

# Stuart Bathurst Catholic High School

## Science Department

Long-term sequencing Year 10 GCSE

As a team we have consistent high expectations based on an ambitious constructed curriculum, designed to build confidence through core substantive knowledge and disciplinary skills. The principles of science of learning and sequencing are weaved throughout with links to prior knowledge to ultimately support knowing and remembering more. We wish to develop enquiring minds of students that question the world around them. They should be able to interpret data and information from a range of sources using mathematical techniques and comprehension skills. They will be able to follow methods to get valid results and analyse the results to reach reasoned conclusions. We expect students to be able to manipulate a range of scientific apparatus and work safely to gather their results. They should be able to gather and record results with a suitable degree of accuracy and precision. When representing results we expect pupils to be able to present their information in an appropriate table or graph.

As a department we are driven by principles of Catholic faith which means we ensure equity of access through our curriculum planning/design and that students are not disadvantaged because of their socio-economic status or SEND/ additional need.

To encapsulate an enjoyment of our subject through our teaching with the aim to inspire our pupils to continue their scientific education for future learning or employment. Our curriculum enables all pupils to do and be of their best and unlocks opportunity for further education.

### HALF TERM 1:

#### **STUDENTS MUST KNOW;**

##### Organisation

- To recap key knowledge from the topic Cells.
- The principles of cellular organisation: cells, tissues, organs, organ systems, organism.
- How the human digestive system works.
- Required practical on how to test for food constituents
- How enzymes work
- Required practical upon the effects of pH upon enzyme activity
- The function of the heart and blood vessels
- The constituents and functions of blood
- The causes and effects of coronary heart disease
- A range of lifestyle disease causes and effects
- The effects of lifestyle upon health
- How cancer is caused and treated
- How plant tissues and organs are arranged and function

##### Bonding, structure and the properties of matter

- To recap key knowledge from the topic Atomic Structure.
- Bonding in Covalent molecules.
- Properties of Simple Covalent compounds.
- Drawing Dot-cross diagrams of Covalent molecules.
- Properties, structure and uses of Giant covalent molecules.
- Nanoparticles (T)
- Comparing Simple and Giant Covalent molecules.
- Metallic Bonding.

##### Particle Model of Matter

- Density. To understand the relationship between mass and volume in calculating density.
- REQUIRED PRACTICAL Investigating density - regular and irregular shaped objects.
- Identify and describe rates of matter and changes of State
- Internal Energy. To explain how the kinematic model applies to the state of matter.

### HALF TERM 2:

#### **STUDENTS MUST KNOW:**

##### Infection and Response

- How Communicable (infectious) diseases are caused and spread.
- Examples of diseases caused by the 4 types of pathogen: viruses, bacteria, fungi & protists.
- How human defence mechanisms work
- How we become immune to diseases
- Required practical investigating effects of antiseptics / antibiotics upon bacterial growth

##### Quantitative Chemistry

- Conservation of mass
- Calculating RAM and RFM
- Mass changes
- Uncertainties in measurements (H)
- Writing and balancing symbol equations
- Moles (H)
- Predicting masses made in reactions (H)
- Using moles to balance equations limiting reactants and concentration (H)

##### Atomic Structure

- Describe the structure of the atom in Dalton model, Plum Pudding model, and nuclear model.
- Describe evidence that led to the development/discovery of nuclear model.
- Determine mass number, atomic number, isotopic data.
- Define activity and state the units.
- Describe properties of ionising radiation, including alpha, beta, gamma.
- Balance decay equations of alpha and beta decay, describing changes to daughter nucleus's mass and charge.
- Determining half lives - graphs and calculation.
- Radioactive contamination and irradiation - evaluating risk.

### HALF TERM 3:

#### **STUDENTS MUST KNOW:**

##### Infection and Response

- How vaccinations work and what they contain
- The discovery of antibiotics and what they do
- How we use painkillers.
- How new drugs are developed and tested for use
- How we produce and use monoclonal antibodies
- The causes and effects of plant diseases upon plants and how they defend themselves.

##### Chemical changes

- Monitoring Chemical Reactions.
- pH and Neutralisation
- Strong and Weak acids
- Making Salts from Metals, Metal oxides, Metal Hydroxides, and Carbonates
- Making and separating soluble and insoluble salts
- The Reactivity Series
- RP8- Making a soluble salt from insoluble oxide or carbonate

##### Electricity

- Current and Charge. How to read a circuit diagram and calculate the current in a circuit.
- Potential Difference and Resistance. To understand the relationship between current and voltage.
- Resistance in a Circuit Investigation. To understand how resistance changes with the length of a wire.
- Component Characteristics. To understand why resistance doesn't stay constant in all components in a circuit.

