Quality of Education Statement
GCSE Combined Science

Curriculum Intent

Subject Vision and Rationale Statement

Wyvern College Vision Statement

*"***To become the finest version of yourself…**

Think deeply, *read widely, discuss openly and listen intently. Study with PRIDe, forever Prepared, Respectful, Involved and Dedicated.*

Grow personally, *in confidence, wellbeing and individuality. Expand your interests and friendships. Develop a conscience and the moral courage to act on it. Embrace the personal challenges of STRIVE.*

Care passionately *about people and causes. Appreciate the help of others; help them through service, teamwork, kindness and leadership. Make this world a better place as an informed and influential citizen, respecting British and universal values"*

At Wyvern we encourage children to be inquisitive. We aim to spark students' minds about the world around them and for them to leave the school with good scientific literacy and numeracy skills. We want the students to think deeply about the world around them from a scientific perspective and be able to form balanced judgments based on their knowledge, their discussions and observations.

Our curriculum has been carefully designed to ensure that topics flow from one to another and build on the previous learning. We've also ensured that topics are interleaved to maximise retention and build a deeper understanding, enabling students to apply their knowledge more effectively. Regular assessments have an appropriate ratio of application and recall questions that focus on the key knowledge and skills needed in order to succeed.

Students will experience exciting investigations that provide them with opportunities for enquiry-based learning. We encourage students to use critical thinking to assess information from both inside and outside the classroom. Quality teaching and learning in conjunction with our enthusiasm and the relationships forged between staff and their classes helps students to achieve their full potential in Science.

We ensure that the Working Scientifically skills are built-on and developed throughout the students' time at Wyvern so that they can apply their knowledge of Science when using equipment, conducting experiments, building arguments and explaining concepts. We want them to grow in confidence so that they can work independently through practical tasks; managing their time and resources and trouble-shooting when problems arise.

Finally, we also believe that it's important for students to care about the world around them. We aim to instil an awareness and understanding of the many issues facing our planet to enable students to make informed decisions and contribute positively to our planet and society. We encourage students to build life skills needed for future careers and so aim to focus lessons on key life skills such as communication, teamwork and perseverance. Our goal is to give them an appreciation of science in the world around them and the rewarding careers that can come from a science education.

Principles of Effective Curriculum Design

An Equitable Curriculum

Key principles

*"***An Equitable Curriculum***- All students access the same curriculum, whichever teacher they have and whatever group they are in. Students are not denied this curriculum because of their SEND, their prior attainment or their teacher. The curriculum rationale ensures what students get taught, not teachers' personal preferences – and this is every child's entitlement."*

Explain your strategy and decision-making to ensure all students access an equitable curriculum. How do you ensure students with SEND, PP, or with different classes and teachers access the same curriculum?

The curriculum is centrally planned and we have excellent shared resources. The teaching routes, combined with shared assessments ensures students receive a consistent diet regardless of teacher. The shared resources provide teachers with a strong starting base with which to then tailor to the needs of their class, with special attention given to SEND and PP needs. Provision is regularly reviewed to ensure all students receive the best quality curriculum and provision.

A Vertical Curriculum & A Spiral Curriculum

Key principles

*"***A Vertical Curriculum***- The curriculum is used as a progression model, it unfolds with increasing levels of challenge. Units are sequenced in such a way that each one builds on what went before and prepares for what comes next. It builds learning up towards clear end points, whilst also being clear what students are expected to know and do at each defined intermediate point. Knowledge and skills therefore get progressively more complex; conceptual understanding becomes more sophisticated because conceptual links are maximised.*

*"***A Spiral Curriculum***- The curriculum explicitly identifies for teachers, students and parents the subject's "Big Ideas" - the essential knowledge, skills and concepts in each unit that need to be retained beyond that unit as they are built upon in later units. The curriculum doesn't just introduce the Big Ideas once, but repeatedly revisits them in ways that provide students with retrieval practice opportunities to ensure curriculum continuity, coherence and retention. This supports students in transferring knowledge and understanding to their long-term memory and makes it easier for them to understand new learning."*

Curriculum End Points for End of KS4

GCSE specifications in combined award science should enable students to:
• develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
• develop understanding of the nature, processes and methods of science, through different types of scientific enquiries that help them to answer scientific questions about the world around them
• develop and learn to apply observational, practical, modelling, enquiry and problem-solving skills, both in the laboratory, in the field and in other learning environments
• develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively.

Curriculum End Points for End of KS3

List here the skills, knowledge and concepts that you are aiming for students to have mastered before they begin their KS4 courses. Think about how these are stepping stones or staging posts towards the KS4 curriculum end points.

The aim is to get all students to a point whereby students have the knowledge and skills to be able to be able to spring board into the KS4 curriculum:

- Biology
- Chemistry
- Physics
- How Science Works
- Practical, hands on skills.
- Be able to write as a scientist might
- Be numerically literate
- Be able to apply their knowledge to unfamiliar contexts
- Know how to revise
- Be confident enough to try, even if they get it wrong.

Unit of Work		(Vertical Curriculum & Spiral Curriculum) Why do students study it?	(Vertical Curriculum) Why do they study it when they do?	(Vertical Curriculum) How will their grasp of the Big Ideas be assessed?	(Spiral Curriculum) How will they be supported to remember & retrieve the Big ideas?
		What are the "Big Ideas" to be taught in this unit (the essential skills, concepts, knowledge that students will need later on)? Why are these essential? (How do they build students up towards the curriculum end points you have identified above?) How else does this unit implement the ideas in your vision statement above?	How do the Big Ideas in this unit build on those from previous units? How do they prepare students for those in future units?	How will the Big Ideas be assessed? Outline the assessed task and assessment objectives.	What strategies will be used to help students remember and retrieve the Big Ideas over time? (E.g. retrieval practice with knowledge organisers, spaced testing etc).
		The KS3 routes follow the KS3 specification laid out by AQA. The content is organised within the topics and sequenced by AQA in such a way that students have opportunities to build on prior learning between year 7 and year 8. It focusses around the big ideas in Science.	**We have followed the spiral curriculum plan laid out by AQA so that students will complete 2 topics linked to a big idea, e.g. matter, in year 7 and then will return to this big idea in year 8 and build on their knowledge with two further topics.** **We have sequenced the topics in such a way that the fundamental big ideas such as matter and energy are in the first half of year 7. Our routes interleave between biology, chemistry and physics topics to encourage links to be made between the subjects.**	Type of assessment will be planned by individual teachers to allow them to meet the agreed department marking policy. Ad-hoc AfL in each lesson. Exam style questions (self/peer/teacher assessed). Home learning tasks will consist of a combination of low stakes quizzing via Educake and assessed task and a feed forward task that will be assigned in response to self, peer or teacher assessment. Low stakes end of topic assessment completed as home learning. Enquiry tasks in most topics that focus on a different skill taken from those laid out in the AQA specification under 'working scientifically' Formal assessments twice a year.	Weekly home learning that is timed and set with the purpose of reviewing content recently studied in lessons in a range of formats. This might be tasks set via Science Surgery, worksheets or exam questions. Most lessons start with a low stakes retrieval task that recaps prior learning. (Additional assessment of prior learning will take place regularly but is class-dependent as it will be in response to AfL in each lesson) Following the spiral curriculum laid out by AQA means that each topic in year 8 clearly links to a big idea in year 7. This will support both teachers and students in making links and retrieving information from prior learning.

