Deptford Green Science Faculty Curriculum Map

Science Faculty Vision:

To ensure all students develop a deep knowledge and understanding across Biology, Chemistry and Physics. At its core, the Deptford Green science curriculum prioritises students' comprehension and application of scientific concepts, so they can use them to make sense of the modern world. Scientific knowledge becomes useful when it can be applied to formal knowledge as well as informal, everyday experience. Therefore, whilst the national curriculum prescribes which substantive and disciplinary content is taught for secondary science, we sometimes go beyond the programme of study to achieve the depth necessary to gain a full understanding of the scientific content necessary for successful progression in science.

The Deptford Green Science curriculum also emphasises some of the wider ideas that cut across the fields of Science, Technology, Engineering and Maths. This serves to align itself to the relevance of Science outside the classroom, where there is often no distinction made between science and technology.

NC Aims:

The National Curriculum for Science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics;
- develop understanding of the nature, processes and methods of science, through different types of scientific enquiry that help them to answer scientific questions about the world around them;
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.
- develop and learn to apply observational, practical, modelling, enquiry, problem-solving skills and mathematical skills, both in the laboratory, in the field and in other environments;
- develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively.

What:

- For students to develop their understanding of scientific concepts and skills through the disciplines of Biology, Chemistry and physics.
- Develop their understanding of the Bog ideas pf science- cells, particles, forces in order make sense of scientific knowledge and understanding connections
- Develop their understanding of scientific models, enabling them to evaluate others and develop their own
- Critique knowledge and data by applying scientific principles regarding reliability and validity
- Analyse data and evaluate experimental design, in order to make valid conclusions
- Use extended writing to consolidate, develop and communicate their knowledge and understanding.

Why:

How does the science curriculum develop SMSC?

Spiritual:

The science curriculum aims to inspire awe and wonder as pupils relate to and make sense of the world around them. From the uniqueness of individual genetic makeup, to the scale of the vastness of the universe. As pupils navigate the Big ideas of science, they move from the concrete to the abstract and learn that everything is connected in our physical world and beyond. In doing so, we also learn to accept that Science cannot provide all the answers and imagination and creativity can lead to new discoveries.

Moral:

Some scientific advancements have had a positive effect on our world as a whole. Others have had a negative, even catastrophic impact on us and our environment and atmosphere. Moral decisions and discussion around these topics is an important part of the decision making process pupils will use as they

navigate their world. To be accepted, based and without prejudice. Modelling this through text, tasks and discussion encourages pupils to be open to a range of ideas and consider them from an informed, critical perspective.

Social:

Much of the success of science depends on the input and feedback from other scientists to develop a shared understanding and evaluate date to make it more trustworthy. Working scientifically often depends on collaborative tasks and sharing of findings. As pupils build a greater understanding of science, it allows them to deepen their everyday social experiences and to better appreciate the positive and negative social impact of science in their homes, communities and our world.

Cultural:

Pupils have opportunities to research the work of scientists from different backgrounds and examine how they have shaped our lives. Topical issues are explored, for example, celebration during science week. Pupils also make use of the environment around them, particularly when studying plants and animals. Historically and currently, science relies on contributions from around the world. Pupils appreciate the importance of acceptance from the scientific community and the shared standards that must be met before use by citizens. Pupils should experience a sense of enjoyment as they earn about themselves, others and the world around them.

How:

Sequence:

Units have been sequenced based on the most effective connections between topics within and across the scientific disciplines of biology, chemistry and physics. In some cases, it has been necessary to teach topics with a high maths demand, after they have been taught by the maths department. Pupils will begin to see the connections between these subjects and become aware of some of the big ideas (See appendix 1) underpinning scientific knowledge and understanding. Careful progression and sequencing of substantive and disciplinary knowledge over time, supports the hierarchical nature of science and achieves rigour. Pupils are guided from concrete to abstract concepts, both within lessons and wider schema.

Coherence:

A degree of rigour is also afforded by the national curriculum for science, which facilitates cumulative knowledge, via a spiralised curriculum. To develop a framework that embeds rigorous learning, the Deptford Green Science curriculum includes what we know about how pupils learn science. For example, grouping related ideas together eases the learning process. The substantive Big ideas of science have, therefore been used to conceptualise knowledge into learnable chunks and facilitate storage of related ideas in long term memory (See appendix 2). Each unit has been attributed to a big idea in Biology, Chemistry and Physics.

Through careful interleaving, pupils are asked to link new content to prior knowledge within the same big idea, leading to meaningful learning. The more instances pupils have to revisit content and apply it in new contexts, the more opportunities they have to strengthen concepts. Cumulative assessments also allow pupils to apply knowledge from one big idea.

Direct instruction is used to efficiently tackle misconceptions in substantive knowledge. Pupils sometimes carry misconceptions about science into the classroom, due to their understanding of the world through their observations and interactions with their peers. A symbiosis of direct instruction and enquiry-based learning is used to challenge pupils to replace these misconceptions and make informed decisions about the world around them, via retrieval of relevant concepts and procedures stored in their long-term memory.

Disciplinary knowledge:

In science, this largely refers to the working scientifically aspect of the programme of study. The Deptford Green Science curriculum seeks to avoid using working scientifically as the mechanism for mastery of knowledge and skills, as pupils tend to recall engagement in the activity, rather than the underlying knowledge. Instead, appropriate sequencing and coherence has taken into account, the substantive knowledge and disciplinary skill pupils need to learn, *before* carrying out investigations. To this end, progression through disciplinary knowledge is mapped out within the substantive knowledge curriculum map.

