



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:

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| 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 'Outstanding Science' 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 |
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| Year 1 | | | | | |
| <u>Biology</u> <u>Animals including Humans</u> (ourselves) -Parts of the body -Comparing bodies -The five senses -Using our senses -Sort things using senses | <u>Physics</u> <u>Seasonal Changes (Autumn/Winter)</u> -Hours of daylight -Ordering seasons -Seasonal events -Dressing for the season -Plants through the seasons -Types of weather -Weather and the seasons | <u>Chemistry</u> <u>Materials</u> -Objects and materials -Naming materials -Identifying materials -Objects and their properties -Floating and sinking -Grouping materials -Investigating materials | <u>Physics</u> <u>Seasonal Changes Deepening Understanding (Spring/Summer)</u> -Hours of daylight -Seasonal events -Dressing for the season -Plants through the seasons -Weather and the seasons | <u>Biology</u> <u>Plants</u> -Identify bulbs and seeds -Identify common garden plants -Identify some wild plants -Identify some trees -Label 4 parts of a plant -Simple Explanation functions of 4 parts of plant | <u>Biology</u> <u>Animals including Humans (animals)</u> -Animal body groups -Identifying mammals -Grouping mammals -Animals and their food -Animal diet -Animal bodies |
| Year 2 | | | | | |
| <u>Chemistry</u> <u>Everyday Materials</u> -Identifying materials -Properties of materials -Materials and their uses -Grouping materials -Properties of metals -Changing the shape of materials | <u>Biology</u> <u>Living Things</u> -Living and non-living things -Animals and their habitats -Name and group common animals and plants -Microhabitats -Food chains -Food sources | <u>Biology</u> <u>Animals including Humans</u> -Stages of human life -Life cycles of animals -Classify animals and their offspring -Human survival -Animal survival -Food Hygiene -Exercise -Heathy eating | <u>Biology</u> <u>Plants</u> -Functions of parts of a plant -Plant reproduction -Investigate plant life cycles -Growing plants -Geminating seeds | <u>Biology</u> <u>Plants</u> -Growing bulbs -Growing healthy plants -Comparing plants | <u>Biology</u> <u>Habitats</u> -Animal Adaptation -Desert animals and plants -Ocean habitat -Rainforest habitat -Savana habitat |

Year 3

Chemistry

Rocks

- Fossils
- Animal fossils
- Properties of rocks
- Comparing rocks
- Investigating rocks
- Investigating soils

Biology

Animals including Humans

- Food groups
- Keeping healthy
- Animals and their food
- Food chains
- Food webs Human skeleton
- Muscles for moving
- Animals and their skeletons
- Types of Skeletons

Physics

Forces and Magnets

- What is a force. Know that a force can be thought of as a push or a pull
- what are the different types of force. Know that there are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed).
- that magnetism is an example of a non-contact force
- Know that magnets have two poles called north and south and about like and opposite poles
- Magnetism through materials

Physics

Forces and Magnets

- Magnets on different surfaces
- Magnetism at a distance
- Magnetic materials
- Magnetic metals
- Magnetic pole
- Using Magnets

Biology

Plants

- Competition for growth
- Identify the main parts of different flowering plants, including parts, you eat
- Functions of parts of a plant
- Comparing needs different plants
- Water transportation
- Life cycle of flowering plant -
- Pollination
- Seed dispersal

Physics

Light

- Light sources
- Light sources and reflectors
- Forming shadows
- Transparent, translucent, or opaque objects
- Sundials

