

Curriculum Aims and Purpose

"Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world." Louis Pasteur

We aim to develop a deep understanding of the world, through promoting knowledge and disciplinary skills in equal measure. Equipping students with the knowledge and tools to make informed decisions, solve problems, and contribute to advancements in society.

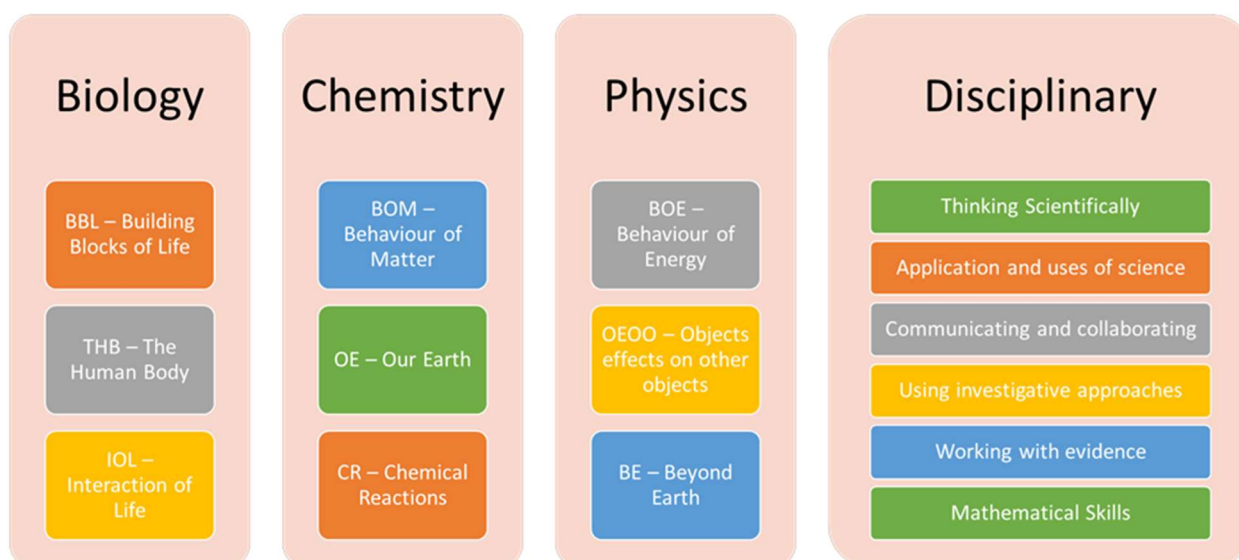
We have established a clear curriculum intent, all aspects of this curriculum meet one or more of the 6 overarching aims. These aims underpin both the strategic and operational components of this curriculum:

- The curriculum will be accessible by all students
- The curriculum will excite students and promote curiosity which is sustained beyond the formal education
- The curriculum will explicitly promote scientific literacy
- The curriculum will make relevant the study of science, and encourage the uptake of science related careers
- The curriculum will be systematically assessed to ensure that students are making the expected progress
- The curriculum will facilitate the improved teaching of science

The Science Curriculum at OIEA goes beyond the National Curriculum, each NC statement is broken down into more specific substantive and disciplinary knowledge to ensure that students knowledge develops over time. Mapped into this curriculum is the "Richness of Science", referring to the way this curriculum sets out to develop the whole student. Richness will engage students in the awe and wonder of science and make the world of science, locally, nationally and globally relevant. Furthermore, the richness of science aims to equip students with a wide range of personal skills that will help them unlock and make the most of any future opportunity they may be presented.

How our Curriculum inducts students into the discipline of the subject:

Science is not only disciplinary in nature in terms of skills but also in terms of subject. Our curriculum is broken down into four overarching domains that are sequenced from primary to the end of secondary education.



Year 7 Overview

Year 7 marks the initial stage of Key Stage 3 (KS3), where the acquired knowledge not only extends upon previously taught concepts in Key Stage 2 (KS2) but also forms the essential groundwork for their educational journey. This gradual accumulation of knowledge and skills is strategically designed to empower students, ensuring their readiness to engage with the more advanced content covered in later years.

You will see some one off taught disciplinary skills lessons, these are to strategically timed to ensure they have the skills necessary for upcoming units. Mathematics skills have been co-sequenced with the Mathematics department.