Year 7 Autumn 1	Skills review 1.5 weeks 3 lessons	<u>Link to vision statement:</u> This short topic gives students the chance to get comfortable with the key lab equipment they will be expected to use during their time in science lessons. The focus is very much on using the lab safely and effectively with the aim of setting up students to become independent learners in future topics.	**Building on prior knowledge** This topic aims to be a leveller. Students come to us with a variety of experiences at KS2 depending on their previous school and family interests. The skills topic aims to clarify any terminology that students may have learnt that may not match up to AQA's chosen vocabulary and launch students with no prior experience of science into the basics. **Preparing for future learning** This topic will immediately introduce key vocabulary that they will encounter throughout their time in Science and will be fundamental to them being able to access later practicals at KS3 and properly engage with required practicals at GCSE.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Home learning task – Science Surgery test to assess retention of vocabulary	As above
Year 7 autumn 1	Matter (particle model and separating mixtures) 3 weeks 10 lessons	<u>Link to vision statement:</u> Several activities promote independent learning, for example in lesson 4 on mixtures students must work through a series of mixtures and consider how they could separate them using the equipment available. There is plenty of time given to peer and class discussion to support students in developing their ideas. Students are expected to follow instructions independently or in pairs to gain valid data and apply their knowledge to formulate conclusions. The method questions help to build scientific literacy skills.	**Building on prior knowledge** This is the first chemistry topic students will study at KS3. It will build on content that should have been covered at KS2 (states of matter, solutions and separating mixtures). This topic will also revisit skills and terminology used in the previous topic on skills. **Preparing for new learning:** This was picked as the first topic in year 7 as it provides the basic knowledge required when studying future topics, for example: diffusion, gas exchange, mixtures, chemical reactions, heat energy	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Home learning task – Differentiated particle model worksheet, separating mixtures BUG the Qu (suggested teacher marked) and end of topic test completed online and marks reported to teacher.	As above

			transfer and pressure in gases and liquids, sinking and floating.	Exam style question – Chromatography method question completed in class and self/peer assess. This supports the completion of the BUG the Qu set as homework and will enable students to approach the homework task with confidence and independence.	
Year 7 autumn 1	Earth (universe and earth structure) 3 weeks 9 lessons	<u>Link to vision statement:</u> The Earth topic is planned to coincide with 'Space week'. During this week, students will take part in the IET Faraday Challenge. This will give students opportunity to think beyond the content they are studying and to work together on a real-world scenario. It will develop their scientific literacy and numeracy skills in a fun and engaging context. As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning.	**Building knowledge:** This topic follows on from the Matter topic as it gives students the opportunity to apply their understanding of state changes to the rock cycle and the formation of igneous and metamorphic rocks. It also follows on from KS2 learning where students will have learnt about seasons, earth and space and electricity in the form of simple circuits. The IET Faraday Challenge day will draw on students KS2 learning on Forces and circuits and allow them to extend their understanding of these in conjunction with the Earth – Universe topic. **Preparing for new learning:** In line with the spiral design of the AQA Activate curriculum, the Earth topic feeds into the Earth topic in year 8 where students will learn about climate and earth's resources. This will build on what students have learnt about the Earth's structure.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Home learning task – Universe exam questions (differentiated), rock cycle worksheet and end of topic test completed online and marks reported to teacher.	As above
Year 7 autumn 2	Organisms (cells and movement) 3 weeks 8 lessons	<u>Link to vision statement:</u> As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning.	**Building knowledge:** This topic builds on prior learning from KS2 where students may have looked at the skeleton or used microscopes.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.**	As above

		Several activities promote independent learning, for example the enquiry task where students dissect a chicken wing and consider how the wing moves. Students then re-visit their findings to link it to their learning.	The enquiry task allows students to draw on knowledge they may already have about the interaction of muscles, bones and ligaments. **Preparing for new learning:** In line with the AQA Activate spiral curriculum, this topic links to the Organisms topic in year 8 where students will study breathing and digestion. An understanding of cells, and specifically specialised cells, and levels of organisation within the human body will also support students in their understanding of the Genes and Ecosystems topics that come later in year 7 where students will learn about human and plant reproduction.	**Specific examples as follows:** Home learning task – Skeletal and muscular systems worksheet (differentiated) (suggested teacher marked) and end of topic test completed online and marks reported to teacher. Extended writing task describing the human body (peer/self assessed).	
Year 7 autumn 2	Forces (speed and gravity) 3 weeks 8 lessons	<u>Link to vision statement:</u> As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning. Students are expected to follow instructions independently or in pairs to gain valid data and make accurate conclusions. Key exam technique is built upon during appropriate activities. As part of the distance -time graphs lesson, students are supported in improving their graph skills through the use of models, self and peer assessment. This will allow students to review and develop their skills in this area and continue to build their confidence. The enquiry task, investigating the speed of the toy car on the ramp, allows students to work through a scenario themselves to collect data, use the calculation they have learnt and the graph skills they have practised. This will allow them to build team-work skills and to develop their	**Building knowledge** This topic builds on prior learning form KS2 when students will have covered forces and been introduced to the concept of graphing data. **Preparing for new learning:** Learning from this topic will be revisited and deepened in the forces topics that will be covered in year 8, 9 and 10.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Enquiry task (investigating speed) – students' results table and graphs (self/teacher assessed). Home learning task – Distance -time graphs worksheet, calculating weight worksheet (both self/peer assessed in lessons) and end of topic test completed online and marks reported to teacher. Extended writing task describing the change in weight of an astronaut.	As above

		confidence in problem solving as they work out what data they need to collect and how best to do that. The extended writing task requires students to apply their learning to a real-world scenario and formulate a response. This topic supports students in developing their numeracy skills through the use of equations, units and graphing.		(self/peer/teacher assessed).	
Year 7 Spring 1	Energy (costs and energy transfer) 3 weeks 9 lessons	<u>Link to vision statement:</u> As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning. Students are expected to follow instructions independently or in pairs to gain valid data and make accurate conclusions. Key exam technique is built upon during appropriate activities Numeracy skills are focused on during calculation lessons, this helps to retain prior learning regarding SI units and the application of equations to new scenarios. In discussions over renewable versus non-renewable energy resources, students will increase their awareness of the issues facing our planet in terms of global warming and electricity use and supply. As well as the importance of science in devising solutions for some of these issues.	**Building knowledge** This topic will start by building on ideas about electricity production and power that students may have encountered at KS2 as part of their study of electricity and circuits. It is likely students will also have some general knowledge about electricity production that can be drawn out and built on. It may also link to ideas they will have encountered about healthy eating, balanced diet and digestion in the 'Food and fuels' lesson. **Preparing for new learning:** The concept of energy stores and transfers will be a new one to most students but is fundamental to their later understanding of chemical reactions in the form of endothermic and exothermic reactions as well as energy transfer in biochemical processes such as respiration and digestion. It is also important to the idea of diffusion and the particle model. There are some key points here where misconceptions can be seeded, in particular through the language students use, for example 'energy production'. The	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Extended writing task comparing the efficiency of the lightbulbs (self/peer/teacher assessed) Home learning task – energy costs worksheet, energy transfer worksheet (both differentiated and will be self/peer assessed in lessons) and end of topic test completed online and marks reported to teacher.	As above