How does the science curriculum develop literacy?

Research by Back, McKeown, and Kucan (2002) has shown that pupil literacy is the strongest predictor of science attainment. In terms of cultural and science capital, children from different socioeconomic backgrounds will likely have encountered vastly different amounts and types of vocabulary. Whether individually or as a collective, in order to engage with and share their understanding of scientific literature, pupils must not only recognise words, but also be able to comprehend their meaning and apply them in a variety of contexts.

If we are to deliver on our science curriculum aim of supporting pupils to be able to make sense of the world around them, we must address weaknesses in literacy, both from a general and subject-specific standpoint. Examining the scope of useful vocabulary is pivotal in the ability of pupils to learn new information and communicate their understanding effectively.

Tier 1 vocabulary:

The common, everyday words that most children enter school knowing already is extremely varied. An added problem is that misconceptions exist, due to the alternate meaning of everyday vs scientific meanings of words. For example, power, weight, force and energy.

Tier 2 vocabulary:

These high-frequency words can have different meanings in science, as compared to other subject areas. Without an understanding of these words, scientific literature is incomprehensible for pupils in science and they will be unable to access the command words used in questions. For example, evaluate, explain, compare, experiment.

Tier 3 vocabulary:

Communicating effectively in science requires vast knowledge and understanding of science-specific keywords, which are often polysyllabic.

The Deptford Green Science curriculum supports pupils to verbally decode unfamiliar words and phrases. Lessons examine both morphology (word structure) and etymology (origin). Commonalities in morphology and etymology are particularly important in making links and connections between structures, functions and processes. Additionally, pupils are sometimes able to relate new words to everyday words they have encountered.

Multiple opportunities are provided for oral and visual recall of words and then, finally, being fluent in their automatic application in a variety of contexts. The curriculum also helps pupils to structure and organise their writing at word and sentence level.

CURRICULUM MAP:

Year 7						
TERM	**AUTUMN 1**	**AUTUMN 2**	**SPRING1**	**SPRING 2**	**SUMMER 1**	**SUMMER 2**
Text/Topic	Enquiry processes Organisms	Matter Forces	Ecosystems Reactions	Energy Genes	Earth Waves	Electromagnetism
Skill/ Concept **(as described in the AQA specification)**	**AQA Working scientifically.** **Organisms - Cells and Movement.**	**Matter – Particle Model** **Forces - Speed**	**Ecosystems - Interdependence** **Reactions – Metals and non-metals**	**Energy – Energy costs / Energy Transfer** **Genes - Variation**	**Earth – Earth Structure** **Waves - Sound**	**Electromagnets – Voltage and Resistance / Current** *Projects / End of Year Assessment*
Hinge Assignment	**AQA Working scientifically.** 25 Mark Assessment Literacy Numeracy Experimental Skills **Organisms - Cells and Movement.** 25 Mark Assessment Literacy Numeracy	**Matter – Particle Model** 25 Mark Assessment Literacy Numeracy Experimental Skills **Forces - Speed** 25 Mark Assessment Literacy Numeracy Experimental Skills	**Ecosystems – Interdependence** 25 Mark Assessment Literacy Numeracy Experimental Skills **Reactions – Metals and non-metals** 25 Mark Assessment Literacy	**Energy – Energy costs / Energy Transfer** 25 Mark Assessment Literacy Numeracy Experimental Skills **Genes - Variation** 25 Mark Assessment Literacy Numeracy	**Earth – Earth Structure** 25 Mark Assessment Literacy Numeracy Experimental Skills **Waves – Sound / Light** 25 Mark Assessment Literacy Numeracy	**Electromagnets – Voltage and Resistance / Current** 25 Mark Assessment Literacy Numeracy Experimental Skills *Projects / End of Year Assessment*

	Experimental Skills		Numeracy Experimental Skills	Experimental Skills	Experimental Skills	
MARKS	**25 / 25**	**25 / 25**	**25 / 25**	**25 / 25**	**25 / 25**	**25 / 25**
End of Unit Assessment	**AQA Working scientifically. Organisms - Cells and Movement. 50 Mark Summative Assessment**	**Matter – Particle Model Forces – Speed 50 Mark Summative Assessment**	**Ecosystems - Interdependence Reactions – Metals and non-metals 50 Mark Summative Assessment**	**Energy – Energy costs / Energy Transfer Genes – Variation 50 Mark Summative Assessment**	**Earth – Earth Structure Waves - Sound 50 Mark Summative Assessment**	**Electromagnets – Voltage and Resistance / Current 50 Mark Summative Assessment**
MARKS	**50**	**50**	**50**	**50**	**50**	**50**
Links to GCSE	Embedded throughout	C1, C2, C3, C4, B1, B2 P1,P5,P7,P8	C3, C4, C5	C5, C6, C10, B1, B4,	B1, B6, B7	C1, P2, P4
Cultural capital/ enrichment	Being able to risk assess various activities Everyday changes of state, separation techniques	Ethics of stem cell research, disease diagnosis Every action has a reaction, speed cameras, speedometers, difference between mass and weight	pH of everyday substances, relieve symptoms of indigestion, everyday chemical reactions, eg rusting, fireworks, gas stoves, cooking, eroding statues Importance of conservation, biodiversity, reliance on other organisms for food production,	Ethics of non renewable energy sources, wasting energy, difference between heat and temperature, calculating home energy bills, rollercoasters, efficiency of appliances, reducing carbon footprint	Importance of earth resources. Industrial activities and their effects on communities. Sound and Music.	Generating electricity and everyday appliances, suitability of materials for circuits, lightning bolts, electric shocks, batteries

