** How is energy stored and transferred in different situations? **Key Vocabulary** **Tier 1** Energy, Heat, movement, light, sound, flow, change **Tier 2** Transfer, convert, system, efficiency, reduce, increase, decrease, insulate, process **Tier 3** Energy store Energy pathway, dissipation, conduction, convection, radiation, insulator, conductor, friction	**Topic Title:** **Energy 2** **KQ:** How can we calculate the amount of energy transferred in different situations? **Key Vocabulary** **Tier 1** Energy, power, work, heat, fuel, change, speed, resource **Tier 2** Calculate, rate Transfer, compare Efficiency, impact **Tier 3** Joule, watt, power efficiency, dissipation, work done, renewable resources, fossil fuels

Year 8	**Topic Title:** Enquiry Processes 2 and Ecosystems **KQ:** How do scientists design and carry out valid investigations to answer questions about the natural world? **KQ:** How do interactions between organisms and their environment shape ecosystems? **Key Vocabulary** **Tier 1** Question, test, plants, animals, food, change, living, environment. **Tier 2** Resource, community, Hypothesis, method, variables, prediction. **Tier 3** Enquiry processes Independent variable, dependent variable, control variables, reproducible Ecosystems Ecosystem, habitat, population, producer, consumer, decomposer	**Topic Title:** Electromagnets **KQ:** How is electricity able to create a magnetic field? **Key Vocabulary** **Tier 1** Metal, wire, battery Switch **Tier 2** Relationship, effect Increase, decrease, measure, compare, investigate, component **Tier 3** Current, magnetic field Electromagnet, solenoid, core, attract, repel, circuit, temporary magnet, permanent magnet.	**Topic Title:** Reactions **KQ:** How can we identify whether a substance is acidic, alkaline, or neutral? **Key Vocabulary** **Tier 1** Colour, mix, change, Gas, solid, liquid **Tier 2** Reaction, evidence, observe, indicator, corrosive, hazard **Tier 3** pH scale, universal indicator, neutralisation, word equation, reactants, products, metal carbonate, metal oxide, metal hydroxide	**Topic Title:** Electromagnets 2 **KQ:** How are electromagnets used in everyday devices? **Key Vocabulary** **Tier 1** Battery, movement, force device **Tier 2** Strength, rotate, contact, circuit, mechanism, system **Tier 3** Relay, electric bell, current, attract, repel, field lines, solenoid, magnetic field, electric motor, armature, commutator	**Topic Title:** Genes **KQ:** How do genes and the environment influence the traits we see? **Key Vocabulary** **Tier 1** Parents, features, similar, different, environment **Tier 2** Characteristic, factor, influence, inherit, combine, predict, compare **Tier 3** Genes, mutation, variation, Reproduction, gamete, fertilisation, inherited characteristic	**Topic Title:** Waves **KQ:** How are sound waves created and how do they travel through different materials? **Key Vocabulary** **Tier 1** Sound, noise, vibrate, loud, quiet, high, low **Tier 2** Transfer, detect, source, medium, measure, compare, pattern **Tier 3** longitudinal wave, transverse wave, amplitude, frequency, pitch

