Science Curriculum Overview, 2021-2022	
Why do we teach Science at Ark BDA?	Students at Ark Burlington Danes study science because it is a fundamental to the way we live and developing our futures. Scientific knowledge allows students to solve practical problems, make informed decisions, and have the future potential to develop new technologies. The scientific mindset that we teach our students will be key to them being able to identify problems, assess those problems and devise solutions to these problems using science knowledge. These skills will allow them to engage with the world around them, making informed decisions based on science knowledge and principles. The goal of science education is not knowledge of a body of facts and theories but a progression towards key ideas which enable understanding of events and phenomena of relevance to students' lives. The knowledge students have developed will be useful in several different ways and will build up incrementally through the key stages. We will sequence core knowledge to enable deeper student understanding, for example the basic understanding of materials in key stage 2 and why certain materials are used for different purposes. To understanding why fibre glass is a good insulator in KS4 and possibly designing new stem cell treatments or developing new Nano batteries for mobile phones in KS5. It is necessary to teach science and the scientific method to help students develop their reasoning and practical skills. Students that don't get a science education miss out on the scientific enquiry method: take a question, use evidence to form an explanation, connect that explanation to existing knowledge and communicate that evidence-based explanation. We want students to have those critical thinking skills, problem thinking skills to make decisions. Problem solving, and critical thinking are two of the most important skills students learn in school. They are essential to making good decisions that lead to achievement and success during and after school. Science is one of the most important subjects in school due to its relevance to students' lives and the universally applicable problem-solving and critical thinking it uses and develops. These are lifelong skills that allow our students to generate ideas, weigh decisions intelligently and even understand the evidence behind decision making. A science education allows students to make connections to the world around them it is empowers them but also allows them to adapt and have insights to new advances in the scientific world.
How do we deliver our Christian values in science?	At Burlington Danes we are proud of our Christian values and we expect all teachers to embed them into their science teaching. Teachers are tasked with giving our students the confidence and self-belief to lead a happy and fulfilled life by encouraging them to aim high, be brave, be kind and keep learning. Students are encouraged to aim high in science; regardless of their starting position we ask them to target the best possible grade and mark they can in any work they are doing. 2 Corinthians 13:11 states to "aim for perfection" and we embody this in our science lessons. We have high expectations of all pupils, we create high standards for all and we ensure we have high quality teaching in our science rooms. Students are taught to always find ways they can improve and better themselves and their understanding of science concepts. Instilling that skill of not settling and aiming for better will help them in an ever-changing world where you will always need to be better and adaptable. Students need to be brave in science, they have to be able to learn from mistakes like lots of highly respected scientists did in the past. 1 Chronicles 28:20 states David said to Solomon "be strong and courageous and do the work". We show students that being brave can be putting your hand up to answer question, being patient when learning new science concepts and not giving up at the first hurdle. Having this skill will enable our students to not be afraid when moving on from BDA and making sure they engage with the world around them. Being kind is an important human value, we expect our students to act kindly, listen carefully and speak sensibly. Kindness is not simply being nice, its courage and discipline, it should be constant and unchanging. Ephesians 4:32 states "be kind to one another, tender hearted, forgiving one another, as God in Christ forgave you." Scientists have dedicated their lives to scientific work and developing new technologies that help us live a better life. There is nothing kinder than leading a life that will help thousands of people. Students are encouraged to keep learning, we show how scientists of the past and present make mistakes but that it didn't stop them and they continue to learn to overcome the mistakes they have made. Proverbs 1:5 states "Let the wise hear and increase in learning, and the one who understands obtain guidance". We expect our students to be determined to reach their goals in all areas of their life. This may not be in science but the skills they have developed in learning science will help them reach their goals in other areas. Learning science has several advantages; the more science learning they do, the more chance they will be able to make connections building up knowledge to help the world in the future.
How do we build core skills and knowledge over time?	During key stage 1 and 2 science tries to be as hands-on as possible: students are given the opportunities to experience science in the real world. Units are fun, challenging and intriguing, stimulating children's curiosity and translating into meaningful experiences. Hands-on exploration both inside and outside the classroom cement their understanding of important scientific concepts. During key stage 3 students build on the knowledge they have from key stage 1 and 2. We follow a coherent 5-year curriculum that every lesson is connected to, with a sophisticated interleaving of knowledge, practical and enquiry skills, mathematics and communication The Science Mastery 5-year curriculum map is organised under the 'big ideas' of science. This allows pupils to make links between topics, building ideas into a coherent picture of how the world works. Presenting new information under the umbrella of a familiar 'big idea' helps pupils to recognise the connectedness of science, and also how each new topic connects to everyday life and familiar contexts. This approach allows for the planned interleaving of prior learning with new learning in a meaningful way. We use engaging lessons, practical work and a real focus on science in their everyday lives to make sure they have the fundamental knowledge to progress.