			extinction, organic foods			
Literacy/ Linked reading	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel
Oracy	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share	Buzz words Brainstorming Think-Pair-Share	Class discussion Odd one out Think-Pair-Share	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers
Numeracy	Identifying error, identifying variables, Graph skills. Scale, magnification,	Calculating forces using newton meters Balanced and unbalanced forces Calculating speed and acceleration Interpreting motion graphs Density calculations, solubility curves, chromatograms	Word and symbol equations Measuring amounts Interpreting pH graphs Calculating the accumulation of chemicals in the food chain Calculating the distribution of energy in a food chain	Calculating useful and wasted energy Energy efficiency calculations Calculating power Calculating cost of electricity Calculating energy saved Side by side calculations SLOP	Wave equation. Understanding the concept of frequency. Rearranging equations.	Calculating resistance/voltage/current using the ohm's law equation
Careers	Research scientist Statistician	Microbiologist Histologist	Pharmacist pharmacologist	Sustainability scientist Environmental	Ecologist Food scientist	Electrical engineer Electronic engineer

	Engineering Particle physics Material scientist Quality control scientist Rheologist	Pathologist Biomedical scientist Nursing Medicine Dentistry Veterinary science Kinematic and mechanical engineering Roller coaster designer / Engineer Automotive designer / Engineer	chemical engineer	engineer Geologist Ecologist Urban planner Waste management Civil Engineer Mechanical engineer	Research scientist Farmer Agricultural scientist Environmental scientist Urban developer	Inventor

Year 8						
TERM	**AUTUMN 1**	**AUTUMN 2**	**SPRING1**	**SPRING 2**	**SUMMER 1**	**SUMMER 2**
Text/Topic	Enquiry processes Organisms	Matter Forces	Ecosystems Reactions	Energy Genes	Earth Waves	Electromagnets
Skill/ Concept	*Enquiry Processes* **Organisms - Breathing**	**Matter – Separating Mixtures** **Forces – Gravity / Contact Forces**	**Ecosystems – Plant Reproduction** **Reactions – Acids and Alkalis / Chemical Energy**	**Energy - Work** **Genes – Human Reproduction**	**Earth – Climate / Earth Resources** **Waves - Wave Effects / Wave Properties**	**Electromagnets – Electromagnets / Magnets** *Projects / End of Year Assessment*
Hinge Assignment	**Enquiry Processes** 25 Mark Assessment Literacy Numeracy Experimental Skills **Organisms - Breathing** 25 Mark Assessment Literacy Numeracy Experimental Skills	**Matter – Separating Mixtures** 25 Mark Assessment Literacy Numeracy Experimental Skills **Forces – Gravity / Contact Forces** 25 Mark Assessment Literacy Numeracy Experimental Skills	**Ecosystems – Plant Reproduction** 25 Mark Assessment Literacy Numeracy Experimental Skills **Reactions – Acids and Alkalis / Chemical Energy** 25 Mark Assessment Literacy Numeracy Experimental Skills	**Energy – Work** 25 Mark Assessment Literacy Numeracy Experimental Skills **Genes – Human Reproduction** 25 Mark Assessment Literacy Numeracy Experimental Skills	**Earth – Climate / Earth Resources** 25 Mark Assessment Literacy Numeracy Experimental Skills **Waves - Wave Effects / Wave Properties** 25 Mark Assessment Literacy Numeracy Experimental Skills	**Electromagnets – Electromagnets / Magnets** 25 Mark Assessment Literacy Numeracy Experimental Skills
MARKS	**25 / 25**	**25 / 25**	**25 / 25**	**25 / 25**	**25 / 25**	**25 / 25**
End of Unit Assessment	**AQA Working scientifically.**	**Matter** **Forces**	**Ecosystems** **Reactions**	**Energy** **Genes**	**Earth** **Waves**	**Electromagnets**

	Organisms **50 Mark Summative Assessment**	**50 Mark Summative Assessment**	**50 Mark Summative Assessment**	**50 Mark Summative Assessment**	**50 Mark Summative Assessment**	**50 Mark Summative Assessment**
MARKS	**50**	**50**	**50**	**50**	**50**	**50**
Links to GCSE	Embedded throughout B1, B2 C1, C2, C4, B1	C1, C2, C4, B1 P1, P5, P7, P8	C3, C4, C5 B1, B2, B6, B7, C9, P4	B1, B4, C5, C6, C10, P1	B7, C4, C9, C10, P1 C1, P2, P4, P7	P4, P6, P8
Cultural capital/ enrichment	Being able to communicate ideas with different audiences What causes a dynamic paradigm shift in science? How is our respiratory system effected by living in inner London? Risks associated with drug, alcohol and tobacco use.	Benefits and drawbacks of everyday friction, contact and non-contact forces used in braking systems Understanding the day-today uses of different elements within the home. How the discovery of artificial polymers changed the agriculture, manufacturing and pharmaceuticals.	How does an injury pack work? / how does a self-warming can of soup work? How can a sufficient supply of oxygen to your gas boiler potentially save your life? Understanding the day-today uses of different elements within the home. How the discovery of artificial polymers changed the agriculture, manufacturing and pharmaceuticals.	How to save money and energy by building net zero home. How do we use simple machine to make day-to-day tasks easier? Issues surrounding human reproduction. Fertility, Contraception etc.	How are human beings' dependant on plants and vis versa? Why are international governments collectively focused on switching to renewable energy resources? How could you reduce your carbon footprint?	How does planet earth act like a bar magnet? How does a door bell/ alarm/ loudspeaker etc work? Why can't we see round corners but hear round corners? Use of electromagnetic waves in our day-today lives

