JOHN PORT SPENCER ACADEMY

Science

Curriculum Overview Science
Key Stage – KS4 Year -10

Joy | Progress | Success | Act with care, kindness, respect and integrity

Our curriculum is carefully sequenced to ensure cumulative knowledge and progression. Each unit builds on the last, with clear concepts that students must grasp to progress. We define end points to illustrate what mastery looks like by year-end.

Location of resources:	**Science Subject Staff – KS4**
Curriculum intent and rationale:	At John Port Spencer we believe in developing a passion for Science. We set high expectations of students to ensure that they can excel in Biology, Chemistry and Physics. In doing so our students are ambitious of what they can achieve. We have an inclusive curriculum in which all students of all abilities have an opportunity to progress at all levels. Our curriculum is designed so that: - Students develop their knowledge and understanding of scientific concepts, building on previous knowledge, so that their understanding deepens over time - Students develop working scientifically skills to that they can predict, plan, carry out, analyse and evaluate their practical scientific investigations - Students are curious about the world around them and are encouraged to ask questions to develop more depth in their understanding. - Students can communicate their ideas, explaining them using the correct scientific language - Students ideas are challenged so that misconceptions are identified and addressed. - Students are inspired to consider a science related career.
National Curriculum Links:	**Biology** • Enzymes and factors affecting the rate of enzymatic reactions. The digestion of key nutrient groups. • The relationship between health and disease. Communicable diseases including sexually transmitted infections in humans (including HIV/AIDs). 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 process of discovery and development of new medicines. The impact of lifestyle factors on the incidence of non-communicable diseases. • Photosynthesis as the key process for food production and therefore biomass for life and the factors affecting the rate of photosynthesis. • The importance of cellular respiration and the processes of aerobic and anaerobic respiration • The genome as the entire genetic material of an organism. How the genome, and its interaction with the environment, influence the development of the phenotype of an organism • the potential impact of genomics on medicine. Most phenotypic features being the result of multiple, rather than single, genes. Single gene inheritance and single gene crosses with dominant and recessive phenotypes. Sex determination in humans. Genetic variation in populations of a species. The process of natural selection leading to evolution. The evidence for evolution • developments in biology affecting classification. The importance of selective breeding of plants and animals in agriculture. The uses of modern biotechnology including gene technology; some of the practical and ethical considerations of modern biotechnology. • Levels of organisation within an ecosystem. Some 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 role of microorganisms (decomposers) in the cycling of materials through an ecosystem. Organisms are interdependent and are adapted to their environment. 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. **Chemistry** • Types of chemical bonding: ionic, covalent, and metallic. The bulk properties of materials related to bonding and intermolecular forces. Bonding of carbon leading to the vast array of natural structures of properties of diamond, graphite, fullerenes and graphene. • Determination of empirical formulae from the ratio of atoms of different kinds. Balanced chemical equations, ionic equations and state symbols. Identification of common gases. The chemistry of acids; reactions with some metals and carbonates. pH as a measure of hydrogen ion concentration and its numerical scale. Electrolysis of molten ionic liquids and aqueous ionic solutions. Reduction and oxidation in terms of loss or gain of oxygen. • Measurement of energy changes in chemical reactions (qualitative). Bond breaking, bond making, activation energy and reaction profiles (qualitative). • Factors that influence the rate of reaction (varying temperature or concentration, changing the surface area of a solid reactant or by adding a catalyst). Factors affecting reversible reactions. **Physics** • Energy changes in a system involving heating, doing work using forces, or doing work using an electric current: calculating the stored energies and energy changes involved. Power as the rate of transfer of energy. Conservation of energy in a closed system, dissipation. Calculating energy efficiency for any energy transfers. Renewable and non-renewable energy sources used on Earth, changes in how these are used. • Forces and fields: electrostatic, magnetic, gravity. Forces as vectors. Calculating work done as force x distance. Elastic and inelastic stretching. Pressure in fluids acts in all directions: variation in Earth's atmosphere with height, with depth for liquids, up-thrust force (qualitative).