			resources developed take care to instil good scientific language that will serve students well into their GCSE course. In line with the AQA Activate spiral curriculum, this topic links into the Energy topic in year 8 when students will study the concept of work and energy transfers in heating and cooling.		
Year 7 Spring 1 and 2	Reactions (metals & non-metals and acids & alkalis) 4 weeks 11 lessons	<u>Link to vision statement:</u> As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning. Students are expected to follow instructions independently or in pairs to gain valid data and make accurate conclusions. Key exam technique is built upon during appropriate activities Students are given lots of opportunity in this topic to develop their practical skills in terms of measuring and using equipment and recording observations. As well as general safety in the laboratory and familiarity with risk assessments. All this support students in developing their skills and growing as independent learners in a practical environment.	**Building knowledge** This topic builds on students' learning in the 'Matter' topic, in particular the concept of pure substances and mixtures as well as the safe use of equipment to work with a variety of substances. **Preparing for new learning:** In line with the AQA Activate spiral curriculum, this topic links into the Reactions topic at year 8 that includes chemical energy and types of reaction. This will also link into the Matter topic covered in year 8 where students will explore the periodic table and the concept of elements. In this topic students will deepen their understanding of the differences between substances that they have started in this topic.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Home learning task – metals and non-metals worksheet (differentiated and will be self/peer assessed in lessons) and end of topic test completed online and marks reported to teacher.	As above
Year 7 Spring 2	Genes (Variation and human reproduction) 2 weeks 7 lessons	<u>Link to vision statement:</u> As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning. Key exam technique is built upon during appropriate activities. Students are supported and encouraged to ask any questions they have. There is a strong feeling among our science teachers that this topic understandably generates a huge amount of curiosity in students and	**Building knowledge** This topic builds on learning from KS2 when they are introduced to human reproductive systems. It also builds on learning from the autumn term on cells. **Preparing for new learning:** This topic introduces concepts that will be revisited as part of students' RPS course, for example, puberty and reproduction. It also leads into the Genes topic in year 8 that	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Home learning – Adaptations BUG the question task (extended writing) (self/peer/teacher assessed)	As above

		that it is important that they always do their best to answer any reasonable question with thought, care and sensitivity. These are often related to the ideas of variation in terms of race and gender as well as ideas around infertility, miscarriage, puberty and contraception.	looks at inheritance and evolution.	Low stakes quiz. Extended writing – Menstrual cycle (self/peer/teacher assessed)	
Year 7 Summer 1	Waves (sound and light) 3 weeks 10 lessons	<u>Link to vision statement:</u> As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning. Students are expected to follow instructions independently or in pairs to gain valid data and make accurate conclusions. In this topic this is largely practised through drawing ray diagrams where students can practise working with precision to draw accurate diagrams. Key exam technique is built upon during appropriate activities Numeracy skills are developed in the form of drawing and interpreting graphs as well as in the use of protractors to measure ray diagrams.	**Building knowledge:** This topic requires students to apply their learning from both the Particles topic and the topic on Energy as they need to recall how particles interact as well as the concept of energy being transferred. It will also draw on learning in KS2 on sound and light. **Preparing for new learning:** This topic forms the building blocks for the Waves topic in year 8 that will look at the effects of waves and their properties in more detail.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Extended writing – Comparing an eye and a camera lens (self/peer/teacher assessed) Home learning – Refraction exam question (self/peer/teacher assessed)	As above
Year 7 Summer 1	Electromagnets (current and voltage and resistance)	<u>Link to vision statement:</u> As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning. Students are expected to follow instructions independently or in pairs to gain valid data and make accurate conclusions. Students will be given the opportunity to investigate current and potential difference in series circuits. Depending on the level the class is working at, the teacher may opt to do this as an enquiry-based activity or a more guided task. Use of calculations is further developed as students study resistance. They will be given the	**Building knowledge:** Students will apply their understanding of the structure of an atom to the transfer of electrons through a circuit. They will also build on learning from KS2 when they will have been introduced to the idea of circuits and electricity. Students have further opportunities to develop their confidence with using and manipulating equations. **Preparing for new learning:** This topic will feed into a topic in year 8 where students will build on their understanding	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Home learning – Resistance calculations (self/peer/teacher assessed) Much of this topic will be assessed in lessons through teachers observations and questioning to identify misconceptions.	As above

		opportunity to practise rearranging equations using triangles.	of circuits to investigate electromagnets.		
Year 7 Summer 2	Ecosystems (interdependence and plant reproduction) 3 weeks	<u>Link to vision statement:</u> As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning. Students are expected to follow instructions independently or in pairs to gain valid data and make accurate conclusions. In discussions about food chains and bioaccumulation, teachers are able to raise awareness in students of the impacts of human activities on the environment.	**Building knowledge:** This topic will build on students own knowledge of wildlife and the environment. It will also draw on learning from KS2 around animals and plants, in particular plant reproduction. **Preparing for new learning:** The concepts of interdependence and adaptation is built on in year 8 as students will revisit the Ecosystems topic and learn about photosynthesis and respiration.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Home learning – Plant reproduction exam questions (self/peer/teacher assessed) Extended writing – seed dispersal (self/peer/teacher assessed)	As above
Year 8 Autumn 1	Electromagnets (electromagnets and magnetism) 2 weeks	<u>Link to vision statement:</u> This short topic gives students the opportunity for enquiry-based learning. Students must work as part of a group to produce a method for investigating the strength of an electromagnet. This occurs halfway through the topic when students should have built up sufficient background knowledge to work independently. There are several opportunities for students to continue to build their confidence in using the practical equipment and independence with troubleshooting any issues they might encounter.	**Building knowledge:** This topic will build on students work in the summer term of year 7 when they learnt about circuits, current and voltage. **Preparing for new learning:** This topic will allow students to use and apply their ideas of circuits and currents. They will revisit this again in year 10 as part of the electricity topic and year 11 when they study electromagnets at a GCSE level – this means the addition of concepts like the right hand rule to build and extend their KS3 knowledge.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Extended writing – using electromagnets (self/peer assessed)	As above
Year 8 autumn 1	Matter (periodic table and elements) 3 weeks	<u>Link to vision statement:</u> This topic provides several opportunities for students to work independently on research tasks. They	**Building knowledge:** This topic will build on the 'Matter' topic from the autumn term of year 7. It will	**Assessment opportunities within this topic will include some, if not all, from**	As above

		are supported in developing their research skills and taught how to use the internet effectively to find reliable sources of information. Key exam technique is built upon during appropriate activities. In this topic, students will have the opportunity to develop their practical skills both through use of equipment, but also through drawing conclusions from observations.	allow them to apply more specific concepts to the general idea of particles. In particular, students will be encouraged to consider the new idea of elements and compounds alongside their understanding of mixtures and pure and impure substances which they were introduced to in year 7. **Preparing for new learning:** The terminology and concepts covered in this topic form the essential foundations for GCSE Chemistry.	**the selection given above.**	
Year 8 Autumn 1/2	Organisms (Breathing and digestion) 3 weeks	**Link to vision statement:** This topic provides opportunities for discussion and enquiry as students consider the mechanisms and systems for breathing and digestion in bodies. As students will have some prior knowledge of nutrition and diets there is the opportunity to challenge ideas and include group discussion, critical thinking and debate. Students will further practise their research skills as they investigate the concept of an unhealthy diet. This contributes to important self-care skills that students need to be healthy. Key exam technique is built upon during appropriate activities.	**Building knowledge:** This topic builds on knowledge covered as part of the organisms topic in year 7 where students learnt about cells and movement. This topic continues the idea of multiple components in a system working together to perform a function as they saw with the muscles and skeleton. **Preparing for new learning:** This topic will be further developed in year 9 when students cover the GCSE science topic on cells in the first term. This will then continue into the organisation topic which is covered across year 9 and 10.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.**	As above
Year 8 autumn 2	Earth (climate and earth's resources) 3 weeks	**Link to vision statement:** Students will have some general knowledge associated with climate change. The knowledge will have come from many different sources and will likely incorporate several	**Building knowledge:** This adds to the Earth topic studied by students in year 7 where they considered the earth's structure and rock cycle. This topic then takes	**Assessment opportunities within this topic will include some, if not all, from the selection given above.**	As above

