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Key Stage 3 Curriculum Journey:

The curriculum in science will ensure that students will explore some of the most engaging aspects of science, including the history and those scientists involved, as well as improving their scientific literacy, practical skill, mathematical skill.

THE YEAR 7 CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4	HALF TERM 5	HALF TERM 6
Topic and learning focus						
	Survival in the wild	Space	No planet B	Healthy Living	Great Discoveries	Alchemy
Foundational Knowledge Prior learning needed	• What does it mean to be a living thing? • What similarities to living things share?	• Where is the Earth? • The meaning of the term 'speed'	• What are the three states of matter? • Structure of planet earth • Making clean water	• What does it mean to be healthy? • Nutrient groups • Importance of exercise	• The importance of electricity • What is a force?	• The significance of atoms and elements • What is an acid and what effect can it have on other materials
Core Knowledge and skills	• Understanding of the key features needed for wildlife to survive. • Feeding • Reflexes • Reproduction	• Gravity being a fundamental force. • Mass vs Weight • Differences between solids, liquids and gases. •	• How each state transfers into the next state • Rock cycle • Examples of the different types of rock	• Effects of exercise • Effects of diet choices • How smoking affects the body	• The effect forces can have on an object • Electric current as a flow of electrons carrying energy	• How atoms make compounds • The difference between pure and impure • How to test for acids • The pH for acids and alkalis
Developmental Knowledge and Skills	• Understand how animals and plants live together in ecosystems and how their features adaptations suit their environment.	• What is a hypothesis • How to substitute into equations • Start to rearrange equations	• Carbon dioxide and it's links to global warming • Practical diagrams for distillation	• How to measure BMI and Waist to hip ratio • Medical impacts of Smoking and alcohol	• How to draw a perfect graph • How to analyse a graph to form a conclusion • The application of electricity • How to draw accurate circuit diagrams.	• Naming compounds and chemicals • Dangers of chemicals such as acids and alkalis and what the hazard symbols mean • How to display chemical reactions • Following an experimental method
Complex Knowledge	• How humans are impacting ecosystems. • Aims of conservation projects	• How particles behave in stars	• Use data to advise the best fuel source • State of matter from data source • Extracting information from a table or graph	• What happens when we sleep? • How to construct a healthy living plan for different people	• The links between electricity and magnetism. • How can we produce motion using electricity?	• What makes an acid corrosive? • Explain the effect of neutralising an acids

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			• Forming informed opinions based on evidence			
Links with the National Curriculum	• Reproduction • Muscles • Digestion • Ecosystems	• Forces • Motion • Space	• States of matter • Rock cycle • Composition of the earth	• Health • Nutrition • Digestion	• Forces • Electricity • Magnetism	• Nature of matter • Atoms, element and compounds • Pure and impure • Chemical reactions
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets ensuring that reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets ensuring that reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work
Cultural Capital	• Students will study lots of different animals and the environments in which they live	• The future of space travel • Advances in space technology	• How pollution is affecting our planet • The structure of the planet	• Effects of smoking, alcohol & sleep on our bodies.	• History of the links between electricity and magnetism. • Study of the famous scientists involved (Volta, Newton etc)	• Where chemicals are used in our everyday lives • History of alchemy
Social, Moral, Spiritual and Cultural Development	• Linking their understanding to different species and the environment. • Building students self-knowledge, self-esteem and self-confidence; when looking at new situations of how conservation can have a positive impact on the environment.	• Awe and wonder (Black holes, the scale of space etc) • Ethical issues (should we spend so much on space research and travel?) • Cultural - learning about famous scientists and their contribution to science	• Awe and wonder (the earth) • Ethical issues involving plastic uses and environment • Requires students to form an opinion based on facts •	• Linking their understanding to health, diet and fitness. • Building students self-knowledge, self-esteem and self-confidence, particularly when looking at diet, alcohol, smoking and disease.	• Appreciating the influences of famous scientists and the impact they have had on life, society and culture.	• The use of chemical based products for households. • Development of the theory of atoms/elements
Fundamental British Values	• Respect for others, the natural world and our environment	• Considering the beliefs of others • Social conflict (Model of the solar system)	• Considering the beliefs of others • Social conflict • Respect for others.	• Respect for others.	• Individual liberty of own views, tolerance and mutual respect of others views is incorporated in learning how different views of electricity have changed over time. • Develop the rule of law in our practicals and how the students	• Teamwork, mutual respect and tolerance all built through the practical aspects of this course. • Following the laboratory rules when conducting practical work with harmful chemicals.

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					have to carry them out.	
Assessment	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) on survival, including for example **respiration, reproduction and reflexes and ecosystems**. 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) including for example **forces, motion and space**. 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) including for example **state transfer, rocks and cycle, carbon dioxide.** 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) including for example **health, nutrition and digestion**. 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) including for example **forces, electricity and magnetism** 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) including for example on the **nature of matter, atoms, element and compounds, pure and impure chemical reactions** 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness

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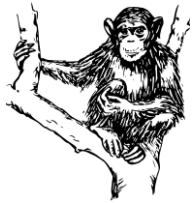
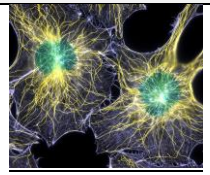
Key Stage 3 Curriculum Journey:

The curriculum in science will ensure that students will explore some of the most engaging aspects of science, including the history and those scientists involved, as well as improving their scientific literacy, practical skill, and mathematical skill.

THE YEAR 8 CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4	HALF TERM 5	HALF TERM 6
Topic and learning focus						
	Chemical Reactions	Physics behind Biology	Life under the microscope	Famous scientists	Women in physics	Biological blueprints
Foundational Knowledge Prior learning needed	• What happens in a chemical reaction • How to identify elements, atoms and compounds.	• Importance of energy • Conservation of energy	• Difference between organs, tissues and cells. • What is respiration? • Why do we use microscopes?	• Structure of the atom • Protons, neutrons and electrons • Size of atoms	• An understanding some atoms are unstable •	• What is DNA? • Where does our DNA come from?
Core Knowledge and skills	• What are the common signs a chemical reaction is taking place? • Identify the products and reactants in a reaction. • What does a catalyst do?	• Describe energy transfers • Calculate the efficiency of a transfer • How does sound travel? • Describe the use of waves	• Process and location of respiration • How do plants get their energy? • Role of different aspects of the cell • Different components of a cell	• How is the periodic table constructed? • What are the trends in the periodic table?	• The process of radioactive decay • Properties of alpha, beta and gamma. • The waves of the EM spectrum and their corresponding uses and dangers. • Why is ionising radiation dangerous	• Fertilisation of an egg • Inheritance in terms of alleles and the effect on the features of a person.
Developmental Knowledge and Skills	• Learn how to construct word equations for reactions • Conducting accurate practical tests	• Describe what can happen when waves strike a material. • Understanding of the terms frequency and wavelength	• Unit conversions • Role of different aspects of the cell • How cells work together in living things	• How do the differences between toms affect their properties? • Predict the properties for atoms from the periodic table.	• Practice of developing a method and conducting a practical task. • Understanding why there are different types of radioactive decay.	• The importance of cell division for living things (Growth and repair). • How to collect and represent data.

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					• Reasons objects reach a terminal velocity	
Complex Knowledge	• Understanding of specific types of reactions such as displacement, oxidation and thermal decomposition.	• Explain how problems with vision can be corrected with lenses	• How different cells are adapted to suit their function.	• What was the impact of each of the individual scientists in the development of the atomic model?	• The processes of nuclear fission and nuclear fusion	• Selective breeding • Advanced terminology (Phenotype, Zygote, Gamete, Organelle etc.)
Links with the National Curriculum	• Chemical reactions • Atoms and elements	• Energy • Energy transfers • Waves • Light and sound	• Cells and organisation • Cellular respiration • Photosynthesis	• Atoms and elements • The periodic table	• Force and motion • EM waves	• Genetics • Inheritance • Cells • Reproduction
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets ensuring that reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets ensuring that reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work
Cultural Capital	• Lots of hands-on work with chemicals and different types of scientific equipment.	• discuss the ways opticians and doctors can help with hearing and sight problems.	• How work with microscopes has impacted life today. • Advancements in technology	• How scientific research can change the way we view things. • Uses of different elements in the world around us.	• Famous scientific moment in history - Manhattan project - Discovery of DNA - Discovery of radioactivity	• How these scientific methods are applied in everyday life.
Social, Moral, Spiritual and Cultural Development	• Developing personal qualities and social skills in the amount of practical and group work within the topic. • Ethical issues around combustion and the		• The role scientists have played in society and how work with microscopes has helped advance medicine.	• Appreciating the hard work of others and the differences they made.	• Scientific developments may give rise to moral dilemmas during the Manhattan project research • Ethical issues surrounding nuclear power	• The possibilities that can be achieved with selective breeding. • Ethical issues when it comes to selective breeding.

	environmental effects					
Fundamental British Values	• Respect for others during group work.	• Students develop team working skills and to taking responsibility in scientific practicals • students experience individual liberty by making choices during an experiment • group work which develops mutual respect in the classroom	• Respect for the work of scientists who make a significant change to the lives of our communities and society, particularly in the field of medicine and health	• Respect for the work of scientists who make a significant change to the lives of our communities and society.	• Tolerance and respect for others during discussions around ethical issues regarding uses of radioactivity and nuclear power.	• Tolerance and respect for others during discussions around ethical issues
Assessment	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) on survival, including for example **chemical reactions, atoms and elements**. 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) on survival, including for example **energy, energy transfers, waves, light and sound**. 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) on survival, including for example **cells and organisation, cellular respiration, photosynthesis.** 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) on survival, including for example **atoms and elements, and the periodic table** 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) on survival, including for example f**orce and motion, and EM waves** 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness	20 mark mid topic test (a series of short answer questions) and then 40 mark end of topic test (a series of short answer questions) on survival, including for example **genetics, inheritance, cells, reproduction** 10 mark scientific skills test (**graphs, equations and practical experiments**). Feedback and response through whole class feedback Practice questions assigned based on area of weakness

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Key Stage 3 Curriculum Journey:

The curriculum in year 9 science will focus on the fundamental scientific concepts, as well as the theories and laws which govern science. These fundamental concepts will become central points upon which future study is grounded. Learners will engage in practical experiences of science and then analyse the results and reflect on their implications before applying these to theory, laws and concepts.