			Why do we look similar and yet so different to our siblings? Why do we have seasonal fruits? How can our environment affect us?			
LITERACY/ Linked reading	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking
Oracy	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers
Numeracy	Determining the charge of an ion	Determining pulse rate and heart rate, Constructing a line graph, Calculating the magnitude of force using the force equation	Calculating enthalpy changes of reactions Calculating bond energies Balancing equations Calculating the unknown mass of	Calculating thermal energy Calculating work done using the work equation	Constructing a line graph to illustrate the effects of different conditions on rate of photosynthesis / respiration	Calculating current, Calculating voltage, Using a compass Measuring the amplitude, wavelength, and

		Interpreting vector diagrams Calculating the resultant force Calculating magnitude of pressure using the pressure equation.	substances in a chemical equation Constructing line / bar / pie charts for continuous / discontinuous data		Interpreting graphical data on different types of energy resources Interpreting graphical data to support global warming theory	frequency of a wave Calculating wave speed Calculating wave frequency
Careers	Research scientist, Statistician, Engineer, Particle physicist, Material scientist, Quality control scientist	Microbiologist Histologist Pathologist Biomedical scientist Nursing Medicine Dentistry Veterinary science Kinematic and mechanical engineering Roller coaster designer / Engineer Automotive designer / Engineer Rheologist Deep sea diver	Pharmacist pharmacologist chemical engineer Geneticists Bioinformatics Embryologist Oncologist Epidemiologist	Geologist Ecologist Quality assurance officer Miners Civil engineer Environmental activist	Discussion around celebrities and role models and key figures and society	Electrical engineer Electronic engineer Inventor, Marine biologist Sound engineer Photographer Radiographer Sonographer Nuclear scientist Telecommunications engineer

Year 9						
TERM	**AUTUMN 1**	**AUTUMN 2**	**SPRING1**	**SPRING 2**	**SUMMER 1**	**SUMMER 2**
Text/Topic	**Enquiry Processes** **Organisms**	**Matter** **Forces**	**Ecosystems** **Reactions**	**Energy** **Genes**	**B1-Cell biology,** **C1-Atomic structure and the periodic table**	**C1-Atomic structure and the periodic table** **P1 - Energy**
Skill/ Concept	**Enquiry Processes** **Organisms - Digestion**	**Matter – Periodic Table / Elements** **Forces - Pressure**	**Ecosystems – Respiration / Photosynthesis** **Reactions – Types of Reaction**	**Energy – Heating and cooling** **Genes – Evolution / Inheritance**	Cell structure, Cell division, Transport in cells. A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes, The periodic table	A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes, The periodic table Internal energy and energy transfers.
Hinge Assignment	**Enquiry Processes** 25 Mark Assessment Literacy Numeracy Experimental Skills **Organisms - Digestion** 25 Mark Assessment Literacy Numeracy Experimental Skills	**Matter – Periodic Table / Elements** 25 Mark Assessment Literacy Numeracy Experimental Skills **Forces - Pressure** 25 Mark Assessment Literacy Numeracy Experimental Skills	**Ecosystems – Respiration / Photosynthesis** 25 Mark Assessment Literacy Numeracy Experimental Skills **Reactions – Types of Reaction** 25 Mark Assessment Literacy Numeracy Experimental Skills	**Energy – Heating and cooling** 25 Mark Assessment Literacy Numeracy Experimental Skills **Genes – Evolution / Inheritance** 25 Mark Assessment Literacy Numeracy Experimental Skills	**B1-Cell biology** 25 Mark Assessment Literacy Numeracy Experimental Skills **C1-Atomic structure and the periodic table** 25 Mark Assessment Literacy Numeracy Experimental Skills	**P1 - Energy**. 25 Mark Assessment Literacy Numeracy Experimental Skills

MARKS	**25 / 25**	**25 / 25**	**25 / 25**	**25 / 25**	**25 / 25**	**25**
End of Unit Assessment	**Enquiry Processes** **Organisms**	**Matter** **Forces**	**Ecosystems** **Reactions**	**Energy** **Genes**	B1 Assessment	C1 Assessment P1 Assessment
MARKS	**50**	**50**	**50**	**50**	**50**	**50**
Links to GCSE	P4, P6, P8	B1, B2, B6, B7, C9, P4	C1, P2, P4, P7	Embedded throughout biology Embedded throughout chemistry	C1, C3, C5, P1, P6 B1, B3, B4, B5, B6, B7	C1, C3, C4, C5, C6, C7 C1, C2, C5, P1
Cultural capital/ enrichment	Understanding the benefits of a balanced diet and risks of an unbalanced diet.	How does structure and bonding of atoms determine the physical and chemical properties of all materials around us?	How could you reduce your carbon footprint? Can we sustain our current way of living?	Why do we look similar and yet so different to our siblings? Why do we have seasonal fruits? How can our environment affect us? Explore discussion surrounding genetic modification including designer babies, GMO etc. Stem cell technology	How does the structural differences in the basic units of all forms of life, enable them to perform different functions? How did invention of the microscope change the world of science? Links between universal transactions and microbiological transport	How do scientists' knowledge of structure and bonding to engineer new material with desirable properties? How do engineers use the principles of particle model when designing vessels to withstand high pressures and temperatures, such as submarines and spacecrafts.