	Teachers use low stake quizzes, mini-assessments, homework's, exam paper questions and mock exams to test students are understanding the material. Retention of material over time is important to understanding more challenging concepts, and teachers use trackers to monitor pupil progress and identify gaps in student knowledge and make changes to their teaching plans. Our science teachers are experts in their field and they share their knowledge of the curriculum through different methods, including teacher instruction, presentations, articles, discussions and homework activities. Lessons follow the same format. Lessons begin with retrieval practice using low stakes quizzing interleaved with connected topics and prior learning. Teachers should use pupils' responses to these questions as the starting point to inform their decisions about how the lesson should progress. Teachers reflect on prior learning through responses to diagnostic multiple choice and use a fix-it task to ensure misconceptions are challenged at the earliest time. Teachers will deliver new learning content by connecting it to prior learning and students own experiences. A check for understanding follows the teaching of any new information. This is a low-stakes formative assessment activity, providing the teacher with a quick snapshot of pupils' understanding. These are carried out using simple whole-class assessment strategies. Through teacher modelling students will build up their own independence to complete tasks with fluidity and confidence. Students are again assessed on this information by either teacher-designed questions or exam questions depending on the key stage. The final part of the lesson brings everything they have learnt together with a diagnostic exit ticket to check learning at the end of each lesson. This consists of three carefully written multiple-choice questions, which will identify the key misconceptions from the lesson that are most common according to the latest research. Teachers in science monitor students' progress on activities in lesson by circulating and noting down observations and doing whole class feedback lessons after a topic and mini assessment has been completed. Students are assessed centrally by ARK with ARK common assessments which are sat twice a year: results are sent home and used to change setting arrangements in science. The results of students throughout key stage 3 will enable us to decide who goes on to study separate science and who goes on to do combined science. Separate science allows students to gain 3 GCSEs in biology, chemistry and physics and combined science allows students to gain 2 GCSEs. Students who are aiming to do A levels in science are advised to do separate science as more content is covered which directly links to topics in the A level sciences. Academic progress is important when guiding our decisions for separate sciences in key stage 4 and A level in key stage 5 but a good attitude, willingness to work and a desire to move into a scientific field is also looked upon favourably. A level science builds heavily on skills that have been developed from key 2 and 3. To complete the A level in any of the three sciences students will need to have the necessary practical skills. We start teaching practical skills in key stage 2 where science is very hands on. In key stage 3 we introduce the scientific model and try to get students thinking in this format to identify and solve problems. During key stage 4 students are given a science practical lab book that covers all the practical aspects of science. They develop a better understanding of the key terms and learn how to use these terms correctly when writing up their science practical's. Teachers monitor and mark these lab books checking student progress and understanding.
How does the study of science prepare students for life beyond Ark BDA?	From KS1 onwards, students will have been encouraged to ask questions and seek answers based in accurate science, to begin to explain the world around them. Not only will students have a good general knowledge of science when they leave BDA, but they will also have skills that will enable them to function in the world around them. Practical skills, functioning skills reasoning skills and analysis skills are all embedded throughout the teaching of science and these skills are transferable to the wider world. Students that have an interest in science will have lots of different avenues open to them. Exciting careers await such as medical sciences, engineering, astrophysics, space technology, marine biology, medical sciences, military sciences, nuclear chemistry, scientific sales, veterinary sciences and many more. Our science course combines relevant, inspiring, practical and challenging work which prepares all students for an ever-changing world. They may not go on to be a marine biologist or nuclear chemist, but they will have developed skills and expertise to function in whatever career they choose. The ability to identify a problem, the ability to use evidence to try and solve that problem and in some cases base their solutions on science or by using the scientific method. Science offers a powerful platform for building confidence, developing communication skills and making sense of the world around us, a world that is increasingly being shaped by science and technology.
Implementation	Science has changed our lives and how we interact with the world in which we live. The primary Science Curriculum provides all pupils with the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. In KS1 and Ks2, pupils have one 2 hour lesson a week, teachers use their differentiation skills to scaffold and challenge students depending on their ability During KS3 and KS4, we follow a coherent 5-year curriculum that every lesson is connected to, with a sophisticated interleaving of knowledge, practical and enquiry skills, mathematics and communication. Big ideas of Science Education were published by Wynne Harlen and others in 2010. These ideas distil down scientific knowledge into ten guiding principles that we can use to explain a diversity of scientific phenomena. The big ideas are lenses by which we can make sense of the world – an important goal for science education. At KS3 there are 4 science lessons a week, with homework given once a week to consolidate the learning that has been done. This is usually retrieval practice for prior learning to ensure content is revisited frequently. Students are taught in classes based on data from primary school and teachers use their differentiation skills to scaffold and challenge students depending on their ability. Towards the end of year 9 students are streamlined into either separate science where they will study biology, chemistry and physics separately or they will do combined science where they study all 3 topics together. BDA has specialist teachers for Biology and Chemistry and students will be taught by experts in their fields if they go on to do separate science. BDA is looking to recruit a physics specialist for KS4, but has a subject expert at KS5. The content in separate science is more challenging and it we expect students that do separate science to go on and do an A level in one of the sciences.

	In year 10 students that do combined science will have 5 science lessons a week, moving to 6 in year 11, this will be spilt between doubles and singles, enabling teachers to plan practical lessons and have time to really embed the learning and key objectives in the lesson. Separate science students will have 7 lessons of science a week in year 10, and 6 in year 11, and again they will have a double and a single, allowing teachers to do practical lessons effectively. Year 12 and 13 students have 7 lessons of their chosen science a week. Lessons in science follow the following format, lessons always start with a 'do now' activity that is a recap of previous learning, this could be in the form of a low stakes quiz or a word fill activity, there is a hook that engages the student, and this is the time where new information is presented to the class via teacher talk, reading or a presentation. Students are assessed on the new information using different assessment for learning strategies including true or false or multiple-choice quizzes. Students are then given the chance to do some independent work on the information, this could mean answering questions set by the teacher or writing a paragraph that uses several key words in the right context. The teacher will always produce a model answer and identify gaps in the students learning by listening to answers and reading through work. Finally, the consolidation activity brings all the learning together and allows students to leave the lesson understanding what the key takeaways are. Topics in science last for a round 2-3 weeks, and at the end of every topic students will be assessed using a mastery quiz in year 7 and 8 or exam questions in year 9 – 11. The assessments are designed to test what students know and understand, test whether they can apply that knowledge in different contexts and finally their ability to analyse and interpret scientific information. They follow the same format of the AQA exams which are divided into the same strands, A01 – knowledge and understanding, AO2 – applying knowledge, and AO3 – evaluating scientific ideas and information. We want students to get into the habit of working on these skills from a young age so that they are used to type of questions exams use. Once an assessment has been completed teachers use a fast feedback method to showcase what went well but also focus on what could be improved. Students receive there papers back with a mark and points of improvement. The teacher will also take the time to reteach parts of the topic that he or she thinks students did not fully understand. The science curriculum is very content heavy, there is a lot of information that students need to learn and remember. Therefore, it is recommended that students buy revision guides to help with consolidation homework activities, but the science team have also embedded revisits to topics previously taught. The homework set in KS3 and KS4 always uses appropriately space and interleaved retrieval practise to revisit connected or prior learning in order to build up the students schema and long-term memory over time. Interleaving information makes it clear where this knowledge sits within the wider context of pupils' learning, and within the big ideas of science.
Impact	In KS1 and KS2, the curriculum is rich in key foundational knowledge and concepts, pupils are encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. Throughout Key stages 1 and 2 pupils learn to use Science to explain what is occurring around them, predict how things might behave and analyse the cause Students in key 3 – 5 are assessed regularly throughout their time at BDA. In lessons pupils will self-assess according to the teachers' model answer. The teacher will check for understanding at key opportunities in the lessons to ensure all students are ready to move on and to identify and correct misconceptions. The teacher will read through students work and make corrections were necessary. Students are assessed at the end of every topic with low stakes diagnostic multiple choice questions followed by a feedback lesson addressing all misconceptions and gaps raised. During autumn 2 students do a ARK common assessments, these are assessments that all ARK schools do and this gives our teachers an idea of the impact their teaching is having on students. The second ARK common assessment is during the summer 2 term. The ARK common assessments allow us to test students understanding of the topics they have studied but also previous topics from previous years. Take for instance a year 9 pupil sitting an ARK common assessment in year 9 autumn 2. That assessment will have questions from topics taught in year 7 and 8. This allows students to constantly revisit information that was taught very early on, doing it this way enables students to keep the information in their long-term memory. All data from these ARK common assessments is shared with students and parents.

