



Science

Curriculum Plan 2020-2021

Author: Mark Steeden, Toby Giles and Louise O'Reilly

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Trust Curriculum Policy Extract

The Trust curriculum ensures all pupils in the Trust experience a rich, broad and balanced experience, reflecting the FMAT mission of 'Enriching lives, transforming futures'. **We want all our pupils to experience the joy and wonder of learning.**

We place a strong emphasis on nurturing the spiritual, moral, social and cultural development of pupils, along with a firm commitment to developing pupils' resilience and character **through the acquisition of life skills**. We are preparing all our pupils to contribute positively to modern British society **and have a suitable career and destination**. All pupils have the entitlement to study a rich and varied curriculum

The Trust values permeate the curriculum

Excellence: a curriculum of the highest quality to ensure excellent outcomes

Dedication: we believe there is dignity in hard work

Ambition: we want the very best for all of our students.

Integrity: moral purpose will underpin the curriculum decisions we make for our pupils

Tradition: British values, literacy and numeracy underpin the curriculum

A well-constructed curriculum will lead to good results because these results will reflect what pupils have learned. The curriculum is the progression model, enabling pupils to **know more, remember more and be able to do more**.

Teaching and Learning Vision

Knowledge is power. Information is liberating.

Kofi Annan

We believe all students, whatever their background, are able to become experts in the disciplines that they study. Their expertise will be achieved through quality teaching and the dissemination of deep knowledge by highly skilled and knowledgeable subject experts – in every classroom, every lesson, every day.

Our students have the right to be introduced to deep knowledge and a wealth of information from the spectrum of subjects that they study. They will be introduced to, and understand, theories and principles that have influenced, continue to influence, and will influence in the future, the world in which they live. They will be prepared to fully engage in academic discussion about their learning.

This learning will secure a successful place in society for our students. They will go further than they ever thought possible.

Teaching and Learning Vision for the *Science* Department

Our mission is to inspire and equip students to become successful and inquisitive young scientists.

Intent	Implementation
Build on foundations laid and excitement fostered during key stage two science study.	<i>We start our y7 curriculum with Lab skills and Physics which are highly practical to engage and builds upon the Key Stage 2 sound unit in which pupils identified how sounds are made. We then transition into biology unit 1 which has a more qualitative approach giving students a foundational understanding of building blocks of life and reproduction.</i>
Equip students with real life scientific understanding pertinent to their era and needs.	<i>Faculty training on the importance of concrete examples, creation of thread modules covering areas pertinent to the needs of students in our context delivered to our KS3 students with lessons grouped in to 3 areas: Learning how to look after yourself (the science of hygiene, diet and holiday survival) Learning how to look after the planet (the science of plastics, pollution and how we affect change) Learning how to learn (the science of memory, motivation and how to succeed)</i>
Communicate cultural capital, the "powerful knowledge" that is subject specific that will enrich students' understanding and conversation pertaining to the world.	<i>Low stakes retrieval practice homework of key information using KOR tasks. Clear explanation phase with students benefitting from balanced distribution of subject specialists. Availability of extracurricular science clubs available to all year groups. Trip to Pitt Rivers museum in Oxford Y11. Y10 UOB Sci-fi and forensic science trip. Leicester Space centre Trip Y9</i>
Acquire sound numeracy and literacy skills.	<i>Remapped KS4 science curriculum to allow students to gain statistical and standard form skill in maths lessons before Ecology unit in Biology and Energy unit in Physics. Incorporation of "important word to learn" tier two language slide. Maths in Science walking talking mock.</i>
Upskill students with qualifications necessary to enable them to progress to competitive level 3 academic or vocational study	<i>Rigorous assessment regime with regular checkpoint tasks with pre-scripted tailored feedback to reduce teacher workload. Use of Tutor time to support y11 pp students who following assessment are furthest from target using. L9 cohort master classes focussing on accessing level 8 and 9 questions</i>
Sequencing and improving curricula in response to the pedagogical needs of our students rather than being content with an unchanging body of resources or prescribed specification order.	<i>Remapped KS4 science curriculum to allow students to gain statistical and standard form skill in maths lessons before Ecology unit in Biology and Energy unit in Physics Teaching organisation before cell biology allows students to start their GCSE studies with tangible and relatable concepts before moving on to Cell Biology. Y9 Electricity unit brought before Energy unit because</i>

	<i>concrete concepts are more appropriate to study first, also RP14 benefits from work on equations covered in electricity.</i>
Enquire empirically using appropriate apparatus and techniques.	<i>Working scientifically module in y9, working scientifically posters, Practical work books, KS3 Science club, Lunchtime Practical club, teacher practical competition.</i>

