

# Beamont Collegiate Academy Curriculum Map



**Year: 10**

**Subject: Science**

Intent	Implementation	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Clarity around knowledge	Theme / topic	Disease Reactivity of Metals Electricity in the Home	Transport Systems The Digestive System Using Resources	Radioactivity Bioenergetics Bonding	The Periodic Table Forces in Action	Defence Against Disease The Nervous System Quantitative Chemistry Acids and Bases	Energy Transfer Energy Changes Advanced Ecology

	Key substantive knowledge	<p><b>Diseases</b></p> <ul style="list-style-type: none"> <li>- Relationship between health and disease.</li> <li>- Communicable and non-communicable disease.</li> <li>- Pathogens in plants and animals.</li> <li>- Body defences against pathogens.</li> <li>- Reducing and preventing spread of disease.</li> <li>- Impact of lifestyle on non-communicable diseases.</li> </ul> <p><b>Reactivity of metals.</b></p> <ul style="list-style-type: none"> <li>- The chemistry of acids; reactions with some metals and carbonates.</li> <li>- Reduction and oxidation in terms of loss</li> </ul>	<p><b>Transport Systems</b></p> <ul style="list-style-type: none"> <li>- Importance of transport systems in multicellular organisms.</li> <li>- Relationship between structure and function of the human circulatory.</li> </ul> <p><b>The Digestive System</b></p> <ul style="list-style-type: none"> <li>- Enzymes.</li> <li>- Factors affecting the rate of enzymatic reactions.</li> <li>- Carbohydrates, proteins, nucleic acids and lipids as key biological molecules.</li> </ul> <p><b>Using Resources.</b></p> <ul style="list-style-type: none"> <li>- Life cycle assessment and recycling to assess environmental impacts.</li> </ul>	<p><b>Radioactivity</b></p> <ul style="list-style-type: none"> <li>- Nuclear models and its development.</li> <li>- Masses and sizes of nuclei, atoms and small molecules.</li> <li>- Differences in number of sub atomic particles in nuclei and isotopes.</li> <li>- Nuclear equations.</li> <li>- Ionisations of radiation.</li> <li>- Radioactive nuclei.</li> <li>- Radioactive materials, half- life, irradiation, contamination and hazards.</li> <li>- Nuclear fission, fusion and the suns energy.</li> </ul> <p><b>Bioenergetics.</b></p>	<p><b>The periodic table</b></p> <ul style="list-style-type: none"> <li>- The modern Periodic Table, showing elements arranged in order of atomic number.</li> <li>- Position of elements in the Periodic Table in relation to their atomic structure and arrangement of outer electrons.</li> <li>- Properties and trends in properties of elements in the same group.</li> <li>- Characteristic properties of metals</li> </ul>	<p><b>Defence Against Disease</b></p> <ul style="list-style-type: none"> <li>- Body defences against pathogens and the role of the immune system against disease.</li> <li>- Reducing and preventing the spread of infectious diseases in animals and plants.</li> <li>- The process of discovery and development of new medicines.</li> </ul> <p><b>The Nervous System.</b></p> <ul style="list-style-type: none"> <li>- Principles of nervous coordination and control in humans.</li> <li>- The relationship between the structure and function of the human nervous system.</li> <li>- The relationship between structure and function in a reflex arc.</li> </ul>	<p><b>Energy transfer</b></p> <ul style="list-style-type: none"> <li>- Energy change in systems.</li> <li>- Conservation of energy in a closed system.</li> </ul> <p><b>Energy changes</b></p> <ul style="list-style-type: none"> <li>- Measurement of energy changes in chemical reactions (qualitative).</li> <li>- Bond breaking, bond making, activation energy and reaction profiles (qualitative).</li> </ul> <p><b>Advanced Ecology</b></p> <ul style="list-style-type: none"> <li>- Levels of organisation within an ecosystem.</li> <li>- Some abiotic and biotic</li> </ul>