	• Speed of sound, estimating speeds and accelerations in everyday contexts. Interpreting quantitatively graphs of distance, time, and speed. Acceleration caused by forces; Newton's First Law • weight and gravitational field strength. Decelerations and braking distances involved on roads, safety. • Relating models of arrangements and motions of the molecules in solid, liquid and gas phases to their densities. Melting, evaporation, and sublimation as reversible changes. Calculating energy changes involved on heating, using specific heat capacity; and those involved in changes of state, using specific latent heat. Links between pressure and temperature of a gas at constant volume, related to the motion of its particles (qualitative). • The nuclear model and its development in the light of changing evidence. Masses and sizes of nuclei, atoms and small molecules. Differences in numbers of protons, and neutrons related to masses and identities of nuclei, isotope characteristics and equations to represent changes. Ionisation; absorption or emission of radiation related to changes in electron orbits. Radioactive nuclei: emission of alpha or beta particles, neutrons, or gamma rays, related to changes in the nuclear mass and/or charge. Radioactive materials, half-life, irradiation, contamination and their associated hazardous effects, waste disposal. Nuclear fission, nuclear fusion and our Sun's energy.

What content needs to be covered? Key Knowledge and skills / misconceptions to address (with vocab in bold and spelling underlined)
By the end of the year students will know:

Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Students will learn key knowledge and skills about: • **Enzymes and digestion** • **Bonding** • **Immunity (Part 1)** • **Energy** **Throughout the unit's students develop their working scientifically skills** **Required Practical:** - **Food tests** - **The effect of pH and amylase**	**Students will learn key knowledge and skills about** • **Immunity (Part 2)** • **Chemical Change** • **Bioenergetics (Photosynthesis)** • **Particles** • **Radioactivity** **Throughout the unit's students develop their working scientifically skills** **Required Practical:** - **Culturing microbes (Higher only)** - **Make pure, dry salt crystals** - **The factors that affect photosynthesis**	**Students will learn key knowledge and skills about** • **Bioenergetics (Respiration)** • **Quantitative chemistry** • **Forces 1** **Throughout the unit's students develop their working scientifically skills.** **Required Practical:** - **Titration (Higher only)**	**Students will learn key knowledge and skills about** • **Inheritance** • **Forces 2** **Throughout the unit's students develop their working scientifically skills** **Required Practical:** - **Acceleration**	**Students will learn key knowledge and skills about** • **Energy change** • **Rates of Reaction** **Throughout the unit's students develop their working scientifically skills** **Required Practical:** - **Energy change** - **Factors that affect rate of reaction**	**Students will learn key knowledge and skills about:** • **Consolidation of previous topics and revision for mocks** • **Mock exam feedback and development work** • **Ecology** **Throughout the unit's students develop their working scientifically skills** **Required Practical:** - **Sampling a plant population (Quadrating)**
Challenge: Students are challenged to grasp the abstract nature of enzymes, particularly how they function at a molecular level and how environmental conditions affect their activity linking this with active site action. Students are challenged in bonding by the abstract nature of the concepts and the need to visualize microscopic structures and then relate this to their relationship to macroscopic properties. Students are challenged in the immune system by being asked to distinguish between the intricacies of the immune system, particularly the differences between active and passive immunity and the roles of phagocytes and lymphocytes. Students are challenged in the energy topic as they are asked to explain energy as a	**Challenge:** Students are challenged as they are expected to understand the different types of pathogens, the specific versus non-specific immune responses, and the roles of various immune cells. Students are challenged by balancing equations can be difficult for some students, especially if they haven't grasped the underlying principles of conservation of mass. Students are challenged as they are asked to distinguish between different types of chemical reactions difficult. Challenge in photosynthesis due to the students having to explain the abstract nature of the process and the complexity of its limiting factors.	**Challenge:** Students often find it challenging to differentiate between breathing and respiration, and to grasp the concept of anaerobic respiration. They may also struggle with the chemical equation for aerobic respiration and the idea that respiration is a cellular process, not just breathing Students often find quantitative chemistry challenging due to its mathematical nature and abstract concepts. Specifically, students struggle with balancing equations, understanding the mole concept, and performing calculations involving stoichiometry and relative formula mass. Students find forces challenging as the mathematical demands of the subject, and	**Challenge:** Students often find several aspects of inheritance challenging at the GCSE level, primarily due to the abstract nature of genetics and the need to grasp complex concepts like alleles, genotypes, and phenotypes. Students often find the concepts of scalar and vector quantities, the relationship between forces and motion, and the application of Newton's Laws of motion particularly challenging in GCSE Physics forces and motion. Additionally, understanding how forces cause changes in motion, including acceleration and turning effects, can be difficult.	**Challenge:** At the GCSE level, students often find exothermic reactions challenging due to confusion about the transfer of energy and the role of bonds. Specifically, students may struggle to understand that it's the difference between bond breaking and bond making that determines whether a reaction is exothermic or endothermic, not just the breaking of bonds. At GCSE level, students often find understanding the factors affecting reaction rates and explaining them in terms of collision theory challenging. Specifically, grasping how factors like temperature, concentration, surface area, and catalysts influence the frequency and success of collisions between reactant particles can be difficult. Additionally, interpreting graphs related to reaction rates and understanding	**Challenge:** GCSE students find revision challenging due to several factors, including difficulty managing time and staying motivated, a lack of effective revision techniques, and feeling overwhelmed by the amount of material to cover. Many students also struggle with exam anxiety and underestimating the time needed for adequate preparation. Students often find GCSE ecology challenging due to the abstract nature of ecological concepts, the complexity of ecosystems, and the need to apply knowledge to unfamiliar scenarios. Specifically, students may struggle with understanding interdependence within ecosystems, predicting the impact of changes, and