How we teach

Intent	Implementation
Structured talk	<i>Embedding Structured talk slide in each lesson, training on delivery of agreed approach.</i>
Practical skills	<i>Working scientifically module in y9, working scientifically posters, practical work books, KS3 Science club, Lunchtime Practical club, teacher practical competition.</i>
Exude positivity	<i>Structured restorative conversations, personalised encouragement feedback, AAHT FGF phone call</i>
Low stakes testing	<i>KOR tasks, Checkpoint tasks, TfE model, SMHW knowledge quizzing, Seneca, Accelerator cohort, Master classes.</i>
Tailored feedback	<i>LIVE IN LESSON FEEDBACK TO SLOP, Checkpoint tasks, Milestone/mock feedback protocol, highlighter policy</i>

At the end of Year 11 students in Science will....

Know...
Students will know the key concepts that underpin science that are included within topics such as cells (mitosis), respiration (metabolism), energy (transfers), forces (weight), particle model (changes of state) and the periodic table (halogens). The ability to know these concepts will then allow the students to move onto the understanding phase of the curriculum.
Understand...
The way scientific ideas flow through the 5 year curriculum at Bournville will support students in building a deep understanding of key scientific concepts. A few examples of these concepts are that they will understand how the heart is able to efficiently pump blood around the body, they will understand how different forms of radiation are used in industry and finally understand how a process like distillation is used to separate solutions with differing boiling points. Students will therefore have a clear understanding of the key scientific concepts that underpin biology, chemistry and physics by the time they leave in Y11.
Be able to...
Students will be able to take the key topics covered over the 5 years of the course and apply them in many different contexts, allowing students to make links to the world they live in. Examples of these contexts are that they will be able to talk about, read and write about scientific principles such as diffusion and collision theory using the correct terminology. They will be able to represent science in its many forms both mathematically in graphs, and tables and visually through models – for example the model of solids, liquids and gases. They will have the ability to carry out scientific skills, whether it be investigating, observing, experimenting or testing out ideas and then analysing them.

Have been exposed to the following knowledge, theories, texts and experiences that span beyond the GCSE specification

Lessons will also incorporate aspects of KS5 content to extend the learning for students, for example within the structure of the heart students will be exposed to the names of the valves that prevent the backflow of blood, they will also go into more detail about the role of the kidney in osmoregulation which is a key topic in A level biology. Experiences Availability of extracurricular science clubs available to all year groups.

Developed their cultural and social capital through the following extra-curricular work

This will occur throughout the five years via opportunities such as Science club where students can, for example, make simple bath bombs that can then be made at home will allow students to gain some experience in creating products at home. In Y10 alongside the curriculum work students are taught about more types of contraception and diseases associated with unprotected sex. The purpose of all of these sessions are to educate students to make the right decisions when it comes to relationships and building a family.

2020-2021 Curriculum Plan

Year 7 Science at Bournville School

The Bournville School Year 7 Science curriculum has been designed to ensure that all students make good progress from their individual starting points. Through a logical sequence of knowledge and concepts (detailed below) we have designed the curriculum to be fully inclusive of all backgrounds. To ensure that we cater towards our intake, we make use of differentiated tasks and place scientific keywords on slides. Throughout lessons there is support for our PP students to close the disadvantaged gap. Creating a challenging yet developmental curriculum that doesn't depend upon prior learning for success, as we have done, ensures that each student is able to make genuine progress towards understanding higher-order thinking and content regardless of their background. For example, the study of 'Energy Costs' in Y7 will enable students to evaluate their own household's consumption of non-renewables and allow them to look to the use of renewables.

The units listed below are studied in this order because using a logical order of objectives equips students for success at GCSE. It also provides a method to follow student progress as their understanding develops during KS3. In year 7 the KS3 students are taught practical skills at the start of the course which focus on HSW principles such as setting up a good experiment, safety, taking measurements and making calculations. These principles are taught first to allow all students to be able to safely complete investigations during the year and to be able to understand the key aspects of how to develop investigations and analyse the results. The reason for this is to refine the HSW skills of our Y7 students in preparation for the investigative aspects of GCSE.

