Science

Intent, Implementation and Impact

Intent	The science department forms part of the 'Knowledge Faculty' along with the mathematics, STEM and humanities departments. The intent of The Observatory School's science department is to provide a safe and positively stimulating learning environment where pupils partake in educational practical tasks away from their nurture bases. High engagement in science lessons is associated with a high proportion of practical lessons. Practical work is an essential part of science education. It gives pupils the necessary transferable skills to access higher education and employment, deepens their knowledge of scientific ideas, develops problem-solving abilities, and enables them to participate in the processes of science. Practical lessons also enable pupils that have needs within their literacy to learn without the pressures of reading and writing. This being said, the development of pupil's literacy within science is imperative. Pupils are supported to develop their literacy within lessons using strategies individualised to them, drawing upon the experience of classroom support staff. In addition to employing strategies associated with improving literacy, there is also a strong emphasis on developing mathematical skills within science lessons. Naturally, mathematics has strong applications within science, therefore opportunities to incorporate maths within lessons are abundant. The ultimate intent is for pupils to graduate with a qualification that reflects their abilities and aligns with their ambitions. The qualifications offered include; ASDAN Science Short Course Award, Pearson Edexcel Entry level certificate (level 1-3), and Pearson Edexcel GCSE Combined Science (double award). On an individual basis, pupils are assessed for the most appropriate qualification that both suits their needs but is also ambitious. All pupils are supported within their learning in their science lessons through differentiated learning outcomes, individualised resources, teaching support and emotional regulation.

Implementation	The science curriculum is led by a secondary science subject specialist and is taught across all base classes within the school and across the PSP (Personalised School Programme) and VPU (Vulnerable Pupil Unit)by multiple teachers and HLTAs. At Key Stage 2 (years 3 to 6), the curriculum is planned in collaboration with the Knowledge Faculty's 'Key Stage 2 Link Teacher' to ensure that the delivery of science is comprehensive and allows effective progression into year 7 (Key Stage 3). Key Stage 2 teachers at The Observatory School are highly trained primary school teachers with a wealth of experience teaching pupils with special educational needs. Their diverse skill set allows effective teaching and learning across a broad span of subjects. Key stage 2 pupils also have access to a science specialist teacher. Pupils in KS2 follow the national curriculum and the scheme of work planned by White Rose Science. In classes based at the Leasowe site, staff have access to a wealth of scientific practical equipment within their state of the art laboratory to enhance their lessons with multi-sensory teaching and scientific investigations. Some scientific content within the curriculum is extracted into the KS2 'forest school' lessons. At Key Stage 3, the curriculum is planned across 3 years - from year 7 up to year 9. The KS3 national curriculum is mapped using Pearson Activelearn software to ensure that all topics are appropriately covered to allow progression through to KS4. Schemes of work and medium term lesson plans are adapted from Pearson Activelearn and ultimately inform the planning of science lessons. Non-specialist teachers across Key Stage 2 and 3 are supported with their science subject knowledge and pedagogies by the 'Science Curriculum Lead' and the 'KS2 link teacher'. From year 7 through to year 11, all science lessons are taught by the science specialist teacher.

	Year 9 pupils complete their KS3 studies and spend the summer term achieving the ASDAN Short Course Award in Science. The course involves collecting evidence for practical based challenges. The pupils can earn up to six credits for the six modules studied: • Human machine • Forces and motion • Chemical change • Biological challenges • Space physics • Performance in sport The ASDAN course is designed to prepare the pupils for KS4 studies, developing skills such as; data collection, displaying results, forming hypotheses and conclusions, and evaluating the scientific method, all whilst learning new scientific theories. Pupils are encouraged to reflect upon their learning and will also write a personal statement and summary of achievements once the course is completed. Some of the pupils who struggle to access content within the KS4 science specifications will carry over their ASDAN science studies into years 10 and 11 to further develop their portfolio and gain more ASDAN credits. Said credits then transfer to the Level 1 ASDAN qualification Certificate of Personal Effectiveness (CoPE). There is a science module within this qualification which is taught by the science specialist at KS4, with a focus of developing pupils' problem solving skills (one of 6 personal skills developed within the modules). In the transition between key stage 3 and key stage 4, pupils are assigned one of two pathways - Vocational or Academic. The pupils within the KS4 vocational pathway will work towards achieving the Pearson Entry Level Certificate in Science.