| Year 4 | | | | | |
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| <p><u>Chemistry</u> <u>States of Matter</u> -Melting points -Solids, liquids and gases -Changing state -Thermal insulators -The water cycle -Evaporation</p> | <p><u>Biology</u> <u>Animals including Humans</u> -The Digestive System -Digestive system organs -Human digestive system -Types of teeth -Tooth structure -Looking after your teeth</p> | <p><u>Physics</u> <u>Sound</u> -How sounds are made -Sound insulation -Investigating pitch -Pitch and volume -Sound and distance -Distance and volume</p> | <p><u>Biology</u> <u>Living Things and their Habitats</u> -Grouping organisms -Grouping animals -Vertebrates and invertebrates -Identifying familiar organisms -Identifying invertebrates</p> | <p><u>Biology</u> <u>Living Things and their Habitats Continued</u> -Classification keys -Habitats throughout the year -Effects of deforestation</p> | <p><u>Physics</u> <u>Electricity</u> -Conductors and insulators -Electrical machines -Electrical components -Electrical circuits -Working circuits -Electrical switches</p> |
| Year 5 | | | | | |
| <p><u>Chemistry</u> <u>Properties and changes in materials</u> -Separating solutions -Soluble materials -Investigating hardness -Separating mixtures -New materials -Reversible and irreversible changes</p> | <p><u>Physics</u> <u>Forces</u> -Levers -Gravity and weight -Force meters -Air resistance -Water resistance -Friction -Pulleys -Gears</p> | <p><u>Biology</u> <u>Living Things and their Habitats</u> -Human life cycle -Compare life cycle of different mammals -Compare life cycle of different amphibians -Reproduction of flowering plant -Reproduction of non-flowering plants -Vegetative reproduction</p> | <p><u>Biology</u> <u>Living Things and their Habitats Continued</u> -Life cycle of birds -Life cycle of insects -Stages of animal reproduction -Comparing reproduction in animals</p> | <p><u>Physics</u> <u>Earth and Space</u> -The solar system -Earth, Sun and Moon -The lunar cycle -Formation of the solar system -Comparing planets -Day and night -Sundials</p> | <p><u>Biology</u> <u>Animals including Humans</u> -Gestation periods -Foetal Development -Child development -Puberty -Men and women -Old age -Human lifetime line</p> |

| Year 6 | | | | | |
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| <p><u>Biology</u> <u>Living Things and their habitats</u> -Evolutionary taxonomy -Classification -Using different classification keys. -Carl Linnaeus -Classify vertebrates and invertebrates. -Classify arthropods -Tree classification</p> | <p><u>Physics</u> <u>Electricity</u> -Electrical components -Changing voltage of cells in an electrical circuit. -Compare variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches</p> | <p><u>Biology</u> <u>Animals including Humans</u> -Functions of blood and blood vessels. -Human circulatory system -The human heart -Effects of Alcohol and Smoking -Diet and exercise</p> | <p><u>Biology</u> <u>Evolution and Inheritance</u> -Fossils and Mary Anning -Charles Darwin -Natural selection -Heredity -Animal and Plant adaptations</p> | <p><u>Physics</u> <u>Light</u> -The shape and size of a shadow -Light travels in straight lines -Investigate how light travels -The human eye -How we see things -Reflecting light -The light spectrum</p> | <p><u>Chemistry</u> <u>Year 6 Transition unit</u> -Navigating the Periodic Table -Analysis of data -Visit to lab -Health and safety</p> |

YEAR 7 KS3 SCIENCE

Half term 1- Introduction to Science Skills
 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 |
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| <p><u>Chemistry</u> 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.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Scientific Skills • Atoms, Elements and compounds • Particle model • Separating techniques | <p><u>Biology</u> This half term, students further develop a strong understanding of the structure of plant and animal cells. Following on from animals including humans in Year 3. Students continue to study the skeletal system and muscles, which is built upon further in Year 8. Students will also learn how to convert between different units, understand standard form and how to rearrange equation.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Microscopes and cells • Structure and function of organs and body systems • Health and lifestyle- digestive system • Drugs, alcohol and smoking | <p><u>Biology</u> In this half-term, students build on their knowledge of plants from year 3. 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</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Reproduction in plants and animals • Fertilisation • Puberty and the menstrual cycle • Plant Adaptations | <p><u>Physics</u> 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.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Mass and weight • Gravity • Hooke's law • Speed, distance, time • Calculating pressure | <p><u>Physics</u> 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.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Electricity-current, voltage, Circuits and resistance • Magnetism-Magnetic fields and electromagnets | <p><u>Chemistry</u> 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.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Periodic table-metals and non-metals, groups and periods • Acids and alkalis • Metals and acids |