One of the first units that is taught in Y7 after the lab skills section is the 'Particle Model' which includes lessons on states of matter, melting and freezing and diffusion, among others. The reason for this is because everything is made from particles and knowledge of their existence will support the development of more challenging topics. For example, we move onto Separating Mixtures later in the year which builds on the students' knowledge of the particle model to explain how mixtures can be separated by processes such as evaporation and distillation. Most KS3 schemes begin with Cells, however students will ask questions like 'what are cells made of?' and more challenging concepts such as exchange will be difficult to access. By having the Particle model before this unit students will be able to then grasp more challenging concepts such as diffusion in the 'Cells' unit of biology as they will now be able to visualise gases and liquids in particle form. By connecting smaller ideas to more abstract ideas, students will be better prepared to apply these concepts when approaching an unfamiliar topic. For example, 'Matter', topics are ordered from simpler, more concrete topics; 'Particle model and

'Separating mixtures' (taught in Y7), to more abstract ones; 'Periodic table' and 'Elements' (taught in Y9). These have been created to avoid repetition, draw on various scientific skills and use different contexts.

The remaining units (energy costs, metals and non-metals etc.) taught in Y7 are all concrete in nature, these will be revisited either in Y8, Y9 or both, alongside more complex units to develop the students understanding of the big ideas in KS3 science. There is a checkpoint assessed task and milestone each half term and this allows us to thoroughly examine the learning of pupils and address any weaknesses in their understanding. In addition to the milestone assessments, an end of year exam is completed in line with the school's assessment calendar.

We offer the opportunity to year 7 pupils to attend a science club. The science club is aimed at developing the curiosity that students have surrounding science, by promoting topics that aren't always in the curriculum which then enable the students to make scientific applications to more than just the classroom.

Year 7 Units of Study		
Intro	Lab skills (B/C/P)	
Unit 1	Energy transfer	
Unit 2	Particle model	
Unit 3	Cells and organisms	
Unit 4	Energy costs	
Unit 5	Separating mixtures	
Unit 6	Movement	
Unit 7	Speed	
Unit 8	Metals and non-metals	
Unit 9	Variation	
Unit 10	Contact forces	
Unit 11	Earth structure	
Unit 12	Human Reproduction	
Unit 13	Gravity and the universe	

Year 8 Science at Bournville

The Bournville School Year 8 Science curriculum has been designed to ensure that all students make good progress from their individual starting points after completing the Y7 curriculum. This progress is achieved because students may complete KS3 with knowledge of individual concepts but lack the understanding to apply their knowledge to unfamiliar contexts. This curriculum provides students with this understanding. Using big ideas, the generalisations, principles and models which connect concepts are at the heart of our syllabus. This is how students can learn to see the world analytically, to explain phenomena and make predictions – all skills they need for their next stage of scientific learning. Therefore through a logical sequence of knowledge and concepts (detailed below) we have designed the curriculum to be fully inclusive of all backgrounds as although our some of our intake has a good level of experience in the sciences and will have developed well throughout Y7, some students may not have had that luxury and may struggle to grasp concepts. The use of differentiated tasks and placing scientific keywords on slides throughout lessons supports our PP students to close the disadvantaged gap. Therefore, creating a challenging yet developmental curriculum as we have done, ensures that each student is able to make genuine progress towards understanding higher order thinking and content regardless of their background and prior understanding.

The current cohort are undertaking the year 8 curriculum that was devised as part of our two yearlong KS3 program. The decision was made to commence with the current KS3 curriculum to ensure students

were covering all required content before transitioning onto a bespoke year 9 program. This is a transitional phase as we move to a three year KS3 curriculum.

The year 8 curriculum is comprised of six units (listed below), covering key concepts in biology, chemistry, and physics. Throughout the units there are numerous opportunities for practical investigation to provide students with a varied, enriching experience in their studies. Regular assessment is included at regular intervals throughout the units in line with the academies marking policy.

One of the first units taught in year 8 is chemistry unit 1, which introduced students to atomic structure and bonding. Prior to the introduction of atoms, the students are given an insight into the history of the atomic theory to conceptualise a relatively abstract concept. Key aspects of atomic structure and bonding are covered within the unit to equip students with the necessary skills and understanding, in chemistry, to progress onto the bespoke transition unit. Following on from chemistry unit 1, students will progress onto biology unit 1, which includes an introduction to digestion, variation, and inheritance. Subsequent units will cover a variety of topics that will be covered at GCSE level. Throughout each unit there are opportunities for students to undertake practical investigation that will complement their learning experience as well as establishing foundation to build upon during required practical investigation at GCSE level.

