

STEM club- KS4 students are invited to act as student leaders for KS3 STEM, OAT LP Days, University visits through the Aimhigher project, involvement in activities as part of British Science Week, opportunities to contribute to STEM newsletters.

The curriculum and assessment of students at this stage of education has been carefully designed to promote deep learning of science and develop students into scientifically literate and aware individuals:

Building on the fundamental concepts delivered in the year 9 science curriculum, in year 10 students will further develop their understanding of concepts across the three science specialisms. Our approach to teaching will be sequential in nature, further securing their understanding of vital biological processes, the material world and energy systems. Embedded within the curriculum students will learn how to graphically represent and analyse different types of data, identify variables and critically examine practical methodologies to identify sources of error and limitations. By the end of the year all students will have acquired key skills and knowledge to prepare them for year 11 content, as well as a growing confidence to carry out practical activities and apply their understanding to unfamiliar contexts. Students will gain experience with using a range of scientific apparatus, discussing scientific developments in the real world and exploring routes into a number of scientific careers. We will refer to facts from local and national sources, supporting students to build their knowledge of the world. The course, as a whole, will allow students to develop the foundations for study of sciences at KS5, leading to potential careers in medicine, pharmacy and engineering.

HALF TERM 1

All students will know:

Biology - Organisation – levels of organisation, enzymes, digestion, food tests, the lungs, the heart, blood and blood vessels, CHD

Chemistry – Structure and bonding – ion formation, ionic bonding, ionic compounds, covalent bonding, simple molecular structures, giant covalent structures, polymers, allotropes of carbon, metallic bonding, states of matter, changing state

Physics – Atomic Structure – discovery of the atom, elements, ions, isotopes, radioactive decay, half-life.

All students will be assessed:

Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Cell, tissue, organ, organ system, enzyme, qualitative, quantitative, atria, ventricles, trachea, bronchi, bronchioles, alveoli, artery, vein, capillary, electrostatic attraction, electron, diamond, graphite, monomer, polymer, delocalized, atom, ion, isotope, half-life, alpha, beta, gamma.

HALF TERM 2

All students will know:

Biology - Infection and response - Health issues, cancer, disease case studies, defence against disease, antibiotics, development of drugs and vaccinations.

Chemistry - Chemical changes - Reactivity of metals with acids and oxygen and extraction of metals, acids and alkalis and making a salt, electrolysis of different solutions.

All students will be assessed:

November Assessment - Topics 1-2 for all specialisms are assessed in a GCSE-style assessment.

Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Communicable, non-communicable, bacteria, virus, pathogen, malignant, tumour, benign, acid, base, alkali, pH, soluble salt, neutralisation, reaction, reactants, products, electrolysis, anode, cathode, molten, aqueous

HALF TERM 3

All students will know:

Chemistry – Energy Changes – Exothermic and endothermic reactions, reaction profiles, temperature changes and bond energies.

Physics - Electricity - Series and parallel circuits, current, potential difference, resistance, ACDC, mains electricity and national grid.

All students will be assessed:

Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Current, charge, potential difference, resistance, power, LDR, thermistor, series + parallel, exothermic, endothermic, activation energy.

HALF TERM 4

All students will know:

Biology - Bioenergetics - Structure of a plant and leaf, photosynthesis, respiration and metabolism

Chemistry – Quantitative Chemistry – relative atomic mass, relative atomic number, moles.

All students will be assessed:

March Assessments -Paper 1 topics covered including topics 1-3 for all three specialisms.

Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Photosynthesis, rate, metabolism, limiting factor, xylem, phloem, respiration, anaerobic, aerobic, stomata, spongy mesophyll, relative atomic mass, relative atomic number, mole, Avogadro's constant.

HALF TERM 5

All students will know:

Biology – Ecology – biotic and abiotic, communities, sampling, food chains, carbon cycle, water cycle, biodiversity.

Chemistry - Rates of Reaction - Collision theory, rates of reaction, effect of concentration, effects of temperature, effect of surface area and pressure and catalysts.

Physics – Energy – energy stores and transfers, calculations, energy resources.

All students will be assessed:

Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Global warming, producer, apex predator, precipitation, transpiration, collisions, catalysts, kinetic, pressure, temperature, efficiency, gravitational potential energy, kinetic energy, fossil fuel, renewable, non-renewable, Newtons, resultant force

HALF TERM 6

All students will know:

Physics - Forces - Scalars and vectors, centre of mass, Hooke's Law, speed, acceleration, distance-time graphs, terminal velocity and stopping distances.

All students will be assessed:

Paper 1 mock exams- covering all topics for paper 1 biology, chemistry and physics.

Formative assessment strategies are used throughout lesson sequences to monitor and assess progress.

This includes low-stakes quizzing, recall based questions and marked work.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Scalar, vector, velocity, displacement, acceleration, Newton, momentum, extension, spring constant, state, describe, explain, evaluate.

HOW STUDENTS CAN BE SUPPORTED AT HOME

Revision guides and workbooks are available to purchase in school.

www.gcse-science.com

www.senecalearning.com

www.physicsandmathstutor.com

HOW THIS LEARNING WILL BE EMBEDDED ELSEWHERE IN THE CURRICULUM

Maths - Percentages (rates of reaction), rearranging to make variables the subject, substituting values for letters in equations, gradients.

History- Infection and response, including the discovery and development of drugs.