		misconceptions and 'fake news'. This topic aims to challenge these misconceptions and build students understanding of the issues facing the planet as a result of climate change. Encouraging students both to think deeply and also to care about issues that are impacting people across the world. Key exam technique is built upon during appropriate activities.	this further to think about the atmosphere, nutrient cycling and resources taken from the earth. It also ties into content in the Ecosystems topic studied at the end of year 7 where students take about the impact of human activity on ecosystems. **Preparing for new learning:** This topic builds foundation knowledge to support students in accessing content in both Chemistry and Biology at GCSE where they study the impact of humans on the planet in more detail.	**Specific examples as follows:** Extended writing (climate change) (self/peer assessed)	
Year 8 autumn 2	Forces (contact and gravity) 4 weeks	**Link to vision statement:** This topic provides many opportunities to recap and retain prior learning. In particular, the skill of graphs and results tables is revisited during an enquiry style investigation and then students will have the opportunity to practise this further as part of the spring investigation. This topic challenges students to apply their understanding of forces to a range of scenarios, for example in the context of pressure in water. This supports them in retrieving knowledge and embedding it into schema.	**Building knowledge:** This topic builds on Forces topic from year 7. In this topic students were introduced to the fundamental ideas around forces. They covered the basics of forces and motion and weight. In year 8, the students will expand their vocabulary and learn to apply the general concept of forces to several different types of forces. **Preparing for new learning:** This topic, building as it does on the topic in year 7, sets students up with the fundamental knowledge that will allow them to access the forces topic in year 9 and forces and motion in year 10. In these topics they revisit similar ideas but in greater depth.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Extended writing (drag and friction) (self/peer assessed)	As above
Year 8 spring 1	Genes (evolution and inheritance) 3 weeks	**Link to vision statement:** As part of this topic, students are given extensive opportunities for discussion, think deeply and questioning. This is a topic that	**Building knowledge:** This topic area builds on students learning in the Genes topic in year 7 where students learnt about the process of	**Assessment opportunities within this topic will include some, if not all, from the selection given above.**	As above

		students are often very engaged with as it opens lots of avenues for enquiry in terms of inheritance and evolution. Students will have opportunities to continue to practise their research skills developed in the organisation topic.	reproduction in both humans and plants. They also covered the idea of variation. No win year 8, students can deepen their understanding and think about the mechanisms that allow for variation to occur. **Preparing for new learning:** Inheritance and evolution is a key idea in Biology that is often referenced in general conversations and the media. This topic will give students some foundation knowledge to be able to interpret what they may come across outside of the classroom. It also gives them a basic understanding that will be built on in year 11 when students cover this topic for their GCSE course.	**Specific examples as follows:** Storyboard task (natural selection) (self/peer/teacher assessed)	
Year 8 spring 2	Reactions (chemical energy and types of reactions) 4 weeks	<u>Link to vision statement:</u> This topic allows students to develop their confidence in chemistry practical tasks. Students will be expected to follow methods and work independently to collect qualitative and quantitative data, working safely and accurately. Students will develop their skills in using equipment to make accurate measurements.	**Building knowledge:** This topic draws on prior learning from both the matter and reactions topic in year 7 and the matter topic earlier in year 8. Students will need to be able to apply the vocabulary they have learnt in the matter topics and use the practical skills they have developed, in particular in the reactions topic in year 7. **Preparing for new learning:** This is an essential stepping stone for students in securing their knowledge of chemistry in order for them to be able to access the chemistry they will experience in the GCSE course. This applies to both the technical vocabulary but also the practical skills.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.**	As above

Year 8 spring 2	Waves (wave effects and wave properties) 3 weeks	<u>Link to vision statement:</u> As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning. Students are expected to follow instructions independently or in pairs to gain valid data and make accurate conclusions. Halfway through the topic there is an enquiry task to encourage students to think deeply about their learning and be build their confidence in applying their learning to a modelling task.	**Building knowledge:** This topic utilises a lot of the learning from the waves topic cover in year 7, where students learnt about wave structure and properties. **Preparing for new learning:** This topic feeds into the waves topic covered in year 9. In the GCSE course students will be required to use what they have learnt at KS3 retrieve, apply and deepen the concepts.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.**	As above
Year 8 summer 1	Ecosystems (respiration and photosynthesis) 4 weeks	<u>Link to vision statement:</u> Photosynthesis and respiration from this topic are key ideas that link lots of other schemas across the biology course. For example, adaptations, cell structures and food chains. As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning. Students are expected to follow instructions independently or in pairs to gain valid data and make accurate conclusions.	**Building knowledge:** This topic builds on ideas from both the ecosystems topic in year 7 but also the organisms topic in both year 7 and earlier in year 8. **Preparing for new learning:** Having a basic understanding of photosynthesis and respiration going into the GCSE course will enable students to more easily make links between topics and to approach new contexts in exam questions with more confidence.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.** **Specific examples as follows:** Exam questions (aerobic respiration) (self/peer assessed)	As above
Year 8 Summer 2	Energy (work and heating and cooling)	<u>Link to vision statement:</u> As in previous topics, there is plenty of time given to peer and class discussion to support students in developing their ideas and encourage them to think about their learning. Students are expected to follow instructions independently or in pairs to gain valid data and make accurate conclusions.	**Building knowledge:** The energy topic in year 7 deals primarily with the tangible idea of energy in the form of generating electricity, food and power. This topic builds on this as it starts to delve into the how and why. This also brings in knowledge on particles from the matter topic in year 7.	**Assessment opportunities within this topic will include some, if not all, from the selection given above.**	As above

			Preparing for new learning: This topic covers key ideas for particles and energy transfers that will be used by students in both the particles and energy topic covered in the first part of year 9. This in turn is foundation knowledge for a significant part of the chemistry and physics courses.		