Term	Focus
1	<p><i>Your new Environment: Introduces lab safety, hazards, and risks to ensure a safe scientific journey.</i></p> <p>The Particle Model: Explores the behavior and interactions of particles in matter.</p> <ul style="list-style-type: none">○ <i>Describe patterns and trends – Disciplinary skills lesson.</i>○ <i>Constructing line graphs - Disciplinary skills lesson</i> <p>Forces, changing shape: Investigates how forces cause objects to change shape or motion.</p> <ul style="list-style-type: none">○ <i>Constructing Bar charts - Disciplinary skills lesson</i> <p>Animal Cells: Examines the structure and function of cells in animals.</p> <ul style="list-style-type: none">○ <i>Convert in and out standard form - Disciplinary skills lesson.</i> <p>The Atom: Delves into the fundamental building blocks of matter and their properties.</p>
2	<p><i>Using a Scientific Calculator - Disciplinary skills Lesson</i></p> <p>Space, Satellites: Explores the realm of space and the technology of satellites.</p> <p>Changes of State: Studies the transitions between different states of matter, such as solid, liquid, and gas.</p> <p>The Breathing System: Investigates the organs and processes involved in human respiration.</p> <p>Types of Reactions: Explores different types of chemical reactions and their characteristics.</p> <p>The Cycles (Rock and Water): Examines the interconnected cycles of rocks and water on Earth.</p>
3	<p>Human Reproduction: Studies the biological process of human reproduction and development.</p> <ul style="list-style-type: none">○ <i>Provide Answers to 2 significant figures - Disciplinary skills lesson.</i>○ <i>Find the mode, median and range - Disciplinary skills lesson.</i>○ <i>Calculating Percentage Change - Disciplinary skills Lesson</i> <p>Health and Disease: Explores factors affecting health and the impact of diseases on the body.</p> <p>Purity: Investigates the concept of purity in substances and its significance boiling points.</p> <p>The Space Race: Explores the historical competition between nations in space exploration and technology.</p>

Homework

- Students are set homework through a online software called Carousel Learning. 30 quick questions per week.
- Carousel promotes knowledge recall through practice and retrieval and linking to the Do Now Activities at the start of every lesson.

Useful resources:

- <https://www.bbc.co.uk/bitesize/subjects/zng4d2p>
- <https://app.senecalearning.com/classroom/course/419c7523-d408-4bc7-9b96-f7f12abdacae>

Assessment

- Students begin each unit with a **pre-topic assessment**. This is low stakes and gives students to demonstrate an opportunity about what they already know and allows staff to adapt lessons for the unit accordingly.
- Students end each topic with a **post-topic assessment**. This is also low stakes, this allows staff to identify gaps and misconceptions in knowledge and address these later in the year. But also gives information for the curriculum director to improve the curriculum so gaps do not persist.
- **Summative assessments** that students get personal scores and feedback on are completed before Data Collection Points three times a year. These cover previously learnt content and skills, students are provided with a summary of what will be on the assessment two weeks before.

Year 8 Overview

Year 8 represents the next phase in Key Stage 3 (KS3), where students continue to build upon the foundational knowledge gained in Year 7, further extending their understanding of concepts introduced in both Year 7 and Key Stage 2 (KS2). This stage is pivotal for the continued development of knowledge and skills, laying the groundwork for the subsequent years and fostering a seamless progression towards more advanced content.

Term	Focus
1	<p>The Reactivity Series of Metals: Explores the hierarchy of metals based on their reactivity with other substances.</p> <p>Our Atmosphere: Investigates the composition, structure, and functions of Earth's atmosphere.</p> <p>Nutrition and Digestion: Examines the process of obtaining nutrients from food and their digestion in the body.</p> <p>Energy In Our Home: Studies the sources, use, and conservation of energy within household settings.</p>
2	<p>The Principles of Energy: Explores the fundamental concepts and principles governing energy transformations.</p> <p>Cellular Respiration: Investigates the biochemical process by which cells produce energy from nutrients.</p> <p>Plant Cells: Examines the structure and function of cells in plants.</p> <p>Forces and Motion: Studies the relationship between forces applied to objects and their resulting motion.</p> <p>Waves: Explores the types, properties and behaviours of waves in various mediums.</p>
3	<p>Temperature or Heat: Investigates the concepts of temperature and heat transfer mechanisms.</p> <p>Forces, Changing Shape: Explores how forces cause changes in the shape or deformation of objects.</p> <p>Photosynthesis: Studies the process by which plants convert light energy into chemical energy to produce food.</p> <p>Electricity: Examines the properties, generation, transmission, and uses of electric energy.</p> <p>Magnetism: Explores the properties and behaviours of magnets and magnetic fields.</p>

Homework

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- <https://app.senecalearning.com/classroom/course/419c7523-d408-4bc7-9b96-f7f12abdacae>

Assessment

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Year 9 Overview

In Year 9, the journey through Key Stage 3 (KS3) continues as students delve even deeper into the curriculum, revisiting and expanding upon the knowledge and skills acquired in both Year 7 and Year 8. This phase represents a crucial part of the spiral progression, wherein concepts from earlier years are not only reinforced but explored at a more profound level.