Year 9	**Topic Title:** Enquiry Processes and Earth 1 **KQ:** What can fossils and rocks tell us about Earth's past? **Key Vocabulary** **Tier 1** Rock, soil, layers, heat, pressure, change **Tier 2** Compare, evidence, sequence, formation, structure, process, texture **Tier 3** Igneous rock, sedimentary rock, metamorphic rock, rock cycle, magma, lava, erosion, weathering, sediment, compaction, cementation	**Topic Title:** Waves 2 and Genes 2 **KQ:** How do we describe and measure the properties of waves? **KQ:** What causes variation between individuals? **Key Vocabulary** **Tier 1** Light, sound, vibrate Reflect, shadow **Tier 2** Medium, direction, transfer, detect, measure, compare, source, interaction **Tier 3** **Waves** Frequency, amplitude, wavelength, speed, longitudinal wave, transverse wave, oscillation, absorption, reflection, refraction, echo **Genes** Variation, environmental, reproduction, gamete, fertilisation, mutation	**Topic Title:** Earth 2 and Organisms **KQ:** How do human activities affect the Earth's resources and climate? **Key Vocabulary** **Tier 1** Fuel, plants, animals, heat, waste, body, breathing **Tier 2** Resource, impact, cycle, transfer, function, system, adaptation, environment, interaction **Tier 3** **Earth 2** Atmosphere, carbon cycle, greenhouse gases, climate change, pollution, renewable resources, non-renewable resources, combustion **Organisms** Organ, organ system, respiration, gas exchange, circulatory system, diffusion, surface area, specialised cells	**Topic Title:** Atomic Structure and the periodic table **KQ:** How does the periodic table help us understand patterns in chemical properties? **Key Vocabulary** **Tier 1** Pattern, group, Metal **Tier 2** Structure, arrangement, pattern, property, predict, compare **Tier 3** Nucleus, proton, neutron, electron, atomic number, mass number, electron configuration, periodic table, group period	**Topic Title:** Energy **KQ:** How can we reduce energy waste and improve efficiency? **Key Vocabulary** **Tier 1** Heat, work, power, change, temperature, movement **Tier 2** Transfer, convert efficiency, dissipate, Rate, system, device **Tier 3** Work done, power, efficiency, insulation, conduction, convection, radiation	**Topic Title:** **Cell Biology** **KQ:** How do cells divide and what regulates this process? **Key Vocabulary** **Tier 1** Surface, function, body **Tier 2** Structure, process Transport, exchange, rate, evidence **Tier 3** Prokaryotic, Eukaryotic, stem cell, mitosis, chromosome, diffusion, osmosis, active transport, microscope, magnification, resolution

St Pauls Academy School
Science Key Stage 4 Curriculum Map – Topics by Term

KS4	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 10	**Topic Title:** Organisation and Energy **KQ:** How are organisms organised from cells to body systems to carry out essential functions? **Key Vocabulary** **Tier 1** System, blood, heart, food, energy **Tier 2** Function, reaction, process, absorption, transport, rate, efficiency, component **Tier 3** **Organisation** Enzyme, active site, substrate, denature digestive system, amylase, protease, lipase, bile, villi, circulatory system **Energy** Work done, power, efficiency, insulation, conduction, convection, radiation	**Topic Title:** Bonding Structure and properties of matter and Electricity **KQ:** How do different types of bonding determine the structure and properties of substances? **KQ:** How do electrical circuits work and what factors affect current, potential difference, and resistance? **Key Vocabulary** **Tier 1** Charge, current, flow, solid, liquid, gas, melt, boil, switch, wire **Tier 2** Transfer, conduct, insulate, property, relationship, measure **Tier 3** **Bonding Structure and properties of matter** Ionic bonding, covalent bonding, metallic bonding, giant ionic lattice, simple molecular, giant covalent, delocalised	**Topic Title:** Infection and Response and Particle model of matter **KQ:** How do pathogens cause disease, and how does the body defend itself? **KQ:** How does the particle model explain the properties and behaviour of solids, liquids, and gases? **Key Vocabulary** **Tier 1** Disease, illness, germs, spread, immune, solid, liquid, gas, heat, change **Tier 2** Cause, prevent, transfer, contact, exposure, energy, density, pressure, process **Tier 3** **Infection and Response** Pathogen, bacteria, virus, fungi, protist, antibody, antigen, vaccination, antibiotic, toxin, immune response, herd immunity **Particle model of matter**	**Topic Title:** Quantitative Chemistry and Bioenergetics **KQ:** How do chemists use equations and calculations to quantify the amounts of substances involved in reactions? **KQ:** What factors affect the rate of photosynthesis and the release of energy during respiration? **Key Vocabulary** **Tier 1** Mass, energy, reaction, gas, plant, animal, food **Tier 2** Calculate, ratio, convert, measure, relationship, rate, process, release, store **Tier 3** **Quantitative Chemistry** Relative formula mass, mole, Avogadro constant, conservation of mass, limiting reactant, concentration, yield **Bioenergetics**	**Topic Title:** Atomic structure and chemical Changes **KQ:** How do metals and non-metals react, and what patterns can we identify in the reactivity series? **KQ:** **Key Vocabulary** **Tier 1** Metal, acid, reaction, charge, salt, gas **Tier 2** Structure, pattern, reactivity, displacement, equation, balance, process, predict **Tier 3** **Atomic structure** Proton, neutron, electron, nucleus, electron shell, energy level, atomic number, mass number, isotope, ion **Chemical Changes** Reactivity series, displacement reaction, oxidation, reduction, ionic equation,	**Topic Title:** Energy changes **KQ:** How can we use bond energies to calculate overall energy changes in reactions? **Key Vocabulary** **Tier 1** Heat, hot, cold, energy, reaction, surroundings, change **Tier 2** Transfer, release, absorb, measure, pattern, compare **Tier 3** Exothermic, endothermic, energy profile diagram, activation energy, bond energy, reaction pathway