AN assessed checkpoint task and milestone will be completed each half term and covers aspects of content they have been taught throughout the year. Students will receive feedback during a subsequent lesson and an opportunity to review and improve their work. Students are given a sense of ownership over their work and clearly identified areas of improvement. In addition to this, students will complete an end of year assessment in line with the school's assessment calendar.

We offer the opportunity to year 8 pupils to attend a science club. The science club is aimed at developing the curiosity that students have surrounding science, by promoting topics that aren't always in the curriculum, which then enable the students to see the relevance of science in the real world outside of the classroom.

Year 8 Units of Study		
Chemistry Unit 1	The periodic table, atomic structure and bonding	
Biology Unit 1	The digestive system, genetic variation, inheritance, and evolution.	
Physics Unit 1	The particle model, Energy transfer, power, and efficiency.	
Biology Unit 2	Gas exchange, the cardiovascular system, muscles, and reflexes.	
Chemistry Unit 2	Earth's resources, environmental chemistry	
Physics Unit 2	Properties of waves, space science.	

Year 9 Science at Bournville

The Bournville School Year 9 Science curriculum has been designed to ensure that all students make good progress from their individual starting points after completing the Y7 and Y8 curriculum. This progress is achieved because students may complete KS3 with knowledge of individual concepts but lack the understanding to apply their knowledge to unfamiliar contexts. This curriculum provides students with this understanding. Using the generalisations, principles and models which connect scientific concepts are at the heart of our syllabus. This is how students can learn to see the world analytically, to explain

phenomena and make predictions – all skills they need for their next stage of scientific learning. Through a logical sequence of knowledge and concepts (detailed below) we have designed the curriculum to be fully inclusive of all backgrounds. Although some of our intake has a good level of experience in the sciences and will have developed well throughout Y7 and Y8, some students may have struggled to grasp concepts. To aid in their development we make use of differentiated tasks and placing scientific keywords on slides throughout lessons and support our PP students to close the disadvantaged gap. Creating a challenging yet developmental curriculum as we have done, ensures that each student is able to make genuine progress towards understanding higher-order thinking and content regardless of their background and prior understanding. For example, the study of respiration, in the context of exercise, will provide students with a tangible link to their everyday lives.

As in year 7 and year 8, the units listed below are studied in this order to equip students with the scientific skills and knowledge to ensure their success at GCSE. It also provides a method to follow student progress as their understanding develops during KS3. At the beginning of their year 9 studies KS3 students are taught, essential, practical skills and lab safety. These principles are taught first to allow all students to be able to understand the key aspects of how to analyse and interpret the results from investigations. The reason for this is to refine the HSW skills of our Y9 students in preparation for the investigative aspects of GCSE.

The next unit taught, following laboratory skills, is cells. The intention is to build on prior knowledge from year 7, unit 3 – cells and organisms, and introduce students to new key concepts in cellular biology. Given that cells are the basis for a lot of future learning in biology, it is essential that adequate time is given to students to develop a conceptual understanding of the topic. The proceeding unit, elements, and the periodic table, is taught with a similar objective in mind. As atoms and chemical bonding is essential in understanding later units at GCSE level, it is essential that a firm understanding of the core concepts is established. Similarly, an understanding of unit 3 (energy changes) is key to success in later physics units in the curriculum.

The remaining units taught in year 9 are all units that have either had simple concepts introduced in Y7 or Y8 and how now lead into more complex ideas in Y9.

Milestone assessments an end of year exam is completed in line with the school's assessment calendar.

Year 9 Units of Study		
Intro	Lab skills/data handling/HSW - BCP skills	
Unit 1	Cells	
Unit 2	Elements and the periodic table	
Unit 3	Energy changes	
Unit 4	Respiration and photosynthesis	
Unit 5	Climate and earth resources	
Unit 6	Energy stores	
Unit 7	Organ systems	
Unit 8	Electricity	
Unit 9	Uses of waves	
Unit 10	GCSE transition: Atomic structure and bonding	
Unit 11	GCSE transition: Rates of reactions	

Year 10 Biology at Bournville

The Bournville Year 10 biology curriculum prepares all pupils to build their knowledge and understanding of key concepts in biology such as circulation and immunity, our students are studying these units because they show a clear progression in challenge and meet the specification criteria that has been placed by AQA.

Combined Science GCSE

In the Autumn term pupils first biology unit of study is 'Infection and response'. This topic builds on the students' knowledge of bacteria from the 'Cells' topic taught in year 9 which enables a demonstration of knowledge recall. Each lesson in this topic builds on the next via learning about the different pathogens before the students discover how they can be treated including vaccination and finally how we develop the treatments. The second topic taught is 'Bioenergetics' which again builds on the content delivered in the cells and organisation topic in year 9 where pupils were taught about the structure and function of plant cells and the role of mitochondria. Pupils are taught about photosynthesis and the methods for measuring the rate of photosynthesis when changing light intensity. They then move onto aerobic and anaerobic respiration and metabolism.