quantity rather than a substance. Additionally, they are asked to grasp the different types of energy stores and transfers, as well as applying mathematical concepts to energy calculations, rearranging and changing units where required. **Misconceptions:** The idea that enzymes are living, that they are used up in reactions, or that they can catalyse many different reactions. It's important to understand that enzymes are proteins, not living cells, and while they are essential for catalysing reactions, they are not consumed in the process. The idea that ionic bonding involves sharing electrons (it's transfer), covalent bonding involves electron transfer (it's sharing), and that atoms bond solely to achieve a full outer shell. Additionally, some students believe that energy is released when bonds break, rather than when they form. Confusion about how the immune system works, the role of vaccines, and the nature of disease transmission. Students may struggle to differentiate between the roles of antibiotics and vaccines, or they might mistakenly believe that vaccines can cause the diseases they are meant to prevent. Additionally, misconceptions exist about the body's ability to "boost" immunity, the effectiveness of hygiene practices, and the idea that a strong immune system means never getting sick. The idea that it can be created or destroyed, that it is a substance that gets used up, and that energy is stored within chemical bonds. Additionally, students often conflate energy with force, mistakenly believing that friction is a form of energy transfer. **Subject specific terminology:** Enzyme, active site, substrate, complementary, lock and key, denatured, specificity	Students are challenged as they must understand the concepts of irradiation and contamination, and the properties of different types of radiation. Students are challenged by asking them to interpret graphs to calculate half-life. **Misconceptions:** Confusing balancing chemical equations with altering the reaction itself, misunderstanding the role of catalysts at equilibrium, and misinterpreting the law of conservation of mass. Additionally, students often struggle with the sub-microscopic level, particularly with aqueous solutions and the reactivity series. The idea that plants obtain all their food from the soil, that they only respire at night, and that photosynthesis is the same as respiration. Other misconceptions involve mistaking the sunlight absorbed by plants for food, or that carbon dioxide is not involved in the process. Students often struggle with the concepts of half-life, the nature of radioactive emissions, and the difference between irradiation and contamination. They may also incorrectly believe that radioactive materials are always depicted as glowing green or that all radiation is artificial. The idea that particles expand when heated, that particles have the same properties as the material they make up, and that the space between particles is filled with air. Additionally, some students struggle with the concept of empty space between particles, particularly in gases, and with differentiating between melting and dissolving. **Subject specific terminology:** Pathogen, Bacteria, virus, fungi, Protista, communicative, non-communicative, vaccine, antibiotics, painkillers, resistance, placebo, double-blind, fungicide, chlorosis. Displacement, oxidation, reduction, combustion, neutralisation, salt, base, titration, pipette, burette, phenolthelein, universal indicator.	