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| | | | | | <u>Careers</u> Students will then be applying their knowledge obtained throughout the year, to looking at different careers in STEM, and possible pathways to follow school. |
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YEAR 8 KS3 SCIENCE

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| <u>Chemistry</u> 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 Year 7. This is built on to teach students about how atoms behave in different chemical reactions such as combustion, thermal decomposition, | <u>Biology</u> 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 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>Physics</u> 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 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> <ul style="list-style-type: none"> • Light • Sound • Space | <u>Chemistry& Biology</u> 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 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 | <u>Physics</u> 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 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 | <u>Maths Skills</u> 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 focus will be applying it to a scientific context. <u>Investigation Skills</u> Students will review the key skills and knowledge needed to carry |
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| <p>endothermic and exothermic reactions</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Electron configuration • Metals reactions with acid, oxygen and water • Displacement reactions • Chemical formulae • Different chemical reactions | <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Photosynthesis and respiration • Food chains • Variation & adaptation | | <p>students for Chemistry Topic 8 in GCSE 9-1.</p> <p>Students also study the topics of Genetics, Evolution and Inheritance. They start by developing their understanding of a specific cell component, the nucleus. This is developed further to teach students how cells contain the information needed for life. Students learn about basic inheritance rules, allowing them to further their understanding of evolution and inheritance as taught in KS2. This will prepare them for Biology Topic 4 in GCSE 9-1, where they will further build on these ideas.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Structure of Earth • Types of Rocks • Rock cycle • Global warming • Carbon cycle • Climate change | <p>in GCSE 9-1 in following years.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Conduction, convection and radiation • Energy stores • Energy transfers • Renewable and non-renewable energy sources | <p>out investigations, which will prepare them for covering the required practical's at GCSE level.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • 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 |
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| | | | <ul style="list-style-type: none"> • Recycling • Extinction <p>Topics Covered:</p> <ul style="list-style-type: none"> • Structure of DNA • Inheritance • Mutations • Variation • Natural Selection and extinction | |
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YEAR 9 FOUNDATION BRIDGING YEAR between KS3 and KS4