During the spring term pupils are taught the topic of 'Homeostasis and response'. This is one of the more difficult biology topics and as with all others needs an understanding of the cell's topic. The content from year 9 gives pupils the basis to study the topic as they were taught about cells such as nerve and sperm cells. During this topic pupils are taught about the structure and function of the nervous system, hormonal control including the regulation of glucose and treating diabetes. Finally, pupils are taught about the menstrual cycle, fertility and fertility treatments.

In the summer term and following straight on from the last biology topic pupils are taught 'Inheritance, variation and evolution'. This follows on well from the 'Homeostasis and Response' topic where the final lessons were on human reproduction. At the start of this topic pupils are taught about the types of reproduction and cell division. This then moves onto inheritance and inherited disorders. The second sub-unit within the topic covers variation, evolution, selective breeding and genetic engineering. These lessons link well together and are specifically taught in this order for that reason. The final part of the second sub-unit covers the ethics of genetic technology in which pupils can evaluate the use of such technologies. The final sub-unit looks more in depth at the evidence for evolution, causes of extinction and the development of antibiotic resistant bacteria. This builds on and helps to revise the content from the infection and response topic taught earlier in year 10 which covered bacterial cells and infections.

Biology GCSE

Like with combined science pupils the first topics taught in year 10 are 'Infection and Response' followed by 'Bioenergetics'. Biology GCSE pupils are also taught the content of monoclonal antibodies, plant diseases and investigating the effect of antiseptics on bacterial growth.

Pupils then move onto 'Inheritance, variation and evolution'. However, homeostasis being a large topic within the Biology GCSE has been moved to the autumn term of year 11. This enables teachers to spend more time on some of the more difficult triple Biology only content of this topic such as the structure of the brain, eye and kidney. The final topic taught is 'Ecology' links well with the chemistry unit of 'Environmental chemistry' (during chemistry lesson time). The content in the ecology topic builds onto the work they have just covered including the evolving atmosphere, global warming and climate change. It also allows pupils to complete the ecology required practical during the summer term where the weather is more suitable and there is better growth of plants to sample.

Pupils are assessed in line with the school's assessment calendar which includes a milestone assessment each half term and an end of year mock exam.

Year 10 Units of Study Combined Science

Unit 1	Infection and response
Unit 2	Bioenergetics
Unit 3	Homeostasis
Unit 4	Inheritance, variation and evolution.

Year 10 Units of Study Biology GCSE

Unit 1	Infection and response
Unit 2	Bioenergetics
Unit 3	Inheritance, variation and evolution
Unit 4	Ecology

Year 11 Biology at Bournville

The Bournville Year 11 *biology* curriculum prepares all pupils to build their knowledge and understanding of key concepts in biology such as inheritance and adaptations, our students are studying these units because they show a clear progression in challenge and meet the specification criteria that has been placed by AQA.

Combined Science GCSE

The first topic that is taught in Y11 to combined science GCSE pupils 'Inheritance, variation and evolution'. This is because it is an interesting but quite long topic out of the biology topics. Each lesson is sequenced to build on prior knowledge from the last, for example we start the topic with sexual and asexual reproduction which then leads onto meiosis (the production of gametes). This also helps to revise prior knowledge of cells.

Pupils then move onto the topic of 'Ecology' which has been moved from the summer term of year 10 when it would typically be taught due to the national events of summer 2020. Ecology links well with the chemistry unit of 'Environmental chemistry' as they both include aspects such as global warming and climate change. Pupils build on knowledge they obtained at KS3 including feeding relationships and food chains and webs.

Biology GCSE

Biology GCSE pupils are taught the Ecology topic at the start of year 11. This also follows on and links with the final topic they were taught in the Chemistry GCSE of 'Environmental chemistry'. The unit of Ecology for incorporate an increase in the amount of content compared to the topic taught to combined Science students. This includes concepts such as making food production efficient and sustainable food production. The unit builds on the foundations delivered at KS3 including feeding relationships, food chains and webs and adaptations of organisms.

Pupils are assessed in line with the school's assessment calendar which includes a series of two mocks examinations.