the need to apply concepts to real-world scenarios. Specifically, difficulties arise in understanding balanced and unbalanced forces, applying Newton's laws, and grasping concepts like moments **Misconceptions:** That respiration is the same as breathing. In reality, respiration is a chemical process. Another misconception is that plants only respire at night or when they are not photosynthesizing; they actually respire all the time, just like animals. Confusing "strong" with "concentrated" and "weak" with "dilute," believing that equilibrium means equal amounts of reactants and products or that the reaction has stopped, and misunderstanding the difference between exothermic and endothermic reactions. Additionally, students often struggle with applying the mole concept and balancing chemical equations. The idea that a force is needed to keep an object moving, that objects "run out" of force, and that forces only come from living things or machines. Additionally, students often struggle with the concept of balanced and unbalanced forces, friction, and the relationship between force, mass, and acceleration. **Subject specific terminology:** Mitochondria, aerobic, anaerobic, fermentation, lactic acid, oxygen debt Moles, atom economy, yield, relative formula mass, concentration, volume Newton, contact, non-contact, limit of proportionality, weight, mass, gravity, air resistance, friction, inelastic deformation, directly proportional.	**Misconceptions:** Several common misconceptions exist regarding inheritance at the GCSE level, particularly regarding the complexity of genetic traits and the role of genes. Students often oversimplify inheritance by assuming that all traits are determined by a single gene with only two alleles (dominant and recessive), and that these alleles directly determine the phenotype. Most characteristics are influenced by multiple genes and environmental factors. Confusing the concepts of speed, velocity, and acceleration, and from misunderstanding the role of forces. Students may incorrectly believe that a force is needed to maintain motion, or that the direction of a force must always align with the direction of movement. **Subject specific terminology:** Gene, allele, gamete, sexual, asexual, fertilisation, homozygous, heterozygous, sex chromosome, inherited, cystic fibrosis, polydactyl, Mendel, punnets square, selective breeding, speciation, natural selection, Darwin, Lamarck, fossil, evolution, dominant, recessive, DNA, nucleotide, bases, phosphate, double helix. Scalar, vector, moments, momentum	the concept of activation energy can also pose challenges. **Misconceptions:** A common misconception about exothermic reactions at the GCSE level is that the reactants themselves release energy. Energy is released when bonds are formed during the reaction, not just by the reactants themselves. Another misconception is that the temperature increase in an exothermic reaction is solely due to the reactants, when it's the surroundings that heat up due to the energy transfer. Confusing the frequency of collisions with the number of collisions, and misinterpreting the relationship between temperature and rate, or concentration and rate. Students may also incorrectly believe that a catalyst affects the equilibrium position of a reaction. **Subject specific terminology:** Endothermic, exothermic, activation energy, chemical cell, fuel cell. Rate, successful collisions, kinetic energy, concentration, catalyst, surface area, gas syringe	interpreting data related to ecological phenomena. **Misconceptions:** Common misconceptions in GCSE ecology include misunderstandings about biomass, energy transfer in food chains, and the roles of biotic and abiotic factors. Students often incorrectly assume biomass accumulates along food chains and that energy transfer arrows show what is eaten rather than the direction of energy flow. It's also important to clarify that all organisms are interconnected within an ecosystem and that changes in one population can affect the entire system. **Subject specific terminology:** Ecosystem, biomass, biotic, abiotic, quadrat, transect, random, herbivore, producer, consumer, omnivore, food chain, food web, community,