Term	Focus
1	<p>The Particle Model: The behaviour and interactions of particles in matter, including solids, liquids, and gases.</p> <ul style="list-style-type: none">○ <i>Describe patterns and trends – Disciplinary skills lesson.</i>○ <i>Constructing line graphs - Disciplinary skills lesson.</i> <p>Forces, Changing Shape: Investigates how forces influence the shape and motion of objects, leading to changes in their form.</p> <ul style="list-style-type: none">○ <i>Convert in and out standard form - Disciplinary skills lesson.</i>○ <i>Using a Scientific Calculator - Disciplinary skills lesson.</i>○ <i>Provide Answers to 2 significant figures - Disciplinary skills lesson.</i> <p>Animal Cells: Examines the structure, function, and organization of cells in animals, the basic units of life.</p> <p>The Atom: Delves into the fundamental building blocks of matter, consisting of protons, neutrons, and electrons.</p>
2	<p>Space, Satellites: Explores the vast expanse of space and the role of satellites in communication, navigation, and observation.</p> <p>The Breathing System: Studies the organs and processes involved in respiration, including inhalation and exhalation.</p> <p>Electricity: Examines the properties, generation, transmission, and applications of electric current.</p> <p>Forces: Investigates different types of forces, such as gravitational, magnetic, and frictional forces, and their effects on objects.</p>
3	<p>Atoms and the Periodic Table: Explores the structure of atoms and their arrangement in the periodic table of elements.</p> <p>Energy and the Particle Model: Examines the relationship between energy and the behaviour of particles in matter.</p> <p>Microscopy: Investigates the principles and applications of microscopy in magnifying and studying small objects or organisms.</p> <p>Transporting Substances: Explores the mechanisms by which substances are transported within organisms or across cell membranes.</p> <p>Bonding, Structure, and Materials: Studies the types of chemical bonding, the arrangement of atoms in materials, and their properties.</p>

Homework

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Assessment

- Students begin each unit with a **pre-topic assessment**. This is low stakes and gives students to demonstrate an opportunity about what they already know and allows staff to adapt lessons for the unit accordingly.
- Students end each topic with a **post-topic assessment**. This is also low stakes, this allows staff to identify gaps and misconceptions in knowledge and address these later in the year. But also gives information for the curriculum director to improve the curriculum so gaps do not persist.
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Year 10 Overview

In Year 10, students continue to advance their academic journey by building upon the comprehensive foundation laid during Key Stage 3 (KS3). This pivotal stage involves further development and application of knowledge and skills acquired in preceding years. Students begin to study Core Practicals in depth, allowing them to use the skills built throughout KS3 to carry out, interpret and understand scientific investigations.

Half Term	Focus
1	<p>Communicable diseases: Examines the transmission, symptoms, and prevention methods of diseases like COVID-19 and influenza.</p> <p>Energy Changes: Explores how energy is transferred and converted in chemical reactions, such as in combustion or photosynthesis.</p> <p>Conservation and dissipation of energy: Investigates methods to reduce energy waste and promote efficient energy use, such as insulation and energy-saving appliances.</p> <p>Preventing and treating disease: Focuses on strategies for disease prevention, including vaccinations, sanitation, and medical treatments.</p> <p>The Earth's atmosphere: Studies the composition, structure, and functions of Earth's atmosphere, including the greenhouse effect and air pollution.</p> <p>Energy resources: Analyses various sources of energy, including fossil fuels, renewable energy, and nuclear power.</p> <p>Non-communicable diseases: Explores the causes, risk factors, and prevention strategies for diseases like diabetes, cancer, and cardiovascular disease.</p> <p>The Earth's resources: Examines the distribution, extraction, and sustainable management of natural resources such as minerals, water, and forests.</p>
2	<p>Molecules and matter: Investigates the properties, structure, and behaviour of molecules and substances at the molecular level.</p> <p>Photosynthesis: Studies the biochemical process by which plants convert light energy into chemical energy to produce glucose and oxygen.</p> <p>Rates and equilibrium: Examines factors affecting reaction rates and how equilibrium is achieved in chemical reactions.</p> <p>Radioactivity: Explores the properties and uses of radioactive materials, including nuclear power generation and medical imaging.</p> <p>Respiration: Investigates the biochemical process by which cells convert glucose and oxygen into energy, releasing carbon dioxide and water as byproducts.</p> <p>Crude oil and fuels: Analyses the formation, extraction, refining, and uses of crude oil and fossil fuels.</p> <p>Forces in balance: Studies the equilibrium of forces acting on objects and systems, including the principles of Newton's laws of motion.</p>
3	<p>Reproduction: Examines the processes of sexual and asexual reproduction in plants and animals, including fertilization and embryonic development.</p> <p>Organic reaction: Explores the mechanisms and applications of organic reactions, such as substitution, addition, and elimination reactions.</p> <p>Motion: Investigates the concepts of velocity, acceleration, and force in describing the motion of objects and systems.</p> <p>Variation and evolution: Studies genetic variation, natural selection, and evolutionary processes shaping the diversity of life on Earth.</p> <p>Polymers: Analyses the properties, synthesis, and applications of polymers, including plastics, fibres, and biomaterials.</p> <p>Electromagnetism: Explores the relationship between electricity and magnetism, including electromagnetic induction and the behaviour of charged particles in magnetic fields.</p> <p>Using our resources: Examines sustainable practices and technologies for resource management and conservation, including recycling, renewable energy, and waste reduction strategies.</p>