Year 11 Units of Study Combined Science GCSE		
Unit 1	Inheritance, variation and evolution	
Unit 2	Ecology	
Year 11 Units of Study Biology GCSE		
Unit 1	Ecology	

Year 10 Chemistry at Bournville

The Bournville Year 10 chemistry curriculum prepares all pupils to build their knowledge and understanding of key concepts in chemistry such as ionic and covalent bonding, our students are studying these units because they show a clear progression in challenge and meet the specification criteria that has been placed by AQA.

Combined Science GCSE

The first chemistry topic taught in year 10 is 'Chemical Changes'. Chemical Changes builds on previous topics in KS3 and 'Structures and Bonding' by providing specific examples of chemical reactions, improving on the detail provided in KS3. Knowledge of the reactivity series early in the topic progresses into displacement and extraction of metals, which can progress into conceptual ideas in C10 Using Resources in year 11. Pupils then move onto the topic of C3 Quantitative chemistry which acts as fundamental knowledge of quantitative chemistry and the application of quantitative interpretation in other GCSE topics that are taught later in the GCSE course. By teaching this topic after 'Chemical Changes' it allows for the fundamental knowledge of neutralization in the 'Chemical Changes' topic to be built on, whilst ensuring prerequisite knowledge is present from cross curricular links with Mathematics.

The next topic to be studied is 'Rate and extent of chemical change'. This topic builds upon KS3 knowledge as well as the content taught in the 'Atomic Structure and periodic table' topic. It provides knowledge of reaction kinetics and how rate of reaction can be changed as well as linking to reaction profiles and the use of catalysts.

The final chemistry topic taught is 'Organic Chemistry'. This also builds upon KS3 knowledge gained on mixtures, separation techniques and Combustion as well as topic of 'Structures and Bonding'. It provides and builds all knowledge from first basics of crude oil and basic hydrocarbons onto the separation of hydrocarbons by fractional distillation.

Chemistry GCSE

As with the combined science GCSE the first topic taught is the 'Chemical changes topic. Pupils then move onto the 'Energy Changes' topic. This topics links with content taught in KS3 such as combustion and prior KS4 content of atomic structure and bonding. It provides knowledge of energy changes in reactions linking bond breaking and making with energy level diagrams and hydrogen fuel cells. Pupils also complete required practical activities in both topics.

Pupils then move onto 'Rate and extent of chemical change' followed by 'Organic chemistry' in the spring term. As with combined science GCSE these topics build on knowledge gained at KS3 and well as the KS4 topics of 'Atomic structures' and 'Structures and bonding'. Chemistry GCSE pupils also gain knowledge in the 'Organic chemistry topic' of the reactions of alkenes, functional groups, polymerization and natural polymers such as DNA. This aspect of the topic provides links with the Biology GCSE and helps to reinforce the aspects such as the structure of DNA.

Finally, Y10 finish with Chemistry of the atmosphere which builds upon knowledge of C4 Chemical Changes, C5 Energy Changes and C7 Organics as well as reviewing, presenting and comparison of data. It also links well with the biology topic of 'Ecology' which follows this topic in the scheme of learning.

Pupils are assessed in line with the school's assessment calendar which includes a milestone assessment each half term and an end of year mock exam.

Year 10 Units of Study Combined Science GCSE

Unit 1	Chemical changes	
Unit 2	Quantitative chemistry	
Unit 3	Rate and extent of chemical change	
Unit 4	Organic chemistry	
Year 10 Units of Study Chemistry GCSE		
Unit 1	Chemical changes	
Unit 2	Energy changes	
Unit 3	Rate and extent of chemical change	
Unit 4	Organic chemistry	
Unit 5	Chemistry of the atmosphere	

Year 10 Units of Study Chemistry GCSE

Year 11 Chemistry at Bournville

The Bournville Year 11 chemistry curriculum prepares all pupils to build their knowledge and understanding of key concepts in chemistry such as fractional distillation and global warming, our students are studying these units because they show a clear progression in challenge and meet the specification criteria that has been placed by AQA.

Combined Science GCSE

The first unit taught in Y11 Chemistry is 'Organic chemistry' it builds on prior KS3 content of compounds and mixtures and KS4 knowledge of atomic structures, separating techniques and structures and bonding. Pupils then move onto the short topic of 'Chemical Analysis' where content such as chromatography is built upon from the work completed in KS3 separating solutions.

After pupils move to 'Chemistry of the atmosphere' and 'Using resources'. These topics require knowledge of Chemical Changes, Energy Changes and Organics Chemistry as well as reviewing, presenting and comparison of data. The two units link well together for example there is a link between finite resources and global warming.