Unit of Work		**(Vertical Curriculum & Spiral Curriculum)** **Why do students study it?**	**(Vertical Curriculum)** **Why do they study it when they do?**	**(Vertical Curriculum)** **How will their grasp of the Big Ideas be assessed?**	**(Spiral Curriculum)** **How will they be supported to remember & retrieve the Big ideas?**
Year and term	What is the title of the unit? How many weeks of how many lessons will it last for?	What are the **essential skills, concepts, knowledge** that students will **need later on?** How do they build students up **towards the curriculum end points** you have identified above? How else does this unit **implement the ideas in your vision statement** above?	How do the Big Ideas in this unit build on those from previous units? How do they prepare students for those in future units?	How will the Big Ideas be assessed? Outline the assessed task and assessment objectives.	What strategies will be used to help students remember and retrieve the Big Ideas over time? (E.g. retrieval practice with knowledge organisers, spaced testing etc).
		The KS4 routes are generally in line with the specification laid out by the AQA exam board. The content is organised within the topics and sequenced by AQA in such a way that students can constantly build on prior learning. **Our routes interleave between biology, chemistry and physics topics to encourage links to be made between the subjects.** **Where our routes differ from the order of the content laid out in the specification, details are given below.**		AfL in each lesson Exam questions (self/peer assessed) linked to both required practicals. Osmosis exam question – set as a home learning task (teacher assessed). End of topic assessment (self/peer assessed) Formal assessments three times a year.	Weekly home learning set via ScienceSurgery.com and in-lesson retrieval quizzes. Retrieval tasks, such as hinge questions, that recap prior learning set throughout lessons. (Teacher-dependent based on AfL in each lesson) Summary sheet for the required practical completed and kept in a folder for easy reference by students. Interleaving weeks are scheduled at regular intervals throughout the routes with lessons planned to revisit how science works skills and key vocabulary. In class retrieval starters via sciencesurgery.com – personalises the Q to the class and to the students.

Year 9 Autumn term	Particles (5.1 + 5.2.1.1 + 5.2.2.2 + 6.3 NOT 6.3.2.2) 5 weeks (16 lessons)	**Links to vision statement** Merging two chemistry and physics units in the Particles topic encourages students to think deeply about the concepts being taught and make links between the subjects. This topic also brings in some simple practical tasks around separating mixtures and investigating the properties of elements in the periodic table. As they learn about density at the end of the topic they will complete their first required practical where they will be given the opportunity to plan, implement and analyse and/or evaluate a practical investigation. This is where teachers will work with students to encourage them to grow in confidence and build their skills in independent learning.	This topic incorporates a combination of the 5.1 Atomic structure and the periodic table unit from the AQA specification along with 6.3 Particle model of matter. We have merged chemistry and physics topics here as this gives students a good grounding in the language and concepts used to describe particles and substances in different contexts. Teaching them alongside each other also helps to clarify misconceptions around what we mean when we talk about 'particles' as students often struggle to convert from the micro (atoms) to the macro (solids). A small point from the specification is not covered in this topic and is instead covered in the next chemistry topic (Structure and bonding) this relates to specification point 5.1.2.5 and 5.1.2.6. An explanation for this change is included with that topic. **Building on prior knowledge** This topic builds on learning in the KS3 course where students learn about atomic structure, the particle model and the structure of the periodic table. At KS4 we take the ideas have been already introduced and deepen their understanding using GCSE level vocabulary and a greater level of application of knowledge. **Preparing for future learning** This topic covers the Big Idea of particles and how they interact. This is fundamental to students understanding of the chemistry topics in the remainder of the course, e.g. Structure and bonding and Chemical changes as well as the physics topic, Radiation.	As above	As above
Year 9 Autumn term	Energy (NOT 6.1.1.3 SHC) 3 weeks (12 lessons)	**Links to the vision statement** This topic builds on students' knowledge of energy resources covered in KS3 and considers the impacts of burning fossil fuels. Discussions around these issues are started here and will be continued in the ecology and chemistry of the atmosphere topics covered in year 10 and 11. Teachers will work to build an awareness in students of some of	This topic follows the 6.1 Energy topic in the AQA specification. The only section of this unit not included from the specification is specific heat capacity as this is best covered when students have a firmer understanding of recording and calculating current, potential difference and resistance. **Building on prior knowledge**	As above	As above

		the issues facing our planet and society as a result of our energy use.	This topic revisits content introduced in the KS3 course in terms of energy transfers and energy resources. **Preparing for future learning** This topic is completed as the first or second topic in the route (depending on the class) as it covers fundamental ideas that link to the Particles topic and are built on in later topics such as Waves and Electricity.		
Year 9 Autumn term	Cells (4.1 + 4.6.1.3, 4.2.2.7) 4 weeks (16 lessons)	**Link to vision statement** To build a deeper understanding of the topic, students will be given opportunities to apply this knowledge to unfamiliar contexts. For example, they should be able to apply their knowledge of the basic structure of an animal cell to a specialised animal cell they have not seen before. This will encourage them to think more deeply about their learning. This topic supports students in building a greater understanding of the world around them as they start to develop their knowledge of how organisms function. They will also be guided in evaluating information linked to the use of stem cells. They will be expected to be able to express a balanced judgement using information they are given. In lessons, students will be encouraged to discuss and debate their ideas and opinions. Students will also continue to grow their confidence in practical scenarios as they will complete 2 required practicals with a variety of skills revisited in each.	This topic follows the 4.1 Cells unit in the AQA specification. In addition to 4.1 Cells, students will learn about cancer (4.2.2.7). This is given in the AQA specification as part of the 4.2 Organisation unit. In the Cells topic it is taught following on from content on cell division as cancer is what happens when the process of cell division goes wrong. This adds a real-world context to the process of cell division. **Building on prior knowledge** There is a strong focus on recapping of vocabulary from KS3 (e.g. structure and function of a cell) and Working Scientifically skills, for example, the use of a microscope and analysing data using numerical and graphical methods. **Preparing for future learning** This topic underpins most future learning in biology. Knowledge of cell structure and function as well as specialised cells and transport of substances feeds into later topics such as Organisation (covered in year 10) and Bioenergetics (covered later in year 9). Understanding of DNA and cellular growth is important for the Inheritance, variation and evolution topic (covered in year 11).	As above	As above
Year 9 Spring term	Structure and bonding (5.2 NOT 5.2.2.1 or 5.2.2.2) 3 weeks (12 lessons)	N/A	This topic follows the 5.2 Bonding, structure and the properties of matter unit in the AQA specification. **Building on prior knowledge** This topic requires students to build on learning from the Particles topic. For example, ionic and covalent bonding can not be accessed		

			without a solid understanding of the electronic structure of an atom covered in the Particles topic. It also builds on students' understanding of the structure of the periodic table (covered in Particles) as students revisit the structure and properties of the groups to learn about trends in reactivity (covered in the specification in unit 5.1). This is more accessible for students here as it requires an understanding of atoms losing and gaining electrons which is introduced as part of ionic bonding. **Preparing for future learning** Knowledge of the key concepts of different types of structure and their properties is fundamental knowledge that is then applied in the Chemical changes, Energy changes and Organic chemistry topics.		
Year 9 Spring term	Forces (6.5.1-6.5.3 only) 2 weeks (8 lessons)	**Links to the vision statement** There is an opportunity in this topic for students to continue to grow their confidence in terms of their practical skills. In the forces and elasticity required practical, students are particularly encouraged to think about potential sources of error in their investigation alongside the usual skills of evaluating risk and recording and analysing data.	This topic follows the first part of the 6.5 Forces unit in the AQA specification. It comprises 6.5.1-6.5.3. The remainder of the unit is delivered during the year 10 spring term as the topic 'Forces and motion'. This early part of the Forces unit is taught out of sync with the order of the AQA specification. One reason for this is that the idea of forces is a key concept that it is important to clarify early and to distinguish from energy (taught in the previous term). There are many links and similar concepts between the topics. A common confusion between students comes from muddling weight with gravitational potential energy, for example. Another reason for covering this content at this point in year 9 is that it serves as a useful opportunity for retrieval. The idea of work done is introduced and linked to the idea of energy transfers. In addition, exam questions can link the forces and elasticity required practical with the equation for calculating elastic potential energy.		

