

KS4 Science Curriculum Policy – Springboard Pathway

Origins of the curriculum

The KS4 springboard pathway science curriculum has been created based on the national curriculum. It considers the wide range of exam boards the pupils may come to us having been previously taught and looks at this in conjunction with the temporary nature of a placement on the springboard pathway. The curriculum develops understanding of both substantive knowledge and disciplinary knowledge carried forward from the KS3 national curriculum and guides them towards content to support exam success, college options and future career possibilities.

The science curriculum is clearly divided into biology, chemistry and physics units that have been consciously selected to develop core knowledge; build a solid foundation and support wider access to science within mainstream settings. The springboard pathway is optimised for pupils on a 19-week placement with the Raedwald trust who will be returning to mainstream education.

Due to the length of pupil placement, it is important that we carefully plan what specific aspects of the National Curriculum we will deliver during their 19-week placement. As such, the curriculum has been written sequentially to support development of core science knowledge within all disciplines of science whilst using a concentric model to revisit scientific skills within the units of study. Learners can spend time studying and understanding the core aspects of the subject area through both theoretical and practical investigation where appropriate. Working scientifically is embedded within each unit which ensures pupils understand the scientific method. Mathematical skills are taught and used through units as appropriate.

By studying this subject, pupils will be able to make observations about the world around them and explain how they have come about. Pupils will embed core knowledge and build on their skills of assessment, evaluation, and conclusion. They will enhance their decision-making ability: they will be better able to predict the effects of both their actions and those of wider society.

The curriculum has been specifically designed for our Alternative Provision (AP) setting. It is purposefully constructed from the national curriculum, giving consideration to the limited time of pupil attendance. It focuses on the key content which will support them when returning to their mainstream settings. We also focus on practical skills whenever possible as these are areas which we know that our pupils often have been able to engage in only a limited capacity. We recognise the importance of prior knowledge on building understanding and skills, we also recognise that due to previous attendance or behaviour etc. at mainstream settings, prior knowledge will be a key barrier for pupils coming to us. The curriculum has enough flexibility in it to adjust for challenges with prior knowledge being missed.

Content and sequencing

The topics covered in our science curriculum include the three disciplines of Biology, Chemistry, and physics;

- Living cells
- Atomic structure
- Forces and energy

Our objective in science is to support pupils' understanding of their environment and existence. We aim to support them in understanding how the world around them works and to give them perspective of their place within it and the impact they, and wider society can have, and their contribution to that, alongside awareness of their physical presence. We aim to give pupils social, technological, mathematical, verbal reasoning and literacy skills. We have organised our curriculum to cover the most fundamental topics of Biology Chemistry and Physics. This represents a balance of all sciences and reflects the reality of science learning they have received and will return to at their mainstream settings. It is a logical continuation of the scientific knowledge and skills gained at KS3. When pupils return to their mainstream settings, they will be able to move onto more complex topics which build on previous knowledge and understanding, as presented in the topics

previously covered. Pupils will enjoy the advantage of an appropriate baseline assessment, to gauge their attainment level and awareness of KS3 knowledge. A strong focus on prior learning in each lesson will ensure they have the key knowledge that they may have previously missed so that pupils can make required progress.

Due to the temporary nature of our placements, it is not possible to teach the full science GCSE syllabus. We have prioritised themes which link into the fundamental knowledge which all science topics build on. This will support pupils upon returning to mainstream as the topics are complementary. Although our curriculum choices are based on the national curriculum, we have closely followed some of the structures of the AQA double award. With AQA being the most common course, both nationwide and regionally, this will best support them when returning to mainstream. Also, there is no requirement for any practical booklets as part of the AQA course; the logistics of taking one back and forth between us and their mainstream setting would be a potential barrier to success. We have selected double science rather than a single science because it would limit post 16 options. Although our ambition is to not host exams for all pupils (this would be done at their mainstream setting), we recognise this will not always be possible. As such we have aimed to follow AQA synergy rather than combined as there are fewer exams in total. Historically we know the number of exams is a barrier and a cause of increased stress for our cohort.

The content will be delivered over a series of 31 lessons during a 19-week period. This will restrict some areas of topic content. We have focused on supporting cross curricular consensus with similar content rather than cross curricular repetition. We have focused on topics which act as the building blocks to all other topics.

Overview of units of study across the focused pathway placement

Week	Subject Content		Subject Content		Subject Content
1	<u>Biology</u> <i>Cells</i> Typical cells	9	<u>Chemistry</u> <i>States of matter</i> Changing states		<u>Physics</u> <i>Forces and energy</i> Identifying forces
	Organelles		Mixtures and separating mixtures		15 Balanced forces
2	Specialised cells	10	Density		Force diagrams
	Microscopes and microscopy		Gas pressure		16 Energy stores and transfers
3	<i>Respiration</i> Aerobic respiration	11	<i>Atoms and molecules</i> Atoms, molecules and compounds		17 Conservation and dissipation
	Anaerobic respiration		Structure of atoms		EPE
4	Comparing respirations	12	Electronic structure		18 GPE
	Fermentation		Calculating RAM		19 KE and GPE
5	Photosynthesis	13	RAM and RFM		Stopping distances
	Diffusion		Chemistry revision and assessment		Physics revision and assessment
6	Osmosis	14	Chemistry assessment Review		Physics assessment review
	Active transport				
7	Revision Techniques				
	Interpreting data and graphs				
8	Biology revision and assessment				