THE YEAR 9 CURRICULUM JOURNEY

	TERM 1	TERM 2	TERM 3
Topic and learning focus	Energy and electricity Cardiovascular system Atoms and bonding	Forces Digestion Neutralisation	Transferring energy Plant and microscopes Electrolysis
Foundational Knowledge Prior learning needed	• The concept of energy and its importance • Use and importance of electricity as a movement of electrons. • What makes something a living thing • SImilarities living things share • Structure of the atom • Understanding of the periodic table • difference between elements and compounds	• An understanding that forces are a way of transferring energy • Recall names of common forces • Where does our energy come from? • What are the different nutrient groups • What are acids and alkalis? • How are these chemicals used? • How do we identify acids?	• What are waves used for? • Recall different waves • Law of conservation of energy • Features of plant cells • Why do plants need energy? • How atoms become ions • Why do we use electrolysis • Electric current and movement of charge
Core Knowledge and skills	• Describing different energy transfers using appropriate diagrams • Understanding of charge, current and potential difference. • The process of respiration and the reactants needed. • How oxygen and glucose get around our body • Electron configuration linked to periodic table • How atoms bond together	• Recall of Newton's laws. • Non-contact forces (Gravity and magnetism) • The roles of the different parts of our digestive system • How enzymes aid digestion • What is the defining feature of an acid and alkali? • The meaning of neutralisation • Write word equations for the reactions of acids and alkalis	• Understand how transfer of energy affect an object (Temperature) • How frequency and amplitude affect pitch and volume. • Efficiency calculations and wasted energy • Respiration, photosynthesis and features of plants. • Products of electrolysis • Terminology (anode, cathode, anion, cation) • Electrolytes linked to the products made
Developmental Knowledge and Skills	• Carry out calculations which require rearranging terms. • The factors affecting current in an electric circuit • How the structure of parts of our body allow substances to easily move around our body. • The process of diffusion • Why atoms bond together • How to predict the type of bonding using the periodic table	• Applications of Newton's laws • How forces and acceleration are linked • What is a force field • What factors affect the rate of a reaction (Enzyme activity) • Shared role of circulatory and digestive systems • Describe a method for carrying out a titration • What affects the concentration of an acid?	• Links between GPE and kinetic energy for a falling object. • Uses of specific waves • Diffusion in plants • Osmosis in plants • Chemical reaction in plants • Attraction of charges based on potential difference • Electrical conductivity
Complex Knowledge	• Understanding the impact of changing potential difference or resistance on the rest of the components in the circuit. • Applying this concept to other animals such as fish.	• What are the differences between the different types of magnets? • Importance of protein in our diet	• Ways to minimise wasted energy (thermal insulation) • Chains of energy transfer • Plant stem cells

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	• Use of appropriate terminology (specific parts of the heart, lungs, vessels etc) • Considering ionic charges involved with bonding. • Describe the bonding in complex ionic compounds	• Growth and repair from cellular replication. • Calculations in terms of concentration and pH. • Complete symbol equations for the neutralisation reactions	• Explaining growth in plants • Which ions are present in different electrolytes • What happens to the ions at the electrodes?
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • How to write up scientific practical work
Cultural Capital	• How we produce electricity on a large scale using power plants and renewable sources. • Variation in the circulatory systems of different animals • History of the periodic table and uses of different elements within it.	• Industrial chemical plants. • Issac Newton and his laws of motion	• Global energy efficiency, are we doing enough? • Electrolysis on an industrial scale
Social, Moral, Spiritual and Cultural Development	• The discovery of electricity and how different our world would be without it. • Ethical considerations of the use of animals in experiments • Chance to discuss how similar all living things are • Extreme chemical reactions and why they happen • The contributions of famous scientist	• Develop an understanding of the impact of food on development and the importance of a balanced diet	• Cost of electrolysis to extract metals. • Respect for plants and nature and the importance of biodiversity within ecosystems.
Fundamental British Values	• Respect for others during practical work	• Tolerance of other people's views on their diet (vegetarian/vegan)	• Respect for others during practical work
Assessment	Open ended question during each topic where students have to explain how concepts from each topic link together on **energy and electricity, the cardiovascular system, atoms and bonding.** Synoptic short answer test, 40 marks on the key questions from the topics and some of the skills developed during the units. Whole class feedback given, teacher will re-teach where appropriate and provide tasks/questions so students can practice areas of weakness.	Open ended question during each topic where students have to explain how concepts from each topic link together on **forces, digestion and neutralisation.** Synoptic short answer test, 40 marks on the key questions from the topics and some of the skills developed during the units. Whole class feedback given, teacher will re-teach where appropriate and provide tasks/questions so students can practice areas of weakness.	Open ended question during each topic where students have to explain how concepts from each topic link together on **transferring energy, plant and microscopes, and electrolysis.** Synoptic short answer test, 40 marks on the key questions from the topics and some of the skills developed during the units. Whole class feedback given, teacher will re-teach where appropriate and provide tasks/questions so students can practice areas of weakness.

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Key Stage 4 Curriculum Journey:

The curriculum in Y10 will allow students to build on and enhance these fundamental concepts in order to broaden their knowledge base and apply what they have learnt to additional knowledge and new scenarios. Our intent is for students to use these foundational and developmental concepts, models and theories so that they can better make sense of the observed diversity of natural and scientific phenomena.

THE YEAR 10 COMBINED SCIENCE CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4	HALF TERM 5	HALF TERM 6
Topic and learning focus	Survival Bonding 2 Forces	Response Fuels Energy, electrical power and heating	Inheritance Neutralisation 2	Evolution Separating mixtures Radioactive decay	Pathogens Metal extraction The EM spectrum and waves	Risk factors Dynamic equilibrium
Foundational Knowledge Prior learning needed	• Food chains and food webs • What is an ecosystem • Atomic structure and electron configuration • Link between force and acceleration.	• What does our nervous system do? • Why we use fuels and the difference between compounds and mixtures. • Good understanding of work done and energy.	• The structure and function of DNA. • Continuous and discontinuous data sets. • Uses of acids and alkalis. • Understanding of neutralisation and how it's done.	• How are animals classified into groups? • Identify how animals have evolved. • Why do we need to separate chemicals? • Simple techniques - filtration. • Structure of the atom • Understanding of alpha, beta and gamma radiation.	• What does it mean to be healthy? • What is disease? • Knowledge of where metals come from and the processes used to extract them from their ores. • Basic properties of how waves transfer energy. • Reflection and refraction.	• Genes and non-communicable diseases. • Knowledge of the cardiovascular system and its function. • Chemical reactions and how to write a word and symbol equation.
Core Knowledge and skills	• Understand the living and nonliving factors that affect the environment and change ecosystems. • How atoms become ions • Drawing dot-cross diagrams to demonstrate bonding • Use of F=ma • Drawing free body diagrams • Understanding of the term 'momentum'.	• How nerve impulses travel around our body and why they are needed. • Thermoregulation and glucoregulation. • Structure and formation of hydrocarbons. • Fractional distillation. • Using Power in a variety of contexts. • Specific heat capacity and	• How genes and alleles are linked to the way a human or animal looks. • How inheritance and variation come about. • Recall products and describe reactions involving acids. • Describe the difference between strong and weak acids in terms of ions.	• Theory of evolution. • Evolution linked to bacteria. • Distillation and fractional distillation. • Chromatography. • Explain why a nucleus may or may not be radioactive. • How is radioactivity measured?	• Communicable and noncommunicable diseases. • Infections, Pathogens and antigens. • Use of the reactivity series to determine which extraction method is the most suitable. • Metals, alloys and their properties.	• Risk factors for various conditions such as Cardiovascular disease. • Drug testing and placebos. • Reversible and irreversible reactions. • What is meant by the term equilibrium. • How the conditions can affect a reversible reaction.

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		specific latent heat.		• Background radiation.	• Similarities, differences, danger and uses of electromagnetic waves.	
Developmental Knowledge and Skills	• Predict and foresee changes based on external factors. • Analyse data to judge impact of changes. • Explain why atoms bond together • The link between delocalised electrons and electricity • Linking stopping distance to work done and kinetic energy	• Use of hormones as chemical messengers within the body. • Separation of crude oil into its fractions. • Understand how the processes of living things affect the gases in our atmosphere • Links between resistance and thermal energy transfer. • Explain the changes in particles when a substance is heated.	• Ratio and probability of inheriting certain genes. • Key features of selective breeding and genetic engineering. • Draw conclusions from experimental data. • Understand the solubility rules for common compounds. • Write a scientific method to carry out a titration.	• Evidence for human evolution. • How can we design practical tasks to demonstrate separation techniques? • Analyse data to determine the type of radioactivity present. • Linking half-life to danger of radioactive materials.	• How does a vaccine work? • Oxidation and reduction. • Typical properties of transition metals. • How the frequency of a wave determines how much energy is transferred. • The reasons for refraction. • The factors that affect what happens to a wave at a boundary.	• Effects of our choices regarding diet and exercise. • Effects of pressure, temperature and concentration on a chemical reaction.
Complex Knowledge	• Provide solutions to help combat changes. • How large lattice structures are formed • Determine properties from the type of bonding. • Apply the principle of conservation of momentum to collisions and explosions.	• Names of the hormones, and the locations they are produced. • Understanding and applying general formulas. • Complete balanced equations. • Using the concept of power to analyse series and parallel circuits.	• Describing the process of who we can genetically engineer and selectively breed. • Explain the effect of limiting reagents on a reaction. • Carry out concentration calculations.	• Specific examples of evolution of animals and the reasons for the changes. • Explain the changes in particles during separation. • Compare different substances using Rf values and boiling points. • Completing half-life calculations and nuclear decay equations.	• How do antibiotics work? • Detail of specific diseases such as HIV and chlamydia • Explain why alloys are used and the advantages certain alloys give over pure metal. • Evaluate data from a life cycle assessment. • Detailed knowledge of specific uses of EM waves.	• Human Genome project. • Why medical trials are difficult and often fail. • Formation of ammonia.
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.

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Cultural Capital	• Study of different ecosystems in various areas of the world. • Modern transport used as context for lessons, bullet trains etc.	• Human impact on our planet. • History of changes to our planet.	• Example of genetics and what is possible in today's world. • Industrial chemical production.	• Charles Darwin - On the origin of species. • Links to forensic science (Careers)	• COVID-19 the vaccine.	• Human Genome project
Social, Moral, Spiritual and Cultural Development	• Famous scientists and their contributions to science. • Ethical debate (Natural vs lab diamonds) • Should we use government funds for satellites and space research?	• New discoveries and how we can create and source new materials. • Protesting climate change.	• Ethical issues, should we be genetically engineering plants and even animals?	• Darwin contribution to science • Evolution theory.	• Ethics - Covid vaccine / herd immunity. • Recycling, reusing, upcycling vs bin and buying new. • Use of X-rays and Gamma rays despite health concerns.	• Development of new medicines and medical trials.
Fundamental British Values	• Democracy in debates on the ethical issues described above.	• Rule of law - considering global laws around pollution and climate change. • Individual liberty - freedom to make your own choices, but consider the wider impact.	• Democracy in debates on the ethical issues described above. • Respecting the views of others who may not hold the same beliefs as you.	• Respecting other people's views.	• Democracy and individual liberty (Issues surrounding lockdown and the Covid vaccine)	• Individual liberty - right to choose treatment for illness. What about treatments not offered by the NHS?
Assessment	First assessment is 45 marks (15 on each subject) which covers the most important knowledge from Y9. A series of short answer questions on cardiovascular system and digestion, energy stores and transfers, atoms the periodic table and neutralisation. Two assessments in each subject during this term. The first assessment in each subject will be a 30 mark short answer test on the content from survival, bonding and forces. The second assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from response, fuels, energy, electrical power and heating; and 20 marks on survival, bonding and forces.		The third assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from inheritance and neutralisation; and 20 marks on inheritance and neutralisation.		The fourth assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from evolution, separating mixtures and radioactive decay; and 20 marks on the content from inheritance and neutralisation; and 20 marks on pathogens, metal extraction, the EM spectrum and waves, risk factors and dynamic equilibrium. End of year exams - GCSE past paper. 60 marks on the topics from GCSE paper 1.	