		electrons, intermolecular forces, polymer **Electricity** Current, potential difference, resistance, series circuit, parallel circuit, resistor, ammeter, voltmeter	Density, mass, volume, internal energy, specific latent heat, specific heat capacity, pressure	Photosynthesis, chloroplast, chlorophyll, glucose, respiration, light intensity, limiting factor, fermentation.	neutralisation, electrolysis, electrode, electrolyte, half-equation, redox	
Year 11	**Topic Title:** **Atomic structure and Forces** **KQ:** How does the structure of the atom explain the behaviour and properties of elements? **KQ:** How do forces affect the motion of objects? **Key Vocabulary** **Tier 1** Mass, push, pull, speed, motion, change, force **Tier 2** Structure, interaction, effect, relationship, resultant, proportion **Tier 3** **Atomic structure** Proton, neutron, electron, nucleus, electron shell, energy level, atomic number, mass number, isotope, ion **Forces**	**Topic Title:** **Homeostasis and response Rates of reaction and waves** **KQ:** How does the body maintain stable internal conditions and respond to changes? **KQ:** How do waves transfer energy, and how can we describe their properties and behaviour? **Key Vocabulary** **Tier 1** Balance, change, control, heat, light, sound, speed, reaction, measure **Tier 2** Stimulus, response, detect, increase, decrease, rate, pattern, transfer, interaction, process **Tier 3**	**Topic Title:** **Inheritance, variation and evolution Organic Chemistry and magnetism** **KQ:** How are characteristics passed from one generation to the next, and what causes variation within a population? **KQ:** How do organic molecules differ in structure and properties, and how do we represent them? **KQ:** How do magnets and magnetic fields interact, and how can magnetism be used in practical applications? **Key Vocabulary** **Tier 1** Parents, similar, different, change, carbon, fuel, magnet, attract, repel **Tier 2**	**Topic Title:** **Ecology, Chemistry of the atmosphere, Chemical Analysis** **KQ:** How do organisms interact with each other and their environment to form stable ecosystems? **KQ:** How has the Earth's atmosphere changed over time, and what human activities influence it today? **KQ:** How do chemists identify substances and determine their composition using analytical techniques? **Key Vocabulary** **Tier 1** Plants, animals, air, gas, change, test, colour, environment **Tier 2** Interaction, impact, evidence, sample,		

	Newton, resultant force, acceleration, weight, mass, gravitational field strength, friction, drag, terminal velocity, extension, elastic limit	**Homeostasis and response** Homeostasis, receptor, coordination centre, effector, negative feedback, hormone, endocrine system, glucagon, insulin, reflex arc, synapse, neurone **Rates of Reaction** Collision theory, activation energy, surface area, concentration, catalyst, temperature, pressure, Equilibrium **Waves** Frequency, amplitude, wavelength, wave speed, transverse wave, longitudinal wave, reflection, refraction, absorption, electromagnetic spectrum, ultrasound	Variation, adaptation, evidence, structure, pattern, interaction, process, compare, sequence **Tier 3** **Inheritance, Variation & Evolution** Gene, allele, chromosome, DNA, mutation, genetic variation, environmental variation, natural selection, evolution, selective breeding **Organic Chemistry** Hydrocarbon, alkane, alkene, functional group, homologous series, crude oil, fractional distillation, combustion, unsaturated, saturated **Magnetism** Magnetic field, permanent magnet, induced magnetism, electromagnet, solenoid, poles, compass, motor effect	process, predict, compare, variation **Tier 3** **Ecology** Ecosystem, population, community, producer, consumer, decomposer, biodiversity, competition, adaptation, quadrat, transect, abiotic factors, biotic factors **Chemistry of the atmosphere** greenhouse gases, methane, climate change, combustion, pollutant, particulates, carbon footprint, greenhouse effect **Chemical Analysis** Pure substance, formulation, chromatography, Rf value, precipitate		