

The Year 9 Curriculum

The five key scientific ideas that underpin the KS3 Science National Curriculum are:

- Cells,
- Interdependence,
- Particles,
- Forces and
- Energy.

Having come from a variety of schools with varying programmes of study, it is important to make sure that these ideas are well established early on as students need to develop their understanding progressively so that they can recognise, use and then apply each of the ideas in different contexts.

As such the units of study for Year 9 provide a natural bridge between ending the KS3 curriculum from their last schools, ensuring all students have a good grounding in the fundamentals that will allow them to go on to succeed in science and engineering, and launch them gently into KS4 with an introduction that both consolidates the KS3 work and extends into the KS4 work.

Term	Topic	Why Now?
1 & 2	CC2 – States of Matter CC2 – Methods of Separating and Purifying Substances <ul style="list-style-type: none"> - States of matter and Mixtures - Filtration and Crystallisation - Chromatography - Investigating ink – Core practical - Distillation - Potable Water CP3 - Conservation of Energy <ul style="list-style-type: none"> - Energy stores and Transfers - Energy Efficiency 	<p>Much of this content should have been covered to some extent in KS3 and so provides a familiar starting point for most students but with the extra content present in KS4, there will also be a sense of progress in their learning. Conceptually the unit is not too demanding and being very visual, it is possible to start building analogous though models which they can relate to what they see these can then be built on in later units. This unit provides a starting point where we can establish the concept of particles and properties and get students to think about these concepts in a qualitative way.</p> <p>All processes involve some form of energy transfer. In order to provide an underlying framework to the learning of concepts later in the course it is important for students to appreciate that energy transfers are at the core of everything that happens. Understanding energy and energy transfers as a concept should</p>

	<p>CP3 - Conservation of Energy (Continued)</p> <ul style="list-style-type: none"> - Energy Transfers and Insulation - Renewables and Non-renewables 	<p>enable students to understand the 'why' underlying many processes.</p> <p>Opportunity to start students thinking about how 'maths' links with science and get them dealing with 'large' numbers in scientific calculations (kilo, Mega and Giga)</p> <p>This completes the energy unit and provides an opportunity for students to see how their learning links to important debates in the wider world – the 'Energy Provision' project for a fictional region is an opportunity to get them to see themselves as educated citizens able to take part in meaningful debate in areas which they might well previously have considered to be the sole domain of adults. This is where the 'interdependence' part comes in strongly.</p>
3 & 4	<p>CB1 - Key concepts in Biology</p> <ul style="list-style-type: none"> - Plant and Animal Cells – including specialisation - Microscopes – Core practical - Bacterial Cells - Transporting Substances across membranes - Osmosis – Core practical - Enzymes – Core Practical <p>CC3-CC7 - Atomic Structure, Bonding and the Periodic Table</p> <ul style="list-style-type: none"> - The atom - Atomic number and Mass number 	<p>This unit re-establishes learning from KS3 in the form of cells and organelles – and moves students forward into thinking about other types of cells such as bacteria and how their structures are related to their functions/behaviours. Establishing enzymes as the 'regulators' of biochemical reactions, and understanding the functions of the different parts of the cell will allow students to access future units CB2 – 6.</p> <p>This unit also provides an opportunity to start students dealing with 'small' numbers in scientific calculations (milli, micro and nano)</p> <p>Understanding why materials behave the way they do will</p>