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| <p><u>Biology</u> In the first half term, the fundamentals of Biology are the focus. This begins with topic B1 Cell Structure 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</p> | <p><u>Chemistry</u> To complete the first full term, students will focus on the foundations of chemistry and study C1 Atomic structure, C2 Periodic table and C3 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</p> | <p><u>Physics & Biology</u> To start the spring term, students focus on the quantitative and bulk knowledge of energy while studying P1 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 then complete the first spring half term by studying how the digestive system is made efficient by the help of enzymes. Students will consolidate their biology knowledge learnt so far and be tested</p> | <p><u>Biology & Physics</u> During the second spring term, students focus on how energy is transferred in objects and through the surroundings. 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. Students will also develop their knowledge on renewable and non-renewable resources that was taught in Year 8. students will</p> | <p><u>Chemistry</u> 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 masses from balanced equations. Students will also discover</p> | <p><u>Fundamental knowledge consolidation</u> 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 of chemistry and then move on to biology and physics. Consolidation will be done through extensive retrieval activities and practice in lessons. The consolidation</p> |
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| <p>and electron microscopy, and osmosis and active transport. These topics are further consolidated through B2 as students start to develop their knowledge on cell division</p> <p><u>Topics covered.</u></p> <ul style="list-style-type: none"> • Cell Structure • Cell division | <p>the difference between atoms, ions and isotopes as well study the difference between covalent and ionic bonding</p> <p><u>Topics covered.</u></p> <ul style="list-style-type: none"> • Atomic structure • Periodic table • Structure and bonding | <p>on this in their KAT 2 assessments next half term.</p> <p><u>Topics covered.</u></p> <ul style="list-style-type: none"> • Conservation and dissipation of energy | <p>now learn in detail how electrical energy is produced through energy from wind, water, the earth, and the sun.</p> <p><u>Topics covered.</u></p> <ul style="list-style-type: none"> • Organisation and the digestive system • Energy transfer by heating • Energy resources | <p>ideas of reduction and oxidation, making salts from metals and insoluble bases, and strong and weak acids and alkalis.</p> <p><u>Topics covered</u></p> <ul style="list-style-type: none"> • Chemical calculations • Chemical changes | <p>phase will end with assessments in each discipline.</p> <p><u>Topics covered</u></p> <ul style="list-style-type: none"> • Chemistry- atoms, bonding and moles • Biology- Cells and organisation of the digestive system • Physics- Energy and energy resources |
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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 |
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| <p><u>Physics</u> To start year 10, students discover and learn about physics particles at work. This includes the topics P4 Electric circuits, P5 Electricity in the home, P6- Molecules and matter and P7- 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 half</p> | <p><u>Biology</u> In the second spring term, students will consolidate their knowledge on Physics before their KAT 1 assessment. Students will then move on to Biology. Students will get an opportunity to build on their existing knowledge acquired in Year 9 about animal and plant cells and learn about how the organisation of cells inside a leaf are a key factor in photosynthesis occurring successfully.</p> <p><u>Topics covered.</u></p> <ul style="list-style-type: none"> • Physics consolidation • B4- plants organisation • B8- Photosynthesis • B4- animal organisation • B9- Respiration | <p><u>Biology</u> Students will start half term 3 by finishing off the content for biology paper 1. They 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 major part in immunity. Students will learn the role of vaccines in herd immunity and the steps involved in the development of drugs.</p> <p><u>Topics covered.</u></p> <ul style="list-style-type: none"> • B5- Communicable diseases • B6- Preventing and treating disease. • B7-Non-communicable diseases | <p><u>Chemistry</u> In the last 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 Le Chatelier's principle.</p> <p><u>Topics covered.</u></p> <ul style="list-style-type: none"> • C6- Electrolysis • C7- energy changes | <p><u>Physics</u> 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.</p> <p><u>Topics covered.</u></p> <ul style="list-style-type: none"> • P8- Forces in balance | <p><u>Chemistry</u> The first half of this final term will focus on consolidating everything that has been taught in Biology to prepare students for a KAT 3 on Biology paper 1. Students end the term with starting to learn topics from Chemistry paper 2 which include units such as crude oil, chemical analysis and the Earth's atmosphere. This builds on their knowledge about atomic structure revisited throughout the course.</p> <p><u>Topics covered</u></p> <ul style="list-style-type: none"> • Biology consolidation • C9- Crude oil and fuel • C12- Chemical analysis |

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| <p>equations to display radioactive decay.</p> <p><u>Topics covered.</u></p> <ul style="list-style-type: none"> • P4- Electric circuits • P5- electricity in the home • P6 Molecules and matter • P7- Radioactivity | | | <ul style="list-style-type: none"> • Chemistry consolidation • C8- Rates of reaction | <ul style="list-style-type: none"> • P9- Motion • P10- Force and motion | <ul style="list-style-type: none"> • C13- The Earth's atmosphere |
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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 Biology | Half Term 4 Chemistry | Half Term 5 Physics | Half Term 6 Chemistry |
|---|---|--|--|---|--|
| <p>To start year 10, students discover and learn about physics particles at work. This includes the topics P4 Electric circuits, P5 Electricity in the home, P6- Molecules and matter and P7- Radioactivity. Students further their knowledge of building</p> | <p>In the second spring term, students will consolidate their knowledge on Physics before their KAT 1 assessment. Students will then move on to Biology where they will get an opportunity to build on their existing knowledge acquired in Year 9 about animal and plant cells. They will develop an</p> | <p>In half term 3, 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</p> | <p>In the last 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</p> | <p>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</p> | <p>The final term of the year will focus on consolidating everything that has been taught in Biology to prepare students for a KAT 3 on Biology paper 1. Students end the term with starting to learn topics from Chemistry paper 2 which include units such as crude oil,</p> |