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Key Stage 4 Curriculum Journey:

The curriculum in Y11 will allow students to further build on the fundamental concepts of science and then tailor their learning to the requirements of the GCSE specification.

THE YEAR 11 COMBINED SCIENCE CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4 and 5
	Cycles Measuring rates of reaction Acceleration as a vector & matter	Growth & reactions Groups of the periodic table Forces, matter and ionising radiation	Exchange Electrolysis 2 Electricity 2	Revision
Foundational Knowledge Prior learning needed	• How cells allow living organisms to function. • Indicators that chemical reactions are taking place. • How to calculate speed and acceleration.	• Knowledge of cell functions. • Photosynthesis and respiration • Describe how the periodic table is arranged. • Describe the trends in reactivity on the periodic table. • Understanding of resultant force and free-body diagrams.	• Identify which substance cells need and how they are used. • Describe the process of electrolysis • Explain why electrolysis is used. • Energy transfers in electric circuits • Substitute into and rearrange equations to calculate electrical quantities.	• Describing different energy transfers using appropriate diagrams • Understanding of charge, current and potential difference. • The process of respiration and the reactants needed. • Oxygen and glucose around our body • Electron configuration linked to periodic table • How atoms bond together
Core Knowledge and skills	• Key features of the water, nitrogen and carbon cycle. • The stages of cell division. • Endo and exothermic reactions. • Recall factors that affect the rates of a reaction. • Using DT and VT graphs to analyse a journey. • History of the structure of the atom.	• Describe the stages of cell division. • Equations for plant functions. • Recall properties of different groups of elements. • Identify products from specific types of reaction (Displacement of halogens and reactions of alkali metals with water). • How the different types of radiation affect matter. • Analyse how forces can deform materials.	• Understanding of processes such as diffusion and osmosis. • State observations of an electrolysis experiment. • Explain in terms of ions how the process works. • Identify the products of electrolysis. • Use of current, charge, potential difference and resistance in electric circuits. • Explain the need for transformers in the national grid	• Recall of Newton's laws. • Non-contact forces (Gravity and magnetism) • The roles of the different parts of our digestive system • How enzymes aid digestion • The defining feature of an acid and alkalis • The meaning of neutralisation • Write word equations for the reactions of acids and alkalis • Understand how transfer of energy affect an object (Temperature) • How frequency and amplitude affect pitch and volume. • Efficiency calculations and wasted energy • Respiration, photosynthesis and features of plants. • Products of electrolysis • Terminology (anode, cathode, anion, cation) • Electrolytes linked to the products made
Developmental Knowledge and Skills	• Describe the interaction between hormones in the menstrual cycle.	• Explain the importance of creating new cells • Investigating the rate of photosynthesis and respiration.	• Comparisons between similar functions (Diffusion and osmosis, breathing and respiration etc).	• Links between GPE and kinetic energy for a falling object. • Uses of specific waves • Diffusion in plants • Osmosis in plants

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	• Explain the differences in the rate of reactions in terms of collisions of particles. • Rutherford's alpha scattering experiment and the discovery of the nucleus. • Calculating gradients and the area under a graph.	• Explain the links between reactivity and the electron configuration of different elements. • Pick out limitations of an experiment and suggest ways to improve these. • Resolving vector diagrams • How multiple forces affect the motion of an object.	• Explain the effect of running an electrolysis experiment on the electrolyte and the electrodes. • Links between electricity and magnetism. • Use of transformers, motors and dynamos.	• Chemical reaction in plants • Attraction of charges based on potential difference • Electrical conductivity • Ways to minimise wasted energy (thermal insulation) • Chains of energy transfer • Plant stem cells • Growth in plants • Ions present in different electrolytes • ions at the electrodes
Complex Knowledge	• Role of the different hormones. • Calculating the energy released from a reaction using bond energies. • Calculating acceleration using $V^2 + U^2 = 2ax$ • Explain how the density of a material links to the atoms within the material.	• Comparisons between cells (Adult and embryonic stem cells) • Balancing symbol equations for complex chemical reactions. • Construct ionic equations for displacement reactions. • Linking knowledge of materials to real life scenarios such as a bungee jump.	• Explain the link between surface area and the size of an organism and explain the significance. • Construct half equations to show the reactions at the electrodes. • Effect of connecting components in series or parallel on the current, potential difference and power. • Forces and magnetism - Fleming's left hand rule.	• The impact of changing potential difference or resistance on the rest of the components in the circuit. • Use of appropriate terminology (specific parts of the heart, lungs, vessels etc) • Considering ionic charges involved with bonding • Bonding in complex ionic compounds • Growth and repair from cellular replication. • Calculations in terms of concentration and pH. • Symbol equations for the neutralisation reactions
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Revision cards and key terminology needed for each of the sections in the examination
Cultural Capital	• Neutron stars are among the most dense objects in the universe.	• Current science - What can we do with stem cells? • Stem cells in nature	• Power stations - Virtual tour	• Appreciation for scientific discoveries • How science operates as a global language of ideas
Social, Moral, Spiritual and Cultural Development	• Terminating pregnancy and IVF • Famous scientists and their contributions - Rutherford & JJ Thomson.	• Ethics: Use of embryonic stem cells.	• Energy and access to energy	• Developing confidence in understanding the sciences and its impact on our world as an integrated discipline
Fundamental British Values	• Rule of law: Terminating pregnancy.	• Rule of law: Should it be legal to grow embryo's to harvest stem cells?	• Equality and equal opportunity: energy supply, consumption and distribution	• Exploring the moral impact of science and how it can be used and distorted from its original purpose
Assessment	Assessment one in each subject is a test made up of three exam on	Mock exams	Assessments created using past paper questions.	Mock exams

	the content from cycles, measuring rates of reaction, acceleration as a vector and matter.		Multiple shorter assessments conducted in class, two exam questions which are completed in exam conditions then peer marked and feedback given. Content includes growth and reactions, groups of the periodic table, forces, matter and ionising radiation, exchange, electricity and electrolysis.	

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Key Stage 4 Curriculum Journey:

The curriculum in Y10 will allow students to build on and enhance these fundamental concepts in order to broaden their knowledge base and apply what they have learnt to additional knowledge and new scenarios. Our intent is for students to use these foundational and developmental concepts, models and theories so that they can better make sense of the observed diversity of natural and scientific phenomena.

THE YEAR 10 BIOLOGY CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4	HALF TERM 5	HALF TERM 6
Topic and learning focus	Survival	Response	Inheritance	Evolution	Pathogens	Risk factors
Foundational Knowledge Prior learning needed	• Food chains and food webs • What is an ecosystem • What is decomposition	• What does our nervous system do? • What are hormones? • Why do we need to respond to our environment?	• The structure and function of DNA. • Continuous and discontinuous data sets. • Where DNA comes from	• How are animals classified into groups? • Identify how animals have evolved. • The 5 kingdoms • What antibiotics treat	• What does it mean to be healthy? • What is disease? • Common diseases .	• Genes and non-communicable diseases. • Knowledge of the cardiovascular system and its function. • Definition of health
Core Knowledge and skills	• Understand the living and nonliving factors that affect the environment and change ecosystems. • How energy is transferred in an ecosystem. • Calculate energy transfers.	• How nerve impulses travel around our body and why they are needed. • Thermoregulation and glucoregulation. • How are stimuli detected?	• How genes and alleles are linked to the way a human or animal looks. • How inheritance and variation come about. • Some genes are found on the sex chromosomes	• Theory of evolution. • Why organisms need to adapt to their environment • How Darwin and Wallace developed the theory of evolution	• Communicable and noncommunicable diseases. • Defences against disease • How pathogens are spread	• What a risk factor is • Risk factors for various conditions such as Cardiovascular disease. • Drug testing and placebos.
Developmental Knowledge and Skills	• Predict and foresee changes based on external factors. • Analyse data to judge impact of changes. • Explain how indicator species can demonstrate	• Use of hormones as chemical messengers within the body. • Names of the hormones, and the locations they are produced. • Blood glucose regulation	• Ratio and probability of inheriting certain genes. • Key features of selective breeding and genetic engineering. • Advantages and disadvantages of selective breeding	• Evidence for human evolution. • Why the domain method is used over kingdoms • How the pentadactyl limb provides evidence for evolution	• How does a vaccine work? • Herd immunity • Aseptic technique • Compare the primary and secondary responses	• Explain why risk factors contribute to the development of disease • Using BMI and waist to hip ratio • Effects of our choices regarding diet and exercise.

	the health of an ecosystem					
Complex Knowledge	• Provide solutions to help combat changes. • Calculate and compare rates of decomposition.	• How synapses allow transmission of impulses • Explain how long and short-sightedness are corrected • Describe effect of ADH on the volume of urine produced	• Describing the process of who we can genetically engineer organisms in unfamiliar contexts • Comparing genetic engineering and selective breeding • Codominance in blood groups	• Unfamiliar examples of evolution of animals and the reasons for the changes. • Evolution linked to bacteria. • Dating stones stools from the environment	• How do antibiotics work? • Virus life cycles • Monoclonal antibodies	• Evaluating the use of BMI • Applications of the human Genome project • Why medical trials are difficult and often fail.
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.
Cultural Capital	• Study of different ecosystems in various areas of the world.	• How the body works • Kidney dissection	• Example of genetics and what is possible in today's world.	• Charles Darwin - On the origin of species.	• COVID-19 the vaccine.	• Human Genome project
Social, Moral, Spiritual and Cultural Development	• Famous scientists and their contributions to science.	• Impact of nerve damage and potential new treatments	• Ethical issues, should we be genetically engineering plants and even animals?	• Darwin contribution to science • Evolution theory.	• Ethics - Covid vaccine / herd immunity.	• Development of new medicines and medical trials.
Fundamental British Values	• Democracy in debates on the ethical issues described above.	• Tolerance and respect surrounding people with differences e.g. disabilities	• Democracy in debates on the ethical issues described above. • Respecting the views of others who may not hold the same beliefs as you.	• Respecting other people's views.	• Democracy and individual liberty (Issues surrounding lockdown and the covid vaccine)	• Individual liberty - right to choose treatment for illness. What about treatments not offered by the NHS?
Assessment	First assessment is 45 marks 15) which covers the most important knowledge from Y9. A series of short answer questions on Cardiovascular system & digestion. Two assessments in each subject during this term.		• The third assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from topic 3 and 20 marks on the unit 1 and 2 content.		• The fourth assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from topic 2 and 20 marks on the unit 1 content. • End of year exams - GCSE past paper. 60 marks on the topics from GCSE paper 1.	

