Science Curriculum Map

Intent:

The curriculum has been designed to empower students with virtues that enable them to excel academically and spiritually inspiring them to serve humanity selflessly (Nishkam), with an abundance of love, compassion and forgiveness. The curriculum aims to support students to learn about peace, forgiveness, love and faith in the Divine through their academic subjects, faith practice and personal development.

Our curriculum is constructed around our vision to ensure we remain:

Faith-inspired: learning from the wisdom of religion
Our students explore the divine context of humanity and wonder of all creation. They not only learn about, but also learn from, the wisdom of religions and in so doing explore the infinite human potential to do good unconditionally. We support students to develop aspects of their own religious, spiritual or human identities. They learn about serenity through prayer and humility in service and in so doing, they deepen their own respective faith, and respect the common purpose of all religious traditions, as well as respecting the beliefs of those with no faith tradition. They explore the unique divinity of the individual, and our common humanity.

Virtues-led: nurturing compassionate, responsible human beings
We believe that the fostering of human virtues forms the foundation of all goodness. Our curricula are carefully enriched to allow experiences where our students, teachers and parents alike learn to grow through a conscious focus on virtues. Our virtues-led education approach helps to provide guidance to enable students to understand their choices in order to help lead better lives. Our students become self-reflective and flourish; they are able to build strong, meaningful relationships and understand their responsibilities to the global family and all creation, founded in faith. Students learn to experience faith through lived out through righteous living in thought, action and deed.

Aspiring for Excellence: in all that we do.
Our students and staff alike aim to become the best human beings they can possibly be, in all aspects of spiritual, social, intellectual and physical life. We foster a school culture which inspires optimism and confidence, hope and determination for all to achieve their best possible. This is accomplished through a rich and challenging curriculum, along with excellent teaching to nurture awe and wonder. Students gain a breadth and depth of knowledge and a love of learning to achieve their full potential.
The curriculum at Nishkam School West London has been carefully crafted to be broad, balanced and stimulating, giving every Nishkam student the opportunity to be knowledgeable, multi-skilled, highly literate, highly numerate, creative, expressive, compassionate and

confident people. Knowledge-rich, skills based and Faith-inspired, the Curriculum at Nishkam School West London is delivered through three **Golden Threads** that are unique to our ethos and virtues:

1	Love and forgiveness vs. Enmity and Hate
2	Peace and Collaboration vs. Conflict and War
3	Trust in God

Every composite of our curriculum is constructed of components that have each of these threads at their core. These elements can be clearly identified in our subject-based curriculum maps and Schemes of Learning documents.

The science curriculum is designed to give students a strong understanding of the world around them and promote curiosity. As students move through the science curriculum at Nishkam, they will acquire and practice the use of specific knowledge and skills from the disciplines of biology, chemistry and physics to help them think scientifically, explain what is occurring and predict how things will behave. The curriculum is sequenced in a way to allow learners to regularly revisit topics, therefore new knowledge and skills are built on what has already been taught. Each unit has built in practice, retrieval and reinforcement of the key concepts to ensure knowledge sticks in the long-term memory.

The curriculum is necessarily aspirational, focused on excellence and on securing in all learners a love of learning through the acquisition of knowledge, the study and practice of faith, and an understanding of the world around them. One aspect of the curriculum is the school ethos of the golden threads. Students will learn via collaboration, peace, forgiveness, and love through each unit of work.

Implementation

The science curriculum in Nishkam is based upon the principles of a spiral curriculum so that each year students will build on existing components of knowledge formed in ever-increasing depth and complexity to develop fluency in the fundamentals of science. Retrieval and practice help to promote recall and application of knowledge and skills. There is an even coverage of all three sciences to ensure there is sufficient mastery of each discipline.

In the Primary Phase, the Kapow scheme is used to guide the teaching of science. The scheme provides full coverage of the National Curriculum, following the programmes of study for each year group carefully. It provides the right balance between working scientifically and learning scientific facts. It links directly to scientific knowledge, skills and understanding to ensure that learning is progressive and continuous.

In both Year 7 and Year 8, each Science is individually taught over a term to enable sufficient coverage of the key scientific components and so that there is sufficient time for the embedding of this knowledge into long term learning. Across both years, students are expected to know scientific matters, skills, and processes along with basic maths and literacy skills. Opportunities to develop these skills have been heavily embedded in both the Year 7 and 8 curricula. This is to ensure these skills are secure composites by the time they reach Year 9 as they will encounter GCSE science topics during this year. To ensure that students have sufficient time to embed the key knowledge and skills being taught, students have four lessons per week. The classes are mixed ability groups and teachers differentiate to ensure that students are appropriately supported and challenged within lessons. As an all through school, our KS3 curriculum seeks to build upon the learning students have undertaken in KS1 and KS2 which allows for a smooth transition from KS2 to KS3 science. This is achieved through collaborating with the primary colleagues and supporting them with subject specific knowledge. Work is also done on an annual basis to ensure that the curriculum at KS3 builds on the work done at KS2. KS3 students follow a curriculum which is designed to cover all aspects of the KS3 National Curriculum.

In the final year of KS3, Year 9 students begin a bridging course to build upon the learning conducted in Year 7 and 8 to ensure all students leave KS3 with the strong foundation of knowledge and skills needed to be successful in KS4. Students will build on existing components of knowledge formed during KS3 which will form eventual composites to be assessed in their GCSE exams in Year 11. The students study each science for a complete term to allow for learning to become durable and fluent.

Year 10 and year 11 KS4 Science are allocated 6 Science lessons a week and follow the AQA (9-1) Trilogy and Single Science pathways with a focus on building on previous knowledge from KS3 to develop conceptual knowledge and skills. Triple science is the demanding option for students and is designed for 20% of the cohort; those who have a real love and aptitude for science and who may wish to carry on their studies at A-level. KS4 classes are in ability groups and teachers are expected to ensure there is stretch and challenge for all students within each group. Class sizes get smaller as you move through the sets to provide the support that is needed for students to reach their target grades. Nishkam Science aspires for all KS4 students to have access to and be exposed to the higher tier to ensure a broad curriculum is delivered. Decisions regarding tiering entries are made after the final mocks in Year 11 to ensure that our students have access to a broad and challenging curriculum.

Nishkam science staff have the appropriate subject knowledge to deliver the curriculum and participate in CPD activities that strengthen both pedagogical knowledge and subject knowledge. The department have the appropriate resources and equipment to deliver the science curriculum in an engaging way that uses self-monitoring and reflection to ensure we deliver the specified content in a continually improving way.

All Nishkam science teachers ensure that the Nishkam virtues and values are incorporated in every learning journey and a particular focus is made on the Golden threads of peace, love, collaboration, and forgiveness. Units are designed to highlight opportunities for development of reading skills and clear common misconceptions. When possible, the curriculum seeks to highlight work done by scientists from the BAME community.

Curriculum overview

EYFS

Animals including Humans
- Know and talk about factors that support their health and wellbeing: exercise; being healthy; tooth brushing; sleep routines
- Explore the natural world around them

Seasonal Changes
- Describe what they see, feel, hear outside
- Understand the effect of changing seasons in the natural world around them

Everyday Materials
- Understand some processes and changes in states of matter
- Have access to different materials to use and manipulate

Plants
- Explore the natural world around them, making observations and drawings of plants
- Understand some processes and changes in the natural world

Living things and their Habitats
- Explore the natural world around them making observations and drawings of animals
- Recognise some environments are different to the one that they live
- Develop understanding of the cycle of life – growth and decay over periods of time (caterpillars/seed)

Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 1					
Physics Forces and space: Seasonal changes Learn how the seasons affect the world around us through weather and daylight.	**Chemistry** Materials: Everyday materials Identify and compare materials based on their physical properties.	**Biology** Animals: Sensitive bodies Understand the senses and how humans use them to understand the world.	**Biology** Animals: Comparing animals Compare a variety of animals and their basic needs for survival.	**Biology** Plants: Introduction to plants Name and identify parts of plants and begin observing plant growth.	**Making connections:** Investigating science through stories Use scientific enquiry inspired by narrative to investigate the world.