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| <p>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 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.</p> <p><u>Topics covered.</u></p> <ul style="list-style-type: none"> • P4- Electric circuits | <p>understanding of photosynthesis and respiration.</p> <p><u>Topics covered</u></p> <ul style="list-style-type: none"> • <i>Physics consolidation</i> • B4- plants organisation • B8- Photosynthesis • B4- animal organisation • B9- Respiration | <p>vaccines in herd immunity and the steps involved in the development of drugs. As separate science students, students will learn about how pathogens can be grown in a lab without contamination and how monoclonal antibodies are made for pregnancy testing.</p> <p>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.</p> <p><u>Topics covered</u></p> <ul style="list-style-type: none"> • B5- Communicable diseases • B6- Preventing and treating disease • B7- Non-communicable diseases • Triple only content | <p>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 Le Chatelier's principle.</p> <p><u>Topics covered</u></p> <ul style="list-style-type: none"> • C6- Electrolysis • C7- energy changes • <i>Chemistry consolidation</i> • C8- Rates of reaction | <p>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. Separate science students will develop their knowledge on how levers work as well as conservation of momentum.</p> <p><u>Topics covered</u></p> <ul style="list-style-type: none"> • P8- Forces in balance • P9- Motion • P10- Force and motion | <p>organic reactions and polymers. 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.</p> <p><u>Topics covered</u></p> <ul style="list-style-type: none"> • <i>Biology consolidation</i> • C9- Crude oil and fuel • C10- Organic reactions |
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| <ul style="list-style-type: none"> • P5- electricity in the home • P6 Molecules and matter • P7- Radioactivity | | | | | <ul style="list-style-type: none"> • C11- Polymers |
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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 |
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| <p>Students start half term 1 by studying Reproduction, Variation and Evolution. To grasp this topic, students will need to revisit topics from KS3 and Year 9 about cells and DNA structure. Students deepen their understanding of genetics, previously covered in Year 8, and are exposed to more challenging composites such as sex inheritance. Students also study Natural selection</p> | <p>Biology Paper 2 is concluded in half term 2 as students study ecosystems and biodiversity. This topic allows students to further explore the impact of humans on biodiversity and the importance of conservation.</p> <p>Upon completing Biology Paper 2 content, students will move onto studying Physics. Students have already completed some of the topics in this paper in Year 10. Starting with forces and motion.</p> | <p>Physics paper 2 content is concluded in half term 3 where 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 knowledge about waves studied in Year 8 and gamma radiation studies in Year 10.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Wave properties • Electromagnetic waves • Electromagnetism | <p>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.</p> | <p>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.</p> | <p>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.</p> |

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| <p>Genetic Modification before moving onto to Evolution and Classification</p> <p>Students then study adaptations, ecosystems, and biodiversity. These topics builds on knowledge about respiration and photosynthesis last learn in Year 9.</p> <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • Reproducti on • Variation and Evolution • Genetics and evolution • Adaptatio ns, Interdepe ndence and competitio n | <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • Biodiversity and ecosystems • Chemical Analysis • The Earth's atmosphere • The Earth's resources | | | | |
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|---|--|--|--|--|--|
| <ul style="list-style-type: none"> Organising an ecosystem | | | | | |
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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 Physics | Half Term 2 Physics & Biology | Half Term 3 Biology & Chemistry | Half Term 4 Chemistry | Half Term 5 Revision | Half Term 6 Revision |
|---|--|---|---|---|---|
| <p>At the start of half term 1, students begin studying the topic of the Human Nervous System. 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.</p> <p>Students end the half term by studying Reproduction, Variation and</p> | <p>Students learn about Ecology such as relationships between organisms in ecosystems. This topic builds on prior knowledge learnt in Year 8 autumn term about food chains and food webs. Students will develop their knowledge and look at specific adaptations animals and plants have that help them survive and compete with another organism. Biodiversity and ecosystems conclude the AQA GCSE Biology course where students look at the human impacts on global warming and the</p> | <p>In Year 11's half term 3, Physics paper 2 content is completed where students study 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 knowledge about waves studied in Year 8 and gamma radiation studies in Year 10.</p> <p>Students then learn about the propagation and effects of electromagnets. Ideas such as the motor effect, transformers, and generators build upon prior Key Stage 3 ideas of magnetic field lines, magnetic materials, and</p> | <p>During this 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.</p> | <p>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.</p> | <p>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.</p> |