	• The first assessment in each subject will be a 30 mark short answer test on the content from the first topic. • The second assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from topic 2 and 20 marks on the unit 1 content.		

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Key Stage 4 Curriculum Journey:

The curriculum in Y10 will allow students to build on and enhance these fundamental concepts in order to broaden their knowledge base and apply what they have learnt to additional knowledge and new scenarios. Our intent is for students to use these foundational and developmental concepts, models and theories so that they can better make sense of the observed diversity of natural and scientific phenomena.

THE YEAR 10 CHEMISTRY CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4	HALF TERM 5	HALF TERM 6
	Bonding 2	Fuels	Neutralisation 2	Separating mixtures	Metal extraction	Dynamic equilibrium
Foundational Knowledge Prior learning needed	• Atomic structure and electron configuration	• Why we use fuels and the difference between compounds and mixtures.	• Uses of acids and alkalis. • Understanding of neutralisation and how it's done.	• Why do we need to separate chemicals? • Simple techniques - filtration.	• Knowledge of where metals come from and the processes used to extract them from their ores.	• Chemical reactions and how to write a word and symbol equation.
Core Knowledge and skills	• How atoms become ions • Drawing dot-cross diagrams to demonstrate bonding	• Structure and formation of hydrocarbons. • Alkanes and Alkenes. • Fractional distillation.	• Recall products and describe reactions involving acids. • Describe the difference between strong and weak acids in terms of ions.	• Distillation and fractional distillation. • Chromatography.	• Use of the reactivity series to determine which extraction method is the most suitable. • Metals, alloys and their properties. • Corrosion	• Reversible and irreversible reactions. • What is meant by the term equilibrium. • How the conditions can affect a reversible reaction.
Developmental Knowledge and Skills	• Explain why atoms bond together • The link between delocalised electrons and electricity	• Separation of crude oil into its fractions. • Understand how the processes of living things affect the gases in our atmosphere	• Draw conclusions from experimental data. • Understand the solubility rules for common compounds. • Write a scientific method to carry out a titration.	• How can we design practical tasks to demonstrate separation techniques?	• Oxidation and reduction. • Typical properties of transition metals.	• Effects of pressure, temperature and concentration on a chemical reaction. • Titration to make fertilisers in a lab
Complex Knowledge	• How large lattice structures are formed • Determine properties from the type of bonding.	• Understanding and applying general formulas. • Fuel cells • Complete balanced equations.	• Explain the effect of limiting reagents on a reaction. • Carry out concentration calculations.	• Explain the changes in particles during separation. • Compare different substances using Rf values and boiling points.	• Explain why alloys are used and the advantages certain alloys give over pure metal. • Evaluate data from a life cycle assessment.	• Formation of ammonia on an industrial scale • Apply principles to the Haber process • Calculations with gases
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given.

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	• Current science articles printed used in class.	• Current science articles printed used in class.	• Current science articles printed used in class.	• Current science articles printed used in class.	• Current science articles printed used in class.	• Current science articles printed used in class.
Cultural Capital	• Why diamond is the hardest known material on the planet - material hardness	• Human impact on our planet. • History of changes to our planet.	• Industrial chemical production.	• Links to forensic science (Careers)	• Industrial impact of extracting metals	• Impact of food production on our planet • The importance of fertilisers
Social, Moral, Spiritual and Cultural Development	• Famous scientists and their contributions to science. • Ethical debate (Natural vs lab diamonds)	• New discoveries and how we can create and source new materials. • Protesting climate change.	• Rule of law around drug production • Consideration for industry production	• Builds on students' imagination • Ethical debate for particle filters in fossil fuel cars • Ethical debate for making potable water available around the world	• Recycling, reusing, upcycling vs bin and buying new.	• Famous scientists and their contributions to science • Debate about discoveries used for good being used for harm - dirty bomb
Fundamental British Values	• Democracy in debates on the ethical issues described above.	• Rule of law - considering global laws around pollution and climate change. • Individual liberty - freedom to make your own choices, but consider the wider impact.	• Respecting the views of others who may not hold the same beliefs as you.	• Democracy in debates on the ethical issues described above.	• Democracy in debates on the ethical issues described above.	• Democracy in debates on the ethical issues described above.
Assessment	First assessment is 15 marks which covers the most important knowledge from Y9. A series of short answer questions on atoms the periodic table and neutralisation. Two assessments in each subject during this term. The first assessment in each subject will be a 30 mark short answer test on the content from Bonding. The second assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from Fuels and 20 marks on the unit 1 content.		The third assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from neutralisation and separating mixtures, and 20 marks on the content from bonding and fuels.		The fourth assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from topic 2 and 20 marks on the unit 1 content. End of year exams - GCSE past paper. 60 marks on the topics from GCSE paper 1.	

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Key Stage 4 Curriculum Journey:

The curriculum in Y10 will allow students to build on and enhance these fundamental concepts in order to broaden their knowledge base and apply what they have learnt to additional knowledge and new scenarios. Our intent is for students to use these foundational and developmental concepts, models and theories so that they can better make sense of the observed diversity of natural and scientific phenomena.

THE YEAR 10 PHYSICS CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4	HALF TERM 5	HALF TERM 6
	Forces	**Energy, electrical power and heating**	**Radioactive decay**		**The EM spectrum and waves**	**Acceleration as a vector & matter**
Foundational Knowledge Prior learning needed	• Link between force and acceleration.	• Good understanding of work done and energy.	• Structure of the atom • Understanding of alpha, beta and gamma radiation.		• Basic properties of how waves transfer energy. • Reflection and refraction.	• How to calculate speed and acceleration.
Core Knowledge and skills	• Use of F=ma • Drawing free body diagrams • Understanding of the term 'momentum'. • Centripetal force causing circular motion	• Using Power in a variety of contexts. • Specific heat capacity and specific latent heat.	• Explain why a nucleus may or may not be radioactive. • How is radioactivity measured? • Background radiation.		• Similarities, differences, danger and uses of electromagnetic waves.	• Using DT and VT graphs to analyse a journey. • History of the structure of the atom.
Developmental Knowledge and Skills	• Linking stopping distance to work done and kinetic energy • Applications of Newton's laws	• Links between resistance and thermal energy transfer. • Explain the changes in particles when a substance is heated. • Internal energy of a substance.	• Analyse data to determine the type of radioactivity present. • Linking half-life to danger of radioactive materials.		• How the frequency of a wave determines how much energy is transferred. • The reasons for refraction. • The factors that affect what happens to a wave at a boundary.	• Rutherford's alpha scattering experiment and the discovery of the nucleus. • Calculating gradients and the area under a graph.
Complex Knowledge	• Apply the principle of conservation of momentum to collisions and explosions.	• Using the concept of power to analyse series and parallel circuits.	• Completing half-life calculations and nuclear decay equations.		• Detailed knowledge of specific uses of EM waves.	• Calculating acceleration using $V^2 + U^2 = 2ax$ • Explain how the density of a material links to the atoms within the material.
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.		• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class. • Research skills

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Cultural Capital	• Modern transport used as context for lessons, bullet trains etc. • Use of metric and imperial measurements.	• Human impact on our planet. • History of changes to our planet.	• The applications and uses of radioactive materials seen in our daily lives. • Risk analysis	• Uses of the different electromagnetic waves in the world around us.	• Neutron stars are among the most dense objects in the universe.
Social, Moral, Spiritual and Cultural Development	• Famous scientists and their contributions to science. • Should we use government funds for satellites and space research?	• The global warming debate, are we doing enough?	• Use of radioactive materials in power stations, is the perceived risk worth it?	• Use of X-rays and Gamma rays despite health concerns.	• Famous scientists and their contributions - Rutherford & JJ Thomson.
Fundamental British Values	• Democracy in debates on the ethical issues described above.	• Rule of law - considering global laws around pollution and climate change. • Individual liberty - freedom to make your own choices, but consider the wider impact.	• Build self-esteem and resilience through a difficult topic. • Respecting other people's views.	• Students take responsibility for their learning through a choice of tasks and independent work.	• Develop resilience through problem solving and independent work.
Assessment	First assessment is 15 marks which covers the most important knowledge from Y9. A series of short answer questions on energy stores and transfers. Two assessments in each subject during this term. The first assessment in each subject will be a 30 mark short answer test on the content from forces The second assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from energy, electrical power and heating; and 20 marks on the content from forces		The third assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from radio-active decay, and 20 marks on the content from forces and energy, electrical power and heating	The fourth assessment for each unit is a synoptic test of approximately 40 marks. This is split with 20 marks on the content from the EM spectrum and waves, and 20 marks on the content form acceleration as a vector and matter. End of year exams - GCSE past paper. 60 marks on the topics from GCSE paper 1.	

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Key Stage 4 Curriculum Journey: Biology

The curriculum in Y11 will allow students to further build on the fundamental concepts of science and then tailor our learning to the requirements of the GCSE specification.

THE YEAR 11 BIOLOGY CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4-6
	Cycles	**Growth & reactions**	**Exchange**	**Revision**
Foundational Knowledge Prior learning needed	• How cells allow living organisms to function. • What a cycle is • Why cells need to divide	• Knowledge of cell functions. • Photosynthesis and respiration • What are enzymes	• Identify which substance cells need and how they are used. • Parts of the circulatory system • What organisms need to survive?	• Food chains and food webs • Understanding an ecosystem • Understanding the function of the nervous system • The structure and function of DNA. • Continuous and discontinuous data sets • Classification of animals • Evolution of animals • Health and disease • Genes and non-communicable diseases. • The cardiovascular system and its function.
Core Knowledge and skills	• Key features of the water, nitrogen and carbon cycle. • The stages of cell division. • Which hormones are involved in the menstrual cycle	• What are stem cells • Equations for plant functions. • How plants and animals grow	• Understanding of processes such as diffusion and osmosis. • Adaptations of root hair cells • Calculating heart rate	• The living and non-living factors that affect the environment and change ecosystems • How nerve impulses travel around our body and why they are needed. • Thermoregulation and glucoregulation. • How genes and alleles are linked to the way a human or animal looks. • How inheritance and variation come about. • Theory of evolution. • Evolution linked to bacteria. • Communicable and non-communicable diseases. • Infections, Pathogens and antigens. • Risk factors for various conditions such as Cardiovascular disease. • Drug testing and placebos.
Developmental Knowledge and Skills	• Role of the different hormones. • Treatments for infertility • How the cycles relate to real world problems e.g. drought and global warming	• Explain the importance of creating new cells • Investigating the rate of photosynthesis and respiration. • Comparing animal and	• Comparisons between similar functions (Diffusion and osmosis, breathing and respiration etc). • Role of stomata • Adaptations of leaf for gas exchange	• Predict and foresee changes based on external factors. • Analyse data to judge impact of changes. • Use of hormones as chemical messengers within the body. • Ratio and probability of inheriting certain genes. • Key features of selective breeding and genetic engineering. • Evidence for human evolution. • How does a vaccine work?