Year Group	Key curriculum end point: Knowledge and skills	How does it link to future progression?
1	**Year 1 Unit 1- Everyday Materials** distinguish between an object and the material from which it is made identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock describe the simple physical properties of a variety of everyday materials compare and group together a variety of everyday materials on the basis of their simple physical properties **Year 1 Unit 2- Autumn & Winter** observe changes across the four seasons observe and describe weather associated with the seasons and how day length varies. **Year 1 Unit 3- Amazing animals** identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals identify and name a variety of common animals that are carnivores, herbivores and omnivores describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. **Year 1 Unit 4- Spring & Summer** observe changes across the four seasons observe and describe weather associated with the seasons and how day length varies. **Year 1 Unit 5- Common plants** identify and name a variety of common wild and garden plants, including deciduous and evergreen trees identify and describe the basic structure of a variety of common flowering plants, including trees.	Year 2 Unit 1- Animals and Survival Year 2Unit 2- Uses of materials Year 2Unit 3- Living things and their habitats Year 2Unit 4- Protecting our environment Year 2Unit 5 - Plants & growth Year 3Unit 1- Skeletons & muscles Year 3Unit 2- Rocks & fossils Year 3Unit 4- Plants: need for survival Year 4Unit 1- Teeth & digestion Year 4Unit 2- States of Matter Year 4Unit 3-Classification and environments Year 5Unit 3- Properties and changes of materials Year 6Unit 2- Classification
2	**Year 2 Unit 1- Animals and Survival** notice that animals, including humans, have offspring which grow into adults find out about and describe the basic needs of animals, including humans, for survival (water, food and air) describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. **Year 2Unit 2- Uses of materials** identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. **Year 2Unit 3- Living things and their habitats** explore and compare the differences between things that are living, dead, and things that have never been alive identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other identify and name a variety of plants and animals in their habitats, including microhabitats describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. **Year 2Unit 4- Protecting our environment** identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other **Year 2Unit 5 - Plants & growth** observe and describe how seeds and bulbs grow into mature plants find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	Year 3Unit 1- Skeletons & muscles Year 3Unit 4- Plants: need for survival Year 4Unit 2- States of Matter Year 4Unit 3-Classification and environments Year 5Unit 3- Properties and changes of materials Year 5Unit 4- Life Cycles Year 5Unit 5- Getting older Year 6Unit 2- Classification Year 6Unit 3- Evolution & inheritance Year 6Unit 5- Circulation and lifestyle

3	**<u>Year 3Unit 1- Skeletons & muscles</u>** identify that animal, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat identify that human and some other animals have skeletons and muscles for support, protection, and movement **<u>Year 3Unit 2- Rocks & fossils</u>** compare and group together different kinds of rocks based on their appearance and simple physical properties describe in simple terms how fossils are formed when things that have lived are trapped within rock recognise that soils are made from rocks and organic matter. **<u>Year 3Unit 3- Light & shadow</u>** recognise that they need light in order to see things and that dark is the absence of light notice that light is reflected from surfaces recognise that light from the sun can be dangerous and that there are ways to protect their eyes recognise that shadows are formed when the light from a light source is blocked by an opaque object find patterns in the way that the size of shadows change. **<u>Year 3Unit 4- Plants: need for survival</u>** identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant investigate the way in which water is transported within plants explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. **<u>Year 3Unit 4- Forces and magnets</u>** compare how things move on different surfaces notice that some forces need contact between two objects, but magnetic forces can act at a distance observe how magnets attract or repel each other and attract some materials and not others compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials describe magnets as having two poles predict whether two magnets will attract or repel each other, depending on which poles are facing.	Year 4Unit 1- Teeth & digestion Year 4Unit 3-Classification and environments Year 5Unit 2- Forces Year 5Unit 4- Life Cycles Year 5Unit 5- Getting older Year 6Unit 1- Light & perception Year 6Unit 2- Classification Year 6Unit 3- Evolution & inheritance Year 6Unit 5- Circulation and lifestyle
4	**<u>Year 4Unit 1- Teeth & digestion</u>** describe the simple functions of the basic parts of the digestive system in humans identify the different types of teeth in humans and their simple functions construct and interpret a variety of food chains, identifying producers, predators and prey. **<u>Year 4Unit 2- States of Matter</u>** compare and group materials together, according to whether they are solids, liquids or gases observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **<u>Year 4Unit 3-Classification and environments</u>** recognise that living things can be grouped in a variety of ways explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment recognise that environments can change and that this can sometimes pose dangers to living things. **<u>Year 4Unit 4- Sound</u>** identify how sounds are made, associating some of them with something vibrating recognise that vibrations from sounds travel through a medium to the ear find patterns between the pitch of a sound and features of the object that produced it find patterns between the volume of a sound and the strength of the vibrations that produced it recognise that sounds get fainter as the distance from the sound source increases	Year 5Unit 3- Properties and changes of materials Year 6Unit 1- Light & perception Year 6Unit 2- Classification Year 6Unit 3- Evolution & inheritance Year 6Unit 4- Electricity & circuits

	Year 4Unit 5- Electricity identify common appliances that run on electricity construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit recognise some common conductors and insulators, and associate metals with being good conductors.	
5	**Year 5Unit 1- Earth & Space** describe the movement of the Earth, and other planets, relative to the Sun in the solar system describe the movement of the Moon relative to the Earth describe the Sun, Earth and Moon as approximately spherical bodies use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. **Year 5Unit 2- Forces** explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object identify the effects of air resistance, water resistance and friction, that act between moving surfaces recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. **Year 5Unit 3- Properties and changes of materials** compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic demonstrate that dissolving, mixing and changes of state are reversible changes explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda **Year 5Unit 4- Life Cycles** describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird describe the life process of reproduction in some plants and animals. **Year 5Unit 5- Getting older** describe the changes as humans develop to old age.	Year 6Unit 1- Light & perception Year 6Unit 2- Classification Year 6Unit 3- Evolution & inheritance Year 6Unit 5- Circulation and lifestyle **Year 7** Biology: Interdependence Chemistry: Particle Model Physics: Forces
6	**Year 6Unit 1- Light & perception** recognise that light appears to travel in straight lines use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. **Year 6Unit 2- Classification** describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals give reasons for classifying plants and animals based on specific characteristics. **Year 6Unit 3- Evolution & inheritance** recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents	**Year 7** Biology: cells Physics: Electric Circuits **Year 8** Biology: Tissues and organs Physics Light

	identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. **Year 6Unit 4- Electricity & circuits** associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches use recognised symbols when representing a simple circuit in a diagram. **Year 6Unit 5- Circulation and lifestyle** identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function describe the ways in which nutrients and water are transported within animals, including humans.	
7	**Biology:** • Cells are alive; all living things are composed of cells, both singly and in multicellular organisms, working together as tissues, organs and organ systems. • The exchange of substances between cells and their environment allows the life processes to occur, fuelled by the organelles within performing their function. • Differentiated cells allow living things to thrive in a huge variety of habitats. **Chemistry:** • Matter is composed of atoms. • Atoms can link together and arrange in a variety of ways leading to the formation of different structures. **Physics:** • Energy cannot be created or destroyed • Energy can be transferred from one store to another. • Different events can be explained in terms of the energy transfers involved. • Energy can be transferred in useful ways for example for transportation, heating and to generate electricity. In these processes, some energy becomes less easy to use.	**Biology** Year 8: Tissues & Organs Year 9: Growth and differentiation Year 10: Organising animals and plants **Chemistry** Year 8: Changing substances Year 9: Atoms and the periodic table Year 10: Structure and bonding **Physics** Year 8: Electric circuits Year 9: Heating Year 10: Conservation and dissipation of energy
8	**Biology:** • Cells work together as tissues. • Tissues work together as organs. • Many organs work together as organ systems. • Multicellular organisms (such as humans, animals and plants) are able to survive because many organ systems work simultaneously to carry out the 7 life processes. • When one part of the system doesn't work, this can have a negative impact on the health of the organism. **Chemistry:** • The behaviour and arrangement of atoms explain the properties of different materials. • In chemical reactions, atoms are rearranged to form new substances. • All chemical reactions involve the rearrangement of atoms. **Physics:** • The ways in which objects move depends on the forces acting on them. • If the forces acting on an object are unbalanced, the object will change its speed, direction or shape. • The behaviour of objects in motion follow mathematical laws that can be used to make predictions about speed, distance travelled, the time taken and acceleration.	**Biology** Year 9: Growth and differentiation Year 10: digestive system **Chemistry** Year 9: Quantitative chemistry Year 10: Structure and bonding **Physics** Year 9: Acceleration Year 10: Forces in Balance Year 11: Force and motion
9	**Biology:** • Living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the environment and with humans in many ways. • Living organisms are interdependent and rely on other organisms in their community to survive and reproduce.	**Biology** Year 10: Organising an ecosystem Year 11: Adaptations, interdependence and competition **Chemistry**

	Chemistry: • The numbers and types of atoms are the same before and after a chemical reaction. • Reactions can be represented using equations. **Physics:** • An electrical current is the flow of charge and is a way of transferring energy. • The electricity that we rely on for everyday use is generated in power stations and transferred to homes and businesses using the National Grid. • Electrical devices use circuits with various components to transfer energy in useful ways.	Year 10: Chemical changes **Physics** Year 10: Electric Circuits Year 11: Force and motion
10	**Biology:** • All of the resources required for life, and produced by living things, are recycled in nature. • The chemicals in ecosystems such as water, minerals and carbon are continually cycling through the natural world. • Animals are ultimately dependent on green plants (or other producers) as their source of energy. **Chemistry:** • The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate. **Physics:** • Waves carry energy from one place to another and can also carry information. • Electromagnetic waves have various uses, particularly in communications and medicine. • Ionising radiation is released from changes to the nuclei of atoms.	**Biology** Year 11: Biodiversity and ecosystems **Chemistry** Year 11: The Earth's atmosphere, the Earth's resources **Physics** Year 11: Wave properties, Electromagnetic waves, electromagnetism
11	**Biology:** • Genetic information in a cell is held in the chemical DNA. • All living things have DNA, which is passed from parent to offspring during reproduction. • A section of DNA which is responsible for a particular protein (or part of the body) is called a gene. • Genes determine the development and structure of organisms. **Chemistry:** • Chemicals in the earth have industrial uses and human industry produces chemicals which can affect the earth. **Physics:** • Objects can have an effect on other objects without touching them. • In some cases, the effect travels out from the source to the receiver in the form of radiation. • In other cases, action at a distance is explained in terms of the existence of a field of influence between objects such as a magnetic, electrical or gravitational field.	**Biology** Year 12: Biological molecules, Nucleic acids, Genetic information variation and relationships between organisms Year 13: Genetics populations, evolution and ecosystems **Chemistry** Year 12: Organic chemistry: Alkanes, halogenoalkanes, alkenes **Physics** Year 12: Waves and optics Year 13: Fields and their consequences:

Subject Overview

	Autumn 1	Autumn 2	Spring	Summer 1	Summer 2
Early Years	6 weeks of lessons 2 hours per week	6 weeks of lessons 2 hours per week	10 weeks of lessons 2 hours per week		
Nursery	My body/ My senses	My neighbourhood (shops) Other environments	Solar System Planets Stars and satellites		Minibeasts and Life Cycle Mammals Birds, Fish Amphibians and Reptiles.
Reception	My body and my senses	My neighbourhood (shops) Other environments	Solar System Planets Stars and satellites		Minibeasts and Life Cycle Mammals Birds, Fish Amphibians and Reptiles.
Year 1	Everyday Materials • distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday materials • compare and group together a variety of everyday materials on the basis of their simple physical properties	Autumn & Winter • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies	Amazing Animals • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • identify and name a variety of common animals that are carnivores, herbivores and omnivores • describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets) • identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense	Spring & Summer • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies	Plants • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees
Year 2	Animals: Needs for survival • notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene	Uses of materials • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	Habitats • explore and compare the differences between things that are living, dead, and things that have never been alive • identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • identify and name a variety of plants and animals in their habitats, including microhabitats • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food	Protecting our environment • identify the potential risks that humans pose to the local. environment • explore and explain the importance of recycling • identify how we can be energy efficient with water and electricity • describe the importance of trees • explain how small changes we can make can help the environment	Plants: Bulbs & growth • observe and describe how seeds and bulbs grow into mature plants • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy

Year 3	Skeletons & Muscles • identify that humans and some other animals have skeletons and muscles for support, protection and movement	Rocks & Fossils • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter	Light & Shadows • recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change •	Plants: Needs for survival • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal	Forces & magnets • compare how things move on different surfaces • notice that some forces need contact between 2 objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having 2 poles • predict whether 2 magnets will attract or repel each other, depending on which poles are facing
Year 4	Teeth & Digestion • describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions	States of matter • compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	Classification & environments • construct and interpret a variety of food chains, identifying producers, predators and prey • recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things	Sound • identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases	Electricity • identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors

Year 5	Earth & Space • describe the movement of the Earth and other planets relative to the sun in the solar system • describe the movement of the moon relative to the Earth • describe the sun, Earth and moon as approximately spherical bodies • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky	Forces • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	Materials: Properties & changes • materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda	Life cycles • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals	Growing old • describe the changes as humans develop to old age • identify and describe the 6 stages of human development • explain the stages of a baby's development • compare the development of humans with other animals
Year 6	Light & Perception • recognise that light appears to travel in straight lines • use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have	Classification • describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals • give reasons for classifying plants and animals based on specific characteristics	Evolution & inheritance • recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution	Electricity • associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • use recognised symbols when representing a simple circuit in a diagram	Circulation & lifestyle • identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • describe the ways in which nutrients and water are transported within animals, including humans

	the same shape as the objects that cast them				

		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 7	**Topic**	• Intro to lab science • Cells • Particle model	• Forces • Reproduction	• Atoms, Elements and Compounds • Gravity	• Inter-dependence	• Energy Transfers • Mixtures	• Electric Circuits
	Big Idea	***Cells are Alive*** Cells are alive; all living things are composed of cells, both singly and in multicellular organisms, working together as tissues, organs and organ systems. The exchange of substances between cells and their environment allows the life processes to occur, fueled by the organelles within performing their function. Differentiated cells allow living things to thrive in a huge variety of habitats. ***Structure determines properties*** Matter is composed of atoms; atoms can link together and arrange in a variety of ways leading to the formation of different structures. This behavior and arrangement of atoms explain the properties of different materials.	***Forces predict motion*** The ways in which objects move depends on the forces acting on them. If the forces acting on an object are unbalanced, the object will change its speed, direction or shape. The behavior of objects in motion follow mathematical laws that can be used to make predictions about speed, distance travelled, the time taken and acceleration. ***Characteristics are inherited*** Genetic information in a cell is held in the chemical DNA. All living things have DNA, which is passed from parent to offspring during reproduction. A section of DNA which is responsible for a particular protein (or part of the body) is called a gene. Genes determine the development and structure of organisms	***Structure determines properties*** Matter is composed of atoms; atoms can link together and arrange in a variety of ways leading to the formation of different structures. This behavior and arrangement of atoms explain the properties of different materials. ***Fields produce Forces*** Objects can have an effect on other objects without touching them. In some cases, the effect travels out from the source to the receiver in the form of radiation. In other cases, action at a distance is explained in terms of the existence of a field of influence between objects such as a magnetic, electrical or gravitational field.	***Organisms are inter-dependent*** Living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the environment and with humans in many ways. Living organisms are interdependent and rely on other organisms in their community to survive and reproduce.	***Energy is Conserved*** Energy cannot be created or destroyed, although it can be transferred from one store to another. Different events can be explained in terms of the energy transfers involved. Energy can be transferred in useful ways for example for transportation, heating and to generate electricity. In these processes, some energy becomes less easy to use. ***Structure determines properties*** Matter is composed of atoms; atoms can link together and arrange in a variety of ways leading to the formation of different structures. This behavior and arrangement of atoms explain the properties of different materials.	***Electricity transfers energy*** An electrical current is the flow of charge and is a way of transferring energy. The electricity that we rely on for everyday use is generated in power stations and transferred to homes and businesses using the National Grid. Electrical devices use circuits with various components to transfer energy in useful ways
	Content	Introduction to science ***Cells*** Animal cells Plant cells Microscopes Using a microscope Observing cells Specialised cells Organising cells ***States of matter*** The Particle Model Properties of the states of matter Melting and Freezing Boiling and Condensing Diffusion	***Forces*** Balanced or unbalanced forces Resultant Forces Interaction pairs Springs and deformation Drag Forces and Friction Practical – Friction ***Reproduction*** Sexual and Asexual Reproduction Puberty and the Reproductive System The Menstrual Cycle Embryo Development	***Atoms Elements and Compounds*** Elements Atoms The Periodic Table Metals and non-metals Compounds Making iron sulfide Chemical formulae Feedback Lesson ***Gravity*** Mass and Weight Keeping in Orbit The Solar System Satellites	***Interdependence*** Ecosystems Feeding Relationships Competition Biotic and Abiotic Factors	***Energy Transfers*** Energy and Energy Transfers Wasted Energy Heat and Temperature ***Mixtures*** Pure and Impure substances Melting and Boiling Separating Mixtures Solubility	***Electric Circuits: Current and PD*** Series and Parallel Circuits Electric Current Potential Difference

		Investigating Diffusion Gas pressure	Plant Reproduction Practical Plant Reproduction Feedback Lesson	Seasons Eclipses			
Year 8	**Topic**	• Tissues and Organs • Acids and Alkalis • Movement and Pressure	• Respiration and Photosynthesis	• Changing Substances • Magnetism • Life Diversity	• Earth Systems	• Electric Circuits (Resistance) • *Nutrition*	• Light
	Big Idea	***Reactions rearrange matter*** In chemical reactions, atoms are rearranged to form new substances. All chemical reactions involve the rearrangement of atoms. The numbers and types of atoms are the same before and after a chemical reaction. We can represent these reactions using equations. ***Bodies are Systems*** Cells work together as tissues. Tissues work together as organs. Many organs work together as organ systems. Multicellular organisms (such as humans, animals and plants) are able to survive because many organ systems work simultaneously to carry out the 7 life processes. When one part of the system doesn't work, this can have a negative impact on the health of the organism. ***Forces predict motion*** The ways in which objects move depends on the forces acting on them. If the forces acting on an object are unbalanced, the object will change its speed, direction or shape. The behavior of objects in motion follow mathematical laws that can be used to make predictions about speed, distance travelled, the time taken and acceleration.	**Ecosystems recycle resources** All of the resources required for life, and produced by living things, are recycled in nature. The chemicals in ecosystems such as water, minerals and carbon are continually cycling through the natural world. Animals are ultimately dependent on green plants (or other producers) as their source of energy.	***Fields produce Forces*** Objects can have an effect on other objects without touching them. In some cases, the effect travels out from the source to the receiver in the form of radiation. In other cases, action at a distance is explained in terms of the existence of a field of influence between objects such as a magnetic, electrical or gravitational field. ***Species show Variation*** All life today is directly descended from a universal common ancestor that was a simple one-celled organism. Over countless generations changes resulting from natural variation within a species lead to the selection of those individuals best suited to survive under certain conditions. Species not able to respond sufficiently to changes in their environment become extinct.	***Earth Systems Interact*** The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate. Chemicals in the earth have industrial uses and human industry produces chemicals which can affect the earth.	***Electricity transfers energy*** An electrical current is the flow of charge and is a way of transferring energy. The electricity that we rely on for everyday use is generated in power stations and transferred to homes and businesses using the National Grid. Electrical devices use circuits with various components to transfer energy in useful ways	***Radiation transfers energy*** Waves carry energy from one place to another and can also carry information. Electromagnetic waves have various uses, particularly in communications and medicine. Ionising radiation is released from changes to the nuclei of atoms.
	Content	***Tissues and Organs*** The Breathing System Gas Exchange The Digestive System Food Tests Diet and Nutrition The Small Intestine	***Photosynthesis and Respiration*** Respiration Exercise and Respiration Anaerobic Respiration Investigating Muscle Fatigue	***Changing Substances*** Chemical changes Conservation of mass Introduction to Balanced Equations Balancing Equations Oxidation and reduction	***Earth Systems*** The Rock Cycle The Water Cycle Combustion	***Electric Circuits; Resistance*** Resistance Resistance Ohm's Law Measuring Resistance ***Nutrition***	***Light*** Properties of Light Reflection Refraction