	The pupils in the academic pathway will also work towards achieving the Pearson Entry Level Certificate in Science, however some of the pupils will also be entered for Pearson GCSE in Combined Science (double award). At KS4, the specifications for the aforementioned qualifications stipulate required practicals that are mandatory for the delivery. The data that informs said pathway placements is a wealth of 'end of unit tests'. Each topic studied across key stage 3 has an end of unit test that assesses pupils' learning. These tests are used across all teachers of science across key stage 3 and are produced by Pearson Activeteach software to complement the schemes of work aforementioned above. Additionally, teachers of KS3 science can track their pupils' progress in 'end of year tests'. At Key stage 4, pupils are similarly assessed at the end of studying a topic. However, they will be assessed using topic specific past examination questions. This will allow effective assessment and will also develop the pupils' examination skills in preparation for the final exams in year 11. Baseline assessments are also employed at the start of the academic year and for all new pupils that join the school throughout the year. Pupils are aware of their progress and use trackers on the back of their exercise books. The trackers show the topics covered and state, based on their assessments, whether they are; at serious weakness, below, on or above their flightpath (an ambitious targeted outcome for when they graduate in year 11). With the introduction of BSquared software, the science department will be able to more accurately monitor pupil progress against specific learning objectives. This will improve the informed planning and progress will be celebrated amongst pupils and their parents. Constant assessment allows for positive feedback for pupils and will inform planning of future topics and any required interventions for pupils with significant gaps in learning. The decision made on qualification entries is reaffirmed by mock exams in the autumn term of year 11, in which capable pupils sit examinations that comprise of 6 papers as specified by Pearson Edexcel. This is done

	to provide pupils with the experience of examinations so that they are best prepared for the official exams. This will also ensure they are sitting the correct tier (higher or foundation), and will also highlight any gaps in their science knowledge to inform planning. Access arrangements for examinations are made in line with the pupils' 'normal way of working'. Appropriate strategies that are stated within lesson plans, Individualised Education Plans (IEPs) and Educational Health Care Plans (EHCPs) can be employed to support candidates within their examinations. Pupils visit the Science Lab for their practical Science lessons whereas theoretical lessons may be taught within nurture bases by the Science specialist or base teacher to develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics. Learning theoretical concepts within the nurture bases allows pupils to be comfortable, access their regular emotional regulation strategies, access their usual learning resources outlined on their Individualised Education Plan (IEP), whilst reducing any unnecessary sensory stimulation that might be associated with the lab environment. For practical lessons in the school's science lab, the application of the school pledge 'Be Safe, Be Ready, Be Respectful' is strongly implemented. Year 7 pupils learn the 'Introduction to Secondary Science' unit of work, which prepares them for working safely and scientifically throughout their school career. As they progress into year 8, their lab skills and investigatorial skills develop as they visit the lab more frequently with the specialist science teacher. In the case of a few pupils, and for various reasons, the school environment may not be the most efficient place for learning. The Personalised School Programme (PSP) and Vulnerable Pupil Unit (VPU) deliver lessons to these pupils offsite, or within the VPU learning space. Many of these include science lessons which are planned in consultation with the science specialist teacher. These programmes follow the pupils' appropriate age, needs and abilities. They include the aspiration of achieving the aforementioned available qualifications.

Impact	The science curriculum is engaging and is kept relevant and up to date by planning in new scientific discoveries and contexts that our pupils can relate to. Our pupils enjoy science and are encouraged to be inquisitive, ask questions and discuss; so that their curiosity of the universe and natural phenomena is nurtured. Pupils are assessed on their learning using a range of different assessment approaches. The progress of pupils is measured using BSquared, in which teachers record against specific criteria matched to their 'step'. The pupils are made aware of their steps and their respective progress using the data entered into their exercise books. Pupils also respond to teacher feedback both verbally and via purple pen in their books. The Science department praises pupils who are making good progress and effort within their science lessons. Parents are sent 'praise postcards' that pupils earn using the 'science stars' reward system. Pupils are also motivated by earning their science curriculum badge that they wear with pride once earnt. Photos of lessons are shared in weekly assemblies and on the school website to showcase the excellence of some of the work within the curriculum. Within each class, a 'recognition board' is displayed which highlights pupils that have displayed good learning attitudes, behaviour and attainment. A significant amount of 'impact' is highly visible within the extracurricular work within the science department. During social time and after school, the lab is used to host learning opportunities themed around STEM. See STEM intent document for further details. Extracurricular activities within the Knowledge Faculty are popular and foster a 'love of learning'. This is evident in high enthusiasm and therefore engagement within lessons. Historically, alumni have graduated with the required qualifications and relevant skill sets to achieve placements within vocational STEM courses at colleges and apprenticeships. The Observatory School also boasts pupils that have entered sixth form colleges and universities to study science. Ultimately, the impact of learning science can shape lives and inspire the next generation of scientists.