

Science

Curriculum Principles

By the end of their education, a student of Science at Dixons Brooklands Academy:

- Know fundamental scientific principles from biology, chemistry and physics that will provide a foundation for understanding and navigating the world. Student knowledge is structured around the big ideas in science which range from the particulate nature of matter, to the cellular basis of living organisms, to space.
- Understand the processes of scientific inquiry that leads to the creation and development of concepts and theories. Students will understand how science can be used to explain observations and make predictions about natural phenomena.

Our uniting 'sentence' is:

"The science department empowers students to be able to explain scientific concepts and to achieve excellent outcomes, whilst developing a curiosity and love for the subject to further explore scientific ideas."

In order to achieve a true understanding of science, topics have been intelligently sequenced based on the following rationale:

Scientific knowledge is broadly hierarchical in nature – students must have a secure understanding of each key block of knowledge before progressing onto the next stage. Therefore, in order to support this, topics and their key concepts have been meticulously planned and ordered to ensure that students are always building on and deepening their previous learning.

- Biology - At KS3 students learn about the structure, function, and behaviour of living organisms in detail, building up from the microscopic cellular level to the macro-scale interactions in an ecosystem. These topics are extended at KS4, with the expectation that students learn to apply this knowledge and make links with other topics such as photosynthesis and homeostasis.
- Chemistry - At KS3, students start with a rigorous grounding in the fundamentals of secondary level chemistry: states of matter, the periodic table, chemical reactions and the behaviour of materials. Having mastered the foundation knowledge, students are fully equipped with the necessary knowledge and skills to tackle the more challenging KS4 content, such as chemical bonding and quantitative chemistry.
- Physics – At KS3, students study forces, waves and electricity and magnetism as well as introducing more challenging concepts such as energy, pressure, and density. In KS4, as they continue to study these topics in more detail, the focus shifts to a more quantitative appreciation of the subject matter and develops mathematical skills.
- Experimental work is a key feature of science. At the start of Y7, the topic 'working scientifically' these skills are taught explicitly. These skills have been carefully mapped across all topics throughout KS3 and KS4 so that students are given many opportunities to apply and develop these concepts. For example, each topic deliberately includes several opportunities to revisit graph and table interpretation skills.

The science curriculum will address social disadvantage by addressing gaps in pupils' knowledge and skills:

- Our curriculum is designed around the most disadvantaged learners. We are careful not to assume any prior general knowledge or cultural capital and always teach new knowledge explicitly.
- The Education Endowment Foundation published a major report in 2017 examining the disadvantaged attainment gap in science. The strongest factor affecting pupils' science scores is their literacy levels. In our department, we actively promote literacy in every lesson by explicitly teaching new vocabulary and reading and discussing challenging texts. We also support our students to answer questions in full sentences by verbally modelling sentence starters, giving adequate thinking time and allowing children to 'turn and talk' with a partner to improve oracy. We plan frequent extended writing tasks and support children with verbal rehearsal activities, sentence starters and keywords.
- In addition to frequent formative assessment within class after each assessment cycle teachers analyse their class booklets along with QLA data to identify gaps in students' knowledge. During these data and planning days detailed intervention and prevention plans are produced which aim to target and address these gaps in knowledge. This often takes the form of targeted cold calling during the Do Now, additional scaffolding within the lesson and small group intervention where possible.

- All students are taught the same rigorous curriculum - we do not narrow or dilute the curriculum. All students are taught from the same work booklets so that everyone is given access to the same powerful knowledge. That being said, teachers understand the need to supplement the work booklets with additional practice and scaffolds or extension material, as required for individual students.

We fully believe Science can contribute to the personal development of students at Dixons Fazakerley Academy:

- The social development of our students is nurtured through the explicit teaching and practice of effective teamwork and communication skills when working in groups for scientific investigations. Groups are selected by the teacher to ensure that students learn to effectively collaborate with others from different backgrounds or from outside of their friendship circle.
- Science naturally provides many opportunities for balanced discussions of moral and ethical issues. For example, we explore the moral complexities of organ transplant, the controversial use of genetic engineering and the disputed use of stem cells for disease treatment.
- When teaching topics such as the theory of evolution and the Big Bang theory, this provides a chance to develop students' cultural awareness as we can discuss viewpoints of these theories from different religions and cultures. We also discuss the apparent lack of diversity and historical sexism in scientific developments – for example, the famous case of Rosalind Franklin's discovery of the structure of DNA.
- Science lessons also provide a wealth of opportunities to explore personal development relating to physical and mental health. For example, students study the effects of smoking, drugs and alcohol from both a scientific and social perspective. When teaching about the digestive system, students are taught about the importance of a balanced diet and how to interpret nutritional information.
- We want students to become respectful and responsible citizens who contribute positively to society. For example, students are taught in detail about global warming, pollution and energy resources so that they understand the importance of recycling, reducing waste and cutting down their carbon footprint.