Year 2					
Biology Living things: Habitats Explore how animals and plants live in different habitats.	**Biology** Living things: Microhabitats Investigate smaller-scale environments and the life they support.	**Chemistry** Materials: Uses of everyday materials Discover how materials are suited to different purposes based on their properties.	**Biology** Animals: Life cycles and health Learn about basic human needs, growth and healthy living.	**Biology** Plants: Plant growth Observe how plants grow and the conditions they need to thrive.	**Making connections:** Plant-based materials Connect plant learning to materials and their uses.
Year 3					
Biology Animals: Movement and nutrition Understand skeletons, muscles and nutrition in animals.	**Physics** Forces and space: Forces and magnets Explore pushes, pulls, and magnetic forces through experiments.	**Chemistry** Materials: Rocks and soil Compare different rocks and explore soil formation.	**Physics** Energy: Light and shadows Investigate how light travels and how shadows are formed.	**Biology** Plants: Plant reproduction Learn about plant lifecycles and reproduction, including pollination.	**Making connections:** Does hand span affect grip strength? Carry out an investigation linking body measurements to strength.
Year 4					
Biology Animals: Digestion and food Explore the digestive system and understand food chains.	**Physics** Energy: Electricity and circuits Build simple circuits and learn about conductors and insulators.	**Chemistry** Materials: States of matter Investigate solids, liquids and gases and how they change state.	**Physics** Energy: Sound and vibrations Discover how sound travels and how pitch and volume work.	**Biology** Animals: Classification and changing habitats Classify animals and plants and explore how habitats change.	**Making connections:** How does the flow of liquids compare? Test and compare how liquids move and flow.
Year 5					
Chemistry Materials: Mixtures and separation Learn how mixtures can be separated using different methods.	**Chemistry** Materials: Properties and changes Investigate material properties and reversible and irreversible changes.	**Physics** Forces and space: Earth and space Explore gravity, friction, air and water resistance through investigation.	**Biology** Living things: Life cycles and reproduction Compare life cycles and reproduction in animals and plants.	**Biology** Animals: Human timeline Learn about human growth and development across the lifespan.	**Physics** Forces and space: Earth and space Understand the movement of the Earth, Moon and planets.

				Making connections: <u>Asteroid size affect the crater size?</u> Investigate the effect of asteroid size on impact craters.	
Year 6					
Biology <u>Living things: Classifying big and small</u> Group and classify organisms by observable characteristics.	**Physics** <u>Energy: Circuits, batteries and switches</u> Explore more complex electrical circuits and components.	**Biology** <u>Living things: Evolution and inheritance</u> Learn how traits are inherited and how species evolve over time.	**Biology** <u>Animals: Circulation and health</u> Study the human circulatory system and healthy lifestyles.	**Physics** <u>Energy: Light and reflection</u> Investigate how light travels and how mirrors and lenses affect it.	**Making connections:** <u>Are some sunglasses safer than others?</u> Investigate UV protection in sunglasses through practical testing. **Chemistry** <u>Year 6-7 Transition Unit The Periodic Table</u> Introduction to the elements and how they are organised on the periodic table.

YEAR 7 KS3 SCIENCE

<u>Half term 1- Introduction to Science Skills</u>

Year 7 students are revisit basic KS3 science skills with opportunities to develop practical, mathematical and literacy skills that would be needed to become a successful scientist throughout KS3 and KS4 Science.

Topics covered:

- Safety, risks and hazards
- Equipment, Measurements, Conversions
- Planning and Variables
- Data analysis, graphs, calculating averages
- Listening and reading skills

Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Chemistry After learning Science skills, students further develop their learning about the fundamental components in Chemistry such as states of matter previously taught in Year 4. Students evaluate scientific models, analyse data to predict the properties of materials and begin to develop their mathematical reasoning skills. Topics Covered: • Scientific Skills • Atoms, Elements and compounds • Particle model • Separating techniques	**Biology** This half term, students develop a strong understanding of the structure of plant and animal cells, cell functions and cell adaptations. Students study the skeletal system and muscles, which is built upon further in Year 8. Students will also learn how to convert between different units and understand standard form. Topics Covered: • Elements, atoms and compounds • Separation techniques • Cells • Body systems	**Biology** After studying the human body, students begin content on reproduction in plants and animals, looking at puberty and adolescence in humans, and plant adaptations; Students build further upon the concept of photosynthesis, and students can investigate this further through a series of core practicals. Students further expand their knowledge from Year 5 by learning about plant adaptations and ecosystems. This unit builds on their knowledge of living things and their habitats from KS2 Topics Covered: • Health and lifestyle • Reproduction in humans and plants	**Physics** Students further their knowledge from Year 4 on forces, motion and pressure. Here they continue with basic principles of motion and forces, specifically an introductory understanding of Newton's laws. These ideas are introduced in Year 7 so students can develop their understanding of components originally introduced during the teaching of Forces in KS2. Topics Covered: • Mass and weight • Gravity • Hooke's law • Speed, distance, time • Calculating pressure	**Physics** Students build on their knowledge of Earth, Space and Electricity learned in Year 5. Students elaborate on their knowledge of electricity and circuit diagrams and understanding current, voltage and resistance in a circuit. Students will also learn the basics of magnetism and link this to electromagnets. Topics Covered: • Electricity- current, voltage, Circuits and resistance • Magnetism- Magnetic fields and electromagnets	**Chemistry** Students build on their knowledge of atomic structure and the particle model and learn about the arrangement of elements in the periodic table. This topic links to prior concepts learned in KS2. Across several practical's, students develop their scientific inquiry skills and evaluate results. They will also develop their graph drawing skills. Topics Covered: • Periodic table- metals and non-metals, groups and periods • Acids and alkalis • Metals and acids Careers Students will then be applying their knowledge obtained throughout the year, to looking at different careers in STEM, and possible pathways to follow school.
YEAR 8 KS3 SCIENCE					
Chemistry We start the first half term with learning about electron configuration and how metals react with other substances. This builds up on their prior knowledge about atomic structure from	**Biology** This half term students build on their knowledge of biological concepts from end of KS2 & Year 7 Autumn 2. We continue exploring photosynthesis, and students can investigate this further through a series of core	**Physics** Year 8 students are reintroduced to KS2 and KS3 physics with Waves and the EM spectrum. They first begin learning about the properties of waves and practise wave speed calculations that require rearrangement, including standard form and	**Chemistry** In this half term, the students return to Chemistry and study The Earth and the atmosphere. The students are taught the structure of the Earth, rock cycle and changes in the atmosphere and the effects of this on the planet. This opportunity	**Physics** This last half term, students move on to Energy, which is new content. Students will build an understanding of the fundamental components in this topic. Student's revisit and build on these ideas at GCSE, allowing them to deepen	**Maths Skills** Students will refine their key maths skills needed to prepare them for the step up to Year 9 science. They will focus on the key skills and topics needed for their bridging year to GCSE, as determined by the science and maths department. The

Year 7. This is built on to teach students about how atoms behave in different chemical reactions such as combustion, thermal decomposition, endothermic and exothermic reactions <u>Topics Covered:</u> • Electron configuration • Metals reactions with acid, oxygen and water • Displacement reactions • Chemical formulae • Different chemical reactions	practicals. Students expand their knowledge by learning about plant adaptations and food chains within ecosystems. This unit builds on their knowledge of living things and their habitats from KS2 <u>Topics Covered:</u> • Photosynthesis and respiration • Food chains • Variation & adaptation	converting between units. Students will then learn about Light and sound, building on what they have learned previously in Year 6 during the topic on Light. <u>Topics Covered:</u> • Light • Sound • Space	is used to show students the impact that human activity can have on the environment using fossil fuels. This allows students to re-evaluate their energy choices and how they can help. It also prepares students for Chemistry Topic 8 in GCSE 9-1. <u>Topics Covered:</u> • Structure of Earth • Types of Rocks • Rock cycle • Global warming • Carbon cycle • Climate change • Recycling Extinction	their understanding of the concepts. This opportunity is used to also address misconceptions so that incorrect ideas are not carried forward. This will support students with Physics Topic 3 in GCSE 9-1 in following years. <u>Topics Covered:</u> • Conduction, convection and radiation • Energy stores • Energy transfers • Renewable and non-renewable energy sources	focus will be applying it to a scientific context. **<u>Investigation Skills</u>** Students will review the key skills and knowledge needed to carry out investigations, which will prepare them for covering the required practical's at GCSE level. <u>Topics Covered:</u> • Converting Units • Order of Magnitude • Percentage Change • Standard Form • Drawing Angles • Averages • Decimals, Fractions, percentages • Rounding to decimal places and significant figures • Variables • Writing methods • Drawing graphs • Making conclusions
YEAR 9 FOUNDATION BRIDGING YEAR between KS3 and KS4					