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		<p>or gain of oxygen.</p> <ul style="list-style-type: none"> <li>- Extraction and purification of metals related to the position of carbon in a reactivity series.</li> </ul> <p><b>Electricity in the home.</b></p> <ul style="list-style-type: none"> <li>- Measuring resistance using p.d. and current measurements.</li> <li>- Quantity of charge flowing as the product of current and time.</li> <li>- Drawing circuit diagrams.</li> <li>- calculating energy efficiency for any energy transfers</li> <li>- The domestic a.c. supply; live, neutral and</li> </ul>	<ul style="list-style-type: none"> <li>- Viability of recycling of certain materials.</li> <li>- The Earth's water resources and obtaining potable water.</li> </ul>	<ul style="list-style-type: none"> <li>- Photosynthesis as the key process for food production and therefore biomass for life.</li> <li>- The process of photosynthesis.</li> <li>- Factors affecting the rate of photosynthesis.</li> <li>- Importance of cellular respiration; aerobic and anaerobic.</li> </ul> <p><b>Bonding</b></p> <ul style="list-style-type: none"> <li>- Changes of states of matter.</li> <li>- Types of chemical bonding: ionic, covalent and metallic.</li> <li>- Bulk properties of materials related to bonding and</li> </ul>	<p>and non-metals.</p> <ul style="list-style-type: none"> <li>- Chemical reactivity of elements in relation to their position in the Periodic Table.</li> </ul> <p><b>Forces in action.</b></p> <ul style="list-style-type: none"> <li>- Newton's First Law.</li> <li>- Resultant forces.</li> </ul>	<p><b>Quantitative chemistry.</b></p> <ul style="list-style-type: none"> <li>- Determination of empirical formulae from the ratio of atoms of different kinds.</li> <li>- Balanced chemical equations, ionic equations and state symbols.</li> </ul> <p><b>Acids and bases.</b></p> <ul style="list-style-type: none"> <li>- The chemistry of acids; reactions with some metals and carbonates.</li> </ul>	<p>factors which affect communities.</p> <ul style="list-style-type: none"> <li>- How materials cycle through abiotic and biotic components of ecosystems.</li> <li>- The importance of biodiversity.</li> <li>- Methods of identifying species and measuring distribution, frequency and abundance of species within a habitat.</li> </ul>
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		<p>earth mains wires, safety measures. _</p> <ul style="list-style-type: none"> <li>- Power transfer related to p.d. and current, or current and resistance.</li> </ul>		<p>intermolecular forces.</p> <ul style="list-style-type: none"> <li>- Structures, bonding and properties of diamond, graphite, fullerenes and graphene.</li> </ul>			
	Disciplinary knowledge	<ul style="list-style-type: none"> <li>- The development of scientific thinking</li> <li>- Experimental skills and strategies</li> <li>- Analysis and evaluation</li> <li>- Vocabulary, units, symbols</li> </ul>	<ul style="list-style-type: none"> <li>- The development of scientific thinking</li> <li>- Experimental skills and strategies</li> <li>- Analysis and evaluation</li> <li>- Vocabulary, units, symbols</li> </ul>	<ul style="list-style-type: none"> <li>- The development of scientific thinking</li> <li>- Experimental skills and strategies</li> <li>- Analysis and evaluation</li> <li>- Vocabulary, units, symbols</li> </ul>	<ul style="list-style-type: none"> <li>- The development of scientific thinking</li> <li>- Experimental skills and strategies</li> <li>- Analysis and evaluation</li> <li>- Vocabulary, units, symbols</li> </ul>	<ul style="list-style-type: none"> <li>- The development of scientific thinking</li> <li>- Experimental skills and strategies</li> <li>- Analysis and evaluation</li> <li>- Vocabulary, units, symbols and nomenclature</li> </ul>	<ul style="list-style-type: none"> <li>- The development of scientific thinking</li> <li>- Experimental skills and strategies</li> <li>- Analysis and evaluation</li> <li>- Vocabulary, units, symbols</li> </ul>