At KS3 and KS4, our belief is that homework should be interleaved-revision of powerful knowledge that has been modelled and taught in lessons. This knowledge is recalled and applied through a range of low-stakes quizzing and practice.

Opportunities are built in to make links to the world of work to enhance the careers, advice and guidance that students are exposed to:

- problem solving activities are built into the curriculum that allow students to apply scientific knowledge to certain career-based scenarios.
- At KS3 an afterschool STEM club introduces students to project work empowering them to work like real scientists, technologists, engineers, or mathematicians. Students choose their own topic and methodologies giving them complete freedom over their work and the opportunity to gain a CREST award.

We teach beyond the specification requirements, but do ensure students are well prepared to be successful in GCSE examinations:

- opportunities to explore the history and philosophy of science are embedded into the curriculum. For example, reading rich texts about an array of topics, such as: Semmelweis' work on Germ Theory and how new chemical elements get their names are included for engagement and to build cultural capital.
- although students' practical skills are no longer assessed through coursework, we believe it is essential that all students can plan and carry out practicals using laboratory equipment safely and accurately so that they are fully prepared for future study and employment. At KS3, we want students to be exposed to a wide variety of engaging practicals, such as investigations into the effectiveness of different brands of indigestion tablets. In KS4 there is a greater focus on the GCSE required practicals – but we are not restricted to this list of experiments.

Year 7 Science

Dixons Brooklands Academy

Long Term Plan 2023/2024

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
Cycle 1	W/C 28/08	W/C 04/09	W/C 11/09	W/C 18/09	W/C 25/09	W/C 02/10	W/C 09/10	W/C 16/10	W/C 06/11	W/C 13/11	W/C 20/11	W/C 27/11	W/C 04/12
	Term 1								Term 2				
	Orientation	Science Skills	Science Skills	Science Skills	Particles & Solutions	Particles & Solutions	Particles & Solutions	Cells & Life Processes	Cells & Life Processes	Cells & Life Processes	Forces & Space	Intervention	Intervention
Cycle 2	W/C 11/12	W/C 18/12	W/C 08/01	W/C 15/01	W/C 22/01	W/C 29/01	W/C 05/02	W/C 19/02	W/C 26/02	W/C 04/03	W/C 11/03	W/C 18/03	W/C 25/03
			Term 3					Term 4					
	Forces & Space	Forces & Space	Atoms & Elements	Atoms & Elements	Atoms & Elements	Reproduction	Reproduction	Reproduction	Energy	Energy	Energy	Intervention	Intervention
Cycle 3	W/C 15/04	W/C 22/04	W/C 29/04	W/C 06/05	W/C 13/05	W/C 20/05	W/C 03/06	W/C 10/06	W/C 17/06	W/C 01/07	W/C 08/07	W/C 15/07	
	Term 5						Term 6						
	Acids & Alkalis	Acids & Alkalis	Acids & Alkalis	Ecology	Ecology	Ecology	Trust assessment revision	Trust assessment	Waves Trust assessment	Waves	Waves	Waves	

Year 8 Science

Dixons Brooklands Academy

Long Term Plan 2023/2024

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
Cycle 1	W/C 28/08	W/C 04/09	W/C 11/09	W/C 18/09	W/C 25/09	W/C 02/10	W/C 09/10	W/C 16/10	W/C 06/11	W/C 13/11	W/C 20/11	W/C 27/11	W/C 04/12
	Term 1								Term 2				
	Orientation	The Body	The Body	The Body	Metal Reactions	Metal Reactions	Metal Reactions	Forces & Motion	Forces & Motion	Forces & Motion	Plants & Photosynthesis	Intervention	Intervention
Cycle 2	W/C 11/12	W/C 18/12	W/C 08/01	W/C 15/01	W/C 22/01	W/C 29/01	W/C 05/02	W/C 19/02	W/C 26/02	W/C 04/03	W/C 11/03	W/C 18/03	W/C 25/03
			Term 3					Term 4					
	Plants & Photosynthesis	Plants & Photosynthesis	Chemical Reactions	Chemical Reactions	Chemical Reactions	Electricity and Magnetism	Electricity and Magnetism	Electricity and Magnetism	Variation & inheritance	Variation & inheritance	Variation & inheritance	Intervention	Intervention
Cycle 3	W/C 15/04	W/C 22/04	W/C 29/04	W/C 06/05	W/C 13/05	W/C 20/05	W/C 03/06	W/C 10/06	W/C 17/06	W/C 01/07	W/C 08/07	W/C 15/07	
	Term 5						Term 6						
	Pressure, moments & density	Pressure, moments & density	Pressure, moments & density	Earth, materials & atmosphere	Earth, materials & atmosphere	Earth, materials & atmosphere	Trust assessment revision	Trust assessment	Trust assessment	GCSE science skills	GCSE science skills	GCSE science skills	