		Enzymes Digestive Enzymes Amylase Activity Writing Scientific Methods Organ Donation Debate Recreational Drugs The Skeletal and Muscular System ***Acids and Alkalis*** The pH Scale Indicators Indicators Practical Neutralisation Making Salts Acids and metal carbonates Making salts from metal carbonates ***Movement and Pressure*** Speed and Acceleration Changing Speeds Distance-Time Graphs Applications of Pressure	Uses of Anaerobic Respiration Photosynthesis Plant Adaptations Investigating Photosynthesis Non-Photosynthetic Plants Biodomes	Core Practical: Burning Magnesium Reactions of Acids Testing for gases ***Magnetism*** Magnets Magnetic Fields Electromagnets Investigating Electromagnets Earth's Magnetic Field ***Life Diversity*** Variation Inheritance Artificial Selection Natural Selection Evolution Human Impact on Natural Selection		Nutrients Health	
Year 9	**Topic**	• Growth and Differentiation • Atoms and the Periodic Table	• Acceleration • Human Interaction	• Intro to Quantitative Chemistry • Heating	• Genetics	• Using Resources • Sound and waves	• Home Electricity
	Big Idea	***Cells are Alive*** Cells are alive; all living things are composed of cells, both singly and in multicellular organisms, working together as tissues, organs and organ systems. The exchange of substances between cells and their environment allows the life processes to occur, fuelled by the organelles within performing their function. Differentiated cells allow living things to thrive in a huge variety of habitats. ***Structure determines properties*** Matter is composed of atoms; atoms can link together and arrange in a variety of ways leading to the formation of different structures. This behavior and arrangement of atoms explain the properties of different materials. ***Reactions rearrange matter*** In chemical reactions, atoms are rearranged to form new substances. All chemical reactions involve the	***Forces Predict Motion*** The ways in which objects move depends on the forces acting on them. If the forces acting on an object are unbalanced, the object will change its speed, direction or shape. The behaviour of objects in motion follow mathematical laws that can be used to make predictions about speed, distance travelled, the time taken and acceleration. ***Organisms are Interdependent*** Living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the environment and with humans in many ways.	***Reactions rearrange matter*** In chemical reactions, atoms are rearranged to form new substances. All chemical reactions involve the rearrangement of atoms. The numbers and types of atoms are the same before and after a chemical reaction. We can represent these reactions using equations. ***Energy is Conserved*** Energy cannot be created or destroyed, although it can be transferred from one store to another. Different events can be explained in terms of the energy transfers involved. Energy can be transferred in useful ways for example for transportation, heating	***Characteristics are inherited*** Genetic information in a cell is held in the chemical DNA. All living things have DNA, which is passed from parent to offspring during reproduction. A section of DNA which is responsible for a particular protein (or part of the body) is called a gene. Genes determine the development and structure of organisms.	***Radiation transfers energy*** Waves carry energy from one place to another and can also carry information. Electromagnetic waves have various uses, particularly in communications and medicine. Ionising radiation is released from changes to the nuclei of atoms.	***Energy is Conserved*** Energy cannot be created or destroyed, although it can be transferred from one store to another. Different events can be explained in terms of the energy transfers involved. Energy can be transferred in useful ways for example for transportation, heating and to generate electricity. In these processes, some energy becomes less easy to use.

		rearrangement of atoms. The numbers and types of atoms are the same before and after a chemical reaction. We can represent these reactions using equations.	Living organisms are interdependent and rely on other organisms in their community to survive and reproduce.	and to generate electricity. In these processes, some energy becomes less easy to use.			
		Growth and Differentiation Eukaryotic and Prokaryotic Cells Aseptic Technique Growth of Bacteria Microscopes Observing Cells Diffusion Diffusion in Living Things Osmosis Osmosis Investigation Active Transport Cell Division Cancer Stem Cells ***Atoms and the Periodic Table*** Atoms Electronic Configuration Isotopes Understanding the Atom The Periodic Table The Noble Gases The Alkali Metals The Halogens The Transition Elements (Chemistry Only)	***Acceleration*** Scalars and Vectors Resultant Vectors Newton's Third Law Newton's First Law Acceleration Acceleration Investigation Velocity-Time Graphs Acceleration Problems ***Human Interaction*** Biodiversity How Humans affect Biodiversity Global Warming Human Waste Pyramids of Biomass Farming and Biotechnology Food Security	***Quantitative Chemistry*** Conservation of Mass Relative Formula Mass Introducing the Mole Mole Calculations Introduction to Concentration Concentration Calculations Soluble Salts Making Soluble Salts ***Heating*** Internal Energy Thermal Transfers Thermal Transfers 2 Specific Heat Capacity Specific Heat Capacity Investigation Specific Latent Heat Pressure in Fluids 1 Pressure In Fluids 2	***Genetics*** Sexual and Asexual reproduction Genes and DNA Genetic Engineering Cloning Monohybrid Inheritance Gene Theory	**Using Resources** Treating water Testing water Using Materials Life Cycle Assessments Reduce Reuse Recycle Evaluating Impact **Sound and Waves** Longitudinal and Transverse Wave properties Sound waves Seismic waves and ultrasound	**Home Electricity** Mains Electricity Plugs Power Cost of electricity Power in circuits Power and Energy in appliances Energy Resources The National Grid Static Electricity
Year 10	**Topic**	• Organising animals and plants • Digestive system • Respiration • The human nervous system	• Energy Changes • Structure and bonding • Chemical Changes	• Photosynthesis • Organising and ecosystem • Forces in balance • Electrolysis • The Earth's resources	• Force and motion • Conservation and dissipation of energy • Chemical analysis • Energy Resources	• Electric Circuits • Electromagnetism • Communicable diseases • Preventing and treating diseases • Non communicable diseases	• Radioactivity • Crude oil • Variation and evolution
	Big idea	***Bodies are Systems*** Cells work together as tissues. Tissues work together as organs. Many organs work together as organ systems. Multicellular organisms (such as humans, animals and plants) are able to survive because many organ systems work simultaneously to carry out the 7	***Reactions rearrange matter*** In chemical reactions, atoms are rearranged to form new substances. All chemical reactions involve the rearrangement of atoms. The numbers and	**Organisms are interdependent** Living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the	**Fields produce forces** Objects can have an effect on other objects without touching them. In some cases, the effect travels out from the source to the receiver in the form of radiation. In other cases,	**Electricity transfers energy** An electrical current is the flow of charge and is a way of transferring energy. The electricity that we rely on for everyday use is generated in power	**Radiation transfers energy** Waves carry energy from one place to another and can also carry information. Electromagnetic waves have various uses, particularly in communications and