	<ul style="list-style-type: none"> - Isotopes - Atomic Number and the periodic Table - Electronic Configuration - Ionic bonding and properties - Covalent bonding and properties - Allotropes of Carbon - Metallic Bonding 	<p>provide an underlying understanding to the physics units on electricity, radioactivity and materials (and to a certain extent, waves). This unit underpins all future chemistry units and will aid with the higher-level understanding for the genetics units.</p> <p>This has been afforded a large chunk of time to make sure that students are totally conversant with the learning by the end of the unit due to its crucial nature to accessing and understanding future content.</p>
5 & 6	<p>CP2 – Forces and Motion</p> <ul style="list-style-type: none"> - Resultant forces - Mass and weight - Newton's Laws - Investigation Acceleration - Core practical - Stopping distance/ crash hazards <p>CP4 / CP5 Waves and EM Spectrum</p> <ul style="list-style-type: none"> - Waves and wave speed - Investigating waves – Core practical - Refraction - EM spectrum - Investigation Refraction- Core practical - EM Radiation and dangers 	<p>As well as being one of the 5 pillars of the KS3 curriculum (and so completing the bridge into KS4) Forces is a natural extension on the topic of potential and kinetic energy, and a precursor to Motion (CP1), Work (CP7 and 8) and Forces and Matter (CP12 and 13).</p> <p>It affords the opportunity to strengthen students' scientific calculation skills ready for the more advanced units to come and start them into understanding how the reality of what they see around them can be modelled and summarised by mathematics and so build in the idea that science is all about modelling the world around us.</p> <p>This extends on from the energy unit and is an important foundation stone to the radioactivity unit and feeds into other units like photosynthesis and genetic mutation in a minor way as well as work on the atmosphere in a more direct way This is the first '100%' KS4 topic that students cover.</p>

Curriculum Map 2022-2023 - Science

	<p>Review and consolidation of the content covered in the year accompanied by an end of year test.</p>	<p>Again, the link between mathematics and science can be further reinforced in this unit, and calculations involving both very big and very small numbers can be practiced to reinforce the appropriate uses of prefixes.</p> <p>Students will have now completed their foundational units that enable them to access the units they will be covering in years 10 and 11. The test will enable us to identify where progress has been made, but also where there are any gaps in the learning, so that we can build in bespoke review components in the upcoming units and strengthen the fundamental learning from this year.</p>
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The Year 10 Curriculum

Term	Topic	Why Now?
7 & 8	CB8 - Exchange <ul style="list-style-type: none"> - Efficient transport and exchange - Circulatory system - The Heart – Dissection - Respiration rates – Core practical. 	<p>This is a highly accessible unit links the unit on cells and adaptations with diffusion and gas exchange and looks at how substances are transported around the body and acts as a nice precursor to the unit on disease which includes lifestyle diseases related to the circulatory system.</p>
	CB5 - Health and Disease <ul style="list-style-type: none"> - Cardiovascular disease - Pathogens - Immune system - Antibiotics 	<p>Strengthening the interdependence theme, students have done the cell structures and specialisation topic, and this unit now extends these themes whilst taking on a specifically human context. Students are approaching the age where they will make behavioural choices which could impact their physical/mental wellbeing (and that of others) – educating them now about big issues such as lifestyle diseases, immunisation and the effects of poor hygiene and sanitation could have a major positive impact in helping them understand the implications of the decisions they make.</p> <p>The study of how bacteria become antibiotic resistant also acts as a pertinent precursor to genetic inheritance.</p>
	CP1 - Motion <ul style="list-style-type: none"> - Vectors and scalars - Acceleration - Distance time graph - Velocity time graph 	<p>This unit links very strongly to the 'Forces' unit covered in year 9 but has been left until year 10 because, although conceptually easy, the combination of graphical and equation work to solve problems can be quite demanding earlier on in the course. By this stage, through the work that they do in maths and the 'interpretation' work done in</p>