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		plant growth		• Effects of our choices regarding diet and exercise.
Complex Knowledge	• Describe the interaction between hormones in the menstrual cycle • Roles of bacteria in the nitrogen cycle • Interactions between the cycles • The importance of hormones in IVF	• Comparisons between cells (Adult and embryonic stem cells) • Using percentile charts • Plant tropisms	• Explain the link between surface area and the size of an organism and explain the significance. • Fick's law • Stroke volume	• Provide solutions to help combat changes. • Names of the hormones, and the locations they are produced. • Describing the process of who we can genetically engineer and selectively breed. • Specific examples of evolution of animals and the reasons for the changes. • How do antibiotics work? • Detail of specific diseases such as HIV and chlamydia • Human Genome project. • Why medical trials are difficult and often fail.
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Revision cards and key terminology needed for each of the sections in the examination
Cultural Capital	• Understanding why fertilisers are used in agriculture • Discussions surrounding IVF and its availability on the NHS	• Current science - What can we do with stem cells? • Stem cells in nature	• Heart dissections	• Appreciation for scientific discoveries • How science operates as a global language of ideas
Social, Moral, Spiritual and Cultural Development	• Terminating pregnancy and IVF	• Ethics: Use of embryonic stem cells.	• Discuss transplantations • How the body works	• Developing confidence in understanding the sciences and its impact on our world as an integrated discipline
Fundamental British Values	• Rule of law: Terminating pregnancy.	• Rule of law: Should it be legal to grow embryo's to harvest stem cells?	• Should transplantation be opted out?	• Exploring the moral impact of science and how it can be used and distorted from its original purpose
Assessment	Assessment One is a test made up of three exam questions. One on a core concept from cycles and one on survival.	Mock exams	Assessments created using past paper questions. Multiple shorter assessments conducted in class, two exam questions which are completed in exam conditions then peer marked and feedback given. The assessments cover survival, response, inheritance, evolution, pathogens, risk factors, cycles, growth and reactions, and exchange.	

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Key Stage 4 Curriculum Journey: Chemistry

The curriculum in Y11 will allow students to further build on the fundamental concepts of science and then tailor our learning to the requirements of the GCSE specification.

THE YEAR 11 CHEMISTRY CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4 -6
	Measuring rates of reaction	Groups of the periodic table	Electrolysis 2	Revision & exams
Foundational Knowledge Prior learning needed	• Indicators that chemical reactions are taking place.	• Describe how the periodic table is arranged. • Describe the trends in reactivity on the periodic table.	• Describe the process of electrolysis • Explain why electrolysis is used.	• Atomic structure and electron configuration • Why we use fuels and the difference between compounds and mixtures • Uses of acids and alkalis. • Understanding of neutralisation and how it's done. • Why do we need to separate chemicals? • Simple techniques - filtration. • Knowledge of where metals come from and the processes used to extract them from their ores. Chemical reactions and how to write a word and symbol equation.
Core Knowledge and skills	• Endo and exothermic reactions. • Recall factors that affect the rates of a reaction.	• Recall properties of different groups of elements. • Identify products from specific types of reaction (Displacement of halogens and reactions of alkali metals with water).	• State observations of an electrolysis experiment. • Explain in terms of ions how the process works. • Identify the products of electrolysis.	• How atoms become ions • Drawing dot-cross diagrams to demonstrate bonding • Structure and formation of hydrocarbons. • Alkanes and Alkenes. • Fractional distillation. • Recall products and describe reactions involving acids. • Describe the difference between strong and weak acids in terms of ions. • Distillation and fractional distillation. • Chromatography. • Use of the reactivity series to determine which extraction method is the most suitable. • Metals, alloys and their properties. • Corrosion • Reversible and irreversible reactions. • What is meant by the term equilibrium? • How the conditions can affect a reversible reaction.
Developmental Knowledge and Skills	• Explain the differences in the rate of reactions in terms of collisions of particles.	• Explain the links between reactivity and the electron configuration of different elements. • Pick out limitations of an	• Explain the effect of running an electrolysis experiment on the electrolyte and the electrodes.	• Explain why atoms bond together • The link between delocalised electrons and electricity • Separation of crude oil into its fractions. • Understand how the processes of living things affect the gases in our atmosphere

		experiment and suggest ways to improve these.		• How can we design practical tasks to demonstrate separation techniques? • Oxidation and reduction. • Typical properties of transition metals. • Effects of pressure, temperature and concentration on a chemical reaction. • Titration to make fertilisers in a lab
Complex Knowledge	• Calculating the energy released from a reaction using bond energies.	• Balancing symbol equations for complex chemical reactions. • Construct ionic equations for displacement reactions.	• Construct half equations to show the reactions at the electrodes.	• How large lattice structures are formed • Determine properties from the type of bonding • Understanding and applying general formulas. • Fuel cells • Complete balanced equations. • Explain the effect of limiting reagents on a reaction. • Carry out concentration calculations. • Explain the changes in particles during separation. • Compare different substances using Rf values and boiling points • Explain why alloys are used and the advantages certain alloys give over pure metal. • Evaluate data from a life cycle assessment. • Formation of ammonia on an industrial scale • Apply principles to the Haber process • Calculations with gases
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Revision cards and key terminology needed for each of the sections in the examination
Cultural Capital	• Industrial chemical production • Industrial impact of chemical production	• Uses of Noble gases	• Electroplating and the environmental impact	• Appreciation for scientific discoveries • How science operates as a global language of ideas
Social, Moral, Spiritual and Cultural Development	• Ethical debate should be use harmful catalysts that speed up a reaction and saves carbon dioxide production	• Famous scientists and their contributions to science. •	• Debate around the ethics of mining metals to save precious metals	• Developing confidence in understanding the sciences and its impact on our world as an integrated discipline
Fundamental British Values	• Democracy in debates on the ethical issues described above.	-	• Democracy in debates on the ethical issues described above.	• Exploring the moral impact of science and how it can be used and distorted from its original purpose

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Assessment	Assessment one is a test made up of three exam questions. One on a core concept, one on the content from measuring rates or reaction and one from dynamic equilibrium or metal extraction.	Mock exams	Assessments created using past paper questions, including content on groups of the periodic table and electrolysis. Multiple shorter assessments conducted in class, two exam questions which are completed in exam conditions then peer marked and feedback given.

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Key Stage 4 Curriculum Journey: Physics

The curriculum in Y11 will allow students to further build on the fundamental concepts of science and then tailor our learning to the requirements of the GCSE specification.

THE YEAR 11 COMBINED SCIENCE CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4 -6
Topic and learning focus	Space	Forces, matter and ionising radiation	Electricity 2	Revision & exams
Foundational Knowledge Prior learning needed	• Objects in the solar system. • The force of gravity. • Frequency and wavelength	• Understanding of resultant force and free-body diagrams.	• Energy transfers in electric circuits • Substitute into and rearrange equations to calculate electrical quantities.	• Link between force and acceleration. • Good understanding of work done and energy. • Structure of the atom • Understanding of alpha, beta and gamma radiation. • Basic properties of how waves transfer energy. • Reflection and refraction. • How to calculate speed and acceleration.
Core Knowledge and skills	• Structure of the universe • Star processes • Mass vs Weight • Life cycle of a star	• How the different types of radiation affect matter • Analyse how forces can deform materials.	• Use of current, charge, potential difference and resistance in electric circuits. • Explain the need for transformers in the national grid	• Use of F=ma • Drawing free body diagrams • Understanding of the term 'momentum'. • Centripetal force causing circular motion • Using Power in a variety of contexts. • Specific heat capacity and specific latent heat. • Explain why a nucleus may or may not be radioactive. • How is radioactivity measured? • Background radiation. • Similarities, differences, danger and uses of electromagnetic waves. • Using DT and VT graphs to analyse a journey. • History of the structure of the atom.
Developmental Knowledge and Skills	• The doppler effect • Gas pressure • Electromagnetic waves and the atmosphere.	• Resolving vector diagrams • How multiple forces affect the motion of an object.	• Links between electricity and magnetism. • Use of transformers, motors and dynamos.	• Linking stopping distance to work done and kinetic energy • Applications of Newton's laws • Links between resistance and thermal energy transfer. • Explain the changes in particles when a substance is heated. • Internal energy of a substance. • Analyse data to determine the type of radioactivity present. • Linking half-life to danger of radioactive materials. • How the frequency of a wave determines how much energy is transferred.

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				• The reasons for refraction. • The factors that affect what happens to a wave at a boundary. • Rutherford's alpha scattering experiment and the discovery of the nucleus. • Calculating gradients and the area under a graph.
Complex Knowledge	• Evidence for the big bang • Nuclear fusion power	• Linking knowledge of materials to real life scenarios such as a bungee jump.	• Effect of connecting components in series or parallel on the current, potential difference and power. • Forces and magnetism - Fleming's left hand rule.	• Apply the principle of conservation of momentum to collisions and explosions. • Using the concept of power to analyse series and parallel circuits. • Completing half-life calculations and nuclear decay equations. • Detailed knowledge of specific uses of EM waves. • Calculating acceleration using $V^2 + U^2 = 2ax$ • Explain how the density of a material links to the atoms within the material.
Literacy (including reading)	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Scientific text is built into booklets so reading is a part of every lesson. • Key vocabulary and definitions given. • Current science articles printed used in class.	• Revision cards and key terminology needed for each of the sections in the examination
Cultural Capital	• Improving research skills	• Evaluating data to draw conclusions	• Power stations - Virtual tour. • Importance of the discovery of electromagnetism.	• Appreciation for scientific discoveries • How science operates as a global language of ideas
Social, Moral, Spiritual and Cultural Development	• Awe and wonder - space	• Awe and wonder - radiation	• Problem solving in the real world – electricity and circuits	• Developing confidence in understanding the sciences and its impact on our world as an integrated discipline
Assessment	Assessment one is a test made up of three exam questions. One on a core concept, one on the content from space and one from the content from the EM spectrum and waves, or acceleration as a vector and matter	Mock exams	Assessments created using past paper questions. Multiple shorter assessments conducted in class, two exam questions which are completed in exam conditions then peer marked and feedback given. Content includes electricity, forces, matter and ionising radiation, and space	

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Key Stage 5 Curriculum Journey: Biology

The curriculum in Y12 will allow students to further build on the developmental concepts of science and then tailor their learning to the requirements of post-16 study.