				and personalised medicine Why are international governments collectively focused on switching to renewable energy resources?	Stem cell technology and personalised medicine Historic developments of the periodic table and atomic structure provide good examples of paradigm shifts in science.	
LITERACY/ Linked reading	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking	Scaffolded structure strips Identify key words Describe key words Spot the mistake Odd one out Word wheel Etymology linking
Oracy	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers	Verbal scaffolds Question prompts Sentence starters Think-Pair-Share Paraphrasing Presenting answers
Numeracy	Measuring the amplitude, wavelength, and frequency of a wave	Constructing and interpret line / bar / pie charts for continuous /	Interpreting graphical data on different types of energy resources	Scale Magnification	Balancing nuclear equations Plotting and	Ratio Word and symbol equations

	Calculating wave speed Calculating wave frequency Using different scale factors	discontinuous data Probability	Interpreting graphical data to support/disprove global warming theory Use continuous data to predict environmental conditions on different planets	Chemical formulae Ratio	interpreting half-life graphs	Calculating density using equation Calculating specific heat capacity using equations Calculating specific latent heat using equation Plot cooling curve
Careers	Sound engineer Photographer Radiographer Sonographer Nuclear scientist Telecommunications engineer	Geneticists Bioinformatics Embryologist Oncologist Epidemiologist Microbiologist	Geologist Ecologist Quality assurance officer Miners Civil engineer Environmental activist	Medical professional Scientists Engineer Chemist Physicists	Medical professional Scientists Engineer Chemist Physicists	Medical professional Scientists Engineer Chemist Physicists

Year 10						
TERM	**AUTUMN 1**	**AUTUMN 2**	**SPRING1**	**SPRING 2**	**SUMMER 1**	**SUMMER 2**
Text/Topic	• B1-Cell Biology revision • C1- Atomic structure revision • P1- Energy revision • B2-Organisation	P4-Atomic Structure C2- Bonding	B3- Infection and response C3-Quantitative chemistry	P2- Electricity B4- Bioenergetics	C5- Energy changes P3- Particle Model C4- Chemical changes	**<u>Year 11 content begins</u>** B5- Homeostasis C6- Rate and extent of chemical change

Skill/ Concept	• Cell structure and transport • Atomic model and periodic table; different types of chemical bonds • Energy stores and transfers; calculations involving energy • The Heart and Blood vessels; Non-communicable diseases	• Model of the Atom; Radioactivity; Half-Life • Ionic, Covalent, Metallic Bonding; Covalent and Ionic compounds;	• Communicable diseases; Bacterial and Fungal diseases; viral and protist diseases; plant responses; Vaccination; Antibiotics and painkillers • RFM, moles, conservation of mass, limiting reactants, concentration	• Current, resistance, voltage, series and parallel circuits • Photosynthesis, respiration, metabolism	• Endo and exothermic reactions; Bond energies; Chemical and fuel cells • Density; Heating and cooling curves; Specific heat capacity; Pressure; • Metal Oxides; Reactions of Acids; Electrolysis; Salts; Extraction of metals; Titrations	Nervous and Endocrine system; Glucoregulation; Osmoregulation; Contraceptives; Infertility Rates of reaction; collision theory
Hinge Assignment	B1- required practicals; scientific literacy and numeracy P1- required practicals; scientific literacy and numeracy B2- required practicals; scientific literacy and numeracy	C2- Bonding 1- scientific literacy and numeracy C2- Bonding 2- scientific literacy and numeracy	B3- Infection and Response B3(triple) Monoclonal Antibodies C3- Quantitative Chemistry	P2- Electricity B4- Bioenergetics	C5- energy changes P3- Particle Model	B5- Homeostasis
MARKS	**B1- 35 marks** **P1- 40 marks** **B2- 40 marks**	**C2- 30 mks (Bonding 1)** **40 mks (Bonding 2)**				
End of Unit Assessment	B1- Cell Structure and Transport C1 and P1- Atomic	P4- Atomic Structure C2- Bonding	B3- Infection and Response	P2- Electricity B4- Bioenergetics	C5+P3- Energy changes + Particle Model	B5- Homeostasis C6- Rate and extent of