		life processes. When one part of the system doesn't work, this can have a negative impact on the health of the organism. **<u>Ecosystems recycle resources</u>** All of the resources required for life, and produced by living things, are recycled in nature. The chemicals in ecosystems such as water, minerals and carbon are continually cycling through the natural world. Animals are ultimately dependent on green plants (or other producers) as their source of energy.	types of atoms are the same before and after a chemical reaction. We can represent these reactions using equations.	environment and with humans in many ways. Living organisms are interdependent and rely on other organisms in their community to survive and reproduce.	action at a distance is explained in terms of the existence of a field of influence between objects such as a magnetic, electrical or gravitational field.	stations and transferred to homes and businesses using the National Grid. Electrical devices use circuits with various components to transfer energy in useful ways.	medicine. Ionising radiation is released from changes to the nuclei of atoms. **<u>Species show variation</u>** All life today is directly descended from a universal common ancestor that was a simple one-celled organism. Over countless generations changes resulting from natural variation within a species lead to the selection of those individuals best suited to survive under certain conditions. Species not able to respond sufficiently to changes in their environment become extinct.
	Content	**Organising animals and plants** • Blood, vessels, heart • Breathing and gas exchange • Tissues organs and transport systems in plants • Transpiration **Digestive system** • Cells, tissues, organs • Digestive systems • Enzymes **Respiration** • Aerobic Respiration • Exercise • Anaerobic respiration • Metabolism and the liver **The human nervous system** • Homeostasis • Structure and function of the nervous system Reflex actions	**Energy Changes** • Exothermic and endothermic reactions • Energy transfers • Reaction profiles • Bond energy calculations **Structure and bonding** • States of matter • Atoms to ions • Ionic and covalent bonding • Giant ionic and covalent structures • Fullerenes and graphene • Bonding in metals • Metallic structures **Chemical Changes** • The reactivity series • Displacement reactions • Extracting metals • Salts from metals • Salts from insoluble bases • Neutralisation and the pH scale Strong and weak acids	**Photosynthesis** • Photosynthesis • The rate of photosynthesis • How plants use glucose • Making the most of photosynthesis **Organising an ecosystem** • Feeding relationships • Materials cycling • The carbon Cycle **Forces in balance** • Vectors and scalars • Forces between objects • Resultant forces • Centre of mass • The parallelogram of forces • Resolution of forces **Electrolysis** • Introduction to electrolysis • Changes at the electrodes	**Force and motion** • Force and acceleration • Weight and terminal velocity • Forces and braking • Momentum • Forces and elasticity **Conservation and dissipation of energy** • Changes in energy stores • Conservation of energy • Energy and work • Gravitational potential energy stores • Kinetic Energy Stores • Energy Dissipation • Energy and efficiency • Electrical appliances • Energy and power **Chemical analysis** • Pure substances and mixtures • Analysing chromatograms • Testing for gases	**Electric Circuits** **Electromagnetism** • Magnetic fields • Magnetic fields of electric currents • Electromagnets in devices • The motor effect • The generator effect • The alternating-current generator • Transformers **Communicable diseases** • Health and disease • Pathogens and disease • Growing bacteria in the lab • Preventing bacterial growth • Preventing infections • Viral diseases • Bacterial diseases • Diseases caused by fungi and protists	**Radioactivity** • Atoms and radiation • The discovery of the nucleus • Changes in the nucleus • More about alpha beta and gamma • Activity and half life • Nuclear radiation in medicine • Nuclear fission • Nuclear fusion • Nuclear issues **Crude oil** • Hydrocarbons • Fractional distillation of oil • Burning hydrocarbon fuels • Cracking hydrocarbons **Variation and evolution** • Variation • Evolution by natural selection • Selective breeding • Genetic engineering • Ethics of genetic technologies

				• The extraction of aluminium • Electrolysis of aqueous solutions **The Earth's resources** • Finite and renewable resources • Water safe to drink • Treating waste water • Extracting metal ores • Life cycle assessments • Reduce, reuse and recycle	• Tests for positive ions • Tests for negative ions • Instrumental analysis **Energy Resources** • Energy demands • Energy from wind and water • Power from the sun and the Earth • Energy and the environment • Big energy issues	• Human defence responses **Preventing and treating diseases** • Vaccination • Antibiotics and painkillers • Discovering drugs • Developing drugs • Making monoclonal antibodies • Uses of monoclonal antibodies **Non communicable diseases** • Non-communicable diseases • Cancer • Smoking and the risk of disease • Diet, exercise and disease • Alcohol and other carcinogens	
Year 11	**Topic**	• Hormonal Coordination • Adaptations, interdependence and competition • Biodiversity and ecosystems • motion	• The Earth's atmosphere • The Earth's resources • Wave Properties • Electromagnetic waves	• Reproduction • Variation and evolution • Genetics and evolution • Forces in balance • Force and motion	• Electromagnetism • Revision • Mock Exams • Exam Review	Revision and Review	GCSE exams
	Big Ideas	**<u>Bodies are systems</u>** Cells work together as tissues. Tissues work together as organs. Many organs work together as organ systems. Multicellular organisms (such as humans, animals and plants) are able to survive because many organ systems work simultaneously to carry out the 7 life processes. When one part of the system doesn't work, this can have a negative impact on the health of the organism. **<u>Characteristics are inherited</u>**	**<u>Earth systems interact</u>** The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate. Chemicals in the earth have industrial uses and human industry produces chemicals which can affect the earth.	**<u>Species show variation</u>** All life today is directly descended from a universal common ancestor that was a simple one-celled organism. Over countless generations changes resulting from natural variation within a species lead to the selection of those individuals best suited to survive under certain conditions. Species not	**<u>Radiation transfers energy</u>** Waves carry energy from one place to another and can also carry information. Electromagnetic waves have various uses, particularly in communications and medicine. Ionising radiation is released from changes to the nuclei of atoms.		