THE YEAR 12 BIOLOGY CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4	HALF TERM 5	HALF TERM 6
Topic and learning focus	Cell structure Biological molecules	Nucleotides and nucleic acids Enzymes and cell division	Biological membranes Communicable disease	Exchange surfaces Biodiversity	Transport in animals and plants Classification	Homeostasis Populations and sustainability
Foundational Knowledge Prior learning needed	• Eukaryotic and prokaryotic • Organelles • Types of microscopes • Biological molecules	• Purpose of DNA • Nucleotide structure • Function of enzymes • Action of enzymes	• What a membrane is • Factors affecting the rate of diffusion across a membrane • Communicable and non-communicable disease • Types of pathogen	• Calculating surface area • Single celled and multicellular organisms • Specialised cells • What biodiversity is • Random and systematic sampling	• Why organisms need circulatory systems • What is transported by the xylem and phloem	• Homeostasis definition • Conditions that must be maintained • Population definition • Predator prey cycle
Core Knowledge and skills	• Functions of organelles • Yeast cell structure • Advantages of each microscopes • Reactions of the biological molecules	• DNA replication • Transcription and translation • How nucleic acids are formed • Factors affecting enzyme activity	• Physical defences against disease • roles of antibodies • Physical defences against disease • roles of antibodies	• The need for exchange surfaces • inhalation and exhalation • Types of sampling • Factors affecting biodiversity	• Comparing single and double circulatory structures • Heart structure • water and transport in plants • Types of conservation	• Why homeostasis is required • Cell signalling • Negative feedback • Interspecific and intraspecific competition
Developmental Knowledge and Skills	• Interactions between organelles • Comparison of microscopes • How the structure and function of biological molecules links	• Comparisons between DNA and RNA nucleotides • Nature of the genetic code • Enzymes and activation energy • Enzyme inhibition	• How the structure of membranes links to its functions • Investigating the permeability of membranes • Chemical defences • Examining blood smears	• Gas exchange in fish • Insect gas exchange • Accurate dissection • Importance of international cooperation for conservation	• Using ECGs • SAN and AVN • Pressure graphs of the heart • Mass flow • Economic reasons for maintaining biodiversity • Phylogeny	• Positive feedback • Ecosystem case studies • Behavioural and physiological responses to changes in temperature • Population growth curves
Complex Knowledge	• How microscopes electron microscopes work • Using eyepiece graticules • Testing and using biological molecules	• Evidence for semi-conservative replication • Causes of variation in meiosis	• Effect of different solvents on membrane permeability • Investigating diffusion in model cells • Inflammatory responses	• Spirometers • the benefits of counter-current flow • Using Simpson's index of • Genetic polymorphism	• Calculating standard variation • Dissociation curves • Standard deviation	• predator prey cycles as an example of negative feedback • Calculating and representing population growth rates

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			• Zoonotic infections			
Literacy (including reading)	• Key vocabulary • Wider reading • Scientific articles	• Key vocabulary • Wider reading • Scientific articles	• Key vocabulary • Wider reading • Scientific articles	• Key vocabulary • Wider reading • Scientific articles	• Key vocabulary • Wider reading • Scientific articles	• case studies • Key vocabulary • Wider reading • Scientific articles
Cultural Capital	• Molecules humans are made of • The immortal cells of Henrietta Lacks • The importance of water to life	• important discoveries in biology e.g semi convservatice replication	• the development of new medications	• Dissection opportunity • Exploring the exchange systems of multiple organisms • use of spirometers to test lung function	• heart dissection • 'pluck' dissection	• Sampling for different organisms
Social, Moral, Spiritual and Cultural Development	• Awe- seeing human cells and the amazing world of microbiology • development of microscopes over time	• Uses of stem cells • potential impact of mutations	• understanding how to keep healthy • Overuse of antibiotics • Herd immunity	• Climate change • Understanding that a biodiverse world is a healthy world and how we all have a responsibility to maintain it	• Evolutionary history • how the human body works • ethics surrounding dissection	• human impacts on populations
Fundamental British Values	• Cooperation and respect during practical tasks and group work • Understanding that on a biological level we are all made of the same molecules	• Link to differences between people being caused by DNA • respect and tolerance during debates on stem cells	• Cooperation and respect during practical tasks and group work	• Understanding that a biodiverse world is a healthy world	• Cooperation and respect during practical tasks and group work • respecting others opinions on dissections	• respect and tolerance surrounding other peoples' opinions on different diets and their effect on sustainability
Assessment	• Transition test - 30 marks of short answer questions based on the transition work. • Two 45 mark assessment, mixture of multiple short and long answer questions on cell structure and biological molecules.	• Two 45 mark assessment, mixture of multiple short and long answer questions, synoptic element on cell structure, biological molecules, nucleotides, nucleic acids, enzymes and cell division	• Two 45 mark assessment, mixture of multiple short and long answer questions, a synoptic element on cell structure, biological molecules, nucleotides, nucleic acids, enzymes, cell division, biological membranes, and communicable disease.	• Two 45 mark assessment, mixture of multiple short and long answer questions, and a synoptic element on cell structure, biological molecules, nucleotides, nucleic acids, enzymes, cell division, biological membranes, and communicable disease, exchange surfaces and biodiversity.	• Two 45 mark assessment, mixture of multiple short and long answer questions, synoptic elements on cell structure, biological molecules, nucleotides, nucleic acids, enzymes, cell division, biological membranes, and communicable disease, exchange surfaces, biodiversity, transport in	• Two 45 mark assessment, mixture of multiple short and long answer questions on cell structure, biological molecules, nucleotides, nucleic acids, enzymes, cell division, biological membranes, and communicable disease, exchange surfaces, biodiversity and homeostasis, populations and sustainability

					animals and plants, and classification.	• End of year exam- full papers, breadth and depth

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Key Stage 5 Curriculum Journey: Chemistry

The curriculum in Y12 will allow students to further build on the developmental concepts of science and then tailor their learning to the requirements of post-16 study.

THE YEAR 12 CHEMISTRY CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4	HALF TERM 5 and 6
	Bonding and organic chemistry	The Periodic table and Alkenes	Moles, alcohols and haloalkanes	Acids, synthetic routes and analysis	Enthalpy and rates of reaction
Foundational Knowledge Prior learning needed	• Definitions of keywords • Alkanes and Alkenes • Naming organic compounds - chain length • Dot and cross diagrams	• Atomic number • Groups of the periodic table • Testing for alkanes and alkenes	• Subatomic particles • Atom arrangement • General formula for an alcohol • IUPAC naming	• Definition of Acid and Base • Acid and Base reactions • Naming salts • Functional groups	• Endothermic and Exothermic reactions • Bond making and bond breaking • Activation energy • Converting between celsius and kelvin • Definitions for standard enthalpy of: formation, reaction, combustion and neutralisation • Collision theory
Core Knowledge and skills	• Different types of formula • Electron orbitals • Shapes of molecules	• Trends in physical properties in groups • Pi and sigma bonds	• Empirical formula calculations • Combustion reactions • Substitution reactions • Elimination reactions	• pH is a logarithmic scale • Strong and weak acids • Interpreting IR spectra • Mass Spectrometry	• Energy profile diagrams for endothermic and exothermic • Bond enthalpy • Specific heat capacity • Drawing a boltzmann distribution curve • Factors that speed up a reaction
Developmental Knowledge and Skills	• Isomers • Functional groups • Trends in physical properties	• Ionisation energy • Trends in periodicity • Electrophiles and nucleophiles	• Concentration calculations • Yield and atom economy calculations • Oxidising an alcohol • Reflux and distillation practical techniques	• Ionic equation for neutralisation • Standard solutions • Titrations • Predicting IR spectra • Predicting fragment patterns	• Drawing Hess's law cycles • Interpreting a Boltzmann curve • Le Chatelier's principle • The effect concentration, temperature, pressure and catalyst have on the position of equilibrium
Complex Knowledge	• Stages of free radical substitution • Writing mechanisms • Dative bonds • Exemptions to the Octet rule	• Ion testing • Addition and condensation polymers	• Ideal gas equation • Water of crystallisation • Hydrolysis • Ozone break down	• Calculating the concentration of unknowns • Identifying compounds from a range of data • Combined techniques • Organic synthesis route	• Compromised conditions between rate and yield • Writing Kc expressions • Calculation Kc

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Literacy (including reading)	• Key vocabulary • Scientific articles • Essay writing technique	• Key vocabulary • Scientific articles • Essay writing technique	• Key vocabulary • Scientific articles • Lab reports • Research methods and referencing	• Key vocabulary • Lab reports	• Key vocabulary • Scientific articles • Essay writing technique
Cultural Capital	• Drug safety - Thalidomide • Why Ice floats	• Development of plastics • Why is aluminium a better electrical conductor that magnesium	• How perfumes are produced • Ozone layer breakdown • Global warming	• Drug contents • Synthetic material	• Chemical engineer •
Social, Moral, Spiritual and Cultural Development	• The safe and effective use of drugs with different isomers	• The problems with plastics and their disposal • Famous scientists - how was the periodic table put together	• Calculating carbon dioxide production from combustion reactions • Exploring the why greenhouse gases absorb radiation that warm up the planet	• Development of modern materials • Identification of new drugs	• Considerations to create large scale manufacturing • Discover different scientists - Boltzmann and Le Chatelier.
Fundamental British Values	• Rule of law for drug productions • Weekly collaborative tasks to encourage students to help each other.	• Cooperation and respect during practical tasks and group work. • Weekly collaborative tasks to encourage students to help each other.	• Weekly collaborative tasks to encourage students to help each other. • Cooperation and respect during practical tasks and group work. • Discussion and debate over the scientific data and it's interpretation	• Discussion and debate over the scientific data and it's interpretation • Weekly collaborative tasks to encourage students to help each other.	• Discussion and debate over the scientific data and it's interpretation • Weekly collaborative tasks to encourage students to help each other.
Assessment	Transition test - 30 marks of short answer questions based on the transition work. Two further short answer assessments each 30 marks. Made up of a range of short answer questions from the topics covered so far.	Two short answer assessments each 40 marks. Synoptic assessments made up of a range of exam style questions on the content and skills from the topics covered this year	Two further short answer assessments each 30 or 40 marks. Made up of a range of short answer questions from the topics covered so far and a synoptic element		End of Year exams consisting of one breadth and one depth paper.

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Key Stage 5 Curriculum Journey: Physics

The curriculum in Y12 will allow students to further build on the developmental concepts of science and then tailor their learning to the requirements of post-16 study.