	structure and Energy B2- Organisation		C3—Quantitative Chemistry		C4- Chemical changes	chemical change
MARKS	**50 mks each EOU test**	**50 mks each EOU test**	**50 mks each EOU test**	**50 mks each EOU test**	**50 mks each EOU test**	**50 mks each EOU test**
Links	• Science safety • KS3 Cells, KS4 Cell Biology, KS3 Digestive system, Plants and photosynthesis, Biological systems and processes • KS3 Reactivity, Atoms and the periodic table, KS4 Atoms and the periodic table	• KS3 Atoms, Elements, Compounds, KS3 Chemical reactions	• KS3 Energy and electricity • KS4 Energy • KS4 Cell biology, organisation	• KS3 ecosystems; KS3 Electromagnets	• KS3 Particles and matter • KS3 Chemical reactions • KS3 Energetics and rates	• KS3 Chemical reactions; KS3 the eye
Cultural capital/ enrichment	• Healthy lifestyles and disease, surgical techniques in CHD, cancer and transplants, cloning, Stem cells • How scientific ideas change over time as new evidence emerges, engineering of materials with new properties, such as Kevlar vests	• Cost of energy bills, energy wastage, National grid and radioactive power plants, non-renewable energy and renewable energy	• Cost of energy bills, energy wastage, National grid and radioactive power plants, non-renewable energy and renewable energy • Vaccinations and autism, herd immunity, corona virus, hygiene, drug testing, MRSA and superbugs.	• Understanding hydroponics and how photosynthesis affects agriculture and crop cultivation; • Circuitry in houses; decorative lights; plugs in houses	• Chemical mosquito repellent/ skunks, nut allergies, perfume • Hair removal (electrolysis), Extracting metals from ores • Extracting metals, batteries and fuel cells, London buses, everyday heating and cooling, fireworks,	• Dialysis; Diabetes and lifestyle diseases • Haber process; industrial processes

					epoxy resin floors, hydrogen bombs, nuclear fission	
Literacy	• Model answers • Etymology key word posters • Students challenged to incorporate key vocabulary into responses • Word wheels • Examples and non examples to contextualise tier 3 words – Frayer model • Origin of element names, eg K for potassium	• Model answers • Sentence sequencing • Misspelling and misinterpretations are challenged. • Use of models to structure scientific writing	• Model answers • Sentence sequencing • Misspelling and misinterpretations are challenged. • Use of models to structure scientific writing • Cause and effect with conjunctions for lifestyle diseases • Evaluation of medical treatments eg stents and statins	• Model answers • Sentence sequencing • Comparison of current, Potential Difference and Resistance in series and parallel circuits • Misspelling and misinterpretations are challenged. • Use of models to structure scientific writing • Cause and effect with conjunctions for lifestyle diseases • Evaluation of medical treatments eg stents and statins	• Model answers • Etymology endothermic and exothermic • Extended response - Compare and contrast exothermic and endothermic reactions • Extended response - Description, Explanation and evaluation of car safety measures •	• Model answers • Etymology of photosynthesis and respiration • Etymology of homeostasis • Sequencing of sentences to describe various homeostatic mechanisms and negative feedback loops • Extended response - Explanation of the role of reproductive hormones
Linked reading	https://classroom.thenational.academy/units/cell-biology-b859	BBC Bitesize Conservation of mass in chemical reactions	Unit - Oak National Academy (thenational.academy)	Unit - Oak National Academy (thenational.academy)	https://classroom.thenational.academy/units/chemical-changes-a5ba	https://classroom.thenational.academy/units/homeostasis-and-

	https://classroom.thenational.academy/units/cell-biology-ht-723d https://classroom.thenational.academy/units/organisation-2345 https://classroom.thenational.academy/units/organisation-ht-b207 https://classroom.thenational.academy/units/atomic-structure-and-periodic-table-c831 https://classroom.thenational.academy/units/atomic-structure-and-periodic-table-ht-739c https://classroom.thenational.academy/units/bonding-structure-and-the-properties-of-matter-e93f	The law of conservation of mass Law of Conservation of Mass Experiment Video clip YouTube: BBC Chemical reactions Burning iron wool experiment at 7 minutes in.	Unit - Oak National Academy (thenational.academy)	Unit - Oak National Academy (thenational.academy)	https://classroom.thenational.academy/units/energy-changes-b607	response-1a15 Unit - Oak National Academy (thenational.academy)

Oracy	• Full sentences • Paired reading • Chorus reading • Verbal scaffolds • Speak like a scientist – focus on tier 3 vocabulary • Discussion to clear up misconceptions	• Paraphrasing content • Students speak in full sentences when discussing or answering a question. • Paired reading • Chorus reading • Verbal scaffolds • Speak like a scientist – focus on tier 3 vocabulary • Discussion of misconceptions around bonding	• Paraphrasing • Sentence stems • Discussion around the misconceptions associated with vaccines • Paired reading • Chorus reading • Verbal scaffolds • Speak like a scientist – focus on tier 3 vocabulary • Reminder not to use 'amount.'	• Paraphrasing • Sentence stems • Full sentences. • Paired reading • Chorus reading • Verbal scaffolds • Speak like a scientist – focus on tier 3 vocabulary • Emphasise plants respire 24 hrs a day • Energy is not produced/ created/ made it is released/ provided	• Paraphrasing • Paired reading • Chorus reading • Verbal scaffolds • Speak like a scientist – focus on tier 3 vocabulary • Discuss misconceptions –	• Paraphrasing • Paired reading • Chorus reading • Verbal scaffolds • Speak like a scientist – focus on tier 3 vocabulary
Numeracy	• M = I/A • Order of magnitude, percentage change, drawing and analysing graphs, correlation and cause, balancing equations, representing elements using symbols, mass and atomic number, mean calculations for isotopes, bonding diagrams	• Conversions from milli, micro, nano and pico to base units. • Calculating electrons for transfer in ionic bonding. • Calculating numbers of sub-atomic particles.	• Multiplication of bacteria, interpreting immune response graphs • Use of multipliers in equations, RAM, Mr, changes in mass, balancing equations	• Current, Potential Difference and Resistance in series and parallel circuits, I-V characteristics • Calculating power and cost of domestic electricity • Balanced symbol equations of photosynthesis and respiration, limiting factor graphs, **inverse square law**	• How to describe changes in energy on a graph and identify changing states of matter. • How temperature, pressure and volume affect the characteristics of a gas. • How doing work on a gas changes it. • Specific heat capacity • Latent heat of vaporisation • Finding the density of regular and	• Calculating reaction times