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| <p>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.</p> <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • Human nervous system • Hormonal coordination • Reproduction • Variation and evolution | <p>effects on biodiversity. This topic has been touched upon in Year 8 spring term and students will be able to use that knowledge to explore deeper the effects humans are having on levels of biodiversity around the world.</p> <p>Once Biology content is completed students move onto studying</p> <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • Adaptations, interdependence • Organising an ecosystem • Biodiversity and ecosystems | <p>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.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • Electromagnetic waves • Visible Light • Electromagnetism • Space | | | |
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| Year 12 Biology: First teaching 2023-24 | | | | | |
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| Half Term 1 | Half Term 2 | Half Term 3 | Half Term 4 | Half Term 5 | Half Term 6 |
| <p>Students start their course by exploring the fundamental building blocks of organisms which are the molecules that make up their cells. Some examples of these molecules are Carbohydrates, lipids, proteins, Nucleoid acids and water. From GCSE knowledge, Students already know the role of these molecules in the survival of an organisms so they will therefor develop their knowledge on the structure of these molecules and the type of reactions they undergo. Students will also recap their knowledge on the differences between prokaryotic and eukaryotic cells to prepare themselves for the next unit on cell structure.</p> <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • Biological molecules | <p>To start the second half-term of the year, GCSE studies of cells are extended through a development of knowledge of the structure of the plasma membrane and how it is selective in the type and time substances that can pass across it. Students will learn about the vital role the cell membrane proteins play in signalling and recognition by the immune system.</p> <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • Cell structure • Transport across membranes • Cell recognition and immune system | <p>During this term, students will develop their knowledge on how different organisms exchange substances with the environment depending on their size. In large multicellular organisms, most cells are too far away from exchange surfaces, and from each other, for simple diffusion alone to maintain the composition of tissue fluid, therefor an exchange system is required. During KS4, students have learnt about the adaptations of exchange surfaces such as the villi and alveoli so they will therefore learn in detail how the cell surface membrane absorbs substances with the help of carrier proteins and other molecules.</p> <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • Exchange | <p>The second half of the spring term will give students opportunity to explore the variety of life around them. Students will develop their knowledge on the role of genes in protein synthesis and how the products of this process can be altered by mutations. Students have learnt about the types of cell division in KS4 and therefore will have an opportunity to learn about how diversity can be measured in species.</p> <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • DNA, genes and protein synthesis • Genetic diversity | <p>To start the summer term, students will 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. Students will conclude the term by consolidation all their knowledge on AS Biology topics and prepare for their end of year KAT 3 exams.</p> <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • Biodiversity • AS level consolidation | <p>In the final term of this year, students will learn how in communities, the biological molecules produced by photosynthesis are consumed by other organisms, including animals, bacteria and fungi. Some of these are used as respiratory substrates by these consumers. From GCSE, students know the basic components of the photosynthesis and respiration reaction, therefore students will develop their knowledge on the light dependent and independent reaction for photosynthesis and glycolysis, link reaction and Krebs cycle for respiration.</p> <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • Photosynthesis • Respiration |