		and nomenclature	and nomenclature	and nomenclature	and nomenclature		and nomenclature
Clarity around sequencing	Main links across the curriculum	<p><b><u>Disease:</u></b>  <b>Yr. 7</b> - Cells and organisation.  <b>Yr. 8</b> - Nutrition, classification and biomechanics.  <b>Yr. 9</b> - Fundamentals of biology.  <b>Yr. 11</b> - Homeostasis and response.</p> <p><b><u>Reactivity of metals:</u></b>  <b>Yr. 7</b> - Core chemistry.  <b>Yr. 8</b> - Physical change and chemical reactions.  <b>Yr. 9</b> - Further chemical reactions, Fundamentals of chemistry.  <b>Yr. 11</b> - Rates and equilibrium, Electrochemistry.</p>	<p><b><u>Transport systems:</u></b>  <b>Yr. 7</b> - Cells and organisation.  <b>Yr. 8</b> - Cellular respiration and the breathing system.  <b>Yr. 9</b> - Fundamentals of biology.</p> <p><b><u>The digestive system:</u></b>  <b>Yr. 8</b> - Animal Nutrition 1, Plant nutrition.  <b>Yr. 9</b> - Animal nutrition 2.</p> <p><b><u>Using Resources:</u></b>  <b>Yr. 8</b> - The Earth's resources.  <b>Yr. 9</b> - Fundamentals of chemistry.  <b>Yr. 11</b> - Sustainability.</p>	<p><b><u>Radioactivity:</u></b>  <b>Yr. 7</b> - The particle model.  <b>Yr. 9</b> - Fundamentals of systems.</p> <p><b><u>Bioenergetics:</u></b>  <b>Yr. 7</b> - Cells and organisation.  <b>Yr. 8</b> - Cellular respiration and breathing systems, bioenergetics and classification.  <b>Yr. 9</b> - Fundamentals of biology.</p> <p><b><u>Bonding:</u></b>  <b>Yr. 7</b> - The particle model, core chemistry.  <b>Yr. 9</b> - Further chemical reactions, fundamentals of chemistry.</p>	<p><b><u>The periodic table:</u></b>  <b>Yr. 7</b> - Particle model, core chemistry.</p> <p><b><u>Forces in action:</u></b>  <b>Yr. 7</b> - Fundamental forces.  <b>Yr. 9</b> - Forces and motion, Fundamentals of physics.  <b>Yr. 11</b> - Momentum and acceleration.</p>	<p><b><u>Defence against disease:</u></b>  <b>Yr. 7</b> - Cells and organisation.  <b>Yr. 9</b> - Fundamentals of biology.  <b>Yr. 11</b> - Homeostasis and response.</p> <p><b><u>The nervous system.</u></b>  <b>Yr. 8</b> - Classification and biomechanics.</p> <p><b><u>Quantitative chemistry.</u></b>  <b>Yr. 7</b> - Core chemistry.  <b>Yr. 9</b> - Fundamentals of chemistry.</p> <p><b><u>Acid and bases</u></b>  <b>Yr. 7</b> - Core chemistry.  <b>Yr. 8</b> - Physical changes and chemical reactions. Further chemical reactions.  <b>Yr. 11</b> - Rates and equilibrium.</p>	<p><b><u>Energy transfer:</u></b>  <b>Yr. 8</b> - Energy stores and transfers.  <b>Yr. 9</b> - Fundamentals of physics.</p> <p><b><u>Energy changes</u></b>  <b>Yr. 7</b> - Core chemistry.  <b>Yr. 8</b> - Physical and chemical reactions.  <b>Yr. 9</b> - Further chemical reactions.  <b>Yr. 11</b> - Rates and equilibrium.</p> <p><b><u>Advanced ecology</u></b>  <b>Yr. 7</b> - Ecology.  <b>Yr. 8</b> - Classification and biomechanics.</p>