Chemistry GCSE

Pupils are taught the final two topics of the Chemistry GCSE course of 'Chemical analysis' and 'Using resources'. 'Chemistry of the atmosphere' which is typically taught before 'Using resources' was moved to the end of Year 10 as the content is simpler in comparison to the difficult chemistry only content found in the 'Chemical analysis' topic. This includes the required practical in which pupils test for positive and negative ions. Therefore, we believe that this is best taught at the start of year 11 which is closer to the final examinations.

Pupils are assessed in line with the school's assessment calendar which includes a series of two mocks examinations.

Year 11 Units of Study Combined Science GCSE		
Unit 1	Organic chemistry	
Unit 2	Chemical analysis	
Unit 3	Chemistry of the atmosphere	
Unit 4	Using resources	
Year 11 Units of Study Chemistry GCSE		
Unit 1	Chemical analysis	
Unit 2	Using resources	

Year 10 Physics at Bournville

The Bournville Year 10 physics curriculum prepares all pupils to build their knowledge and understanding of key concepts in physics such as forces and electricity, our students are studying these units because they show a clear progression in challenge and meet the specification criteria that has been placed by AQA.

Combined Science GCSE

At the start of year 10 pupils are first taught the unit of 'Electricity' followed by 'Energy'. These topics link well together as pupils gain knowledge of aspects such as power and energy transfers in the 'Electricity' topic which are fundamental knowledge needed in the 'Energy' topic and in the completion of required practical's such as specific heat capacity. These topics also build on content from KS3 such as the forms of energy and basic electricity and circuits.

The next topic focusses on 'Particle Models of Matter' which requires the knowledge of energy transfer to fully comprehend the ideas of changes of state, motion of particles and pressure. This leads in the spring term to the 'Atomic Structure' topic which requires the knowledge of energy, particle motion, how electricity is produced in fossil fuel power stations and pressure to fully understand why we use nuclear materials and nuclear power. The content from prior KS4 topics supports the understanding of both of these topics which supports the logical sequencing of these units.

Physics GCSE

As with the combined science GCSE pupils are taught the unit of 'Energy' following on from the 'Electricity' unit which was taught in year 9. Again, pupils then move onto 'Particle model of matter' and 'Atomic structure'. Finally, Physics GCSE pupils are taught the topic of 'Forces'. This is the largest of all units and uses the idea of energy (Work done) to explain how things behave when forces are applied. The unit incorporates ideas from the unit of 'Energy' for Work done and energy transfers and the unit of 'Density' for Pressure in a liquid, atmospheric pressure. This sequencing means the unit of 'Energy' and 'Particle models of matter' must be delivered to pupils prior to the topic of 'Forces'.

Pupils are assessed in line with the school's assessment calendar which includes a milestone assessment each half term and an end of year mock exam.

Year 10 Units of Study Combined Science GCSE		
Unit 1	Electricity	

Unit 2	Energy	
Unit 3	Particle model of matter	
Unit 4	Atomic structure	
Year 10 Units of Study Physics GCSE		
Unit 1	Energy	
Unit 2	Particle model of matter	
Unit 3	Atomic structure	
Unit 4	Forces	

Year 11 Physics at Bournville

The Bournville Year 11 physics curriculum prepares all pupils to build their knowledge and understanding of key concepts in physics such as light and waves, our students are studying these units because they show a clear progression in challenge and meet the specification criteria that has been placed by AQA.

Combined Science GCSE

The first unit studied is 'Forces'. This is the largest of all units and builds on the work completed on forces at KS3. The unit also incorporates ideas from the unit of 'Energy' for Work done and energy transfers and the unit of 'Density' for Pressure in a liquid, atmospheric pressure. This sequencing means the unit of 'Energy' and 'Particle models of matter' must be delivered to pupils prior to the topic of 'Forces'.

Pupils then move onto the smaller topic of 'Waves' which requires the idea of energy transfer and motion to comprehend the nature of Waves which were taught in Y10. From the unit of 'Waves' pupils move directly on to the topic of 'Magnetisms and electromagnetism' which requires prior knowledge of non-contact forces and electricity from the 'Forces' topic and the 'Electricity' unit of study. It also builds on the foundations of magnetism that was delivered at KS3.