			The entirety of the Forces unit is not covered at this point in the route as there are many concepts in the Forces and motion topic that rely on a confidence with forces, manipulating equations and interpreting graphs that are better introduced in year 10 when students have had the chance to build their mastery of these skills. **Building on prior knowledge** As stated above, there are many links here with the Energy topic that allow students to enhance their understanding of how interactions between objects occur. **Preparing for future learning** This topic provides opportunities for students to practise and develop their skills with substituting values into equations, rearranging equations and converting units, as well as linking more than one equation. These skills are essential for the Forces and motion and Electricity topics that will be delivered in year 10.		
Year 9 Spring / Summer term	Infection and response 3 weeks (12 lessons)	**Links to the vision statement** There are many opportunities in this topic for students to develop an awareness of issues around health within society. This might be through understanding how poor sanitation can lead to the transmission of disease or through a discussion of the development, use and accessibility of vaccinations and antibiotics.	This topic follows the 4.3 Infection and response unit in the AQA specification. An addition to this topic is taken from the 4.2 Organisation unit. Students are taught 4.2.2.5 health issues and 4.2.2.6 the effect of lifestyle on some non-communicable diseases. This is covered as an introduction to the Infection and response topic. This small section of content contains ideas that are familiar for students from both general knowledge and from KS3 and so leads in nicely to the idea of diseases and their impact on the body. It also serves as a useful comparison when students then continue through the topic to learn about communicable diseases and helps to deepen their understanding of the difference between the two. Content from 4.3 Infection and response is taught before content from 4.2 Organisation as the bulk of the organisation unit is taught closely linked with the 4.4		

			Bioenergetics unit. This will enable students to make important links between the two units, however, organising and retaining the information required to make these links is something students find difficult and so this is left until the early part of year 10 when students are more comfortable with GCSE Science and the key concepts. **Building on prior knowledge** Students' knowledge of the structure of animal and bacterial cells taken from the Cells topic is essential here. **Preparing for future learning** This topic builds an appreciation for the cause and effect nature of actions within the body. For example, a cut breaks the barrier of the skin, which allows pathogens to enter, which causes infection and a response from the immune system. The ability to apply knowledge to form a chain of events is important for students in later units such as bioenergetics.		
Year 9 Spring / Summer term	Using resources 2 weeks (8 lessons)	**Links to the vision statement** In this topic, teachers will engage students in discussions and debate around the consequences of humans' use of natural resources. Students will be encouraged to think about what is happening and why, as well as exploring what can be done. Students should come out of this topic with a greater awareness of the impact of our lifestyles on the planet. In addition, this topic allows students to apply knowledge already covered in KS3 and deepen their understanding as they are introduced to new concepts such as life cycle assessments.	This topic follows the 5.10 Using resources unit in the AQA specification. This is taught out of sync with the AQA specification. We have chosen to do this for two main reasons. The first is that this is an easily accessible topic for year 9 students. The second is a matter of retrieval and developing ideas. The content on desalination and required practical on potable water allows them to revisit the ideas of physical changes of matter covered in the particles topic in the autumn term. In addition, the content on finite and renewable resources, LCAs and recycling builds on a KS3 topic, 'Earth's resources'. **Building on prior knowledge** As stated above, this topic revisits and develops ideas from the Particles topic in the autumn term of year 9, as well as the KS3 topic Earth's resources covered in the spring/summer of year 8.		

Year 9 Summer term	Bioenergetics – photosynthesis 3 weeks (12 lessons)	**Links to the vision statement** As explained in the adjacent column, this topic is structured in such a way, drawing on 2 areas of the specification, that students are able to develop a higher level of understanding of the content than would have been possible if the topics were taught separately. This will ensure students are better equipped to confidently apply the knowledge from this topic to a greater range of contexts.	This topic incorporates content from two units in the AQA specification. 4.2.3 Plants, organs and systems taken from the 4.2 Organisation unit alongside 4.4.1 Photosynthesis taken from 4.4 Bioenergetics. The reasoning here was that there are so many links between the two areas of content within those units that teaching them together could only serve to build a more holistic view of the system and thereby significantly aid retention and understanding. Exam questions frequently require students to draw on their knowledge of both topics together and so it makes sense to create those connections from the outset. **Building on prior knowledge** This topic links to the Bioenergetics topic taught in year 7 that introduces the idea of adaptations in the leaf and the concept of photosynthesis that is then developed and expanded in this topic. In addition, students will need to draw on their knowledge of plant cell structure and specialised cells taken from the Cells topic delivered in the autumn term of year 9. **Preparing for future learning** This topic provides a good grounding in the workings of plants that will support students understanding of the concept of competition and interdependence that is covered in the Ecology topic at the end of year 10. It also provides students with additional context to embed their understanding of the link between structure and function which is an important idea in many of the science topics.		
Year 9 Summer term	Waves 2 weeks (8 lessons)	N/A	This topic follows the 6.6 Waves unit in the AQA specification. It is taught prior to topics on electricity and atomic structure, which come before waves in the AQA specification, as the content is accessible for year 9 students.		

			Building on prior knowledge The concept of waves as a form of energy transfer allows for links to be made with the Energy topic here. **Preparing for future learning** This topic leads on to further discussion of the effects of ionising radiation in the Atomic structure topic that is introduced in year 10. It also gives a different context for the calculation of speed that is the starting point for the Forces and motion topic delivered in year 10.		
Year 10 Autumn term	Electricity 4 weeks (16 lessons)	**The topic builds on the topic of electricity and allows students to apply their knowledge to specific heat capacity.** Links to vision statement are around the fact that many students are interested in a career in electrical engineering – let's face it, electrical cars are coming are we need more electrical mechanics. We challenge students to work on their perseverance – electoral equipment is notoriously dodgy! It also encourages problem solving.	This topic follows the '6.2 Electricity topic in the AQA specification. **Building on prior knowledge** Concept from KS3. The only exception is that we teach "Specific Heat Capacity" in this topic and not in "Energy". To understand how we can calculate the power transferred to the immersion heater students need to know about ammeters and voltmeters and the concept that P= IV. This topic follows on from Energy taught in year 9 and allows us to revisit Power. It's taught in year 10 as it allows us to interleave the idea of power but also students are more mature and have greater scientific knowledge. Electricity can be a difficult topic to grasp. **Preparing for future learning** Supports students with the future topic of magnetism.	AfL in each lesson Exam questions (self/peer assessed) linked to required practicals. SHC exam question – set as a home learning task (teacher assessed). End of topic assessment (self/peer assessed)	
Year 10 Autumn term	Organisation - circulation system 1 week (4 lessons)	**Healthy living concepts around diet and exercise.** **Link to everyday diseases that many families have faced, Statins and pace makers being the most common. We look at evaluating costs to society via a lesson on statins and looking at which drug should be given to a patient. We also look at how people have a responsibility to look after themselves.** **Link to careers around GPs – activity were students need to act as a GBP and decide whether**	**Building on prior knowledge** Builds on the topic of cells. **Preparing for future learning** Introduces the idea of non-communicable diseases. As per spec, except for the fact that we teach coronary heart disease here and not as part of the topic of disease. This is because we think it allows us to get students to apply their knowledge and get a deeper understanding of the heart as apposed to doing in two sections.	As above	