THE YEAR 12 PHYSICS CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4	HALF TERM 5	HALF TERM 6
	Vectors and Motion Thermal Physics	Forces Space		Materials Circular motion	Gravitational fields Oscillations	Electricity Waves
Foundational Knowledge Prior learning needed	• Scalars and vectors • Speed and acceleration • Solids, liquids and gases • Calculating gradients and areas of graphs.	• Recall the common forces • Links between force, resultant force and acceleration • Arrangement of solar systems, galaxies and the universe.		• Elastic and inelastic materials • Elastic potential energy • Frequency and time period	• Features of gravitational fields. • Frequency and time period. • Understanding of circular motion as a comparison.	• Circuit symbols • Current, potential difference and resistance. • Waves as a vibration which transfers energy • Frequency, amplitude, wavelength.
Core Knowledge and skills	• Base units • Analysing motion graphs • Describe situations involving transfers of thermal energy. • Specific heat capacity and latent heat. • Moles as an amount of substance	• Newton's laws of motion • Moments as turning forces • Terminal velocity • Explaining the stages of a star's life • Doppler shift used as evidence for the expanding universe leading to Hubble's law.		• Stress, strain and young's modulus • Analysing graphs of materials under tension. • Centripetal force • Links between velocity and radius of circle.	• Use appropriate equations to calculate gravitational field strength and force. • Conditions for simple harmonic motion. • Variations of energy within an oscillation • Links between displacement, velocity and acceleration throughout an oscillation.	• Resistivity, potential dividers and internal resistance. • Combining resistors in series and parallel. • Properties of LDRs and Thermistors and applications as variable resistors. • Energy transferred by electricity. • Reflection, refraction, polarisation, diffraction. • Superposition when waves meet.
Developmental Knowledge and Skills	• Identifying and combining errors. • Multi-step mathematical problems. • Use of different units (^oC or K)	• Resolving forces at different angles and understanding the effects. • Equilibrium • Energy levels in atoms • What we can learn from the temperature and emissions of stars.		• The radian as a unit of angle • Angular velocity • Experimental techniques to prove the validity of an equation.	• Graphing position, velocity and acceleration of a pendulum. • Using trigonometric functions to solve questions involving repeating sequences. • Gravitational potential • Future links to magnetic and electric fields.	• Electron gun and its links to electric fields. • Coherence and phase difference. • Stationary waves • Analysing circuits with components in series and parallel.
Complex Knowledge	• Combining non-perpendicular vectors	• Archimedes principle and its applications.		• Cross unit links with materials and both vectors	• Resonance and damped oscillations	• Complex electric circuits involving multiple different components.

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	• Average speed of gas particles	• How neutron stars are formed • Dark energy and dark matter • Parallax angle as a basis for determining astronomical distances.	and forces. • Applying knowledge to specific examples such as a rollercoaster going around a loop. • Conical pendulum	• Practical examples of forced oscillations • Applying ideas surrounding gravitational potential and gravitational potential energy to specific situations in space travel.	• Sensing circuits • Constructive and destructive interference
Literacy (including reading)	• Key vocabulary • Scientific articles • Lab reports	• Key vocabulary • Scientific articles • Essay writing technique • Research methods / referencing	• Key vocabulary • Scientific articles • Lab reports	• Key vocabulary • Scientific articles • Lab reports • Research task	• Key vocabulary • Scientific articles • Lab reports
Cultural Capital	• Development of temperature scales •	• Design of cruise ships and how it's possible they float • Space travel and research	• Rollercoaster development/engineering (Careers)	• Cost of space travel. • NASA	• Learning about the latest developments in physics.
Social, Moral, Spiritual and Cultural Development	• The work of famous scientists (Avagadro, Kelvin, Boltzmann)	• Awe and wonder - Space	• Modern materials being developed for their strength.	• Funding for space travel.	• Worldwide energy demands and the impact of the growing need for electricity.
Fundamental British Values	• Cooperation and respect during practical tasks and group work. • Weekly collaborative tasks to encourage students to help each other.	• Collaboration on research projects • Students develop self-confidence through presenting research.	• Weekly collaborative tasks to encourage students to help each other.	• Students develop self-confidence through presenting research.	• Cooperation and respect during practical tasks and group work.
Assessment	Transition test - 30 marks of short answer questions based on the transition work. Two further short answer assessments each 40 marks. Made up of a range of short answer questions from the topics covered so far.	Three short answer assessments each 40 marks. Synoptic assessments made up of a range of exam style questions on the content and skills from the topics covered this year	Two short answer assessments each 40 marks. Synoptic assessments made up of a range of exam style questions on the content and skills from the topics covered this year	One full exam paper 20 multiple choice questions on the topics from this year, followed by a series of short answer questions based on the content. There will be one extended answer question and at least one practical based question.	End of year exam. 20 multiple choice questions on he topics from this year, followed by series of short answer questions ased on the content. There will be ne extended answer question and t least one practical based question.

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Key Stage 5 Curriculum Journey:

The curriculum in Y13 will allow students to further build on the developmental concepts of science and then tailor their learning to the requirements of post-16 study.

THE YEAR 13 BIOLOGY CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4 and 5
Topic and learning focus	Neuronal communication Respiration Cellular control and patterns of inheritance	Hormonal communication Photosynthesis Manipulating genomes, cloning and biotechnology	Excretion Ecosystems Plant and animal responses	Revision and exam preparation
Foundational Knowledge Prior learning needed	• structure of the nervous system • parts of a reflex arc • respiration equations • mitochondria structure • Transcription and translation	• how hormones are transported • examples of endocrine glands • purpose of photosynthesis • genetic engineering	• Examples of waste products produced by cells • What an ecosystem consists of • Why animals and plants need to respond to their surroundings • purpose of reflexes	• Eukaryotic and prokaryotic • Organelles • Types of microscopes • Biological molecules • Purpose of DNA • Nucleotide structure • Function of enzymes • Action of enzymes • What a membrane is • Factors affecting the rate of diffusion across a membrane • Communicable and non-communicable disease • Types of pathogen • Calculating surface area • Single celled and multicellular organisms • Specialised cells • What biodiversity is • Random and systematic sampling • Why organisms need circulatory systems • What is transported by the xylem and phloem • Homeostasis definition • Conditions that must be maintained • Population definition Predator prey cycle
Core Knowledge and skills	• neurone structure • where the reactants of respiration are used • where each stage of respiration occurs • mutations	• hormone action • glucoregulation keywords • structure of the chloroplasts • thin layer chromatography • restriction enzymes	• role of the liver • kidney structure • divisions of the nervous system • types of muscle • Energy transfers • succession	• Functions of organelles • Yeast cell structure • Advantages of each microscopes • Reactions of the biological molecules • DNA replication • Transcription and translation • How nucleic acids are formed

			• Recycling in ecosystems	• Factors affecting enzyme activity • Physical defences against disease • roles of antibodies • Physical defences against disease • roles of antibodies • The need for exchange surfaces • inhalation and exhalation • Types of sampling • Factors affecting biodiversity • Comparing single and double circulatory structures • Heart structure • water and transport in plants • Types of conservation • Why homeostasis is required • Cell signalling • Negative feedback Interspecific and intraspecific competition
Developmental Knowledge and Skills	• the pacinian corpuscle • actions of neurotransmitters • the intermediate molecules produced during respiration • Switching genes on and off	• the roles of hormones in the stress response • the Calvin cycle • limiting factors in respiration • gene therapy	• structure of the liver • types of dialysis • the nephron • Knee jerk reflex • muscle structure • affecting succession	• Interactions between organelles • Comparison of microscopes • How the structure and function of biological molecules links • Comparisons between DNA and RNA nucleotides • Nature of the genetic code • Enzymes and activation energy • Enzyme inhibition • How the structure of membranes links to its functions • Investigating the permeability of membranes • Chemical defences • Examining blood smears • Gas exchange in fish • Insect gas exchange • Accurate dissection • Importance of international cooperation for conservation • Using ECGs • SAN and AVN • Pressure graphs of the heart • Mass flow • Economic reasons for maintaining biodiversity • Phylogeny • Positive feedback • Ecosystem case studies

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				• Behavioural and physiological responses to changes in temperature Population growth curves
Complex Knowledge	• saltatory conduction • summation • the lac operon • how chemiosmosis generates ATP	• non-cyclic and cyclic photophosphorylation • Electrophoresis	• how the structure and function of the kidneys are related • Detecting chemicals in urine • sliding filament theory • student T-test	• How microscopes electron microscopes work • Using eyepiece graticules • Testing and using biological molecules • Evidence for semi-conservative replication • Causes of variation in meiosis • Effect of different solvents on membrane permeability • Investigating diffusion in model cells • Inflammatory responses • Zoonotic infections • Spirometers • the benefits of counter-current flow • Using Simpson's index of • Genetic polymorphism • Calculating standard variation • Dissociation curves • Standard deviation • predator prey cycles as an example of negative feedback Calculating and representing population growth rates
Literacy (including reading)	• Key vocabulary • Wider reading • Scientific articles	• Key vocabulary • Wider reading • Scientific articles	• Key vocabulary • Wider reading • Scientific articles	• Key vocabulary in revision cards and knowledge organisers • Case study examples Scientific references and contexts
Cultural Capital	• cause of multiple sclerosis • how the body works	• exploring the pigments in leaves • discussions surrounding future use of gene therapy	• kidney dissection • how the body works	• Appreciation for scientific discoveries How science operates as a global language of ideas
Social, Moral, Spiritual and Cultural Development	• Effects of drugs on the nervous system	• ethical discussions surrounding the use of gene therapy	• Discussions surrounding transplants	Developing confidence in understanding the sciences and its impact on our world as an integrated discipline
Fundamental British Values	• Rule of law- discuss laws surrounding drug use	• respect and tolerance of different views on gene therapy	• Individual liberty- choices surrounding organ donation	Exploring the moral impact of science and how it can be used and distorted from its original purpose

Assessment	• Two 45 mark assessment, mixture of multiple short and long answer questions • Hall based exams- assessment on each side of the y12 course- 40 marks per paper	• Two 45 mark assessment, mixture of multiple short and long answer questions	• Two 45 mark assessment, mixture of multiple short and long answer questions • Mock assessments	Mock and practice questions from the exam board drawing across all of the subject content from the course

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Key Stage 5 Curriculum Journey:

The curriculum in Y13 will allow students to further build on the developmental concepts of science and then tailor their learning to the requirements of post-16 study.