Ionic, covalent, metallic, electrostatic attraction, intermolecular bonds, fullerene, buckminsterfullerene Kinetic, gravitational potential, elastic potential, specific heat capacity, specific latent heat, Joule, Kilojoule	Chlorophyll, chloroplast, transpiration, translocation, xylem, phloem, root hair cell, palisade, stomata, guard cells. Melting point, boiling point, condensing, boiling, freezing. Alpha, beta, gamma, ionising, penetration power, half-life, contamination				

Previous learning that is particularly relevant:		
At KS3 students will have learnt the structure of the digestive system and the role of enzymes in digestion. They will have learnt that there are chemical bonds between the atoms of a molecule. Students will have learnt the types of energy stores and that energy is transferred and cannot be created or destroyed. Students will have learnt about microorganisms and how some diseases are caused and prevented. AT KS3 they will have studied some simple chemical reactions as well as how to write a word equation. Students will have learnt the how plants carry out photosynthesis and how the leaf is adapted. They will have learnt the particle model of solids, liquids and gases and what happens when they change state.	Students will have learnt what we mean by respiration and its role in living organisms. They will have learnt what a contact and non-contact force is, investigated forces and carried out some simple force calculations. They will have learnt how characteristics are inherited, how variation is achieved and how natural selection allows organisms to adapt over time. Students will have measured speed and interpreted distance-time graphs.	Students will know that some reactions release heat energy. They will have learnt that some reactions are faster than others. Students will have learnt food chains and food webs, how to measure the population of plants, reasons for extinction and the role of conservation in increasing biodiversity.

Future Learning - How content prepares students for future units, Key Stage 4, or Key Stage 5?		
For KS4 students they understand the role of enzymes for other metabolic processes such as photosynthesis and respiration later in the course. The unit on photosynthesis then support their understanding of the role that plants have in the carbon cycle and their role as producers in food chains in the ecology unit later in the year. Their study of infectious disease helps them compare this to genetic diseases that are then learnt about in the inheritance unit. For KS4 they understand the bonding that may help them understand the link between bonding and boiling point (such as in fractional distillation in year 11). It also links with the calculation of bond enthalpies they learn about later in the course. For KS4 their understanding of particles helps them understand the properties of materials and density that is taught in later units. It also helps them understand forces such as air resistance. For KS4 their understanding of radioactivity helps support their understanding of atomic structure and this is an overlapping content taught in chemistry. These units prepare students for KS5 as they learn more about the roles of the digestive enzymes and how exactly molecules are absorbed at the small intestine. The understanding of bonding at KS4 is taken further into KS5 where they look more deeply in how the types of bonding will influence the properties of the substances	For KS4 students an understanding of respiration means that they understand its importance later in the carbon cycle and in reducing energy released at each part of a food chain. It is a fundamental principle that can be linked in many ways between energy released. For KS4 students an understanding of quantitative chemistry supports all the mathematical questions that come later in further chemistry units. For KS4 students an understanding of forces helps them understand the forces involved in the later units of magnetism and space. The work on respiration prepares them for the Biochemistry of respiration at KS5. The skills involved in quantitative chemistry form the foundation into A Level chemistry in which students study calculate much more complex calculations throughout the A Level course. Newtons Laws are taken further into A Level Physics in which they are studied in more depth and apply these to forces and motion. The study of inheritance at KS4 is then taken into more depth and complexity in A Level biology. For example learning more detail about transcription and translation and moving from monohybrid inheritance to dihybrid inheritance.	For KS4 students an understanding of rates of reaction supports them in understanding equilibrium and le Chatelier's principle in further units. For KS4 the ecology unit bring several biological concepts together and this helps prepare them. The Ecology from KS4 then leads into Ecology at KS5, whereby student's study the concepts in further depth and carry out statistical analysis.

Outcomes:
By the end of the year pupils will be able to solve/create/produce/write:

- Answer questions that demonstrate their knowledge and understanding of scientific ideas, scientific techniques and procedures, including multi choice, shorter answer and extended response. (AO1)
- Demonstrate working scientifically skill in which students can draw graphs, identify variables, plan, conclude and evaluate investigations. Identify the types of error, calculate a mean and uncertainty and identify the resolution of a measuring instrument. Be able to distinguish between the words reliable, repeatable, reproducible and accurate (AO1)
- Answer questions in which they can apply their knowledge to unfamiliar scenarios across topic areas (AO2)
- Answer questions in which they analyse ideas, evaluate, make judgements and draw conclusions. They should be able to make suggestions about how to improve am experimental procedure (AO3)

Assessment Strategy How we know our students are knowing and remembering more –
Data from hunting not fishing, formative and summative assessment/s is used to adapt teaching and provide targeted challenge and intervention, supporting SEND and disadvantaged pupils.

