

Science Curriculum Overview – Raedwald Trust Cross-Site

Curriculum Overview for Science				
CYCLE A: Autumn Term 1 & 2				
Subject Area	Unit 1: Origins			
	Biology B1: Cell Biology, Diffusion, Osmosis and Active Transport	Chemistry C1: Atomic Structure and the Periodic Table Chemistry C3: Quantitative Chemistry	Physics P2: Electricity and Circuits Physics P3: Particle Model of Matter	
	Biology B6: Inheritance, Variation and Evolution			
Taught Content	A typical cell, the function of key organelles, special features of specialised cells, identify parts of a microscope and know how to use it, calculate the size of magnified object. The process of diffusion, osmosis and active transport and comparisons between them.	Particle arrangement of solids, liquids and gases, changes of state, pure substances and mixtures, separating mixtures (refer to CSI), the difference between atoms, molecules and compounds, structure of atom including location and properties of subatomic particles, the modern Periodic Table, showing elements arranged in order of atomic number, alkali metal properties and trends, halogen properties and trends. Electronic structure of atoms, calculate RAM (relative atomic mass) and RFM (relative formula mass)	Particle models and motion in gases, Density of materials, gas pressure,	
Knowledge/skills	The theory of the process of natural selection leading to evolution, evidence for evolution, how fossils are formed, mechanism of selective breeding, risks and benefits of selective breeding, antibiotic resistance		Measuring resistance using p.d. and current measurements, exploring current, resistance and voltage relationships for different circuit elements; including their graphical representations quantity of charge flowing as the product of current and time, drawing circuit diagrams for series and parallel circuits; exploring equivalent resistance for resistors in series, the domestic a.c. supply; live, neutral and earth mains wires, safety	

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			measures, power transfer related to p.d. and current, or current and resistance
Key Skills	Required practical: Osmosis - planning experiments to make observations, test hypotheses or explore phenomena - making and recording observations and measurements using a range of apparatus and methods In addition: - The ways in which scientific methods and theories develop over time - Using a variety of concepts and models to develop scientific explanations and understanding - Appreciating the power and limitations of science and considering ethical issues which may arise - Explaining every day and technological applications of	Required practical: none In addition - Using prefixes and powers of ten for orders of magnitude (e.g. tera, giga, mega, kilo, centi, milli, micro and nano) - The ways in which scientific methods and theories develop over time - Using a variety of concepts and models to develop scientific explanations and understand. - Using SI (Standard Index) units and IUPAC (International Union of Pure and Applied Chemistry)	Required practicals: Density, Resistance of a wire, I-V practical - Carrying out experiments appropriately, having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations - Making and recording observations and measurements using a range of apparatus and methods - Carrying out and representing mathematical and statistical analysis. - Interpreting observations and other data, including identifying patterns and trends, making

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	science; evaluating associated personal, social, economic and environmental implications; and making decisions based on the evaluation of evidence and arguments Evaluating risks both in practical science and the wider societal context, including perception of risk		inferences and drawing conclusions In addition - Presenting observations and other data using appropriate methods. - Developing their use of scientific vocabulary and nomenclature.
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CYCLE A: Spring Term 1			
Subject Content	Unit 2 - Cuisine		
	Biology B2 - Digestive system, Enzymes, Lungs and breathing Biology B3 – Non-communicable disease, Smoking, Alcohol, Obesity	Chemistry C4 Acids and bases, Neutralisation, Exothermic and endothermic reactions	Physics P1 Energy stores and transfers, conservation and dissipation
Taught Content	The digestive system, enzymes, denaturing of enzymes.	Identifying the effects of mixing acids and alkalis.	Conservation of energy in a closed system, dissipation of energy.

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Knowledge/ skills	The relationship between health and disease – health and risk factors Communicable diseases - food poisoning only (the rest of communicable disease in NHS year 2) Non-communicable diseases Bacteria, viruses and fungi as pathogens in animals and plants. Body defences against pathogens and the role of the immune system against disease Reducing and preventing the spread of infectious diseases in animals and plants The impact of lifestyle factors on the incidence of non-communicable diseases.	Endothermic and exothermic reactions. pH and neutralisation including what happens during a neutralisation reactions.	Energy changes in a system involving heating and doing work using forces. Calculating the stored energies and energy changes involved.
Key Skills	Required practicals – Enzymes and Food tests	Required practical making salts (lab and kitchen version) developing their use of scientific vocabulary and nomenclature	Required practical Specific Heat Capacity (through video only)