	<p>CC8 – Acids and Alkali</p> <ul style="list-style-type: none"> - Bases and salts - Preparing copper sulphate – Core practical - Balancing equations - Investigation Neutralisation – Core practical - Reactions of acids with metals and carbonates - Solubility <p>CB2 – Cells and Control (to return to in y10)</p> <ul style="list-style-type: none"> - Mitosis - Growth in Plants - Growth in Animals) 	<p>science, students are more confident in extracting information from graphs to use in equations.</p> <p>Once students understand what an acid and a base are, along with how to identify them, the process of neutralisation becomes a relatively accessible routeway into carrying out and understanding chemical reactions. Which then leads on to predicting and balancing chemical reactions, which lays the foundations for the quantitative chemistry units in year 10 and 11. There is also the opportunity here to reinforce students' measurement practical skills and introduce students slowly to 'precision' practical skills like titration.</p> <p>The Growth and Repair part of this unit provides a pertinent link from health and disease in terms of needing to produce new replacement cells and affords the opportunity to introduce students to tissues not yet encountered but that they will need to know (Xylem nerve cells etc).</p> <p>It also provides the opportunity to explain the role of DNA in the cell reproduction process and need to have a copy in each 'self-repairing' cell as this will feed directly into the 'Inheritance' and 'Selection' units.</p>
9 & 10	<p>CC13 - Groups in the Periodic Table</p> <p>CC14 - Rates of Reaction</p> <p>CC15 - Heat Energy Changes in reactions</p> <ul style="list-style-type: none"> - Groups I, VII and 0 - Rates of reaction - Endo and Exo thermic reactions 	<p>The reactions of group I and VII further prepare the ground for the calculation-based chemistry. With the energy and forces unit complete, rates of reaction should be easily conceptually accessible,</p>

	<p>and will feed into the photosynthesis unit when it arises. Endo and exothermic reactions will help bring together the forces, energy and bonding units, and again will feed into photosynthesis.</p> <p>CB3 - Genetics CB4 - Natural Selection and genetic modification</p> <ul style="list-style-type: none"> - Meiosis - DNA extraction - Core practical - Mutation and Variation - Evolution - Breeding and variety - Genes in agriculture and medicine <p>CP9 - Electricity and circuits</p> <ul style="list-style-type: none"> - (<i>Electrostatics</i>) - Current, Charge and Potential Difference - Resistance - Investigating Resistance – Core practical - Power - Electrical safety 	<p>The groundwork has been laid with mitotic cell division and with the development of antibiotic resistant bacteria; students are now ready to access this unit. This ensures that all the paper 1 Biology content is delivered, ready for a full mock exam at the end of the year – thus allowing whole papers to be used to gauge attainment and progress using the published grade boundaries.</p> <p>Another topic that students will be familiar with from KS3, but quite often without having the foundation knowledge to understand what is happening in terms of electrons. This brings an opportunity for students to experience how their learning so far helps to explain something they have been familiar with since the start of secondary. It also affords the opportunity for a large chunk or practical work in what are otherwise two quite ‘theory driven units’. There is also a real opportunity for mathematical work involving selection of equations, selection of relevant values and consolidating the use of prefixes for large and small numbers. This unit needs to be done before CP10 and CP11 (Magnetism, Motor Effect and Induction).</p>
11 & 12	CC - 10, 11, 12 Electrolysis and Metals	

	<ul style="list-style-type: none"> - Electrolysis - Copper sulphate – Core practical - Reactivity - Ores, Oxidation and Reduction - Dynamic Equilibrium - Life cycle Assessment and Recycling <p>CP6 - Radioactivity</p> <ul style="list-style-type: none"> - Atomic models - Radiation - Radioactive decay - Half life - Dangers of Radiation <p>CB8 - Ecosystems and Material Cycles</p> <ul style="list-style-type: none"> - Abiotic and Biotic factors - Quadrats and Transects - Core practical - Biodiversity - Parasitism and Mutualism - Carbon, Water and Nitrogen cycle <p>Review and consolidation of the content covered in the year accompanied by an end of year Exam. This will consist of three full GCSE paper 1s (Paper 1 in biology, Paper 1 in chemistry and paper 1 in Physics).</p>	<p>The groundwork has been laid with electricity, atomic structure and bonding; students are now ready to access this unit. This ensures that all the paper 1 Chemistry content is delivered, ready for a full mock exam at the end of the year – thus allowing whole papers to be used to gauge attainment and progress using the published grade boundaries.</p> <p>The groundwork has been laid with the work on atomic structure, waves, energy and DNA and Genetics along with the mathematical skills developed throughout the (nearly) 2 years up to this point; students are now ready to access this unit. This ensures that after the ‘Motion’ topic is delivered at the beginning of term 6, all the paper 1 Physics content is delivered, ready for a full mock exam at the end of the year – thus allowing whole papers to be used to gauge attainment and progress using the published grade boundaries.</p> <p>Conceptually quite accessible at any level to students, this can be taught around the activities, exams and trips that can often go on at the end of summer term - students can quite easily find an access point into the lessons if they have missed a previous one. Also, if circumstances allow, this is the best time to do trips into fields and wildlife areas to monitor etc.</p> <p>Now that the content is covered to sit these papers completely, students will gain the first experience of sitting full GCSE papers.</p>
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The Year 11 Curriculum