		Genetic information in a cell is held in the chemical DNA. All living things have DNA, which is passed from parent to offspring during reproduction. A section of DNA which is responsible for a particular protein (or part of the body) is called a gene. Genes determine the development and structure of organisms.		able to respond sufficiently to changes in their environment become extinct.			
	Content	**Hormonal Coordination** • Principles of hormonal control • The control of blood glucose levels • Treating diabetes • The role of negative feedback • Human reproduction • Hormones and the menstrual cycle • The artificial control of fertility • Infertility treatments **Adaptations, interdependence, and competition** • The importance of communities • Organisms in their environment • Distribution and abundance • Competition in animals and plants • Adaptations in animals and plants **Biodiversity and ecosystems** • The human population explosion • Land and water pollution • Air pollution • Deforestation and peat destruction • Global warming • The impact of change • Maintaining biodiversity • Trophic levels and biomass • Food security and efficiency • Sustainable food production **Motion** • Speed and distance-time graphs • Velocity and acceleration • More about velocity time-time graphs • Analysing motion graphs	**The Earth's atmosphere** • History of our atmosphere • Greenhouse gases • Global climate changes • Atmospheric pollutants **The Earth's resources** • Finite and renewable resources • Water safe to drink • Treating waste water • Extracting metal ores • Life cycle assessments • Reduce, reuse and recycle **Wave Properties** • The nature of waves • The properties of waves • Reflection and refraction • More about waves • Sound waves • The uses of ultrasound • Seismic waves **Electromagnetic waves** • The electromagnetic spectrum • Light, infrared, microwaves, and radio waves • Communications • Ultraviolet waves, X-rays, and gamma rays x-rays in medicine	**Reproduction** • Types of reproduction • Cell division in sexual reproduction • DNA and the genome • Inheritance in action • More about genetics • Inherited disorders • Screening for genetic disorders **Variation and evolution** • Variation • Evolution by natural selection • Selective breeding • Genetic engineering • Ethics of genetic technologies **Genetics and evolution** • Evidence for evolution • Fossils and extinction • More about extinction • Antibiotic resistance bacteria • Classification • New systems of classification **Forces in balance** • Vectors and scalars • Forces between objects • Resultant forces • Centre of mass • The parallelogram of forces • Resolution of forces **Force and motion** • Force and acceleration • Weight and terminal velocity • Forces and braking • Momentum • Forces and elasticity	**Revision:** • Energy and energy resources • Particles at work • Atoms bonding and moles • Chemical reactions and energy changes • Cells and organisation • Disease and bioenergetics	**Revision:** • Biological response • Genetics and reproduction • Ecology • Rates equilibrium and organic chemistry • Analysis and the Earth's resources • Forces in action • Waves electromagnetism and space	GCSE Exams

				Electromagnetism • Magnetic fields • Magnetic fields of electric currents • Electromagnets in devices • The motor effect • The generator effect • The alternating-current generator • Transformers Transformers in action			

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 12 Physics	**Mechanics and materials** • Forces in equilibrium • On the move • Newtons laws of motion • Force and momentum • Work, energy and power • Materials	**Electricity** • Electric current • Circuits	**Waves and optics** • Waves • Optics	**Practical work in Physics** • Measurements and their errors	**Particles and radiation** • Matter and radiation • Quarks and leptons • Quantum phenomena	• Revision and review
Year 13 Physics	**Further mechanics and thermal physics** • Motion in a circle • Simple harmonic motion • Thermal Physics • Gases	**Fields and their consequences** • Gravitational fields • Electric fields • Capacitors • Magnetic fields • Electromagnetic induction	**Nuclear physics** • Radioactivity • Nuclear energy	• **Revision and review**	• **Revision and review**	• **A Level Exams**
Year 12 Chemistry	**Inorganic Chemistry 1** • Periodicity **Physical chemistry** • Atomic structure • Amount of substance • Bonding	**Physical Chemistry** • Oxidation reduction and redox equations **Inorganic Chemistry** • Group 2, the alkaline earth metals • Group 7	**Organic chemistry** • Introduction to organic chemistry • Alkanes • Halogenoalkanes	**Organic chemistry** • Alkenes **Physical Chemistry** • Energetics • Kinetics	**Organic chemistry** • Alcohols • Organic analysis **Physical Chemistry** • Chemical equilibria and le Chatlier's principle	**Physical Chemistry** • Thermodynamics • Rate equations • Equilibrium constant
Year 13 Chemistry	**Physical Chemistry** • Acids and bases **Organic chemistry** • Optical isomerism • Aldehydes and ketones • Carboxylic acids and derivatives	**Organic chemistry** • Aromatic chemistry • Amines • Polymers • Amino acids proteins and DNA **Physical Chemistry** • Electrode potentials	**Inorganic Chemistry** • Transition metals • Reactions of ions • Properties of period 3 • Nuclear magnetic resonance •	**Organic chemistry** • Chromatography • Organic synthesis • Revision and review	• Revision and review	• A Level Exams
Year 12 Biology	**Biological Molecules** • Introduction to Biological molecules • Nucleic acids	**Cells** • Cells • Transport across cell membranes	**Cells** • Cell recognition and the immune system **Organisms exchange substances with their environment**	**Genetic information variation and relationships between organisms** • DNA, Genes and protein synthesis • Genetic diversity	**Energy transfers in and between organisms** • Photosynthesis • Respiration	• Revision and review

			• Exchange • Mass Transport	• Biodiversity	• Energy and ecosystems	
Year 13 Biology	**<u>Organisms respond to changes in their environments</u>** • Nervous Coordination and muscles • Homeostasis	**<u>Genetics populations, evolution and ecosystems</u>** • Inherited change • Populations and evolution • Populations in ecosystems	**<u>The control of gene expression</u>** • Gene expression • Recombinant DNA technology	• Revision and review	• Revision and review	• A Level Exams