#### **How this will be assessed:**

# Stuart Bathurst Catholic High School

<ul style="list-style-type: none"> <li>• Specific Latent Heat. To understand how to calculate latent heat of fusion and vaporisation.</li> <li>• Specific Heat Capacity. To understand for different material the amount of energy required to raise 1 kg of the material by 1 °C.</li> <li>• Specific Heat Capacity Required Practical.</li> <li>• Gas Pressure. To understand how pressure in a container is affected by temperature, number of particles, volume of container.</li> </ul> <p><b>HOW THIS WILL BE ASSESSED:</b></p> <p>Low stakes quizzing, questioning, retrieval practice and recall, Mid point knowledge check through each unit. End of topic test at the end of every unit.</p>	<p><b>How this will be assessed:</b></p> <p>Low stakes quizzing, questioning, retrieval practice and recall. Mid point knowledge check through each unit. End of topic test at the end of every unit.</p>	<p>Low stakes quizzing, questioning, retrieval practice and recall. Mid point knowledge check through each unit. End of topic test at the end of every unit..</p>
<p><b>HALF TERM 4:</b> <b>STUDENTS MUST KNOW:</b></p> <p><b>Bioenergetics</b></p> <ul style="list-style-type: none"> <li>• Photosynthesis &amp; limiting factors</li> <li>• The rate of photosynthesis</li> <li>• Respiration &amp; metabolism</li> <li>• Aerobic &amp; Anaerobic respiration</li> <li>• Exercise and respiration</li> </ul> <p><b>Chemical changes</b></p> <ul style="list-style-type: none"> <li>• Metal reactions and extraction</li> <li>• Redox reactions</li> <li>• Electrolysis, Writing Half equations, Predicting the products of electrolysis (CuSO<sub>4</sub> and NaCl).</li> <li>• RP9 – Electrolysis of an aqueous solution</li> </ul> <p><b>Energy changes</b></p> <ul style="list-style-type: none"> <li>• Monitoring Chemical Reactions.</li> <li>• Exothermic and Endothermic reactions.</li> <li>• Calculating Bond energies.</li> <li>• RP4 - Temperature changes</li> </ul> <p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>• Draw circuit symbols of a range of components.</li> <li>• Qualitatively describe what is potential difference, current, and resistance.</li> <li>• Sketch I-V graphs for a resistor, filament lamp, and diode.</li> <li>• Learn the p.d. and current rules for series and parallel circuits.</li> <li>• Calculate the total resistance of a series circuit and determine the maximum resistance for resistors in parallel.</li> <li>• State Ohm's Law and apply this in circuit analysis.</li> <li>• Sketch and describe the purpose of all components in a 3-pin UK plug.</li> </ul>	<p><b>HALF TERM 5:</b> <b>STUDENTS MUST KNOW:</b></p> <p><b>Homeostasis and response</b></p> <ul style="list-style-type: none"> <li>• The structure &amp; function of the human nervous system</li> <li>• How reflexes aid the body &amp; the function of synapse</li> <li>• Required practical – Ruler drop test</li> </ul> <p><b>Quantitative Chemistry</b></p> <ul style="list-style-type: none"> <li>• Review of Combined Paper 1 content</li> <li>• Percentage yield and atom economy (T)</li> <li>• Empirical formulae (T)</li> <li>• RP2 - Titration (T)</li> <li>• Titration calculations (T)</li> </ul> <p>Continue Electricity:</p> <p><b>Forces</b></p> <ul style="list-style-type: none"> <li>• Define scalar and vector, identifying quantities as such.</li> <li>• Define and provide examples of contact and non-contact forces.</li> <li>• Relate mass and weight; define centre of mass.</li> </ul> <p><b>HOW THIS WILL BE ASSESSED:</b></p> <p>Low stakes quizzing, questioning, retrieval practice and recall. Mid point knowledge check through each unit. End of topic test at the end of every unit..</p>	<p><b>HALF TERM 6:</b> <b>STUDENTS MUST KNOW:</b></p> <p><b>Homeostasis and Response</b></p> <ul style="list-style-type: none"> <li>• The structure &amp; function of the human nervous system</li> <li>• How reflexes aid the body &amp; the function of synapse</li> <li>• Required practical – Ruler drop test</li> <li>• The role of hormones in the body</li> <li>• The hormonal control of the human reproductive cycle</li> </ul> <p><b>The rate and extent of a chemical change</b></p> <ul style="list-style-type: none"> <li>• Collision theory</li> <li>• Factors affecting the Rate of a Chemical reactions (Temperature, Concentration, Surface area, Catalysts)</li> <li>• Rate graphs</li> <li>• Reversible Reactions and Le Chatelier's Principle.</li> <li>• RP 11 – Effect of concentration on the rate of reaction</li> </ul> <p><b>Forces</b></p> <ul style="list-style-type: none"> <li>• Determining resultant forces in free body diagrams.</li> <li>• Forces and elasticity - Hooke's law and elastic/inelastic extensions.</li> <li>• Motion-time graphs</li> <li>• Motion with constant acceleration</li> <li>• Newton's Laws of Motion</li> <li>• Factors affecting stopping distance.</li> <li>• (HT) Momentum calculations and qualitative descriptions of conservation.</li> <li>• REQUIRED PRACTICAL 6 – Investigate the relationship between force and extension for a spring.</li> </ul> <p><u>Mock preparation</u></p>