		drugs and the cost to the NHS are actually required.			
Year 10 Autumn term	Bioenergetics - respiration 1 week (4 lessons)	We've already taught the topics of particles, energy and photosynthesis in year 9 so allows us to link back to these ideas.	**Building on prior knowledge** We split this into two topics: Photosynthesis – which is done in year 9 and Respiration – in year 10. This is because we think it's important to teach the circulatory and respiratory systems before moving onto the topic of respiration. **Preparing for future learning** The carbon cycle relies heavily on understanding respiration. This is taught under Ecology at the end of year 10. Idea that O2 is required link is need for the evolution of the atmosphere.	As above.	
Year 10 Autumn/ Spring term	Forces in motion (6.5.4-6.6.5) 3 weeks (12 lessons)	**There are lots of opportunities to support students with their maths skills and also realise that the units can tell them what to do, for example: kgm/s.** **Do we have a lesson where we think about designing a fairground ride?** **We also link to safety while driving and get students to think about the responsibility of car owners to make sure they are fit and their vehicles are. We also link this to MOTs for those students thinking of becoming mechanics,**	We teach this as per the spec apart form the fact we split forces up into two halves as it's a massive topic and we've found students can lose interest. **Building on prior knowledge** We do forces in action in year 9, so now we can build on that knowledge.		
Year 10 Autumn/ Spring term	Chemical changes gap to fill				
Year 10 Spring term	Chemical analysis 1 week (4 lessons)	**Link to vision statement:** Develops students understanding of the importance to not take a company's claims for granted and the use of being able to analyse substances to ensure they are safe and as advertised. For example, the use of chromatography to identify the substances in a given food colouring to ensure no banned additives are being used.	This topic has been moved earlier than the structure in the AQA specification. **Building on prior knowledge** This is because it allows for a timely link back to the learning of mixtures and separation techniques studied in year 9. **Preparing for future learning** Pure substances having specific boiling points is required to help with the topic of Organic Chem which is taught in year 11.		
Year 10 Spring term	Homeostasis and the nervous system. Spec points: 4.5.1, 4.5.2, 4.5.3.1, 4.5.3.2	**Links to health and exercise – diabetes type II – this is a massive cause of health problems in the UK and affects many students' families – it is also one that can be avoided.**	As per spec. Apart from the fact that this topic is split into two parts. Students struggle with the menstrual cycle, so we leave that until year 11 when they are a more mature and it also allows us to work		

	NOT reproductive hormones. 2 weeks (8 lessons)	**We look at the moral issues from food co, Gov and the individual.**	on retrieval of knowledge covered now in year 10. **Building on prior knowledge** Need to understand that neurones are specialised cells that transfer electrical messages from the topic of specialised cells covered in year 9. Need to understand the concept of osmosis (taught in year 9) as to why it's important to maintain water, sugar and ion levels in the blood. The fact that sugar is transported via the blood from the topic of digestion. **Preparing for future learning** Reproductive system under hormonal control is covered in year 11. Being able to respond to your surroundings links well to the topic of evolution (covered in year 11)		
Year 10 Spring term	Energy changes 1 week (4 lessons)	Link to everyday resources students are familiar with: Hand warmers, cold packs from the nurse, self-heating coffee cans, etc. Interpreting graphs.	As per spec. **Building on prior knowledge** Idea of conservation of energy to explain that heat energy must be taken in or given out in order to balance/meet this law. Build on idea of neutralisation reactions and that these give out heat energy. Build on the physics concept of energy. **Preparing for future learning** Understanding of reversible reactions and reaction profiles are required for rates of reaction and catalysts and also for understanding dynamic equilibriums (covered in yr11)		
Year 10 Spring term	Organisation - digestive system 2 weeks (8 lessons)	Links to diet and healthy living. - Link to food nutrition careers? Practical skills here require team work in order to complete in a timely fashion.	We teach this at a later point than the rest of this topic because it allows us to break up a large topic, make links to prior learning in order to strengthen longer term retention of knowledge and also because the practical skills here require a greater set maturity. It's also a challenging practical which if done in year 9 is a long time ago by the time they get to year 11.		

			Building on prior knowledge We've already covered the concept of cell organisation in year 9. We can link back this in a timely fashion. Also are made back to the idea of multicellular organisms and how they have specialised exchange surfaces. **Preparing for future learning** Needed for genetic disorder of Cystic fibrosis. Links to biological catalysts when we look at rates of reaction.		
Year 10 Spring /Autumn term	Atomic structure All 6.4 2 weeks (8 lessons)	Can we link to careers? Rolls Royce and nuclear engineers? Small modular reactors are the future – lots of new jobs. Further develop student's maths skills and also to understand the risks and dangers of radiation and also the uses – many of which affect their everyday lives – smoke alarms, increasing shelf life of foods, etc.	**Building on prior knowledge** We follow the AQA spec apart from the "development of the model of the atom". This is taught in year 9 under particles but is added to in terms of Chadwick and Bohr. Gives us a chance to retrieve information covered in year 9. The topic also builds on the structure of the atom, also taught in year 9 – good point to retrieve this info and support long term retention. Also, conservation of mass when writing nuclear equations. **Preparing for future learning**		
Year 10 Summer term	Quantitative chemistry 2 weeks (8 lessons)	**Work on good scientific numeracy skills. Support students by linking to concepts they are familiar with, for example looking at ratios as cooking with "parts" 2 parts water, one-part flour.**	As per AQA spec. **Building on prior knowledge** Builds on content learnt from periodic table. Looking at relative atomic masses.		
Year 10 Summer term	Ecology 3 weeks (12 lessons)	**Link to vision statement:** Develop students' understanding of the issues facing our planet with regards to biodiversity, waste management and food security and production. This will enable students to make informed decisions and capable to contribute positively to our planet and society.	**As per spec.** We teach this topic out of sequence compared to AQA because we felt it important for students to understand what adaptations are before looking at inheritance and evolution. **Building on prior knowledge** KS3 ideas behind sampling and adaptations and also the idea of evolution via natural selection. **Preparing for future learning** Links to content within Chemistry of the Atmosphere. Students revisit the ideas, eg deforestation and link these to global warming.		
Year 11 Autumn	Organic chemistry 2 weeks	**Link to vision statement:**	Despite coming after rates of reaction in the AQA chemistry specification, it is taught before that		

	(8 lessons)	Students are encouraged to describe a balanced and justified evaluation of the World issue of using crude oil. To build a deeper understanding of the topic, students will be given opportunities to apply their knowledge of alkane structures and properties to unfamiliar contexts.	to allow students more time to develop their practical skills before covering the rates of reaction topic. **Building on prior knowledge:** Students will build on their understanding of balancing symbol equations, from year 8 chemical reactions and year 9 particles topics, by applying it to new situations. Students will also build upon the properties of simple molecules from the year 9 bonding topic by applying it to a real-World situation to explain the fractional distillation column. **Preparing for future learning:** Further developing the skill of applying multiple pieces of prior understanding to new real-World issues closer to the GCSEs will better prepare students for AO2 style questions.		
Year 11 Autumn	Magnetism and Electromagnetism 2 weeks (8 lessons)	**Link to vision statement:** Deeper understanding of the topic will be developed through the application of this knowledge to unfamiliar contexts. For example, triple science students need to decipher how microphones work, and all students will need to interpret and explain diagrams showing the use of electromagnets in a device. This also links to nurturing students' curiosity and understanding of the world around them.	**Building on prior knowledge:** There is a focus on how to investigate magnetic fields and the relationship between magnetism and electrical current from the year 8 magnetism topic. It builds upon this by introducing more complex situations which require the use of new equipment for enquiry, further developing students critical thinking and creativity skills. **Preparing for future learning:** In this topic, students need to decipher complex diagrams to explain how devices work. This focus on analysis and high level of application to unfamiliar contexts closer to the GCSE exams, aids students in accessing questions which require these higher order thinking skills.		
Year 11 Autumn	Rates of Reaction (+ the Haber process for triple science from the Using Resources topic) 2 weeks (8 lessons)	**Link to vision statement:** Deeper understanding of the topic will be developed through the application of this knowledge to unfamiliar contexts, such as chemical reactions in industry.	This topic has been moved later than in the AQA specification as there is a high level of practical skill involved. It is logical to allow students more time to become confident in handling laboratory equipment before covering this topic.		