Term	Topic	Why Now?
13	<p>Revision activities</p> <ul style="list-style-type: none"> - The mock exams will have highlighted areas where further work needs to be done, the areas for development from these exams will determine the focus of these revision activities. <p>CB7 - Animal Control</p> <ul style="list-style-type: none"> - Hormones - Menstrual cycle - Diabetes and blood sugar <p>CB6 - Plants</p> <ul style="list-style-type: none"> - Photosynthesis - Light intensity and Photosynthesis- Core practical - Transpiration and Translocation 	<p>This is an opportunity to remind, reinforce and develop students' understanding and knowledge in these areas of weakness, thus preparing them for the topics to come. It also provides the opportunity to kick start revision for the final exams and model methods of revision to give students an opportunity to find what works best for them.</p> <p>Packed full of information that doesn't come arise in any of the other units, this unit could easily get 'forgotten' if done earlier in the course, but with the links to fertility and contraception is relevant to be done as early as possible – hence placed at the start of the year.</p> <p>Students have thought about transport in animas, and also studied the unit on ecosystems – this unit ties in the ideas in those units.</p>
14	<p>CC9 - Molar Calculations</p> <ul style="list-style-type: none"> - Mass and empirical formulae - Conservation of mass - Moles <p>CP7/P8 - Energy and Forces</p> <ul style="list-style-type: none"> - Vector diagrams - Work and Power <p>Revision activities</p> <ul style="list-style-type: none"> - The Nov. mock exams will have highlighted areas where further work needs to be done, the areas for 	<p>The most mathematically challenging of all the units – this consolidates all the work on quantitative chemistry so far, ready for the November mocks.</p> <p>Provides an opportunity for revision of forces and motion as well as covering the new content.</p>

	development from these exams will determine the focus of these revision activities.	
15	<p>CP10/11 - Magnetism</p> <ul style="list-style-type: none"> - Magnets - Electromagnets - Transformers <p>CC16/17 - Fuels and Earth</p> <ul style="list-style-type: none"> - Hydrocarbons - Combustion - The atmosphere - Climate Change 	<p>Provides an opportunity to review and revise the concepts from the energy and electricity topics as well as cover the new unit content.</p> <p>Again, an opportunity to review topics such as energy, acids and alkalis, and waves as well as get them thinking about the bigger issues.</p> <p>Though the 'science' of the unit is not too tricky, the themes of sustainability, responsibility and lifestyle choices require maturity if students are going to engage properly and think about the impact of their lifestyle choices, so this unit is best done as late on as possible.</p>
16	<p>CP12/13 – Particle Model, Forces and Matter</p> <ul style="list-style-type: none"> - Density - Investigating Densities – Core practical - Energy calculation - Investigating water – Core practical - Pressure - Bending and stretching (Hooke's law) - Investigating Springs – Core practical 	<p>This unit allows the opportunity to strengthen and extend students' mathematical work in science and acts as a good springboard into revision with the themes of energy, forces, particles and investigative science.</p>
17	Revision and Examinations	

Triple science

With the triple science course, which is taught in the option block as additional three lessons on top of the compulsory Combined Science, nearly all of the extra content that converts the Double qualification into three separate GCSEs is linked to units that students will cover in their core science lessons.

With extra triple science lessons starting at the beginning of year 10, the first port of call is to cover extra content from the year 9 units of waves and forces.

From then on, students study the extra content related to the units they have studied in core science in the following term in triple science.