The curriculum and assessment of students at this stage of education has been carefully designed to promote deep learning of science and develop students into scientifically literate and aware individuals:

Building on the fundamental concepts delivered in the year 10 science curriculum, year 11 will provide students with the opportunity to use fundamental concepts taught in lower KS4 to learn about other scientific processes. This sequential approach to teaching will allow students to further explore the human body, ecological relationships, organic chemistry and the properties of waves. Students will continue to develop how to graphically represent and analyse different types of data, identify variables, critically examine practical methodologies to identify sources of error and limitations as well as appreciate and practise

how to approach examination style questions. By the end of the year all students will have acquired key skills and knowledge to allow them to access GCSE examinations, write concisely about scientific phenomena and apply their understanding to unfamiliar contexts. Students will continue to gain experience with using a range of scientific apparatus, discussing scientific developments in the real world and exploring routes into a number of scientific careers. We will refer to facts from local and national sources, supporting students to build their knowledge of the world. Students also have the opportunity to speak with representatives at Severn Trent concerning the treatment of waste water and potential careers in the industry. The course, as a whole, will allow students to develop the foundations for study of sciences at KS5, leading to potential careers in medicine, pharmacy and engineering.

HALF TERM 1

All students will know:

- » **Biology – homeostasis and response** - Nervous system, reflexes, hormones, menstrual cycle, contraception, blood glucose control, diabetes.
- Chemistry - Chemical Analysis** - Pure substances, mixtures, formulations, chromatography and testing for chlorine/oxygen/hydrogen/carbon dioxide.
- Physics - Forces** - Scalars and vectors, centre of mass, Hooke's Law, speed, acceleration, distance-time graphs, terminal velocity and stopping distances.
- » **Chemistry** - organic chemistry - Hydrocarbons, alkanes, alkynes, cracking and combustion.

All students will be assessed:

Assessment window 1 – students will be assessed on paper 2 topics already taught.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Alkene, alkane, combustion, distillation, homeostasis, neuron, effector, collisions, temperature, kinetic, Soluble, chromatography, separate, mobile, stationary.

ENRICHMENT OPPORTUNITIES

STEM club- KS4 students are invited to act as student leaders for KS3 STEM, OAT LP Days, University visits through the Aimhigher project, private tutoring through mytutor, Severn Trent speaker, involvement in activities as part of British Science Week, opportunities to contribute to STEM newsletters.

HALF TERM 2

All students will know:

Biology - Inheritance - Reproduction, meiosis, DNA and the genome, genetic conditions, embryo screening, variation, selective breeding, evolution and natural selection.

Chemistry - Chemistry of the Atmosphere - Early atmosphere, greenhouse gases, pollution and carbon footprints.

Physics - Waves - Longitudinal and transverse waves, speed of a wave, EM spectrum, refraction, radiation.

All students will be assessed:

Students will complete exam-style questions and low stakes quizzes as part of their lessons.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Sexual, asexual, mitosis, genotype, phenotype, dominant, recessive, allele, carbon dioxide, methane, climate change, wavelength, frequency, refraction, electromagnetic spectrum.

HALF TERM 3

All students will know:

Chemistry - Using Resources - Natural and finite resources, life cycle assessment, potable water and water treatment.

Physics - Magnets and Electromagnets - Magnetic fields, electromagnets and motor effect - Space - Triple students only.

All students will be assessed:

Paper 1 mock - all students will be assessed on paper 1 content in biology, chemistry and physics.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Magnet, induced magnet, pole, finite, potable, reverse osmosis, desalination.

HALF TERM 4

All students will know:

Revision - all specialisms - students will be revising content from their KS4 science journey.

All students will be assessed:

March/April mock exams - all students will be assessed on paper 2 content in biology, chemistry and physics.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Identify, describe, explain, plot, relationship, correlation, evaluate, apply.

HALF TERM 5

All students will know:

This half term will be used as examination preparation for Year 11. Plans for this half term will be in response to question level analysis from both sets of mock exams to ensure that weaknesses are addressed before the GCSE examination period.

All students will be assessed:

GCSE examinations - biology, chemistry and physics paper 1.

Students have workshops planned into curriculum time. These modelled sessions focus on a variety of substantive and disciplinary knowledge, such as variables, graph plotting and evaluating data.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Identify, describe, explain, compare, evaluate, calculate, state, suggest, analyse.

HALF TERM 6

All students will know:

This half term will be used as examination preparation for Year 11. Plans for this half term will be in response to question level analysis from both sets of mock exams to ensure that weaknesses are addressed before the GCSE examination period.

All students will be assessed:

GCSE examinations - biology, chemistry and physics paper 2.

Students have workshops planned into curriculum time. These modelled sessions focus on a variety of substantive and disciplinary knowledge, such as variables, graph plotting and evaluating data.

Reading skills needed for this unit:

- » Command words.
- » Extracting information from various parts of a text.
- » Comprehension.
- » Interpreting data.

Key vocabulary:

Identify, describe, explain, compare, evaluate, calculate, state, suggest, analyse.

HOW STUDENTS CAN BE SUPPORTED AT HOME

Revision guides are available to purchase in school.

www.gcsescience.com

www.senecalearning.com

www.physicsandmathstutor.com

www.tassomai.com

HOW THIS LEARNING WILL BE EMBEDDED ELSEWHERE IN THE CURRICULUM

Maths - Ratios and percentages (Inheritance), rearranging to make variables the subject, substituting values for letters in equations, gradients.

Geography - composition of the atmosphere (Chemistry of the atmosphere), water cycle.