In the first half term, the fundamentals of Biology are the focus. This begins with the topic of Cell Biology which act as an anchor for topics which are studied later in Biology. Ideas of cell features, microscopes, and diffusion are built upon from the previous Key Stage as students delve deeper through topics such as prokaryotic and eukaryotic organisms, light and electron microscopy, and osmosis and active transport. These topics are further consolidated through the final parts of cell biology where students start to develop their knowledge on cell division. The final part of the first half term is spent looking at the topic of organisation, specifically the components of blood and the structure of the heart. <u>Topics covered</u> • Cell structure and transport • Cell division • Organisation • Atomic structure	To complete the first full term, students will Focus on the foundations of chemistry and study atomic structure, Periodic table, Structure and bonding. Students have learnt about the structure of an atom in year 7 and are aware of the position of metals and non-metals on the periodic table. This term will give the students an opportunity to learn about the history of the development of the structure of the atom and the periodic table. Students will also learn the difference between atoms, ions and isotopes as well study the difference between covalent and ionic bonding. <u>Topics covered</u> • Atomic structure • Periodic table • Structure and bonding	To start the spring term, students focus on the quantitative and bulk knowledge of energy while studying Conservation and dissipation of energy. Students further their understanding from KS3 of components such as the conservation of energy, energy stores and energy equations and their calculations. Students complete the first spring half term by looking at how energy is transferred through different materials. students have learnt about different materials that are insulators and conductors in year 8 and will now get an opportunity to look at how conduction occurs on an atomic level. <u>Topics covered</u> • Conservation and dissipation of energy • • Energy transfer by heating	During the second spring term, Students will learn about the organisation of the human digestive system. Students have studied the parts of the digestive system in KS3 and will now have an opportunity to look at what happens on a cellular level. Students will also look at how breathing and gas exchange allows respiration to occur in organisms. This is a part of the Bioenergetics unit of the GCSE AQA specification. Students will also develop their knowledge on renewable and non-renewable resources that was taught in year 8. students will now learn in detail on study how electrical energy is produced through energy from wind, water, the earth, and the sun. <u>Topics covered</u> • Organisation and the digestive system • Bioenergetics - Respiration	Students will already have studied the metal reactivity series, displacement reactions, and the pH scale during year 7 so students will start the summer half term by learning C4- Chemical calculations and C5- Chemical changes. In these units' students will develop their maths skills and learn how to use various formulas to work out masses, moles and reacting mases from balanced equations. Students will also discover ideas of reduction and oxidation, making salts from metals and insoluble Bases, and strong and weak acids and alkalis. <u>Topics covered</u> • Energy Resources • Quantitative chemistry • Chemical changes	The final term of this year will focus on consolidating everything that has been taught in this foundation bridging year. Students will begin to consolidate their knowledge on chemistry and then move on to biology and physics. Consolidation will be done through extensive retrieval activities and exam practice in lessons. The consolidation phase will end with assessments in each discipline. The final part of the year 9 course will be on looking at molecules and matter. <u>Topics covered</u> • Chemical changes • Revision for KAT 3 • Chemical analysis

YEAR 10 COMBINED SCIENCE

Students who are not following the Separate Sciences option for their GCSE's, will be taught the AQA GCSE Combined Science: Trilogy course (8464). Combined Science consists of 6 lessons of science per week where all three disciplines of Biology, Chemistry and Physics are taught. By the end of year 11, each student will sit 6 papers (B1, B2, C1, C2, P1, P2) of 70 marks, lasting 1 hour and 15 minutes each at the end of Year 11. The Combined Science course will be taught according to the map below:

Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Physics To start year 10, students discover and learn about physics particles at work. This includes the topics of Electric circuits, Electricity in the home, Molecules and matter and Radioactivity. Students further their knowledge of building electrical circuits, voltage and current, and series circuits by going over charge, electrical power, and electricity in the home regarding appliances and the wiring and cables involved. Students will also develop their maths skills by using equations to work out density of materials and using	**Biology** In the second spring term, students will consolidate their knowledge on Physics before their KAT 1 assessment. Students will then move on to Biology and will build on previously learnt content from Biology Topic 1 (cell structure) and revisit concepts covered in Year 7 to develop an understanding of the difference between communicable and non-communicable diseases. Students will also explore concepts such as disease prevention and how are white blood cells play a	**Biology** Students will start half term 3 by finishing off the content for biology paper 1 and learning about Bioenergetics, especially plant biology and photosynthesis. The last few weeks of this half term students will move on to Chemistry and study the last 3 topics in Chemistry paper 1. In these topics, students will study how ionic compounds are separated by electrolysis and the energy changes that are involved in various chemical reactions. Students will complete the term by studying rates of reaction where students are exposed to more complicated concepts such as dynamic equilibrium, and Le Chatelier's principle. Topics covered.	**Chemistry** In the last half term of spring, students will begin by revisiting Chemistry paper 1 units to prepare them for their KAT 1 exams. Students end the term with starting to learn topics from Chemistry paper 2 which include units such as the Earth's atmosphere. This builds on their knowledge about atomic structure revisited throughout the course. Topics covered. • Chemistry consolidation • Chemistry of the Earth's atmosphere.	**Physics** Students have learnt all the topics from physics paper 1. In this half term, they are therefore targeting Physics Paper 2, as this content will deepen their understanding of previous Physics content. Students will need to draw upon knowledge of forces and states of matter to explore concepts such as vector diagrams, finding the centre of mass, using parallelograms to find resultant forces etc. Students will deepen their understanding of speed and velocity time graphs and look at how graphs can be used to determine when terminal velocity of objects has been reached.	**Chemistry** Students focus solely on chemistry paper 2 units such as the earths renewable and non renewable resources. This is to ensure the completion of chemistry paper 2 content. Students will assess their knowledge by sitting a chemistry paper 2 for their KAT 3 exams. Topics covered • Crude oil and fuels. • Analysing earths resources

half equations to display radioactive decay. Topics covered. • Electric circuits • Electricity in the home • Molecules and matter • Radioactivity	major part in immunity. Students will learn the role of vaccines in herd immunity and the steps involved in the development of drugs. Topics covered. • Physics consolidation • Infection and Response	• Bioenergetics- Photosynthesis • Electrolysis • Energy changes • Rates of reaction		Topics covered. • Forces and their interactions • Motion • Force and motion	

YEAR 10 SEPARATE SCIENCES

Students following the Separate Sciences pathway will continue the course of AQA GCSE Biology (8461), AQA GCSE Chemistry (8462) and AQA GCSE Physics (8463). Students following this pathway will have 9 lessons that are split equally into Biology, Chemistry and Physics lessons per half term. The extra content covered in these three disciplines means that each student will sit 6 papers (B1, B2, C1, C2, P1, P2) of 100 marks, each lasting 1hr 45 minutes at the end of Year 11. The Separate Sciences course will be taught according to the map below:

Half Term 1 **Physics**	**Half Term 2** **Biology**	**Half Term 3** **Chemistry**	**Half Term 4** **Chemistry**	**Half Term 5** **Physics**	**Half Term 6** **Chemistry**
To start year 10, students discover and learn about physics particles at work. This includes the topics of Electric circuits, Electricity in the home, Molecules and matter and Radioactivity. Students further their knowledge of building electrical circuits, voltage and current, and series circuits by going over charge, electrical power, and electricity in the home regarding appliances and the wiring and cables involved. Students will also develop their maths	In half term 2, students will build on previously learnt content from Biology Topic 1 (cell structure) and revisit concepts covered in Year 7 to develop an understanding of the difference between communicable and non-communicable diseases. Students will also explore concepts such as disease prevention and how white blood cells play a major part in immunity. Students will learn the role of vaccines in herd immunity and the steps involved in the development of drugs. As separate science	In the first half term of spring, students will move on to Chemistry, beginning by revisiting atomic structure and electron configuration, all of which are found within Topic 1. Students have been taught this content in KS3 and Year 9, however revisiting these components means students build upon this knowledge when they continue studying Chemistry from the end of last half term, A strong understanding of electronic configuration will enable students to successfully progress to C8 (Rates of Reaction) where students are exposed to more complicated concepts such as dynamic equilibrium, and	In the last half term of spring, students will consolidate their learning on topics from chemistry paper 1 to prepare them for their KAT 2 exams. After the KAT exams, students will learn the final few topic of Chemistry paper 2 which are chemical analysis, The earth's atmosphere and resources. Here students will learn how to test for various gases and ions and see how instruments can be used to test the nature of substances. When studying the Earth's atmosphere, students will learn about	In the first half term of summer, students will move on to content from physics paper 2. Students have learnt all the topics from Physics paper 1. In this half term, they are therefore targeting Physics Paper 2, as this content will deepen their understanding of previous Physics content. Students will need to draw upon knowledge of forces and states of matter to explore concepts such as vector diagrams, finding the centre of mass, using parallelograms to find resultant forces etc. Students will deepen their understanding of speed	Students start the term with continuing to learn topics from Chemistry paper 2 which include topics such as the earth's resources and using the earth's resources. Topics covered: • The Earths resources. • Using the earth's resources

skills by using equations to work out density of materials and using half equations to display radioactive decay. Students will develop their knowledge further and learn about how nuclear reactors undergo reactions of nuclear fission to produce energy. <u>Topics covered.</u> • Electric circuits • Electricity in the home • Molecules and matter • Radioactivity	students, students will learn about how pathogens can be grown in a lab without contamination and how monoclonal antibodies are made for pregnancy testing. Students studying separate science will also have a chance to revisit their learning from their bridging year to further enhance their knowledge. This will enable them to have access to the most demanding content. <u>Topics covered</u> • Communicable diseases • Preventing and treating disease • Non-communicable diseases	Le Chatelier's principle. The final part of this term will concentrate on organic chemistry where students will learn about the uses and separation of crude oil as well all reactions of alkenes. This builds on their knowledge about atomic structure revisited throughout the course. Organic reactions and polymers are units specific to separate science students. Here they develop their knowledge on reactions of alkenes and structures of carboxylic acids and esters. Natural polymers such as starch, DNA and polypeptide chains are also learnt about. <u>Topics covered</u> • Electrolysis • Energy changes • Rates of reaction • Organic chemistry	how the earth's atmosphere has evolved over 4500 billion of years due to natural causes and more recently human activity. <u>Topics covered</u> • Chemical analysis • The Earth's atmosphere • The Earths resources • Using our resources	and velocity time graphs and look at how graphs can be used to determine when terminal velocity of objects has been reached. Separate science students will develop their knowledge on how levers work as well as conservation of momentum. <u>Topics covered</u> • Forces in balance • Motion • Force and motion	

YEAR 11 COMBINED SCIENCE					
Half Term 1 Biology	**Half Term 2 Biology**	**Half Term 3 Physics**	**Half Term 4 Revision**	**Half Term 5 Revision**	**Half Term 6 Revision**
At the start of half term 1, students begin studying the topic of the Homeostasis and control. Students' understanding of the circulatory system from the Organising Animals and Plants unit covered in year 10 will enable students to better comprehend the hormonal system.	Autumn half term 2 will start with revising the topic of Chemistry paper 2 to help prepare for KAT 1's. The second part of half term 2 will be spent covering topics from Biology paper 2. Students will develop their knowledge and look at specific adaptations animals and plants have that help	The first week of half term 3 will be spent consolidating topics from biology paper 2 as students will be tested on this. The rest of half term 3 is where Physics paper 2 content is concluded as students study waves and electromagnetic waves. The nature and properties of waves has been taught in Year 8 and in Year 10 when studying alternating currents on an oscilloscope trace. This is building up on previous	During the half term 4 students will undertake tailored revision that will be chosen by their subject lead and class teacher to make sure students are exam ready. This will help students to consolidate their learning ahead of GCSE exams in May and June.	During the summer term students undertake tailored revision that will be chosen by their subject lead and class teacher to make sure students are exam ready. This will help students to consolidate their learning ahead of GCSE exams in May and June.	GCSE EXAMS- students on a collapsed timetable. Science revision sessions will be held where necessary.

Students end the half term by studying Reproduction, Variation and Evolution. To grasp this topic, students will need to revisit topics from KS3 about cells and DNA structure. The topic of Variation and Evolution follows which revisits genetics, previously covered in Year 8, and students deepen their understanding of these concepts and are exposed to more challenging composites such as sex inheritance covered in the last half term. <u>Topics covered:</u> • Human nervous system • Hormonal coordination • Reproduction • Variation and evolution	them survive and compete with other organisms. Students will also look at how systems of classification can be used to group organisms of similar characteristics. <u>Topics covered</u> • Adaptation interdependence and competition • Organising an ecosystem • Biodiversity and ecosystems	knowledge about waves studied in Year 8 and gamma radiation studies in Year 10. <u>Topics Covered:</u> • Wave properties • Electromagnetic waves . • Electromagnetism -			

YEAR 11 SEPARATE SCIENCES

Students following the Separate Sciences pathway will continue the course of AQA GCSE Biology (8461), AQA GCSE Chemistry (8462) and AQA GCSE Physics (8463). Students taking this option will have 9 lessons that are split equally into Biology, Chemistry and Physics lessons per half term. The extra content covered in these three disciplines means that each student will sit 6 papers (B1, B2, C1, C2, P1, P2) of 100 marks, each lasting 1hr 45 minutes at the end of Year 11. The Separate Sciences course will be taught according to the map below:

Half Term 1 Biology	**Half Term 2 Biology**	**Half Term 3 Physics**	**Half Term 4 Physics**	**Half Term 5 Revision**	**Half Term 6 Revision**
at the beginning of the spring term, students begin studying the topic of the Human Nervous System.	Autumn half term 2 will start with revising the topic of Chemistry paper	The beginning of half term 3 is where Physics paper 2 content is studied. Topics include, electromagnetic	Students then learn about the propagation and effects of electromagnets. Ideas such as the motor effect, transformers, and	During the summer term students undertake tailored revision that will be	GCSE EXAMS- students on a collapsed timetable. Science revision sessions

Students' understanding of the circulatory system from the Organising Animals and Plants topic covered in half term 1 will enable students to better comprehend the hormonal system. Students end the half term by studying Reproduction, Variation and Evolution. To grasp this topic, students will need to revisit topics from KS3 about cells and DNA structure. The topic of Variation and Evolution follows which revisits genetics, previously covered in Year 8, and students deepen their understanding of these concepts and are exposed to more challenging composites such as sex inheritance covered in the last half term. <u>Topics covered:</u> • Human nervous system • Hormonal coordination • Reproduction • Variation and evolution.	2 to help prepare for KAT 1's. The second part of half term 2 will be spent covering topics from Biology paper 2. Students will develop their knowledge and look at specific adaptations animals and plants have that help them survive and compete with other organisms. Students will also look at how systems of classification can be used to group organisms of similar characteristics. <u>Topics covered</u> • Adaptation interdependence and competition • Organising an ecosystem • Biodiversity and ecosystems	waves. The nature and properties of waves has been taught in Year 8 and in Year 10 when studying alternating currents on an oscilloscope trace. This is building up on previous knowledge about waves studied in Year 8 and gamma radiation studies in Year 10. <u>Topics covered:</u> • Nature of waves • Electromagnetic waves	generators build upon prior Key Stage 3 ideas of magnetic field lines, magnetic materials, and solenoids. To complete the Physics content, students break orbit and learn about the beginning of our Universe and bodies found within it. Key Stage 3 content covers ideas on the life cycle of a star, the Big Bang, and the different named features of a solar system. In this topic the prior learning is extended by introducing concepts of satellites and orbits, red-shift and cosmic microwave background radiation providing evidence for our starting point and future. <u>Topics Covered:</u> • Electromagnetic waves • Visible Light • Electromagnetism • Space	chosen by their subject lead and class teacher to make sure students are exam ready. This will help students to consolidate their learning ahead of GCSE exams in May and June.	will be held where necessary.