		<p><b>Electricity in the home</b>  <b>Yr. 8</b> – Electricity and electromagnets.  <b>Yr. 9</b> – Fundamentals of physics.  <b>Yr. 11</b> – Electrical calculations.</p>		<p><b>Yr. 11-</b>  Electrochemistry.</p>			
	Authentic cross curricular links	<p><b>Disease</b>  - Lifestyle links with PE and hospitality.</p> <p><b>Electricity in the home</b>  - Maths skills.</p>	<p><b>Transport Systems</b>  - PE.</p> <p><b>The Digestive System</b>  - Hospitality.</p> <p><b>Using Resources</b>  - Geography.</p>		<p><b>Forces in Action</b>  - Maths skills.</p>	<p><b>The Nervous System</b>  - PE</p> <p><b>Quantitative Chemistry</b>  - Maths skills.</p>	<p><b>Energy Transfer</b>  - Maths skills.</p> <p><b>Advanced Ecology</b>  - Geography.</p>

Vocabulary	Key words	<p><b>Disease selected vocab-</b> virus, bacteria, protist, fungi, malignant tumour, benign tumour, non-communicable, communicable.</p> <p><b>Reactivity of metals selected vocab-</b> Oxidation, reduction, displacement, corrosion, sacrificial protection.</p> <p><b>Electricity in the home selected vocab-</b> component, resistor, diode, thermistor, current, potential difference, resistance.</p>	<p><b>Transport systems selected vocab-</b> Plasma, Platelets, Palisade mesophyll, Spongy mesophyll, Xylem, Phloem, Transpiration, Translocation.</p> <p><b>The digestive system selected vocab -</b> Enzyme, catalyst, carbohydrates, protein, lipids, substrate, active site, metabolism.</p> <p><b>Using resources selected vocab –</b> Finite, renewable, natural resources, synthetic, potable water, pure water, sterilisation.</p>	<p><b>Radioactivity selected vocab-</b> Nucleus, radioactive, half-life, irradiation, contamination.</p> <p><b>Bioenergies selected vocab-</b> photosynthesis, aerobic respiration, anaerobic respiration, metabolism, lactic acid.</p> <p><b>Bonding selected vocab-</b> metallic bonding, ionic bonding, covalent bonding, intermolecular, electrostatic.</p>	<p><b>The periodic table selected vocab –</b> halogen, alkali metal, trend, lustrous, tarnish, displacement.</p> <p><b>Forces in action selected vocab-</b> resultant, moment, elasticity, linear, nonlinear, equilibrium, gravity.</p>	<p><b>Defence against disease selected vocab-</b> Pathogen, vaccinations, antibodies, antibiotics.</p> <p><b>The nervous system selected vocab-</b> receptor, sensory neurone, synapse, relay neurone, motor neurone, effector.</p> <p><b>Quantitative chemistry selected vocab-</b> relative formula mass (<math>M_r</math>), limiting reactant, Avogadro constant, closed system, concentration, relative atomic mass.</p> <p><b>Acid and base selected vocab –</b> acid, base, alkali, concentration, neutralisation.</p>	<p><b>Energy transfer selected vocab –</b> kinetic, elastic, Gravitational potential, latent heat, specific heat capacity,</p> <p><b>Energy Changes selected vocab-</b> endothermic, exothermic, activation energy, bond energy.</p> <p><b>Advanced ecology selected vocab-</b> Ecosystem, interdependence, abiotic, biotic, photosynthetic transect, distribution, biodiversity, pyramid of biomass, tropic level.</p>
Assessment	Summative assessment	KP1 Disease Knowledge Retrieval KP2 MCQ GF	KP1 Transport Essay KP2 MCQ GF	Y10 PPE KP2 MCQ GF	KP1 Periodic Table Comprehension KP2 MCQ GF	KP1 Nervous System Practical Skills KP2 MCQ GF	Y10 PPE1 Y10 PPE2
Links to the real world / careers / PD		<p><b>Disease</b></p> <ul style="list-style-type: none"> <li>- Clinical Scientist</li> <li>- Medical science liaison</li> </ul>	<p><b>Transport Systems</b></p> <ul style="list-style-type: none"> <li>- Cardiologist.</li> <li>- Biomedical scientist.</li> </ul>	<p><b>Radioactivity</b></p> <ul style="list-style-type: none"> <li>- Radiographer</li> <li>- Radioactive waster process systems lead.</li> </ul>	<p><b>The Periodic Table</b></p> <ul style="list-style-type: none"> <li>- Research chemist.</li> <li>- Forensic scientists.</li> </ul>	<p><b>Defence Against Disease</b></p> <ul style="list-style-type: none"> <li>- Epidemiologist.</li> <li>- Vet.</li> <li>- Research scientist.</li> </ul>	<p><b>Energy Transfer</b></p> <ul style="list-style-type: none"> <li>- Energy physics.</li> <li>- Academic research.</li> </ul>