			The Haber process has been moved into this topic from 'using resources' since this content links well with Le Chatelier's principle.		
Year 11 Autumn	Chemistry of the atmosphere and Using resources topic. (All Chem 4.9 + 4.10 NOT 4.10.4) 3 weeks (12 lessons)	**Link to vision statement:** This topic supports students in building a greater understanding of the world around them as they start to develop their knowledge of how materials are produced and the impacts of these processes on the environment. They will also be guided in evaluating information linked to LCAs for different material options for a given product. They will be expected to be able to express a balanced judgement using information they are given. In lessons, students will be encouraged to discuss and debate their ideas and opinions.	These topics follow the AQA specification chronologically and are the final chemistry topics. The learning in ecology regarding the carbon cycle links well to chemistry of the atmosphere, and human impact on biodiversity links well to LCA's. The learning in organic chemistry links well to polymers.		
Year 11 Spring term	Homeostasis – reproductive hormones 1 week (4 lessons)	**Link to vision statement:** Growth in student's wellbeing as students will better understand how to control conception, either by preventing it to reduce unwanted pregnancies or promoting it when they do wish to start a family in their future lives. They will also develop a deeper understanding of the changes that females go through during their menstrual cycle. This will promote respect and caring towards females who may struggle with these changes.	The learning in reproductive hormones acts as a logical introduction to the inheritance, variation and evolution topic which is why it is taught here instead of with the rest of the homeostasis topic in year 10.		
Year 11 spring term	Inheritance, variation and evolution 3 weeks (12 lessons)	**Link to vision statement:** This topic supports students in building a greater understanding of the world around them as they start to develop their knowledge of genetic engineering and selective breeding, as well as inherited diseases and the screening for these during pregnancies. They will be guided in evaluating the ethical and medical factors of these processes and will be expected to be able to express a balanced judgement using given information and their own personal beliefs. This will enable students to help make the world a better place as informed citizens and encourage	Although this is the penultimate topic in the biology AQA specification, students tend to find this topic more abstract than ecology, which is the final topic in AQA specification. Therefore, it is logical to allow students as much time as possible to develop their deeper thinking skills before tackling this topic.		

		their caring of people and causes.			

A Horizontal Curriculum

Key principles

*"**A Horizontal Curriculum**- Students' learning within one subject is linked to their learning in other subjects. These links are meaningful and authentic, rather than contrived or artificial. Where appropriate, common methods for teaching the same numeracy or literacy skills are used across different subjects and where relevant, the Big Ideas students gain from one subject are built upon in another."*

List here the skills, knowledge and concepts that are common between this course and other courses within the college. After discussions with relevant Curriculum Leaders, explain the decisions that were made around sequencing of taught content and common approaches to teaching methods.

A Broad and Balanced Curriculum

Key principles

*"**A Broad and Balanced Curriculum**- The curriculum balances depth (level of detail given to topics or skills) with curriculum breadth (the range of topics or skills covered). The curriculum promotes diversity and includes cultural capital to equip students with the knowledge and skills to succeed in life."*

Explain your strategy and decision-making to ensure all students access a broad and balanced curriculum. What decisions were made around breadth versus depth? How does your curriculum promote diversity? Which cultural capital opportunities are incorporated into your curriculum and how do these equip students with the knowledge and skills to succeed in life?

We spend time making sure students cover everything within the AQA specification. We carry out a lot of investigative work to support students securing knowledge and also work on their How Science Works skills and application of knowledge. We are somewhat tied with regards to the depth that we go to by the curriculum time available, so whilst it is rare that we go much deeper than the specification, we do make links with other content already studied where possible. With regards to Cultural Capital, this is incorporated throughout various topics, for example stem cell research, various diseases such as cancer, heart diseases, diabetes, and other genetic disorders. We also aim to instil an awareness and understanding of the many issues facing our planet to enable students to make informed decisions and contribute positively to our planet and society.

We encourage students to build life skills needed for future careers and so aim to focus lessons on key life skills such as communication, teamwork and perseverance. Our goal is to give them an appreciation of science in the world around them and the rewarding careers that can come from a science education.

An Inclusive Curriculum

Key principles

*"**An Inclusive Curriculum**- The curriculum ambition is the same for all students but is made accessible for SEND, low attaining and disadvantaged students. This means the curriculum and its component lessons are planned on the principle of "teach to the top" but are organised into small individual units which are logically sequenced and then scaffolded to help students each reach their individual highest possible level."*

Explain the approaches you use to ensure that all students access an inclusive curriculum. Explain how the curriculum is adapted to be accessible for SEND, low-attaining and disadvantaged students. How are lessons and teaching resources differentiated?

SEND, low-attaining and disadvantaged students are well-supported in Science. This is primarily through excellent, Quality First Teaching and in-class interventions. Students are appropriately challenged and supported in their lessons. We aim to teach to the top but scaffold lessons and resources to ensure that all achieve that level.

A Work-Related Curriculum

Key principles

*"**A Work-Related Curriculum**- Within each programme of study there are opportunities for students to learn about work in related industries and sectors of the economy. This includes gaining the knowledge and understanding of different careers and jobs."*

Explain the work-related knowledge and skills that you have built into the curriculum and how these are shared with students. Which careers and jobs are linked to and why?

There are many opportunities to link to the world of work through curriculum content. Within lesson, we aim to make links to various industries to highlight a range of career opportunities for students with the aim of improving the relevancy to students. Links are also made explicit with the use of external visitors from industry through online workshops and talks.

An Adaptive Curriculum

Key principles

*"**An Adaptive Curriculum**- Regular planned assessments measure what students have understood from the taught curriculum and there is flexibility to adapt the future curriculum on the basis of this assessment. For example, this could mean finding time to reteach areas of student weakness or to include more opportunities for revisiting content than were originally planned."*

Explain how the curriculum has been planned to be adaptive so that areas of student weakness can be retaught.

In science students are assessed regularly through both low and high-stake assessments. Data from summative assessments is used to inform future planning. Students also receive personalised intervention tasks after every formal assessment (carried out three times a year). These assessments cover a broad range of content that students have been exposed to date on that pathway. These assessments have a similar weighting to real GCSE papers in terms of Demand Level, Assessment

Objectives, Skills, Maths, and How Science Works content. We also have a tracker sheet so that we have mapped out what is assessed when in order to enable us to have an oversight to ensure that key content is assessed regularly and that the various skills are covered throughout their journey.

Through the use of science surgery's "In Class Retrieval" tool, students are exposed to questions from areas they are struggling with on a regular basis. This tool utilises the cognitive science principles of spaced learning, interleaving and retrieval practice. This provides a personalised learning experience for each class and student as it utilises data from a class' performance online and in their assessments to date.