Year 12 Biology: 2025-2026
The A Level AQA Biology Specification is delivered in tandem with two specialist teachers.
Topics 1 and 2 are covered in half terms 1-3
Topics 3 and 4 are covered in half terms 3-5
In the final assessment window students are assessed using a full AQA Biology A Level Paper 1

Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Topic 1: Part 1: Building on the fundamental principles of biological molecules covered in GCSE, students start this A Level unit by deepening their knowledge of the common chemistry that exists with the few carbon-based compounds found in all cells. Specifically, students learn about the structure, formation and breakdown of carbohydrates, lipids and proteins and how these molecules are utilised in cells. Enzymes are used as a case study for proteins and students will gain practical skills when investigating the effect of factors on enzyme activity.	**Topic 1: Part 2:** As this unit progresses students begin to understand the most important biological molecule of all, DNA. Students learn about the structure of DNA and how it is replicated in cells. They begin to understand how DNA molecules code for all the proteins within cells and the role of other nucleic acids in protein synthesis. In addition, the molecule ATP will be introduced and students will appreciate that this is the biological currency of energy.	**Topic 3: Part 1** Students will begin this unit by developing their knowledge of how differing organisms exchange substances with their environment and be able to justify why different organisms require different methods of exchange During GCSE, students learnt about the adaptations of exchange surfaces such as the villi and alveoli so they will build on this core knowledge and apply it to new contexts including fish gills and insect tracheole systems.	**Topic 3: Part 2** Following on from the principles explored in GCSE regarding heart structure and function, students delve deeper into understanding the role of the heart in the mass transport of substances around an organism by explaining the stages of the cardiac cycle. The role of haemoglobin in oxygen loading and unloading as well as tissue fluid formation adds depth to the understanding of the system as a whole. Risk factors for cardiovascular disease and effectiveness of treatments for these conditions allows students to develop their analytical skills.	**Topic 3: Part 3** Plant cells, tissues, organs and systems are considered throughout the course and during this section students gain a broad understanding of adaptations of the leaves and how xerophytic plants are adapted for living in dry conditions. At GCSE, students understood the roles of xylem and phloem as vessels within plants which transport water and sucrose. At A Level they build on this by explaining transpiration in relation to the cohesion-tension theory and discuss the mass-flow theory in phloem.	**Topic 2: Part 3** A challenging aspect of the A is understanding immunity in the context of cell recognition and signalling. Students require the core knowledge of protein synthesis and structure in order to fully understand the role of antibodies in the specific immune response. Teaching of this concept is therefore taught at the end of the year when students have the prerequisite knowledge from topic 1 and 3.
Topic 2: Part 1: Using knowledge of prokaryotic and eukaryotic cell structure and cell division students expand their understanding of cell organelles and their functions. Comparing methods of observing cells is also considered with opportunities for students to hone their own microscopy skills when investigating mitosis in growing root tips	**Topic 2: Part 2:** At GCSE students learned the basics of transport mechanisms that enable cells to exchange substances with their surroundings. At Level students gain a deeper knowledge of the structure of plasma membranes and how it is selective in the type of substances that can pass across it.	**Topic 4: Part 1** Biological diversity is rooted in the vast variety of species that exist on Earth. Throughout this topic students explore the origins of genetic diversity and build on their structural knowledge of DNA to then explain the nature of the genetic code and how proteins are synthesised in cells.	**Topic 4: Part 2:** Evolution by natural selection is a core biological principle which is studied in this section of the course. The topic reviews relevant contexts including the rise of antibiotic resistant bacteria and how science has changed the way they identify and categorisation species using the principles of taxonomy.	**Topic 4: Part 3** To start the summer term, students learn that biodiversity is reflected in the vast number of species of organisms, in the variation of individual characteristics within a single species and in the variation of cell types within a single multicellular organism. Investigating and measuring biodiversity are core principles and introduces students to statistical analysis.	**Topic 5: Part 1** Energy transfers will be introduced by considering the process of photosynthesis. At GCSE, students know the basic equation and will now be given the opportunity to understand the biochemistry of the process by explaining in detail the light dependent and independent reaction.
Topics covered:	**Topics covered:**	**Topics covered:**	**Topics covered:**	**Topics covered:**	**Topics covered:**

• Carbohydrates • Lipids • Proteins and Enzymes • Prokaryotes, Eukaryotes and Viruses	• DNA Structure and Replication • ATP • Water • Transport mechanisms	• Exchange in prokaryotic cells, insects, fish and mammals • Digestion and Absorption • Protein Synthesis • Mutation	• Heart structure and function • Cardiac Cycle • Risks for CVD • Natural Selection • Speciation and Taxonomy	• Leaf Structure • Cohesion-Tension Theory • Mass-Flow Theory • Measuring Biodiversity • Investigating Biodiversity	• Chloroplast structure • ATP synthesis and hydrolysis • Stages of Respiration
Practical Work • Required Practical 1: Enzymes • Required Practical 2: Observing Mitosis	**Practical Work:** • Required Practical 3 – Dilutions • Required Practical 4 – Membrane Permeability	**Practical Work:** • No required practical	**Practical Work** • Required Practical 6 - Heart dissection (video) • Required Practical 7: Aseptic Techniques	**Practical Work:** • No required practical	**Practical Work:** • No required practical
Assessments: • Weekly written and online homework • Half term check-test	**Assessments:** • Weekly written and online homework • KAT 1 bespoke assessment covering content from across the Autumn Term	**Assessments:** • Weekly written and online homework • Half term check test	**Assessments:** • Weekly written and online homework • KAT 2 – Full AQA AS Paper 1 incorporating all concepts from topic 1and 2	**Assessments:** • Weekly written and online homework • Half term check test on topic 3 and 4	**Assessments:** • Weekly written and online homework • KAT 3 – Full A Level Paper 1 covering concepts from topics 1 to 4

Year 12 Chemistry Cohort 2025-2026						
	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Teacher A- 3 hours	Students will revise the idea of the atom, looking at some of the evidence for subatomic particles. They will be introduced to mass spectroscopy and learn how to analyse/draw mass spectra. The evidence for the arrangement of electrons will be studied and they will learn a more sophisticated atomic model using orbitals. Students will then move to inorganic chemistry and talk about periodicity. They will learn how to classify elements on the P.T. into blocks. They will also investigate the main properties of period 3 elements and explain trends in their ionization energies. Finally, they will learn about group 2 elements, the alkaline earth metals. They will use the idea of electron arrangement to understand the bonding in compounds of these elements and trends in their reactivity. **Topics covered:** 3.1.1 Atomic structure 3.2.1 Periodicity 3.2.2 Group 2, the alkaline earth metals **Required practical:** N/A	Students will talk about redox reactions. They will learn how to calculate the oxidation state of an atom and determine the type of reaction based on the change in the oxidation state of the atom. Students will also learn how to create complex half equations and overall equations for redox reactions. They will then move on to inorganic chemistry and talk about the group 7, halogens. Students they will recap reactivity of halogens based on their electronic structure. They will learn about the reactions of halogens or halides with main compounds and explain trends based on the reducing or oxidising ability. Finally, they will investigate methods of how to identify the halides present in a solution. **Topics covered:** 3.1.7 Oxidation, reduction and redox equations 3.2.3 Group 7(17), the halogens **Required practical:** Required practical 4	Students revisit exothermic and endothermic reactions and introduce to the concept of enthalpy changes. They will learn about Hess law and how to use it in order to create thermochemical cycles. Students will then move on to kinetics and revisit the collision theory. They will learn about the Maxwell-Boltzmann distribution and factors affecting the rate of reaction. They will finish the half term by learning about how catalysts work. **Topics covered:** 3.1.4 Energetics 3.1.5 Kinetics **Required practical:** Required practical 2 Required practical 3	Students will start learning about organic chemistry. They will learn the basics rules of nomenclature and isomerism. They will talk about structural isomers and stereoisomers. They will revisit basic concepts such as the fractional distillation of crude oil and the cracking process. They will then move on to halogenoalkanes and their formation. They will be introduced to nucleophilic substitution reactions and elimination reactions. Furthermore, they will learn about alkenes and their reactions, such as electrophilic addition reactions. **Topics covered:** 3.3.1 Introduction to organic chemistry 3.3.2 Alkanes 3.3.3 Halogenoalkanes 3.3.4 Alkenes **Required practical:** N/A	Revision for their KAT3 exams. **Topics covered:** • Physical chemistry topics (sections 3.1.1 to 3.1.7) • Inorganic chemistry (section 3.2.1 to 3.2.3)	Students complete the KAT3 exams. They will also complete their work experience. Students will complete on topic of A Level chemistry about periodicity and period 3 elements.
Teacher B- 2 hours	Students will learn about quantitative chemistry. They will recap main GCSE	Students will talk about structure and bonding. They will recap the main	Students will talk about the dynamic equilibria. They will revisit Le Chatelier	Students will learn about alcohols and their reactions. They will talk	Revision for their KAT3 exams.	Students complete the KAT3 exams.