# Stuart Bathurst Catholic High School

<ul style="list-style-type: none"><li>• Calculate using power and energy equations - including power wasted as heating.</li><li>• Define the National Grid.</li><li>• Describe the purpose of transformers in the National Grid.</li><li>• Explain how step-up transformers improve efficiency.</li><li>• REQUIRED PRACTICAL 3: Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits.</li><li>• REQUIRED PRACTICAL 4: use circuit diagrams to construct appropriate circuits to in</li></ul> <p><b>HOW THIS WILL BE ASSESSED:</b></p> <p>Low stakes quizzing, questioning, retrieval practice and recall. Mid point knowledge check through each unit. End of topic test at the end of every unit.</p>		<p><u>Reviewing/reteaching core ideas for paper 1</u></p> <p>Students issued with KO/glossaries, Advice on where to revise included sent out to students/parents. Preparation lessons on the build up to examinations. Walkthrough papers</p>
<p>Home learning set will consist of a combination of: Seneca and self quizzing using knowledge organisers.</p>		

# Stuart Bathurst Catholic High School

## Year 11 GCSE Science Long-term sequencing Year 11 GCSE Science

Year 11 GCSE Science Long-term sequencing Year 11 GCSE Science		
<p><b>HALF TERM 1:</b> <b>STUDENTS MUST KNOW:</b></p> <p><b><u>Inheritance, variation and Evolution</u></b></p> <ul style="list-style-type: none"> <li>• Establish causes of variation between individuals</li> <li>• Compare mitosis and meiosis</li> <li>• How selective breeding is carried out</li> <li>• How genetic engineering is carried out</li> </ul> <p><b><u>Organic Chemistry</u></b></p> <ul style="list-style-type: none"> <li>• Fractional distillation and cracking</li> <li>• Examples of Homologous Series</li> <li>• Alkenes and their Reactions (H)</li> <li>• Alcohols and their reactions (T)</li> <li>• Carboxylic Acids and their reactions (T)</li> <li>• Esters (T)</li> <li>• Addition and Condensation polymerisation (T)</li> <li>• Structure of Amino Acids (T)</li> <li>• Structure of DNA, Natural polymers (T)</li> </ul> <p><b><u>Waves</u></b></p> <ul style="list-style-type: none"> <li>• Progressive waves - transverse and longitudinal waves.</li> <li>• Wave properties - time period, wavelength, frequency, wavespeed</li> <li>• Order the electromagnetic spectrum in terms of wavelength</li> <li>• Suggest uses of all aspects of the electromagnetic spectrum</li> <li>• Draw ray diagrams for refraction of light at a boundary.</li> <li>• Qualitative treatment of refraction.</li> <li>• (HT) Describing how antennas convert radio waves to electrical signals.</li> </ul> <p><b>HOW THIS WILL BE ASSESSED:</b></p> <p>Low stakes quizzing, questioning, retrieval practice and recall</p> <p>Mid point knowledge check through each unit</p> <p>End of topic test at the end of every unit.</p>	<p><b>HALF TERM 2:</b> <b>STUDENTS MUST KNOW:</b></p> <p><b><u>Inheritance, variation and Evolution</u></b></p> <ul style="list-style-type: none"> <li>• How antibiotic resistance evolves in bacteria</li> <li>• How we classify living organisms</li> <li>• The evidence for evolution including fossil evidence</li> </ul> <p><b><u>Chemical Analysis</u></b></p> <ul style="list-style-type: none"> <li>• What defines Purity and a Formulation,</li> <li>• Paper chromatography and calculating Rf,</li> <li>• How the Rf is used in analysis,</li> <li>• Testing for Gases (Cl<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub> and