		<ul style="list-style-type: none"> <li>- Academic research</li> <li>- Neurologist.</li> </ul> <p><b>Reactivity of Metals</b></p> <ul style="list-style-type: none"> <li>- Materials chemist.</li> <li>- Welder</li> <li>- Metallurgist</li> </ul> <p><b>Electricity in the Home</b></p> <ul style="list-style-type: none"> <li>- Electrician</li> <li>- Electrical engineer</li> <li>- Electricity analyst.</li> <li>- Clean energy researcher.</li> </ul>	<ul style="list-style-type: none"> <li>- Operation manager (serious hazards of transfusion).</li> <li>- Haematology.</li> </ul> <p><b>The Digestive System</b></p> <ul style="list-style-type: none"> <li>- Nutritionist.</li> <li>- Dietitian</li> <li>- Gastroenterology.</li> </ul> <p><b>Using Resources</b></p> <ul style="list-style-type: none"> <li>- Materials chemist</li> <li>- LCA consultant</li> <li>- LCA analysis.</li> <li>- Clean water engineer.</li> <li>- Water quality scientist.</li> <li>- Wastewater specialist.</li> <li>- Water treatment engineer.</li> </ul>	<ul style="list-style-type: none"> <li>- Radiation shielding engineer.</li> <li>- Nuclear radiation consultant.</li> </ul> <p><b>Bioenergetics</b></p> <ul style="list-style-type: none"> <li>- Bioenergy mechanical engineer.</li> <li>- Research biologist</li> <li>- Respiratory therapist.</li> </ul> <p><b>Bonding</b></p> <ul style="list-style-type: none"> <li>- Analytical chemist</li> <li>- Chemical engineer.</li> <li>- Teacher.</li> </ul>	<p><b>Forces in Action</b></p> <ul style="list-style-type: none"> <li>- Structural engineer.</li> <li>- Hydraulic modeller.</li> </ul>	<p><b>The Nervous System</b></p> <ul style="list-style-type: none"> <li>- Psychiatrist.</li> <li>- Neuroscience nurse.</li> <li>- Electroneurodiagnostic technician.</li> </ul> <p><b>Quantitative Chemistry</b></p> <ul style="list-style-type: none"> <li>- Lab technician.</li> <li>- Optical materials researcher.</li> <li>- Analytical scientist.</li> <li>- Quantitative groundwater scientist.</li> <li>- Research scientist.</li> </ul> <p><b>Acids and Bases</b></p> <ul style="list-style-type: none"> <li>- Food scientists.</li> <li>- Soil and plant scientists.</li> <li>- Chemical technicians.</li> </ul>	<p><b>Energy Changes</b></p> <ul style="list-style-type: none"> <li>- Chemical analyst.</li> <li>- Plant specialist.</li> </ul> <p><b>Advanced Ecology</b></p> <ul style="list-style-type: none"> <li>- Local government and statutory agencies.</li> <li>- Consultancy.</li> <li>- Science research</li> <li>- Media and public relations.</li> </ul>
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