	ideas such as moles and relative atomic mass. They will learn how to calculate the moles of gas substances using the Ideal Gas Equation and how to determine the empirical formula of compounds based on experimental data. The students will also learn how to create a standard solution, perform titrations and determine the concentration of unknown solutions. **Topics covered:** 3.1.2 Amount of substance **Required practical:** Required practical 1	characteristics of the three types of bonds and their diagrams. They will learn about the electronegativity of atoms and investigate the polarity of molecules. They will also learn about the forces acting between molecules and the shapes of molecules and ions. **Topics covered:** 3.1.3 Bonding **Required practical:** N/A	Principle and investigate how the changes on the system effect the position of the equilibrium. They will discuss how changing the conditions can affect the yield and how this can find application in industry thinking about costs and yields. **Topics covered:** 3.1.6 Chemical equilibria, Le Chatelier's principle and Kc **Required practical:** N/A	about the formation of ethanol and reactions such as elimination and oxidation of alcohols. They will then finish the year 12 content by learning about mass spectrometry and infrared spectroscopy. **Topics covered:** 3.3.5 Alcohols 3.3.6 Organic analysis **Required practical:** Required practical 5 Required practical 6	**Topics covered:** Organic chemistry (section 3.3.1 to 3.3.6)	They will also complete their work experience. Students will complete on topic of A Level chemistry about equilibrium constant Kp. They will learn how to apply the equilibrium law and the LCP to reversible reactions in gas phase.
Assessments	EOUT – 3.1.1 and 3.2.1	KAT1 – Physical and Inorganic chemistry (section 3.1.1 up to 3.1.3, 3.2.1 up to 3.2.3)	Paper 1 AS Chemistry	KAT2 – Physical and organic chemistry (sections 3.1.2 to 3.1.6, 3.3.1 to 3.3.6)	Exam practice and preparation Paper 2 AS Chemistry	Paper 1 and 2 AS Chemistry

Year 12 Physics: cohort 2025-2026					
Half Term 1	**Half Term 2**	**Half Term 3**	**Half Term 4**	**Half Term 5**	**Half Term 6**
Students start their course by learning about how the fundamental base units of measurement are vital and bring about awareness that measurement errors can arise and what students can do numerically about these. Students are then introduced to fundamental properties of matter, and to electromagnetic radiation and quantum phenomena so that they become aware	To start the second half-term of the year, GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary waves. Topics looked at in great depth are inclusive of refraction, superposition, diffraction and interference. Components include use of the wave equation and	To start off the Spring term, student's knowledge and understanding of forces, energy and momentum are developed. Components include the use scale diagrams in order to represent both forces and their resultant forces as well as use of earlier equations linking gravitational potential energy to kinetic energy. Composite ideas include how formulae and uses of	To start the fourth half-term, students finish off content based on momentum and collisions whilst continuing with a study of materials considered in terms of their bulk properties and tensile strength. Components include how the equations for elastic potential energy and force applied due to an object's spring constant and extension given to an elastic object. Composites include	To start off the Summer term, students gain appreciation of the many electrical applications that are important to society by delving deep into ideas related to semiconductors, resistivity, multimeters, and emf. Components include the use of basic circuit components and equations used at GCSE level as well as those related to basic circuit rules in both series and	To start off the sixth half-term of the year, students learn about circular motion in-detail, then move on to simple harmonic motion, and learn about resonance as forced vibrations. Students also learn about thermal energy transfer building up on composite ideas such as states of matter, heat transfer mechanisms (e.g. conduction, convection, and radiation), and kinetic

of the way new ideas develop and evolve in physics. Students consider components of learning such as the make-up of an atom and the radioactive particles and rays to further build up on composite ideas which are new in this part of the curriculum. **Topics covered:** • 3.1 Measurements and their errors • 3.2 Particles and radiation **Assessments:** • 3.2 Particles and radiation	basic knowledge about different kinds of waves so that they can build up composite ideas associated to Young's double slit experiment. **Topics covered:** • 3.3 Waves **Assessments:** • KAT 1 (3.1, 3.2, and 3.3 minus 3.3.2.2) • 3.3 Waves	forces and motions equations can be used to calculate the speed of a moving object in a circular motion. **Topics Covered:** • 3.4 Mechanics and materials (3.4.1.1 to 3.4.1.5) **Assessments:** • *None*	how these formulae can be used and experimental data on elastic materials can be displayed so that students can calculate the Young Modulus of a material to be able to discern ideas about that material's behaviour. **Topics Covered:** • 3.4 Mechanics and materials (3.4.1.6 to 3.4.2.2) **Assessments:** • KAT 2 (3.4 minus 3.4.1.7) • 3.4.1 Mechanics • 3.4.2 Materials	parallel circuits. Composites include how a potential divider can be used in order to have resistors used in such fashion so that a variable potential difference can be applied to a circuit (or a part of a circuit if built as a parallel circuit). Students also revise as they prepare to sit an AS Paper 1. **Topics Covered:** • 3.5 Electricity • Revision (3.1 to 3.5) **Assessments:** • 3.5 Electricity	theory of particles. These allow students to abridge composite ideas such as the ideal gas equation, Boyle's Law and Charles' Law for gases. **Topics Covered:** • 3.6 Further mechanics and thermal physics **Assessments:** • KAT 3 - AS Paper 1 (3.1 to 3.5) • 3.6.1 Periodic motion • 3.6.2 Thermal physics

Year 13 Biology: 2025-2026
The A Level AQA Biology Specification is delivered in tandem with two specialist teachers.
Topics 5 and 6 are covered in half terms 1-2
Topics 7 and 8 are covered in half terms 3-4
Exam preparation and revision are prioritised in half term 5 ahead of the Public A Level Exams in May

Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Topic 5: Part 1: To review the learning on photosynthesis, Year 13 students begin the term completing two required practicals linked to photosynthetic pigments and enzyme action. Students then enhance their understanding of energy transfers by exploring energy flow within ecosystems and how productivity within ecosystems is affected by farming practices.	**Topic 5: Part 2:** Knowledge of the photosynthetic pathways are transferred to understanding and explaining the processes of cellular respiration. Drawing on links to mitochondrial structure taught in topic 2 students will gain the bigger picture surrounding this fundamental biological principle. Investigating the rate of respiration through a	**Topic 7: Part 1** Models of inheritance are taught in this topic and students will progress their understanding of monohybrid and dihybrid crosses. The concepts of populations are considered and a review of the process of evolution takes. Students will be able to use the Hardy-Weinberg equation to assess allele frequency and extended their knowledge of evolution	**Topic 7: Part 2** Populations in ecosystems are the theme for this half term and students will recall methods of measuring diversity using quadrats from topic 4. The concept of biological niches are introduced and students link the role of an organism to specific abiotic and biotic factors in each ecosystem. Primary and secondary succession of species is	**Revision** Revision for A level Exams May/June 2025. Core concepts across all 8 topics reviewed.	**Revision** Revision for A level Exams May/June 2025. Core concepts across all 8 topics reviewed.