Formative:

White boards are 'on hand' in every lessons and are used routinely in every lesson to check understanding at each point of the learning journey of the lesson.

Teachers circulate to make sure that students understand what they are doing and assess the understanding, reteaching within the lesson where needed.

Exit tickets are used to check students understanding at the end of the lesson.

Summative (& cumulative)

Unit assessments in
- Enzymes
- Bonding
- Energy
- Chemical change
- Immunity
- Particles
- Radioactivity
- Bioenergetics (Photosynthesis and Respiration)
- Quantitative Chemistry
- Forces 1
- Inheritance
- Forces 2
- Energy Change
- Rates of Reaction
- Ecology

Opportunities to revisit past learning:

The starter questions are designed for students to recall from the current topic and past topics.

The development lesson after the assessment students revisit and relearn the sections of the topic that they don't understand.

There is a revision schedule built into the curriculum leading up to mock exams and examinations.

There are 'spaced' learning lessons where the teacher goes back to previous topics.

Opportunities for homework (including apps):
Students complete their Sparx homework which consolidates what they have done in lesson and questions on topics they struggle with.
The insights tool helps teachers focus on areas their classes are getting wrong.

For each topic students complete an exam question homework which is then self-assessed in class.

How is the curriculum adapted to meet the needs of SEND and disadvantaged pupils, while maintaining high expectations?

Many of the concepts in science involve abstract ideas. We use visuals and physical models the help students understand fundamental theories like the particle model – a threshold concept which allows them to understand further phenomena. We also use dual coding to help students visualise what it looks like and help them retain this into their long-term memory.

There is lots of subject specific vocabulary which is pre taught at the beginning of the lesson. A focus of repeating these key words and returning to them is used to help students retain these in their long term memory.

We use scaffolding techniques to help SEN students make progress. This may be sentence starters, key words to use in order in individual support in starting the task.
These are main strategies we use in Science with our disadvantaged students
- They experience success in every lesson, increasing confidence and a belief in themselves
- Demonstrating excellence to them so that they understand what they are aiming for to increase the expectation of what they can achieve

- Support with resources at home. Many of our disadvantaged students have lower attendance, sometimes through no fault of their own. Having a workbook and revision guides, knowing what sections to complete if they are away helps support their learning and means that they can understand the lesson when they return.
- Priority seating and first for feedback in live marking.

Wider Curriculum and Enrichment – cultural capital and real world application -

Enriching experiences:

Science support on specific topics is offered after school.

Our curriculum supports the school value of:

Joy	***Foster enthusiasm and engagement by*** Engaging experiments, allowing students to actively participate and use these to understand concepts. Opportunities to take science outside, particularly with the Ecology unit. Model building and hands on activities to help with abstract concepts. Games and quizzes to make the learning interactive. A wide range of variety so lessons, although the same format, lessons are not all the same. Working in pairs and groups on activities to engage students with their peers.
Progress	***We monitor and support progress through*** Every lesson teachers monitoring the progress of the students (see formative assessment). The results from each topic tests are monitored to ensure students are making progress towards their target grade.
Success	***We celebrate success* by** Praise used with students in lessons in the moment. Use of other students work on the visualizer to celebrate a student's success publicly. Following a unit test result students can receive a 'personal best' certificate or 'top f the class certificate. At the end of each half term students are nominated for being a science superstar and these are given out with small prizes. Excellent student work in displayed in the faculty.
Act with care, kindness, respect, and integrity	***We build meaningful connections with our students by*** Giving students the opportunity to work in groups in which they are expected to respect each other to be an effective team. Encouraging students to speak to be kind to each other. Students work with integrity during practical work, following instructions, being safe and recording results accurately

Literacy, Oracy and disciplinary language:

Reading:

Students read and comprehend scientific texts, including textbooks and articles, to grasp concepts and information.

Writing

Writing practical methods and conclusions, extended response in which they have to sequence a series of ideas in a logical sequence. Explain, and summaries, in which students to articulate their understanding clearly and accurately using the correct scientific terminology.