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	• planning experiments to make observations, test hypotheses or explore phenomena • making and recording observations and measurements using a range of apparatus and methods • evaluating methods and suggesting possible improvements and further investigations In addition: • Explaining every day and technological applications of science; evaluating associated personal, social, economic and environmental implications; and making decisions based on the evaluation of evidence and arguments • Applying a knowledge of a range of techniques, apparatus, and materials to select those. • Using SI Units	• planning experiments to make observations, test hypotheses or explore phenomena In addition: • Recognising the importance of peer review of results • Using SI Units • Recognising the importance of scientific quantities and understanding how they are determined.	• Representing distributions of results and making estimations of uncertainty • Interpreting observations and other data, including identifying patterns and trends, making inferences and drawing conclusions. In addition • Carrying out and representing mathematical and statistical analysis. • Translating data from one form to another.
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Subject Content	Unit 3 - CSI		
	Biology B6: Inheritance, Variation and Evolution	Chemistry C1 and C8 – separating mixtures Chemistry C4 - Extracting metals	Physics P6 - Waves Physics P7- Electromagnetism
Taught Content	DNA, chromosomes, Genetic diagrams, Meiosis, types of reproduction, mitosis – asexual reproduction	Chromatography, filtration, crystallisation (not distillation – in eco-warriors) , purity and formulations, using chromatograms, Rf value Reactivity series, extracting metals, electrolysis, how ions are formed	Types of waves, measuring and calculating waves, electromagnetic waves, transverse and longitudinal waves, ripple tank. Uses and risks of high frequency, EMS, magnetic fields,
Knowledge/ skills			
Key Skills	- Recognising the importance of peer review of results and of communication of results to a range of audiences. - Using a variety of concepts and models to develop scientific explanations and understanding - Developing the use of scientific vocabulary and nomenclature	Required Practical: Chromatography - Carrying out experiments appropriately, having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations - Making and recording observations and measurements using a range of apparatus and methods In addition:	Required Practical: Waves (video only) - Interconverting units - Using an appropriate number of significant figures - Evaluating methods and suggesting possible improvements and further investigations - Presenting observations and other data using appropriate methods In addition:

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		• Recognising the importance of peer review of results and communication of results to a range of audiences (e.g. a scientific report for teacher and an infographic or presentation to feedback to non-specialists) • Interconverting units	• Having due regard for health and safety considerations • Explaining every day and technological applications of science • Appreciating the power and limitations of science
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CYCLE A: Summer Term 1 & 2			
Subject Content	Unit 4 – Fort versus Port		
	Biology B4 - Bioenergetics B6 – Inheritance, Variation and Evolution (classification only) B7 - Ecology	Chemistry C7 – Organic Chemistry C9 – Atmospheric Science	Physics P1 – Energy resources
Taught Content Knowledge/ skills	Photosynthesis, rates of photosynthesis. Levels of organisation within an ecosystem.	Global warming Climate change Carbon cycle Hydrocarbons, crude oil Fractional distillation	Evaluating energy resources Describing and evaluating different methods of generating electricity. Justifying which energy resources are most suitable.

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	Abiotic and biotic factors which affect communities. The importance of interactions between organisms in a community. How materials cycle through abiotic and biotic components of ecosystems The importance of biodiversity. Methods of identifying species and measuring distribution, frequency and abundance of species within a habitat. Positive and negative human interactions with ecosystems. Classification	Burning fossil fuels and the effects of the products of combustion. Positive and negative human interactions with ecosystems. Potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate. Common atmospheric pollutants. Sulphur dioxide, oxides of nitrogen, particulates and their sources. The Earth's water resources and obtaining potable water.	Wind, solar, geothermal, hydro-electricity, waves and tides, biofuels and non-renewables. Trends in Energy resource use.
Key Skills	Required practicals; Rates of Photosynthesis, Field investigations Applying a knowledge of a range of techniques, apparatus, and	Required practical; water purification Carrying out experiments appropriately, having due regard to the correct manipulation of	Required practical; None In addition;

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	materials to select those appropriate both for fieldwork and for experiments • Recognising when to apply a knowledge of sampling techniques to ensure any samples collected are representative • representing distributions of results and making estimations of uncertainty • Being objective, evaluating data in terms of accuracy, precision, repeatability, and reproducibility and identifying potential sources of random and systemic error. In addition: • The ways in which scientific theories and methods develop over time. • Making and recording observations and measurements using a range of apparatus and methods.	apparatus, the accuracy of measurements and health and safety considerations. • Presenting reasoned explanations • Presenting observations and other data using appropriate methods. In addition; • Recognising the importance of scientific quantities and understanding how they are determined. • Explaining every day and technological applications of science; evaluating associated personal, social, economic and environmental implications • Understanding a variety of concepts and models to develop scientific explanations and understanding.	• The ways in which scientific methods and theories develop over time. • Appreciating the power and limitations of science and considering ethical issues which may arise. • Evaluating risks in both practical science and the wider societal context, including perception of risk • Carrying out and representing mathematical and statistical analysis • Developing the use of scientific vocabulary and nomenclature.
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CYCLE B: Autumn Term 1 & 2			
Subject Content	Unit 5 - Gladiators		
	Biology B4 – Bioenergetics B2 - Organisation	Chemistry C1 – Atomic Structure and the periodic table C2 – Bonding, Structure and Properties of matter	Physics P5 – Forces P1 - Energy
Taught Content Knowledge/ skills	Aerobic Respiration, Anaerobic Respiration. Circulatory system - Heart, Blood and blood vessels.	Recap (Atomic Structure and States of matter) Ionic Bonding, Giant Ionic structures. Covalent Bonding and Simple covalent structures. Giant covalent structures and Metallic Bonding.	Balanced Forces and Force Diagrams. Elastic Potential Energy. Gravitational potential energy. Kinetic Energy. Hooke's Law Contact and non-contact forces Weight, mass and gravity Resultant forces and Work done Forces and elasticity Investigating springs.
Key Skills	Required practical: none	Required practical: none	Required practical: Force and extension.