Nutrient cycles are also considered with students developing their understanding of the nitrogen cycle and the role of bacteria in decay and decomposition.	required practical will also take place in this term.	by considering the process of speciation.	introduced and explained in depth through using case studies like sand dunes and forest fires.		
Topic 6: Part 1: Using knowledge of GCSE nervous system function and reflex arcs students develop their understanding of how organisms respond to their environment. Specific case studies are used to explore nervous control including the role of receptors in creating generator potential. Link back to topic 3 heart structure are made when deepening understanding of the role of sinoatrial node in controlling heart rate and how action potentials lead to muscular contraction in skeletal muscle.	**Topic 6: Part 2:** Homeostatic control mechanisms are revisited from GCSE and students will recall the basic principles of reflex arcs. Specific homeostatic processes are covered in depth including blood glucose regulation and maintaining water potential. Mechanisms of control in plants are also studied and students get a deep understanding of the role of IAA in plant growth responses.	**Topic 8: Part 1** Building on knowledge of DNA, genes and protein synthesis students develop their understanding of the complex process of gene expression in organisms and how this leads to varying proteins being produced in cells as a result of regulation of transcription and translation. A review of cancer and how this develops as a consequence of lack of regulatory mechanisms is reviewed.	**Topic 8: Part 2:** The students will gain an appreciation of the wide applications of gene technology following the breakthrough in the human Genome Project. Concepts such as genetic fingerprinting and identification of inheritable conditions is studies is learned by reviewing specific case studies and examples.	**Revision** Revision for A level Exams May/June 2025. Core concepts across all 8 topics reviewed	**Revision** Revision for A level Exams May/June 2025. Core concepts across all 8 topics reviewed
Topics covered: • Photsynthesis • GPP and NPP • Nutrient Cycling • Receptors • Synaptic Transmission • Control of HR	**Topics covered:** • Aerobic and Anaerobic • Respiration • Negative Feedback • Blood glucose Regualtion • Controlling water Potential	**Topics covered:** • Inheritance • Hardy Weinberg Principle • Speciation • Gene expression • Cancer	**Topics covered:** • Environmental factors and niches Investigating distribution • Succession • Genetic Fingerprinting • Genetic Diagnosis	**Topics covered:** • Core concepts topics 1-8	**Topics covered:** • Core concepts topics 1-8
Practical Work • Required Practical 7 – Chromatography • Required Practical 8 Isolating Chloroplast	**Practical Work:** • Required Practical 9: Factors affecting Respiration • Required Practical 11 – Dilutions	**Practical Work:** • Required Practical 12 – Investigating Distribution	**Practical Work** • No required practicals.	**Practical Work:** • No required practical	**Practical Work:** • No required practical

Assessments: • Baseline Test following summer Topic 1-4 • Weekly written and online homework • Half term check-test	**Assessments:** • Weekly written and online homework • KAT 1 – 2 papers one A2 Paper 1 and one bespoke assessment covering content from Topics 5-6	**Assessments:** • Weekly written and online homework • Half term check test	**Assessments:** • Weekly written and online homework • KAT 2 – Full A2 Papers 1, 2 and 3	**Assessments:** • Public exams	**Assessments** • Public exams

Year 13 Chemistry Cohort 2025-2026					
Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
TEACHER A- 3 hours: Students will learn about Born-Haber cycles and enthalpy changes. Further study of thermodynamics builds on the Energetics section of AS content and is important in understanding the stability of compounds and why chemical reactions occur. Students will also learn about electrochemical cells and how they work. **Topics covered:** 3.1.8 Thermodynamics 3.1.11 Electrode potentials and electrochemical cells	Students will learn about acids and bases and how to calculate the pH of a solution. They learn about the use of the correct indicator depending on each scenario given and how to use calibration curves. They will also learn about how to make a buffer solution, and they will discuss changes in the pH of the buffer solution under different conditions. **Topics covered:** 3.1.12 Acids and bases **Required practical:** Required practical 9	They will then move on to organic chemistry and recap isomerism and basic rules of nomenclature. They will then learn about optical isomerism and synthesis of optically active compounds. Students will move on to learn about different functional groups and their homologous series. Initially they will focus on the compounds containing the carboxylic group. They will learn about acylation reactions, how esters are formed and the properties of aromatic compounds as well as their reactions.	Students will learn about amines and study their structure, classification, properties, and reactions, including their basic nature and nucleophilic behavior. They will then move on to organic synthesis and they will learn how to design and execute synthetic pathways to produce specific organic molecules. This involves understanding the interconversion of functional groups, identifying appropriate reagents and reaction conditions, and analyzing reaction schemes.	Students will learn to use various analytical techniques to identify and characterize compounds. This includes understanding and applying techniques like spectroscopy (including infrared, mass spectrometry, and nuclear magnetic resonance) and chromatography. They also learn how to interpret the data obtained from these techniques to determine the structure and properties of unknown compounds. **Topics covered:**	A Level exams

Required practical: Required practical 8		**Topics covered:** 3.3.7 Optical isomerism 3.3.8 Aldehydes and ketones 3.3.9 Carboxylic acids and derivatives 3.3.10 Aromatic chemistry **Required practical:** Required practical 10	**Topics covered:** 3.3.11 Amines 3.3.14 Organic synthesis **Required practical:** N/A	3.3.15 Nuclear magnetic resonance spectroscopy 3.3.16 Chromatography **Required practical:** Required practical 12	
TEACHER B- 2 hours: Students will start with transition metals. The transition metal topic covers the properties, reactions, and uses of these elements. Students learn about their electronic structure, variable oxidation states, complex formation, and catalytic activity. They also explore the reasons for the colored compounds and the different types of complexes transition metals form. **Topics covered:** 3.2.5 Transition metals **Required practical:** Required practical 11	Students will learn about the catalytic properties of transition metals, which are linked to their ability to exhibit variable oxidation states and form complex ions. They will also learn about the different types of catalysts (heterogeneous and homogeneous) and how transition metals are used in industrial processes like the Haber process and the Contact process. Students will learn about the behavior of ions in aqueous solutions, particularly those of transition metals. They study how these ions react with various reagents like hydroxide, ammonia, and carbonate, forming characteristic precipitates and complex ions.	Students will finish the physical chemistry topics by learning about the Arrhenius equation and rate of chemical reactions. They will investigate the rate expression and order of reactions and the rate-determining steps. **Topics covered:** 3.1.9 Rate equation **Required practical:** Required practical 7	Students will recap addition polymerisation and learn about condensation polymerisation and its uses. **Topics covered:** 3.3.12 Polymers **Required practical:** N/A	They will then be studying natural polymers will learn about the structure, formation, and properties of these large molecules. They will also explore the different types of natural polymers, including proteins, nucleic acids (DNA and RNA), and polysaccharides like starch and cellulose, and how they contribute to life's processes. **Topics covered:** 3.3.13 Amino acids, proteins and DNA **Required practical:** N/A	

	Topics covered: 3.2.5 Transition metals 3.2.6 Reactions of ions **Required practical:** N/A				
ASSESSMENTS: EOUT – 3.1.8 and 3.2.5	KAT1 – Bespoke Physical and Inorganic chemistry	EOUT – 3.1.8, 3.1.12, 3.1.9 EOUT - 3.3.7, 3.3.8, 3.3.9, 3.3.10	KAT2 – A Level Chemistry Paper 1: Inorganic and Physical Chemistry	A Level Paper 2: Organic and Physical Chemistry. A Level Paper 3.	

