JOHN PORT SPENCER ACADEMY

Science

Curriculum Overview
Key Stage – KS3 Year -8

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

Location of resources:	JOHN Science Staff - Documents
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:	The national curriculum for science aims to ensure that all pupils: - Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics - Develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them. - Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future. Scientific knowledge and conceptual understanding.

What content needs to be covered? Key Knowledge and skills / misconceptions to address
By the end of the year students will know:

Term 1	Term 2	Term 3
Students will learn key knowledge and skills about: **Respiration** **Chemical Reactions** **Electricity and magnetism** **Challenge:** Balancing equations Naming compounds Displacement reactions and prediction The motor effect Prediction of potential difference and current Teaching chemical reactions presents several challenges, including abstract concepts, complex language, and the need for strong foundational knowledge. Students often struggle with visualizing the microscopic world of atoms and molecules, understanding the symbolic language of chemistry, and grasping the underlying principles of reaction mechanisms. Additionally, misconceptions about matter and its properties can further hinder learning. Many students struggle to grasp concepts like potential difference and current, which are not easily linked to everyday experiences. Additionally, students often develop inaccurate models of how electricity works, like the "current is used up" concept, which can hinder their understanding of more complex circuits.	**Students will learn key knowledge and skills about:** **Inheritance and evolution** **Materials** **Matter** **Challenge:** Genetic cross diagrams Using the reactivity series Brownian motion Teaching inheritance science presents several challenges, primarily stemming from the abstract and complex nature of the concepts involved. Students often struggle to grasp fundamental ideas like genes, alleles, and chromosomes, and how these relate to observable traits (phenotypes). **Misconceptions** That characteristics can be inherited and blended from parents **Subject specific terminology** Chromosome, Variation, Evolution, Selective breeding, Classification	**Students will learn key knowledge and skills about:** **Ecosystems** **Earth and Atmosphere** **Space** **Challenge:** Challenges with teaching space at KS3 level primarily revolve around making the vastness and complexity of the subject matter accessible and engaging for young learners. Key difficulties include conveying the scale of the universe, explaining abstract concepts like gravity and light years, and addressing misconceptions about space phenomena. **Misconceptions:** The greenhouse effect is always a bad thing. The difference between weight and mass **Subject specific terminology** Habitat, Biodiversity, Fertilizer, DDT, Quadrat, Rainforest Igneous, Metamorphic, Sedimentary, Magma, Tectonic, Extrusive, Core.

Misconceptions: That animals respire and plants only photosynthesise. 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. That Energy is created and not just released. All acids are bad, and they are more dangerous that alkalis. **Subject specific terminology** Respire, Limiting factor Bonds, Endothermic, Exothermic, Neutralisation, Reactive, Salt, Electrostatic Resistance, Series, Parallel, Pole **Working scientifically terminology** • **Hypothesis:** A testable prediction or explanation. • **Experiment:** A scientific procedure to test a hypothesis. • **Control:** A standard for comparison in an experiment. • **Variable:** A factor that can change in an experiment. • **Independent Variable:** The factor that is changed or manipulated. • **Dependent Variable:** The factor that is measured in response to the independent variable. • **Control Variable:** Factors kept constant during an experiment. • **Observation:** Using senses to gather information. • **Prediction:** A statement about what might happen in the future. • **Evidence:** Data or information that supports a claim. • **Conclusion:** A statement based on the results of an experiment. • **Reliability:** The consistency of results. • **Validity:** Whether an experiment measures what it is intended to measure.	Composite, Ceramic, Inorganic, Tensile strength Dissolve, Evaporation, Sublimation, Conservation of mass	Atmosphere, Light year, Galaxy, Axis, Weight and mass
Previous learning that is particularly relevant:		
Basic parts of the circulatory system Group materials based on their properties Solutions are mixtures Magnets have 2 poles Identify common appliances that run on electricity	Fossils Variation in offspring Describe some simple chemical changes Materials can change state Some materials can dissolve	Basics of food chains and key word How environments can change Compare types of rocks What rocks are made from. The sun, moon and stars are spherical Gravity is a non-contact force
Future Learning -		

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Outcomes:
By the end of the year pupils will be able to

Pupils should be able to:

- Answer questions that demonstrate their scientific knowledge and understanding in Biology, Chemistry and Physics.
- Make predictions, plan and carry out a range of practical work safely and record their results
- Conclude and evaluate their results, making suggestions for improvements
- Identify and classify sources of error
- Apply mathematical concepts such as calculating a mean, drawing a graph and using equations
- Explain how scientific theories might change as new evidence develops and the importance of Peer review

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:
Sticky starters
Questioning
Use of mini whiteboards
Homework – low stakes tests
Development tasks – whole class and individual
Extended writing tasks
Practical investigations and write ups

Summative (& cumulative)

End of unit tests (3 per half term)
Extended writing questions
Investigation write ups.

End of year 8 exam

Opportunities to revisit past learning: All starters have previous learning on them.

Opportunities for homework (including apps):
Online homework set on Sparx
Revision tasks using BBC KS3 Bitesize

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 and hunting not fishing technique

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

Enriching experiences:

Science club after school
Possible zoo visit
Zoo project
Competitions

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* Formative feedback, extended writing tasks and clear success criteria. We will regularly analyse misconceptions and allow development time in lessons.
Success	*We celebrate success* by Science superstars Test results postcards Excellence points Certificates for key practical work
Act with care, kindness, respect, and integrity	*We build meaningful connections with our students by* Promoting a safe classroom which is supportive and allows students to ask questions about their learning. Students are expected to work with others safely during practical work.

Literacy, Oracy and disciplinary language:

Key words on all knowledge organisers
Extended writing tasks for all units
Use of scientific key words on starters and throughout resources

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

History – key scientific discoveries/ Darwin and evolution. History of medicine

Geography- rocks and Earth

Food technology – nutrition and food groups/microorganisms and disease

Maths- calculations and graph drawing

PE – circulation and breathing/respiration

PRE - ethical issues

Our curriculum supports personal development by:

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 analyzing 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: Job links in all ppts** The **career profiles** show how the science in that unit relates to the rest of life and expose pupils to a broad range of roles and diverse representations of careers, building pupils' cultural capital and science identity. This involves careers such as doctors, gene therapists, radiographers, opticians, hearing specialists, nutritionists, pharmacists, engineers and pilots. The profiles can be used in a variety of ways to suit each class and may provide a stimulus for further links between what they are learning and careers that this links with.

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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?
Summer 2025	More working scientifically to embed the key skills required for KS4	