H<sub>2</sub>),</li> </ul> <p><b><u>Chemistry of the atmosphere</u></b></p> <ul style="list-style-type: none"> <li>• The History of the atmosphere and the carbon cycle</li> <li>• The Greenhouse Gases and their effect on Global warming and Climate change</li> <li>• Reducing Carbon footprints</li> <li>• Atmospheric pollutants and their effects on the environment</li> </ul> <p><b><u>Magnetism and Electromagnetism</u></b></p> <ul style="list-style-type: none"> <li>• Permanent magnets, induced magnets - drawing field lines, plotting compasses</li> <li>• Electromagnets - factors affecting the magnetic field strength</li> <li>• (HT) Fleming's Left hand Rule and the motor effect</li> </ul> <p><b>HOW THIS WILL BE ASSESSED:</b></p> <p>Low stakes quizzing, questioning, retrieval practice and recall</p> <p>Mid point knowledge check through each unit</p> <p>End of topic test at the end of every unit.</p>	<p><b>HALF TERM 3:</b> <b>STUDENTS MUST KNOW:</b></p> <p><b><u>Ecology</u></b></p> <ul style="list-style-type: none"> <li>• How organisms are adapted for survival</li> <li>• How ecological communities are organised</li> <li>• How abiotic and biotic factors affect organisms</li> <li>• How ecosystems are organised</li> <li>• How materials are recycled in ecosystems</li> </ul> <p><b><u>Space</u></b></p> <ul style="list-style-type: none"> <li>• Stellar evolution of stars with mass similar to the Sun and much greater than the Sun</li> <li>• Red shift</li> <li>• Evidence for the Big Bang Theory</li> <li>• Orbital motion, natural and artificial satellites</li> </ul> <p><b><u>Using resources</u></b></p> <ul style="list-style-type: none"> <li>• Natural and synthetic resources.</li> <li>• Renewable and Finite resources.</li> <li>• Sustainable development.</li> <li>• Alternative Methods of metal extraction (H).</li> <li>• Reusing and Recycling materials</li> <li>• Life cycle assessments,</li> <li>• Potable water and wastewater treatment</li> <li>• Corrosion, alloys and NPK fertilisers (T)</li> </ul> <p>RP13- How to test and distil salt water</p> <p><b>HOW THIS WILL BE ASSESSED:</b></p> <p>Low stakes quizzing, questioning, retrieval practice and recall</p> <p>Mid point knowledge check through each unit</p> <p>End of topic test at the end of every unit.</p>

# Stuart Bathurst Catholic High School

<p><b>HALF TERM 4:</b> <b>STUDENTS MUST KNOW:</b> <b>Revision for paper 2 mock</b></p> <ul style="list-style-type: none"><li>• Biology revision</li><li>• Chemistry revision</li><li>• Physics revision</li></ul> <p><b>HOW THIS WILL BE ASSESSED:</b></p> <p>Low stakes quizzing, questioning, retrieval practice and recall</p> <p>Mid point knowledge check through each unit</p> <p>End of topic test at the end of every unit.</p>	<p><b>HALF TERM 5:</b> <b>STUDENTS MUST KNOW:</b> Targeted revision following QLA of paper 1 and 2</p> <ul style="list-style-type: none"><li>• Biology revision</li><li>• Chemistry revision</li><li>• Physics revision</li><li>•</li></ul> <p><b>HOW THIS WILL BE ASSESSED:</b></p> <p>Low stakes quizzing, questioning, retrieval practice and recall</p> <p>Mid point knowledge check through each unit</p> <p>End of topic test at the end of every unit.</p>	<p><b>HALF TERM 6:</b></p> <p style="text-align: right;"><u>EXAM</u></p>
<p><b>Home learning set will consist of a combination of: Seneca and self quizzing using knowledge organisers. In some cases when funding is available student workbooks may be used as an alternative</b></p>		