Year 13 Physics: Cohort 2025-2026					
Half Term 1	**Half Term 2**	**Half Term 3**	**Half Term 4**	**Half Term 5**	**Half Term 6**
Students resume their Physics course by starting off learning about elements linked to thermal physics and gas laws, ideas which they last discovered in GCSE Physics in year 9. They then discover general ideas about fields in the Universe before delving deeply into learning about gravitational fields, electrical fields, and lastly looking at capacitance whereby they will do their second required practical of the term so far. **Topics covered:** • 3.6.2 Thermal physics • 3.7.1 Fields • 3.7.2 Gravitational fields • 3.7.3 Electric fields • 3.7.4 Capacitance **Assessments:** • 3.6.2 Thermal physics • 3.7.2 Gravitational fields	To start the second half-term of the year, students will continue their learning in the topic of Capacitance. The students then conclude their learning of Fields by learning the topic of Magnetic fields which includes two required practicals. Students then start the topic of Radioactivity where they carry learning over from GCSE knowledge and 3.2.1 Particles whilst completing their twelfth and final required practical. Students will also complete a full A-Level paper 1 which includes all topics inclusive of 3.1 to 3.6.1. **Topics covered:** • 3.7.4 Capacitance • 3.7.5 Magnetic fields • 3.8.1 Radioactivity **Assessments:** • KAT 1 – A-Level paper 1	To start off the Spring term, students will continue learning about the topic of Radioactivity. Once they have completed this, they will have finished all the core A-Level Physics content. After this, they will finish their learning by studying their last topic of 3.9 Astrophysics which includes the sub-topics of telescopes, classification of stars, and cosmology which relate back prior knowledge of refraction, ray diagrams and behaviour of converging and diverging lenses, Law of Reflection, and ray diagrams for a convex mirror. **Topics Covered:** • 3.8.1 Radioactivity • 3.9.1 Telescopes • 3.9.2 Classification of stars • 3.9.3 Cosmology **Assessments:**	To start the fourth half-term, students will be focusing resolutely on the Year 12 content but looking at Level 2 exam questions aimed at the A-Level demand as they will be completing another full A-Level paper 1. Students will then go through specific exam question packs for the Year 13 content to ensure that they are exposed to as many different question types as possible for their A-Level exam papers as they will be completing two more full papers: A-Level paper 2 and A-Level paper 3. **Topics Covered:** • 3.1 to 3.6.1 • 3.6.2 to 3.8 • 3.9 **Assessments:** • KAT 2 A-Level paper 1 • KAT 2 A-Level paper 2	To start off the Summer term, students will continue going through more practice on all topics as they will cover another round of full A-Level papers. These papers will be the students' final chance of understanding what grade they will each achieve in August if they continue working at the same rate. Feedback from these papers will provide vital intervention for each student. A note should be made that students will sit their A-Level paper 1. **Topics Covered:** • 3.1 to 3.6.1 • 3.6.2 to 3.8 • 3.9 **Assessments:** • A-Level paper 1 • A-Level paper 2 • A-Level paper 3 Section A	To start off their final half-term at Nishkam, students will sit their A-Level paper 2 and their A-Level paper 3. A note should be made that their A-Level paper 3 will contain the practical components as well as the optional module of 3.9 Astrophysics. **Topics Covered:** • 3.1 to 3.6.1 • 3.6.2 to 3.8 • 3.9 **Assessments:** • *N/a* **Exam entry:** • A-Level paper 2 • A-Level paper 3 Section A • A-Level paper 3 Section B Option A Astrophysics

• 3.7.3 Electric fields	• 3.7.4/5 Capacitance and Magnetic fields	• 3.8.1 Radioactivity • 3.9 Astrophysics	• KAT 2 A-Level paper 3 Section A • KAT 2 A-Level paper 3 Section B Option A Astrophyiscs	• A-Level paper 3 Section B Option A Astrophysics **Exam entry:** • A-Level paper 1	

Year 6 to 7 Transition

Throughout the year, there is ongoing collaboration between the Science Co-ordinator in the Primary phase and the Curriculum Leader of Science in Secondary. Joint learning walks and book looks are carried out. There are opportunities for cross-phase leaders to spend time in classrooms and teach cross-phase. There is also a KS3 Lead in Science who has responsibility for ensuring the transition is seamless and that the secondary teachers are provided with a range of information from the Primary classroom. Exemplar work is provided by Year 6 teachers which helps to ensure there is no performance dip at the start of year 7 and that expectations of what these students are capable of is clearly defined.

In Year 6, there is a tour of the secondary science lab facilities to help the students develop confidence in this new learning environment prior to their start in Year 7.

At the start of year 7, students are taught the science skills unit which helps to bridge the gap between science skills learnt in year 6 and skills that would be needed to successfully embed knowledge into a student's long-term memory throughout KS3 and KS4 Science. The skills unit consists of differentiated lessons focusing on practical, numeracy and literacy skills. In addition, at the start of Year 7, GL Assessments are sat by the students and the results are cross-referenced with internal Teacher-Assessed data and the KS2 SATs data. This information becomes a starting point for planning for the new cohort, ensuring appropriate support and challenge can be provided from the outset.

Enrichment Opportunities

Primary phase

Enrichment in the primary phase goes beyond curriculum requirements for the teaching of science. It will have an impact on a student's learning by creating memorable experiences both in the classroom and beyond. This involves, educational visits, topical workshops, speakers and science projects. Our science curriculum aims to give every child the opportunity to feel like an expert within the subject. We believe that students learn best when they are engaged and see a true purpose to their learning.

Learning is enriched with a range of educational visits such as: London Wetlands Centre, Winchester Science Museum and Planetarium, London Zoo and Kew Gardens. Students also have opportunities to discover more about their own local environment using the school grounds and Osterley Park to enhance their experiences of real-life science.

Cultural capital is developed through access to 'live lessons' where students can interact with scientists from a range of scientific disciplines. Workshops and visits from prominent members of our local community such as dentists enhance our cultural capital. A celebration of science is planned annually with 'British Science Week', this is a whole school celebration of science, technology, engineering and maths. Students engage in meaningful activities which promote connections, and they have opportunities for fun experiment sessions led by secondary students.

Secondary phase

The Science curriculum has been designed to ensure that our students acquire a deep understanding of the subject matter that they are learning about. To facilitate this, students will learn about contexts and content which goes beyond the exam specification and national curriculum, and we believe that this will equip our students with the knowledge and skills to thrive in a modern society. For example, in Year 8, when studying about extinction students learn about mass extinction events such as the extinction of the dinosaurs which is not covered in the national curriculum. Where appropriate, students debate the ethical issues associated with the Science they are learning about including the use of stem cells and genetic screening. Our Triple Science students will also study concepts in greater detail than the specification and are taught aspects of the A Level curriculum, for example when they are learning about protein synthesis.

Online learning tools such as Seneca Learning are used to help students embed knowledge of key components in their long-term memory so that they can build on this knowledge over time. Students have opportunities to expand their scientific knowledge through opportunities of completing cell and atom models, pin hole cameras, rock cycle models etc. KS3 students further expand their knowledge through the completion of research projects once a term. These projects include researching the contributions of BAME scientists and designing energy efficient homes. These projects allow students to express their ideas creatively and extend their knowledge beyond the curriculum. Students at Nishkam can take part in various activities that take place during science week which involves career events, lunchtime fun experiment sessions and focused practical sessions within lessons that give the opportunity to appreciate science at its best.

Impact:

Students will know more, remember more and understand more about the curriculum. Students retain prior-learning and explicitly make connections between what they have previously learned and what they are currently learning.

All students will have:

- A wider variety of skills linked to both scientific knowledge and understanding, and scientific enquiry/investigative skills.
- A richer vocabulary which will enable them to articulate their understanding of taught concepts.
- Confidence and a love of learning for all things science.

Formative assessment is an integral part of our approach to Teaching and Learning. Teachers use questioning and assessment for learning to assess and respond to student learning in real time. This ensures student misconceptions are identified and addressed quickly.

In the Primary phase, teachers use assessment for learning within lessons to provide live feedback to allow pupils to deepen their understanding and identify gaps in knowledge and skills. Knowledge reviews are planned for spaced retrieval and allow for misconceptions to be addressed and further embed pupils understanding of key knowledge, skills and vocabulary. The progression of skills and knowledge allows teachers to assess the impact over the course of a unit, year and across phases. The scheme of learning is used to identify prior links and future learning which informs teacher assessment and allows building blocks of learning to further develop schemas within topics and across subjects.

Summative assessments are used alongside knowledge organisers to assess the impact of learning at the end of a unit. This in turn informs future teaching adaptations, based on misconceptions and gaps in knowledge and skills. Enquiry questions are used to assess the impact of the teaching of knowledge, skills and vocabulary by allowing pupils to apply their understanding through reflections and critical thinking.

In the Secondary phase, students are set homework which covers both current and prior content to ensure students complete the spaced practice needed to develop their long-term memory of concepts. Teachers mark this work and use it as a formative diagnostic assessment to ensure all knowledge is retained, to address any gaps in knowledge and inform teachers' planning.

Students will also sit a summative assessment every full term. This assessment will be cumulative and will assess not only what the students have learned over the previous term, but also their understanding of all relevant material previously taught. Staff are supported to mark these accurately and post assessment moderation also takes place to ensure the validity of the data. All data is analysed centrally (not by teachers) and each Curriculum Leader is given a report outlining the areas of strength and weakness. Curriculum Leaders use this information to inform future planning, support with additional interventions and set changes.

Our feedback and interventions support students to strive to be the best scientists they can be, ensuring a high proportion of students are achieving above national average outcomes at the end of each phase.