THE YEAR 13 CHEMISTRY CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4 and 5
	Rates and Enthalpy Benzene and Carbonyls	Acids and Bases Nitrogen compounds	Redox and Synthesis	Revision and Exam preparation Exams
Foundational Knowledge Prior learning needed	• Orbits and bonds • Structure and functional group of alkenes • Naming compounds • Electrophiles • The rate equation • Factors that speed a chemical reaction	• Polymers • Functional groups • dative covalent bonds • Redox • Mono, di and tri basic acids • Salt formation	• Redox • Titrations • Oxidation numbers • Balancing equations • Transition metals • Functional groups	• Alkanes and Alkenes • Naming organic compounds - chain length • Dot and cross diagrams • Atomic number • Groups of the periodic table • Testing for alkanes and alkenes • Subatomic particles • Atom arrangement • General formula for an alcohol • IUPAC naming • Definition of Acid and Base • Acid and Base reactions • Naming salts • Functional groups • Endothermic and Exothermic reactions • Bond making and bond breaking • Activation energy • Converting between celsius and kelvin • Definitions for standard enthalpy of: formation, reaction, combustion and neutralisation • Collision theory
Core Knowledge and skills	• Reactivity of Phenol compared to benzene • Disproving Kekule's model of benzene • Monitoring of a rates practical and collecting data • Use of IT software to analyse data	• Condensation polymers • Basic structure of amino acids • Chiral isomers • Conjugate acid-base pairs	• Single half equations • Reducing and oxidising agents • Measuring voltage in electrochemical cells • Electrochemical series and reactivity • Ligands • Reflux and Distillation • GC-MS	• Different types of formula • Electron orbitals • Shapes of molecules • Trends in physical properties in groups • Pi and sigma bonds • Empirical formula calculations • Combustion reactions • Substitution reactions • Elimination reactions • pH is a logarithmic scale

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				• Strong and weak acids • Interpreting IR spectra • Mass Spectrometry • Energy profile diagrams for endothermic and exothermic • Bond enthalpy • Specific heat capacity • Drawing a boltzmann distribution curve • Factors that speed up a reaction
Developmental Knowledge and Skills	• Electrophilic addition reactions • Benzene and catalysts • Half-life • Orders	• How zwitterions are formed • naming of polyesters and polyamides • Amino acids formation to proteins • Converting between pH and concentration for strong acids • The concentration of strong bases using Kw	• Merging two or more half equations • Redox titration calculations for familiar redox titrations • Complex ions • Transition element precipitations • Types of chemical reactions • The order chemical reaction need to be carried out • Carbon and Hydrogen NMR environments	• Isomers • Functional groups • Trends in physical properties • Ionisation energy • Trends in periodicity • Electrophiles and nucleophiles • Concentration calculations • Yield and atom economy calculations • Oxidising an alcohol • Reflux and distillation practical techniques • Ionic equation for neutralisation • Standard solutions • Titrations • Predicting IR spectra • Predicting fragment patterns • Drawing Hess's law cycles • Interpreting a Boltzmann curve • Le Chatelier's principle • The effect concentration, temperature, pressure and catalyst have on the position of equilibrium
Complex Knowledge	• Ortho, Meta and para directors • Friedel-Crafts • Rate determining step • The Arrhenius equation	• Multistep synthetic routes - including conditions and products • Hydrolysis • Ka • Buffer calculations	• Redox titration calculations for unfamiliar redox titrations • Fuel cells • Ligand substitution • Oxygen transport • Multi-step organic synthesis - including benzene • Analysis of H NMR to identify compounds	• Stages of free radical substitution • Writing mechanisms • Dative bonds • Exemptions to the Octet rule • Ion testing • Addition and condensation polymers • Ideal gas equation • Water of crystallisation • Hydrolysis • Ozone break down • Calculating the concentration of unknowns • Identifying compounds from a range of data • Combined techniques

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				• Organic synthesis route • Compromised conditions between rate and yield • Writing Kc expressions • Calculation Kc
Literacy (including reading)	• Key vocabulary • Scientific articles • Lab reports • Research methods and referencing • Essay writing technique	• Key vocabulary • Scientific articles • Lab reports • Research methods and referencing • Essay writing technique	• Key vocabulary • Scientific articles • Lab reports • Research methods and referencing	• Key vocabulary in revision cards and knowledge organisers • Case study examples Scientific references and contexts
Cultural Capital	• Use in the manufacture of dyes, resins, plastics, pharmaceuticals and explosives • Inefficiencies within chemical reactions	• Kevlar vest - bullet proof materials • Making Nylon strands from the interface of two solutions • Why is warm water more acidic than cold water? • Buffer blood action to maintain the correct pH	• Rechargeable batteries • Carbon monoxide poisoning • Colourful fireworks	• Appreciation for scientific discoveries How science operates as a global language of ideas
Social, Moral, Spiritual and Cultural Development	• Awe and wonder - positional changes on benzene • Ethical considerations of the manufacture of some compounds as they pollute the groundwater and contribute to acid rain • The production and use of chemical weapons and additive drugs • Implications of slow chemical reactions	• Use of synthetic chemicals that have more than one isomer - Thalidomide babies • Nitrogen containing fossil fuels and the link to global warming, acid rain and non-disposable plastics • Famous scientists • Medical - how the body controls the acidic levels of carbon dioxide levels in the blood	• The use of transition metals in the cure for cancers • The ethical considerations around the advantages and disadvantages of rechargeable batteries • The ethical consideration about using HCN to make new compounds • productions of non-disposal plastics	Developing confidence in understanding the sciences and its impact on our world as an integrated discipline
Fundamental British Values	• Cooperation and respect during practical tasks and group work.	• Cooperation and respect during practical tasks and group work.	• Cooperation and respect during practical tasks and group work.	• Exploring the moral impact of science and how it can be used and distorted from its original purpose

	• Weekly collaborative tasks to encourage students to help each other.	• Weekly collaborative tasks to encourage students to help each other. • Research and discussion into failed medical treatment and the impacts on family generation later	• Weekly collaborative tasks to encourage students to help each other.		
Assessment	Two 40 mark synoptic assessments on topics from Year 12 and this first half term on rates and enthalpy, benzene and carbonyls	Two 40 mark synoptic assessments	Full exam papers	• Mock and practice questions from the exam board drawing across all of the subject content from the course	

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Key Stage 5 Curriculum Journey:

The curriculum in Y1 will allow students to further build on the developmental concepts of science and then tailor their learning to the requirements of post-16 study.

THE YEAR 13 PHYSICS CURRICULUM JOURNEY

	HALF TERM 1	HALF TERM 2	HALF TERM 3	HALF TERM 4 and 5
	Capacitors Quantum Physics	Electric fields Radioactivity	Medical Physics Magnetic fields	Revision and Exam preparation Exams
Foundational Knowledge	• Electromagnetic radiation • Frequency and wavelength • Energy levels in atoms • Flow of charge around simple electrical circuits.	• Knowledge of gravitational fields • Structure of the atom and how the model was developed. • Radioactive decay of unstable nuclei through alpha, beta and gamma decay.	• Electromagnetic radiation (Gamma rays) • Knowledge of gravitational and electric fields. • Shape of magnetic fields	• Scalars and vectors • Speed and acceleration • Solids, liquids and gases • Calculating gradients and areas of graphs. • Recall the common forces • Links between force, resultant force and acceleration • Arrangement of solar systems, galaxies and the universe. • Elastic and inelastic materials • Elastic potential energy • Frequency and time period • Features of gravitational fields. • Frequency and time period. • Understanding of circular motion as a comparison. • Circuit symbols • Current, potential difference and resistance. • Waves as a vibration which transfers energy • Frequency, amplitude, wavelength.
Core Knowledge and skills	• Photoelectric effect • Threshold frequency and work function. • De Broglie equation • Use of capacitors to store electrical charge • Capacitance • Combining capacitors in series and parallel. • Energy stored in charged capacitors	• How to calculate electric field strength, force, electrical potential. • Uniform and radial electric fields. • The strong force within the nucleus. • Hadrons, baryons, mesons and quarks. • The stability curve and atoms position on the graph. • Fission and fusion reactions.	• CAT scans, gamma cameras and PET scans. • Use of ultrasound and acoustic impedance • Determine the magnitude and direction of a force on a current carrying conductor. • Calculations involving magnetic flux and magnetic flux density. • Faraday and Lenz's laws.	• Base units • Analysing motion graphs • Describe situations involving transfers of thermal energy. • Specific heat capacity and latent heat. • Moles as an amount of substance • Newton's laws of motion • Moments as turning forces • Terminal velocity • Explaining the stages of a star's life • Doppler shift used as evidence for the expanding universe leading to Hubble's law. • Stress, strain and young's modulus • Analysing graphs of materials under tension. • Centripetal force • Links between velocity and radius of circle.

				• Use appropriate equations to calculate gravitational field strength and force. • Conditions for simple harmonic motion. • Variations of energy within an oscillation • Links between displacement, velocity and acceleration throughout an oscillation. • Resistivity, potential dividers and internal resistance. • Combining resistors in series and parallel. • Properties of LDRs and Thermistors and applications as variable resistors. • Energy transferred by electricity. • Reflection, refraction, polarisation, diffraction. • Superposition when waves meet.
Developmental Knowledge and Skills	• Photoemission due to absorption of a photon of EM radiation. • Relating electrons flow to charging and discharging capacitors. • Exponential discharge of a capacitor. • Time constant of a capacitor-resistor circuit.	• Links to gravitational and magnetic fields. • Electric fields inside capacitors • Einstein's mass-Energy equation and its applications. • Exponential decay of radioactive materials.	• Links between radiation and medicine. • How Magnetism and electricity are closely linked. • Generators, motors and transformers.	• Identifying and combining errors. • Multi-step mathematical problems. Use of different units (°C or K) • Resolving forces at different angles and understanding the effects. • Equilibrium • Energy levels in atoms • What we can learn from the temperature and emissions of stars. • The radian as a unit of angle • Angular velocity • Experimental techniques to prove the validity of an equation. • Graphing position, velocity and acceleration of a pendulum. • Using trigonometric functions to solve questions involving repeating sequences. • Gravitational potential • Future links to magnetic and electric fields. • Electron gun and its links to electric fields. • Coherence and phase difference. • Stationary waves • Analysing circuits with components in series and parallel.
Complex Knowledge	• Electron diffraction through crystalline material • Wave particle duality • Circuits with multiple capacitors	• Linking force to electric potential energy. • Binding energy within the nucleus of atoms. • Calculations involving fission and fusion.	• Reflection of ultrasound to create an image. • Piezoelectric effect • Using change in magnetic flux in order to determine an induced EMF.	• Combining non-perpendicular vectors • Average speed of gas particles • Archimedes principle and its applications. • How neutron stars are formed • Dark energy and dark matter • Parallax angle as a basis for determining astronomical distances. • Cross unit links with materials and both vectors and forces. • Applying knowledge to specific examples such as a rollercoaster going around a loop. • Conical pendulum

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				• Resonance and damped oscillations • Practical examples of forced oscillations • Applying ideas surrounding gravitational potential and gravitational potential energy to specific situations in space travel. • Complex electric circuits involving multiple different components. • Sensing circuits • Constructive and destructive interference
Literacy (including reading)	• Key vocabulary • Scientific articles • Lab reports	• Key vocabulary • Scientific articles • Lab reports	• Key vocabulary • Scientific articles • Lab reports	• Key vocabulary in revision cards and knowledge organisers • Case study examples • Scientific references and contexts
Cultural Capital	• Quantum physics and the developments over time.	• The applications and uses of radioactive materials seen in our daily lives.	• The discovery of electricity and how it changed the world.	• Appreciation for scientific discoveries • How science operates as a global language of ideas
Social, Moral, Spiritual and Cultural Development			• Radioactive materials used in medicine.	• Developing confidence in understanding the sciences and its impact on our world as an integrated discipline
Fundamental British Values	• Students develop self-confidence through presenting research.	• regular collaborative tasks to encourage students to help each other. • Promote self-confidence by presenting revision notes.	• Promote self-confidence by presenting revision notes.	• Exploring the moral impact of science and how it can be used and distorted from its original purpose
Assessment	Synoptic assessment 40 marks. Made up of a range of exam style questions on the content and skills from the paper 2 content. Synoptic assessment on last year's content from terms 1-5.	Synoptic assessment 40 marks. Made up of a range of exam style questions on the content and skills from the paper 2 content. Synoptic assessment on last year's content from terms 1-5.	Mock exams (Full set of three papers)	• Mock and practice questions from the exam board drawing across all of the subject content from the course