					irregular solids and of liquids (RP) • Energy diagrams, calculating bond energies, enthalpy change • Reactivity series, writing ionic equations, balancing equations of metals and acids (redox reactions), the pH scale, titration calculations, neutralisation equations, Representation of reactions at electrodes as half equations	
Careers	• Microbiologist, histologist, pathologist, coroner • Electrician, Electrical engineer, Nuclear Physicist	• Electrician, engineer, electrical engineer, mechanical engineer, power station worker, energy engineer, line installer and repairer, electronics, power plant operative, cardiovascular technologist, construction manager	• Synthetic chemist, research associate, analytical chemist, forensic chemist, toxicologist, radiochemistry, nuclear chemist • Perfumer, molecular physicist, quantum mechanics, optical physics, mechanical engineering, silicon industry, researcher at CERN, quantum	• Personal trainer, Sports Scientist, Physiotherapist, Botanist, phlebotomist, ecologist, floristry • Beautician, Geologist, biochemist, engineer, Lab technician, Chemical engineer, Industrial chemist,	• Nurse, doctor, physiotherapist, homeopathy, dietician, ambulance service, healthcare support worker, sexual health worker • Nuclear physicist, nuclear medicine, radioactive engineer, Radiologist, Sonographer	• Medic, mechanical engineer, lecturer, utilities company, thermodynamicist, project engineer, fluid dynamics, power plant operative, turbo chemistry, wind engineering, hydronic, hydraulics engineer • Aerospace engineer, crane operator,

		• Nurse, Medic, Pharmacist, Analytical chemist, Pharmacologist, virologist, microbiologist, tropical medicine, immunologist, biomedical scientist	chromodynamics			building technician

Year 11						
TERM	**AUTUMN 1**	**AUTUMN 2**	**SPRING 1**	**SPRING 2**	**SUMMER 1**	**SUMMER 2**
Text/Topic	P5-Forces C6- Rate and Extent of Chemical Change	C6- Rate and extent of Chemical Change B5- Homeostasis C7- Organic Chemistry C8- Chemical Analysis	C8- Chemical Analysis B7- Ecology B6- Inheritance and variation C9- Chemistry of the Atmosphere	B6- Inheritance and variation P6- Waves P7- Magnetism and Electromagnetism C10- Use of Resources	Revision of Paper 1- B1-B4; C1-C5 and P1-P5; Revision of paper 2 – B5-B9; C6-C10; P5-P9	**Exams**

Skill/ Concept	• Forces and Elasticity; Hooke's law; Distance and Displacement; Newton's laws; Acceleration; Stopping Distances; Momentum • Rates of Reaction; Collision theory	Reversible reactions; Le Chatelier's principle Nervous and Endocrine system; Glucoregulation; Osmoregulation; Contraceptives; Infertility Fractional distillation of crude oil; Alkanes, Alkenes, Alcohols, Carboxylic Acids Purity and Formulations; Chromatography	• Identifying gases; Identifying Ions; Instrumental methods and Spectroscopy • Trophic levels; Food webs and chains; Food security • DNA and the genome; Genetic inheritance; Inherited disorders; Sex determination; Variation; Evolution and speciation; Selective breeding and genetic engineering • Evolution of the atmosphere; Carbon footprints; greenhouse gases and Climate change	• Fossils; Resistant bacteria; Classification • Transverse and longitudinal waves; Parts of a wave; wave calculation; EM waves		
Hinge Assignment	**Forces** **Homeostasis (Triple)**	**Organic Chemistry** **Chemical Analysis (Triple)**	**Chemical analysis** **Chemistry of the Atmosphere** **Inheritance** **Waves (Triple)**	**Variation** **Using Resources**		

MARKS	**Forces (40) C – (60) T Homeostasis (T)- 65**	**Organic Chemistry (25) C (50) T Chemical Analysis (45)**				
End of Unit Assessment	**Forces Rate and extent of Chemical Changes**	**Homeostasis Organic Chemistry**	**Chemical Analysis** **Inheritance**	**Variation and Evolution** **Waves**		
MARKS	**50 marks each EOU test**	**50 marks each EOU test**	**50 marks each EOU test**	**50 marks each EOU test**		
Links	• Science safety • KS3 Forces, KS3 Physical and chemical changes	• KS3 Specialised cells; KS3 Separating Techniques (Matter) KS4 Design Technology; KS4 Engineering	• KS3 Variation; KS3 Genes; KS3 Interdependence; KS3 Earth	• KS3 Genes; KS3 Waves; KS3 Electromagnets		
Cultural capital/ enrichment	• Use of pulleys and gears in everyday objects; car safety; sports (track and field, race car driving); • Industrial processing of products like ammonia (Haber Process)	• Keeping cool; use of insulation materials to improve heating and cooling; Product design • Industrial processes- fractionating crude oil and uses in the Petroleum industry.	• The role of Physiotherapists in London 2012 Olympics. • Why do we look similar but different to our siblings? Designer babies, twins, Did we descend from apes?	• Artificial limbs, Paralympics, London eye • Formula 1 racing, stopping distances, car safety • Microwaves, Sky TV, Broadband, fibre optic cables, do mobile phones cause cancer? • Operation of magnets in	•	