	Biology assessment review				
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There will be scientific skills interwoven throughout. These skills will be revisited throughout each unit of study to help pupils embed skills that can be transferred back into their mainstream setting. The skills we will assess are:

- Scientific Attitudes:

Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review

- Experimental Skills and Investigations:

Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge, and experience

- **Analysis and Evaluation:**

Interpret observations and data, including identifying patterns and using observations, measurements, and data to draw conclusions

Present reasoned explanations, including explaining data in relation to predictions and hypotheses

The above is all based on a full-time offer, there may be some pupils on a part time placement. The curriculum will be adjusted appropriately so that it is personalised for these pupils.

We will use our baseline assessment to form a basis for pedagogical adaptation. This would include Irlen's, dyslexia, dyspraxia, and dyscalculia. We will also look at subject specific knowledge and individual pupil styles of learning i.e., auditory/visual/kinaesthetic strengths and weaknesses. We will use Individual learning plans (ILPs) and SEND Information as guidance to adjust our classroom practice as necessary to best support each pupil e.g., increased scribing, reading overlays etc.

Assessment and outcomes

With our classes being small, teachers have the capacity to clearly monitor the progress each pupil makes in each lesson. This will allow staff to adjust the following lesson with regards to any short fall or misconceptions in pupil learning, so that they continue to progress at the expected level to successfully access the curriculum. We will also use a RAG rating on the whole school formative assessment tracker to monitor this long term, starting from their baseline level on arrival, for which an assessment is completed during our induction process. We can then feedback to their mainstream setting and it will inform us of weaknesses which need to be addressed in the future. Alongside this we will have end of module tests for the content of each discipline within the placement. The test will be a series of exam questions for the content and skills covered, this will be completed in class as part of a timetabled lesson, in an open book and staff supported style. The test will cover 30 minutes of mixed style exam questions with time to feedback with the pupils. The purpose of it being open book is to avoid the increased pressure and anxiety which we historically know can be a trigger for disruptive behaviour and reduced attendance, whilst still giving pupils exposure to exam style questioning and giving pupils the opportunity to develop the skills required for exam success. This information will, alongside informing our planning, help us to demonstrate progress. It will also help the pupils identify areas of strength and weakness, to both support revision and make informed post 16 and career decisions.

The intended outcome of this will be for all pupils to return to school in a position to achieve a nationally recognised qualification in science which will help to open wider opportunities for post 16 and career choice.

Science and the wider curriculum

Modern Culture imbibes Science, so it is vitally important that Science is recognised in this context. In Science Teaching and Learning, we endeavour to explore and celebrate, research and developments that take place in diverse cultures. We aim to expand Cultural Diversity and awareness, particularly with reference to the contemporary contribution of Culturally Diverse Scientists. Science has a major impact on the quality of our lives. Within Science Teaching and Learning, Pupils consider the moral impact of Science and Technology upon our everyday lives e.g., Road safety, the value of life. Moral decisions are an important aspect of science. Scientific discoveries and inventions need to be used responsibly, and decisions made based on evidence, not prejudice. Within Science Teaching and Learning, Pupils are encouraged to be both open minded and critical: we aspire to Pupils developing and engaging their Moral Compass, helping them to understand their world. Scientists are collaborators. The sharing of ideas, data, and results is a key principle of the Scientific Method. We encourage Pupils to work together on Scientific Investigations and to share results, to improve Methodology and Reliability.

Within science we aim to discuss both contemporary and historic contributions to scientific discovery with examples from across the globe, expanding our knowledge beyond Eurocentric concepts and figures. When necessary, we will also identify with a critical eye, scientific concepts which are outdated or controversial. We will aim to consider pupils inherent environment with a desire to promote and expand more diverse experiences

Literacy and communication cover a variety of skills, including taking and making notes, summarising information, presenting ideas/data, persuasive writing, and arguments. It also covers the 'spoken language' component of the National Curriculum. Teachers will incorporate metacognition and dialogue in the classroom, use activities to engage pupils with reading scientific text (helping them to comprehend it) and support pupils to develop their scientific writing skills.

Technical vocabulary forms a key part of scientific learning, and it will form a part of almost every lesson. When encountered it will be explicitly defined for pupils to identify, absorb, and use as part of the wider lesson.

Studying science will provide pupils with understanding of life beyond education. Pupils will gain understanding of their environment and existence. They will have perspective of their place within the world and the impact they, and wider society can have, and their contribution to that. This will allow pupils to make informed decisions about what is best for

them, their families, society as a whole and the most vulnerable within it. Pupils will gain social, technological, mathematical, verbal reasoning and literacy skills to support their post 16 careers and wider life choices.