Homework

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- Carousel promotes knowledge recall through practice and retrieval and linking to the Do Now Activities at the start of every lesson.

Useful resources:

- <https://www.bbc.co.uk/bitesize/subjects/zrkw2hv>
- <https://app.senecalearning.com/classroom/course/6b76a6e0-cf79-11e7-83a9-29a486db2c9f>
- <https://app.senecalearning.com/classroom/course/e39e7f70-d100-11e7-9b85-bbf8589a9044>
- <https://app.senecalearning.com/classroom/course/fe56ca00-05aa-11e8-9a61-01927559cfd5>

Assessment

- Students end each topic with a post-topic assessment. This is also low stakes, this allows staff to identify gaps and misconceptions in knowledge and address these later in the year. But also gives information for the curriculum director to improve the curriculum so gaps do not persist.
- Summative assessments that students get personal scores and feedback on are completed before Data Collection Points three times a year. These cover previously learnt content and skills, students are provided with a summary of what will be on the assessment two weeks before.

Year 11 Combined Science Overview

In Year 11, students continue to study GCSE topics but also integrate their cumulative knowledge, honed since Year 7, navigating topics that have increased complexity. This final GCSE year emphasises the application of foundational understanding, strategically sequencing content to challenge students with more advanced concepts.

Half Term	Focus
1	<p>Variation and evolution: Explores the diversity of life forms and the mechanisms driving evolutionary change, including natural selection and genetic variation.</p> <p>Chemical calculations: Examines mathematical techniques used in chemical analysis, including stoichiometry, molarity, and percentage yield calculations.</p> <p>Radioactivity: Investigates the properties and applications of radioactive materials, including decay processes and the use of isotopes in medicine and industry.</p> <p>Genetics and evolution: Studies the role of genetics in evolution, including inheritance patterns, mutations, and genetic variation.</p> <p>Bonding Recap and Electrolysis: Reviews the concepts of chemical bonding and electrolysis, including ionic, covalent, and metallic bonds, and electrolytic processes.</p> <p>Forces in balance: Explores the equilibrium of forces acting on objects and systems, including the principles of Newton's laws of motion and equilibrium conditions.</p>
2	<p>Adaptations, interdependence, and competition: Examines how organisms adapt to their environment, their interactions within ecosystems, and the competition for resources.</p> <p>Motion: Investigates the concepts of velocity, acceleration, and force in describing the motion of objects and systems.</p> <p>Force and motion: Explores the relationship between forces applied to objects and their resulting motion, including the effects of friction, gravity, and air resistance.</p> <p>Chemical analysis: Studies techniques used to analyze chemical substances, including chromatography, spectroscopy, and titration methods.</p> <p>The human nervous system: Investigates the structure and function of the human nervous system, including neurons, synapses, and the transmission of nerve impulses.</p> <p>Hormonal coordination: Examines the role of hormones in coordinating physiological processes and maintaining homeostasis within organisms.</p> <p>Ecosystems: Studies the structure and function of ecosystems, including biotic and abiotic factors, energy flow, and nutrient cycling within ecosystems.</p>
3	Countdown to exams revision and GCSE examination period.