Listening

Students take part in active listening as this is essential for understanding scientific concepts presented by teachers and peers, and for engaging in meaningful discussions.

Speaking

Students say the subject specific vocabulary so that they can explain scientific ideas accurately and are more likely to use these words in their written work.

The teaching of science to Year 10 develops a range of these literacy skills which include

- Writing out a step-by-step written method
- Completing extended response questions
- Reading out loud from textbooks and articles
- Watching a video and answering questions while they do this
- Comprehension exercises
- Matching words to their definitions
- Looking up the meaning of words in a glossary
- Selecting the correct word to use from a list of choices

Cross-Curricular opportunities / Opportunities to develop 'character':

History: How scientists collected evidence and developed theories e.g. Theory of natural selection Darwin, Lamarck, Mendel, Newton.

Maths: Athematic and number, handling data, algebra, graphs, geometry and trigonometry.

Geography: Impact of climate change, ecosystems, adaptations to the environment.

English: Constructing an evaluation with different viewpoints. Expressing and explaining ideas and theories using written communication.

PRE: Ethical viewpoints that scientist have to consider e.g. using embryos for research.

Our curriculum supports personal development by:

Discussion of different viewpoints and empathy for those making these choices e.g. the choice to have embryo screening for genetic diseases.
The ability to understand and evaluate what they read in the news that links to what they are learning e.g. Climate change. They may then use this information to make their own life choices in the future.
An understand of 'fake news' which may not be from a reliable source.

Careers / Employability skills:
How does the curriculum link to the following employability skills:

Listening – Active listening, which involves focused attention and understanding of what others are saying. It's essential for effective communication, collaboration, and problem-solving. Active listening demonstrates respect, builds rapport, and helps individuals grasp information accurately and efficiently.

Speaking – Speaking skills are crucial for science professionals as they enable effective communication of complex information, collaboration in teams, and successful presentation of research findings. These skills are essential for securing and excelling in scientific careers, encompassing clear and concise communication.

Problem solving - Problem-solving is a crucial employability skill, particularly in science fields, as it involves identifying and analysing problems, developing solutions, and evaluating their effectiveness. Scientific problem-solving relies on critical thinking, creativity, and a systematic approach to finding solutions. Employers highly value candidates who demonstrate strong problem-solving abilities, as these skills are transferable to various work situations and contribute to career success.

Aiming high – Setting ambitious goals, developing relevant skills, and actively seeking opportunities for growth and advancement. It involves proactive planning, a positive attitude towards challenges, and the ability to learn from setbacks. This approach is crucial for success in scientific careers, as it enables individuals to tackle complex problems, collaborate effectively, and contribute to innovation.

Critical thinking – Critical thinking is a crucial employability skill, particularly valuable in science-related fields. It involves actively analysing information, evaluating evidence, and solving problems using reasoned judgment. For science graduates, critical thinking is essential for data analysis, research design, and navigating complex scientific concepts

Staying positive – Staying positive and developing a growth mindset are crucial for success in science-related careers. A positive attitude, resilience, and adaptability are valuable employability skills that can be cultivated through self-reflection, practice, and seeking support. These qualities enhance problem-solving, foster innovation,

Leadership – Leadership skills, in particular, demonstrate an individual's ability to motivate, manage, and influence others, making them valuable assets to any organization

Teamwork – Teamwork is a crucial employability skill involving working effectively with others to achieve a shared goal. It encompasses various sub-skills like communication, problem-solving, active listening, and conflict resolution. Developing these skills enhances collaboration, efficiency, and overall productivity

Creativity – Creativity is a highly valued employability skill across all fields, including science and technology. It enables individuals to approach problems with innovative solutions, adapt to change, and contribute to advancements.

Employment Sectors discussed include:

Engineering
Medicine
Drug research and development
Design engineers (of cars)
Nuclear engineering

Curriculum impact is evaluated through pupil study, work scrutiny, and progress data. Findings inform regular curriculum review to ensure continuous improvement.

When was this curriculum last reviewed? Include date	What changes were made and why?	How is ongoing improvement ensured?
22/07/2025	Changes were made to have more focus at key words at the start of the lesson. This was to increase the use of subject specific vocabulary in their work.	