			• How can we reduce our carbon footprint?, is it sustainable?, what is our impact on our environment?	doorbells and applications of electromagnets		
Literacy	• Model answers • Etymology key word posters • Students challenged to incorporate key vocabulary into responses • Word wheels • Examples and non examples to contextualise tier 3 words – Frayer model • Origin of element names, eg K for potassium	• Model answers • Etymology of photosynthesis and respiration • Etymology of homeostasis • Sequencing of sentences to describe various homeostatic mechanisms and negative feedback loops • Extended response - Explanation of the role of reproductive hormones	• Model answers, • Sentence sequences for electrolysis, use of the OILRIG acronym to describe REDOX reactions • Extended response - Description of difference between alloy and pure metal • Explanation of how electricity is conducted in a metal	• Model answers • Story on the history and development of the atom • Extended response, considering the precautions taken to prevent contamination and irradiation from radioactive sources. • Evaluation of using nuclear reactors to generate electricity • Model answers • Extended response - Compare and contrast uses of electromagnets		

Linked reading	**https://classroom.thenational.academy/units/forces-6562**	https://classroom.thenational.academy/units/homeostasis-and-response-1a15	**https://classroom.thenational.academy/units/ecology-a6da** **https://classroom.thenational.academy/units/inheritance-variation-and-evolution-0224**	**https://classroom.thenational.academy/units/waves-4cef**		
	• Full sentences • Paired reading • Chorus reading • Verbal scaffolds • Speak like a scientist – focus on t • How scientific ideas change over time as new evidence emerges, engineering of materials with new properties, such as Kevlar vests	• Paraphrasing • Sentence stems • Discussion around the misconception s melt or vaporise za • Paired reading • Chorus reading • Verbal scaffolds • Speak like a scientist – focus on tier 3 vocabulary • Reminder not to use 'amount.'	• Full sentences • Paired reading • Chorus reading • Verbal scaffolds • Speak like a scientist • Emphasis that arrows show the direction of energy transfer in a food chain, distinguish the ways that carbon dioxide is added and removed particularly for decomposition, emphasise that plants do not eat food, they make it • repeated reminder not to use amount use mass weight and concentration	• Full sentences • Paired reading • Chorus reading • Verbal scaffolds • Speak like a scientist • Verbal diagnostic questioning around temporary and permanent induction. • Discuss the misconception that matter moves with weights, many students confuse the effect of change the amplitude and frequency of the soundwave on the pitch and volume of the sound		

			instead, discussion around conservation of energy atoms cannot be lost or made in chemical reactions, that gases do not disappear during chemical reactions			
Numeracy	Using data from graphs; calculating gradient of a graph; manipulating equations of F=ma; drawing distance-time and velocity-time graphs; Calculating force an extension, calculating resultant force, worked on an energy transfer, forces and elasticity, moments levers and gears, pressure in a fluid, describing motion, distance and displacement, speed, velocity, the distance time relationship, acceleration common Newton's first second and	• Calculating reaction times • Calculations of retention factor values	• Punnett squares; calculating probability • Calculating and estimating percentage sizes from ecological sampling;	Wave calculations; manipulation of the wave equation; Motor effect equation F= BIl.		

	third law, stopping distance and reaction time, braking distance, momentum					
Careers	• Perfumer, molecular physicist, quantum mechanics, optical physics, mechanical engineering, silicon industry, researcher at CERN, quantum chromodynamics • Nuclear physicist, nuclear medicine, radioactive engineer, Radiologist, Sonographer • utilities company, thermodynamicist, project engineer, fluid dynamics, power plant operative, turbo chemistry, wind engineering, hydronic, hydraulics engineer •	• Perfumer, molecular physicist, quantum mechanics, optical physics, mechanical engineering, silicon industry, researcher at CERN, quantum chromodynamics • Nuclear physicist, nuclear medicine, radioactive engineer, Radiologist, Sonographer • utilities company, thermodynamicist, project engineer, fluid dynamics, power plant operative, turbo chemistry, wind engineering, hydronic, hydraulics engineer	• Personal trainer, Sports Scientist, Physiotherapist, Botanist, phlebotomist, ecologist, floristry • Nurse, doctor, physiotherapist, homeopathy, dietician, ambulance service, healthcare support worker, sexual health worker • Geneticist, doctor, nurse, midwife, palaeontologist, geologist, zoologist, botanist	• molecular physicist, quantum mechanics, optical physics, mechanical engineering, silicon industry, researcher at CERN, quantum chromodynamics • Nuclear physicist, nuclear medicine, radioactive engineer, Radiologist, Sonographer • utilities company, thermodynamicist, project engineer, fluid dynamics, power plant operative, turbo chemistry, wind engineering, hydronic, hydraulics engineer		