Homework

- Students are set homework through a online software called Carousel Learning. 30 quick questions per week.
- Carousel promotes knowledge recall through practice and retrieval and linking to the Do Now Activities at the start of every lesson.

Useful resources:

- <https://www.bbc.co.uk/bitesize/subjects/zrkw2hv>
- <https://app.senecalearning.com/classroom/course/88066eb0-1d8c-11e8-a6da-15f18bba751c>
- <https://app.senecalearning.com/classroom/course/4c2bb850-1d46-11e8-840a-ed991cd3461d>
- <https://app.senecalearning.com/classroom/course/f4627c20-1e1d-11e8-b99c-3168302284a4>

Assessment

- Students end each topic with a post-topic assessment. This is also low stakes, this allows staff to identify gaps and misconceptions in knowledge and address these later in the year. But also gives information for the curriculum director to improve the curriculum so gaps do not persist.
- Summative assessments that students get personal scores and feedback on are completed before Data Collection Points three times a year. These cover previously learnt content and skills, students are provided with a summary of what will be on the assessment two weeks before.

Year 11 Triple Science Overview

In Year 11, students continue to study GCSE topics but also integrate their cumulative knowledge, honed since Year 7, navigating topics that have increased complexity. This final GCSE year emphasises the application of foundational understanding, strategically sequencing content to challenge students with more advanced concepts.

Half Term	Focus		
1	Biology Variation and evolution: Explores the diversity of traits within populations and the mechanisms driving evolutionary change over time. Genetics and evolution: Investigates how genetic variation and inheritance contribute to evolutionary processes, including natural selection and speciation. Adaptations, interdependence, and competition: Examines how organisms adapt to their environment, their relationships within ecosystems, and the competitive interactions for resources. Organising an ecosystem: Studies the structure and function of ecosystems, including the roles of producers, consumers, and decomposers in energy flow and nutrient cycling.	Chemistry Chemical calculations: Explores mathematical techniques used in chemical analysis and stoichiometry, including balancing chemical equations and calculating reaction yields. Bonding Recap and Electrolysis: Reviews the principles of chemical bonding, including ionic, covalent, and metallic bonds, and investigates electrolytic processes involving the decomposition of compounds.	Physics Radioactivity: Examines the properties, decay processes, and applications of radioactive isotopes in medicine, industry, and environmental science. Forces in balance: Studies the equilibrium of forces acting on objects and systems, including the conditions for static and dynamic equilibrium. Motion: Investigates the concepts of velocity, acceleration, and force in describing the motion of objects and systems.
2	Biology Biodiversity and ecosystems: Explores the variety of life forms within ecosystems and the importance of biodiversity for ecosystem stability and resilience. The human nervous system: Examines the structure and function of the nervous system, including neurons, synapses, and the transmission of nerve impulses. Hormonal coordination: Investigates the role of hormones in regulating physiological processes and maintaining homeostasis within organisms. Homeostasis in action: Explores how organisms maintain internal stability in response to changing external conditions, including temperature regulation, water balance, and blood sugar control.	Chemistry Chemical analysis: Studies techniques used to analyse chemical substances, including chromatography, spectroscopy, and titration methods.	Physics Force and motion: Explores the relationship between forces applied to objects and their resulting motion, including Newton's laws of motion and the effects of friction, gravity, and air resistance. Force and Pressure: Investigates the interaction between force, which is a push or pull acting on an object, and pressure, which is the force exerted over a specific area. Space: Explores the vast and mysterious expanse beyond Earth's atmosphere, encompassing celestial bodies such as planets, stars, galaxies, and the phenomena that occur within it.
3	Countdown to exams revision and GCSE examination period.		

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- Carousel promotes knowledge recall through practice and retrieval and linking to the Do Now Activities at the start of every lesson.

Useful resources:

- <https://www.bbc.co.uk/bitesize/subjects/zrkw2hv>
- <https://app.senecalearning.com/classroom/course/6b76a6e0-cf79-11e7-83a9-29a486db2c9f>
- <https://app.senecalearning.com/classroom/course/e39e7f70-d100-11e7-9b85-bbf8589a9044>
- <https://app.senecalearning.com/classroom/course/fe56ca00-05aa-11e8-9a61-01927559cfd5>

Assessment

- Students end each topic with a post-topic assessment. This is also low stakes, this allows staff to identify gaps and misconceptions in knowledge and address these later in the year. But also gives information for the curriculum director to improve the curriculum so gaps do not persist.
- Summative assessments that students get personal scores and feedback on are completed before Data Collection Points three times a year. These cover previously learnt content and skills, students are provided with a summary of what will be on the assessment two weeks before.