Year 9 Science

Dixons Brooklands Academy

Long Term Plan 2023/2024

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
Cycle 1	W/C 28/08	W/C 04/09	W/C 11/09	W/C 18/09	W/C 25/09	W/C 02/10	W/C 09/10	W/C 16/10	W/C 06/11	W/C 13/11	W/C 20/11	W/C 27/11	W/C 04/12
	Term 1								Term 2				
	Orientation	C1 Atomic structure and the periodic table	C1 Atomic structure and the periodic table	C1 Atomic structure and the periodic table	C1 Atomic structure and the periodic table	C1 Atomic structure and the periodic table	B1 Cell Biology	B1 Cell Biology	B1 Cell Biology	B1 Cell Biology	P3 Particle Model of Matter	P3 Particle Model of Matter	Intervention
Cycle 2	W/C 11/12	W/C 18/12	W/C 08/01	W/C 15/01	W/C 22/01	W/C 29/01	W/C 05/02	W/C 19/02	W/C 26/02	W/C 04/03	W/C 11/03	W/C 18/03	W/C 25/03
			Term 3					Term 4					
	P3 Particle Model of Matter	C2 Bonding, structure and properties	C2 Bonding, structure and properties	C2 Bonding, structure and properties	C2 Bonding, structure and properties	B2 Organisation	B2 Organisation	B2 Organisation	B2 Organisation	B2 Organisation	B2 Organisation	P4 Atomic Structure	Intervention
Cycle 3	W/C 15/04	W/C 22/04	W/C 29/04	W/C 06/05	W/C 13/05	W/C 20/05	W/C 03/06	W/C 10/06	W/C 17/06	W/C 01/07	W/C 08/07	W/C 15/07	
	Term 5						Term 6						
	P4 Atomic Structure	P4 Atomic Structure	B3 Infection & Response	B3 Infection & Response	B3 Infection & Response	B3 Infection & Response	Trust assessment revision	Trust assessment	Trust assessment	C8 Chemical Analysis	C8 Chemical Analysis	C8 Chemical Analysis	

Year 11 Science

Dixons Brooklands Academy

Long Term Plan 2023/2024

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
Cycle 1	W/C 28/08	W/C 04/09	W/C 11/09	W/C 18/09	W/C 25/09	W/C 02/10	W/C 09/10	W/C 16/10	W/C 06/11	W/C 13/11	W/C 20/11	W/C 27/11	W/C 04/12
	Term 1								Term 2				
	Orientation	P5 Forces	P5 Forces	P5 Forces	P5 Forces	C7 Organic Chemistry	C7 Organic Chemistry	B6 Inheritance, variation and evolution	B6 Inheritance, variation and evolution	MOCK EXAMS	MOCK EXAMS	P6 Waves	P6 Waves
	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind		Topic rewind	Topic rewind
Cycle 2	W/C 11/12	W/C 18/12	W/C 08/01	W/C 15/01	W/C 22/01	W/C 29/01	W/C 05/02	W/C 19/02	W/C 26/02	W/C 04/03	W/C 11/03	W/C 18/03	W/C 25/03
			Term 3					Term 4					
	P6 Waves	C6 Rates of reaction	C6 Rates of reaction	C6 Rates of reaction	B7 Ecology	B7 Ecology	B7 Ecology	P7 Magnets and electromagnets	P7 Magnets and electromagnets	MOCK EXAMS	MOCK EXAMS	Required practical	Required practicals
	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind	Topic rewind			Topic rewind	Topic rewind
Cycle 3	W/C 15/04	W/C 22/04	W/C 29/04	W/C 06/05			W/C 03/06			W/C 01/07			
	Term 5			GCSE Exams			GCSE Exams continue			GCSE Exams finish			
	Required practicals	Intervention / Past papers	Intervention / Past papers										
	Topic rewind	Topic rewind	Topic rewind										