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	In addition: • developing their use of scientific vocabulary and nomenclature • explaining every day and technological applications of science; evaluating associated personal, social, economic and environmental implications; and making decisions based on the evaluation of evidence and arguments	In addition: • using a variety of concepts and models to develop scientific explanations and understanding • developing their use of scientific vocabulary and nomenclature	• presenting observations and other data using appropriate methods • translating data from one form to another • carrying out and representing mathematical and statistical analysis • interpreting observations and other data, including identifying patterns and trends, making inferences and drawing conclusions • presenting reasoned explanations, including relating data to hypotheses In addition:
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CYCLE B: Spring Term 1 & 2			
Subject Content	Unit 6 - Mechanics		
	Biology B2 – Organisation	Chemistry C7 – Organic chemistry C8 – Chemical analysis	Physics P5 - Forces

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Taught Content Knowledge/skills	The organs in the nervous system, understand the link between and stimulus and response in the nervous system, methods to measure reaction speed.	Carbon emission, carbon cycle, greenhouse effect, chemical analysis, tests for gases. Extracting aluminium, understanding hydrocarbons and the extraction of oils, cracking, fractional distillation, understand alkenes	Forces and acceleration, weight and terminal velocity, speed, momentum, the differences between contact and non-contact forces, understand conservation of momentum, calculate weight and why it varies on different planets, calculate terminal velocity. Thinking distance, braking distance, stopping distance
Key Skills	Required Practical: Reaction rates (nervous system) - presenting observations and other data using appropriate methods - evaluating methods and suggesting possible improvements and further investigations - representing distribution of results and making estimations of uncertainty (e.g. how distraction affects validity and reliability)	Required Practical: none In addition: explaining every day and technological applications of science; evaluating associated personal, social, economic and environmental implications; and making decisions based on the evaluation of evidence and arguments	Required practical: Investigating force, mass and acceleration - applying knowledge of a range of techniques, apparatus, and materials to select those appropriate both for fieldwork and for experiments - being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error - communicating the scientific rationale for investigations,

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			including the methods used, the findings and reasoned conclusions, using paper-based and electronic reports and presentations • using SI units and IUPAC chemical nomenclature unless inappropriate
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CYCLE B: Summer Term 1 & 2			
Subject Content	Unit 7 - NHS		
	Biology B3 – Communicable disease (except food poisoning)	Chemistry C6 – Rates of reaction	Physics P4 - Radiation
Taught Content Knowledge/skills	Viral and Fungal disease. Immune system. Vaccination. Pathogen cells – Bacteria and protist Communicable diseases - sexually transmitted infections in humans (including HIV/AIDs) (mention relevant plant diseases)	Understand rates of reaction: Factors that affect rates of reaction: surface area, temperature, concentration, pressure, catalysts	Recap (Calculate relative atomic mass and Isotopes) Atoms and radiation. Discovery of the nucleus. Changes in the nucleus Activity and half-life. Irradiation and contamination

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	Homeostasis, temperature, blood glucose and water level		
	Menstrual cycle, controlling fertility		
Key Skills	Required practical: Microscopy - Carrying out and representing mathematical and statistical analysis - using prefixes and powers of ten for orders of magnitude (e.g. tera, giga, mega, kilo, centi, milli, micro and nano) In addition: - recognising the importance of peer review of results and of communication of results to a range of audiences. (e.g. Understand that the results of drug testing and trials are published only after scrutiny by peer review.) - evaluating risks both in practical science and the wider societal	Required practical: rates of reaction - using scientific theories and explanations to develop hypotheses - presenting observations and other data using appropriate methods - translating data from one form to another - interpreting observations and other data, including identifying patterns and trends, making inferences and drawing conclusions - interpreting observations and other data, including identifying patterns and trends, making inferences and drawing conclusions	Required practical: none In addition: - developing their use of scientific vocabulary and nomenclature - the ways in which scientific methods and theories develop over time

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	context, including perception of risk (e.g. evaluate the global use of vaccination in the prevention of disease) explaining everyday and technological applications of science; evaluating associated personal, social, economic and environmental implications; and making decisions based on the evaluation of evidence and arguments	presenting reasoned explanations, including relating data to hypotheses	
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