Physics GCSE

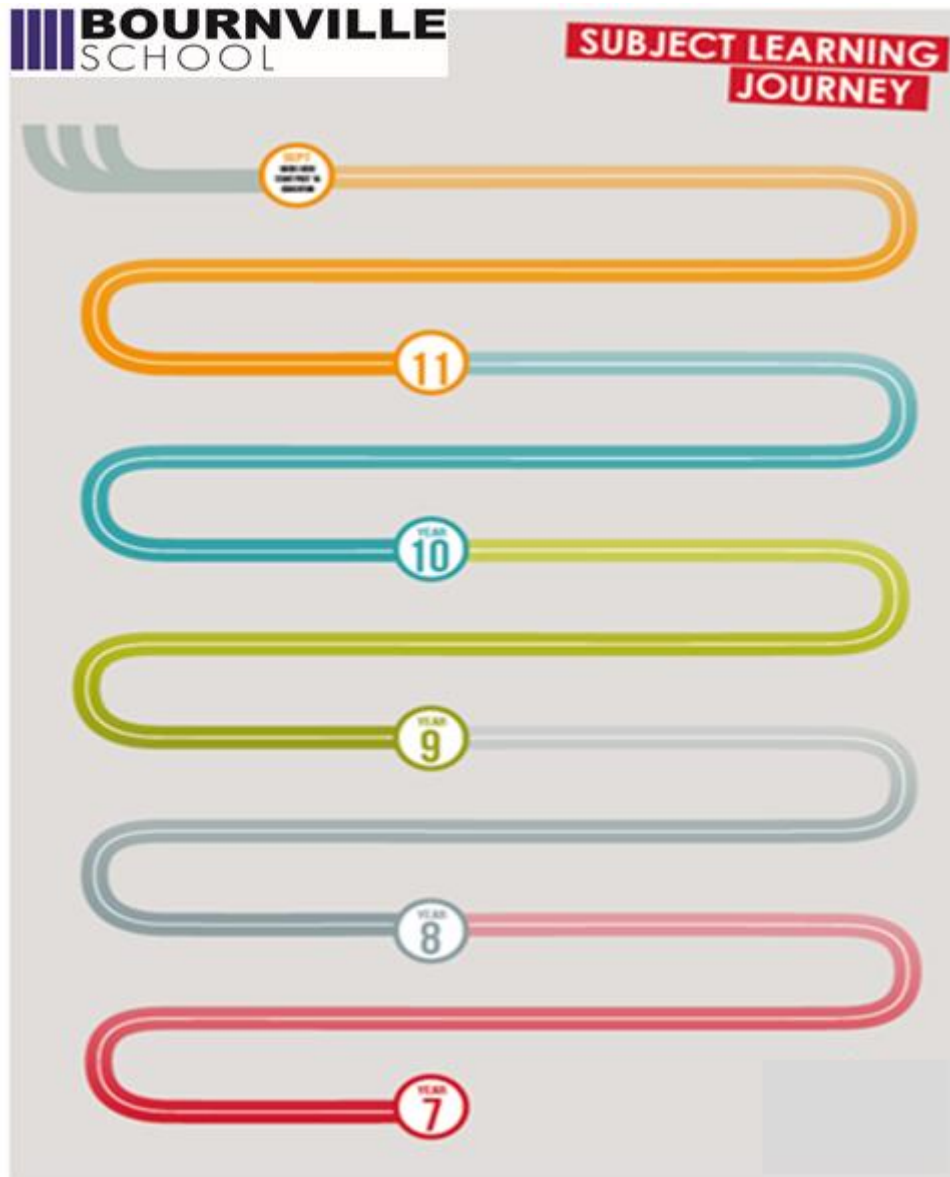
Physics GCSE pupils start the year with the topic of 'Magnetism and electromagnetism'. This is a longer unit in the physics GCSE and incorporates the additional content of generators and transformers. This builds on prior KS4 topics such as 'Electricity' and gives a useful opportunity to revise aspects of this unit. The final unit students' study is the unit of 'Space' this is a Physics GCSE topic only and is not studied as part of the Combined Science GCSE pathway. The topic builds on the foundations of space that are taught at KS3 and include the formation of the solar system, life cycle of a star and the expanding universe.

Pupils are assessed in line with the school's assessment calendar which includes a series of two mocks examinations.

Year 11 Units of Study Combined Science GCSE		
Unit 1	Forces	
Unit 2	Waves	
Unit 3	Magnetism and electromagnetism	
Year 11 Units of Study Physics GCSE		
Unit 1	Magnetism and electromagnetism	

Unit 2	Space	
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The *Subject* Department Learning Journey at a glance



To include – topics, purpose of study and assessment points. To show how and why the curriculum is sequenced in the way in which it is.