| <ul style="list-style-type: none"> Nucleic acids Cell structure | | <ul style="list-style-type: none"> Mass transport | | | |
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| Year 12 Chemistry: First teaching 2023-24 | | | | | |
| Half Term 1 | Half Term 2 | Half Term 3 | Half Term 4 | Half Term 5 | Half Term 6 |
| <p>Students will start the year by recapping the atomic structure and the basic calculations in chemistry such as number of subatomic particles from mass and atomic number, RAM and number of moles. They will be introduced to mass spectrometry and analysis of compounds. They will also cover chemical calculations, such as finding the empirical formula, titration calculations and Ideal Gas equation. They will then move on to atomic structure and bonding.</p> <p><u>Topics Covered</u></p> <ul style="list-style-type: none"> Atomic structure and moles Amount of substance | <p>Year 12 students will start learning about the specific groups of the periodic table (group 2 and group 7). They will also learn about the redox reactions, recap half equations, and learn how to calculate the equilibrium constant. Finally, they will start the energetics topic, where they will start talking about enthalpy changes.</p> <p><u>Topics Covered</u></p> <ul style="list-style-type: none"> Periodicity Redox Chemical equilibrium and K_c Energetics Required practical 2 Required practical 4 | <p>Students will continue with the energetics topic and learn about Hess Law. Year 12s will also be introduced to the basic rules of nomenclature and isomers. They will also recap fractional distillation of crude oil and cracking of hydrocarbons.</p> <p><u>Topics Covered</u></p> <ul style="list-style-type: none"> Energetics Nomenclature Reaction mechanisms Isomerism Alkanes | <p>Students will continue with organic chemistry and get introduced to basic organic reactions such as nucleophilic substitution and elimination reactions. They will then move on to alkenes and alcohols. They will learn about the oxidation of alcohols. They will then move onto the organic analysis topic.</p> <p><u>Topics Covered</u></p> <ul style="list-style-type: none"> Halogenoalkanes and reaction mechanisms Alkenes Alcohols and oxidation of alcohols Organic analysis Required practical 5 | <p>Year 12 students will continue the organic analysis topics and learn about mass spectrometry and IR spectrometry. They will also cover the kinetics topic. They will learn about Maxwell-Boltzmann distribution and recap the collision theory. They will also revisit topics such as the rate of reaction and how it can be affected by the temperature, pressure and catalysts.</p> <p><u>Topics Covered</u></p> <ul style="list-style-type: none"> Organic analysis Kinetics Required practical 3 Required practical 6 | <p>A2 topics Year 12 students will start the A2 level chemistry topics by studying Physical Chemistry in greater depth.</p> |

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| <ul style="list-style-type: none"> • Structure and bonding • Required practical 1 | | | | | |
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Year 12 Physics: First teaching 2023-24

| Half Term 1 | Half Term 2 | Half Term 3 | Half Term 4 | Half Term 5 | Half Term 6 |
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| <p>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 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</p> | <p>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 basic knowledge about different kinds of waves so that they can build up composite ideas associated to Young's double slit experiment.</p> <p><u>Topics covered:</u></p> | <p>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 forces and motions equations can be used to calculate the speed of a moving object in a circular motion.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • 3.4 Mechanics and materials | <p>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 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</p> | <p>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 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</p> | <p>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 theory of particles. These allow students to abridge composite ideas such as the ideal gas equation, Boyle's Law and Charles' Law for gases.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • 3.6 Further mechanics |

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| <p>composite ideas which are new in this part of the curriculum.</p> <p><u>Topics covered:</u></p> <ul style="list-style-type: none"> • 3.1 Measurements and their errors • 3.2 Particles and radiation | <ul style="list-style-type: none"> • 3.3 Waves | <p>(3.4.1.1 to 3.4.1.5)</p> | <p>ideas about that material's behaviour.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • 3.4 Mechanics and materials (3.4.1.6 to 3.4.2.2) | <p>if built as a parallel circuit). Students also revise as they prepare to sit an AS Paper 1.</p> <p><u>Topics Covered:</u></p> <ul style="list-style-type: none"> • 3.5 Electricity • Revision (3.1 to 3.5) | <p>and thermal physics</p> |
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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.