Reddish Vale High School Science Department 5 Year Plan 22/23

Year Group (ctrl + click to access)	**Rationale – scheme rationale is based around mastery of science: students are introduced to base topics repeatedly throughout both keystages to ensure they master skills and content.**
Intent, Implementation & Impact	
Assessment Dates	All assessment dates are based on a teacher delivering the course in standard lesson times with no 'lost' lessons to snow days, fire drills etc. For all tests the date given will be a guide; within KS3 tests will be carried out in lessons at the end of the term and as such staff will need to build these into their planning. KS4 tests will be carried out at the end of a topic and as such the date for these will vary based on the class and teacher combination. For all testing, staff should plan and order these well in advance to allow tests to be printed for use.
Assessment booklets and moderation	Moderation will be carried out in T&L time with staff bringing assessment booklets and resources to share and we will also be carrying out joint moderation of exemplar exam answers. Assessment booklets will be provided for all staff with the core assessment pieces and tests ready for staff to use with all classes. Extra assessment pieces should be printed by staff who are teaching Higher or Separate Science classes; these resources can be found in the lesson folders as 'additional resources' or through Exampro.
Homework	Core homework to support retention of knowledge over time will be set on Seneca by HOD every two weeks (Red Monday). Staff should also identify this homework on google classroom and set reminders as necessary. Deadline for Seneca will be Midnight Blue Thursday, however staff should be setting a deadline for their class based on when they see them. Additional homework is to be set by teachers as necessary for classes to ensure progress.
Year 7 Year 8	Year 7 and 8 introduce key concepts for students which will allow them to understand the basic principles which govern all the scientific concepts in the world round them. Each primary topic of Biology, Chemistry and Physics contains knowledge which can be applied to the secondary topic and has skills of analysis and comparison interwoven. Both years build upon each other and begin the task of allowing students to begin developing 'mastery' of key scientific skills, eg year 7 students covering 'particles', leading to year 8 students covering 'periodic table and materials'; both topics rely on similar principles which must be looked at multiple times. Assessments will take place at the end of each term on all topics covered that term.
Year 9	The year 9 scheme of learning introduces students to all the key areas needed to fully access the GCSE Combined Science qualification, focusing on the key concepts for Biology, Chemistry and Physics. This year includes key skills areas and mini-tests which need to be focused on in order to ensure pupils are fully prepared to access the content of GCSE lessons. Lesson guides are also written around beginning to stretch and challenge student abilities within science through identification of 'Triple Science Only' lessons. Staff are able to ensure all ability groups are support; to 'push' students towards these triple topics where applicable or ensure they approach learning at a slower pace to encourage 'revisiting for mastery' for lower ability classes. Assessments will take place at the end of each topic.

Combined Science Paper 1 Combined Science Paper 2	All key topics from the GCSE scheme are covered with most classes having individual teachers for Biology, Chemistry and Physics; some lower ability classes do have a singular teacher for all three to ensure that building relationships with staff is paramount alongside content specificity. All students will receive two GCSE results from six exams at the end of the course which vary from 1-5 in Foundation and 4-9 in Higher. These results are directly linked and are based on an average score from all six exams completed. (one grade is NOT linked to each paper as with previous years) Core practicals are required to be completed by all students and as such are identified in the lesson order part of the scheme, but also in a specific 'Core practical' session to ensure staff plan and understand the number of core practicals they must carry out in a given period. Assessments will take place at the end of each topic.
Triple Science Paper 1 Triple Science Paper 2	Triple Science GCSE students will sit a total of six exams, with each pair of exams for a subject giving them a full GCSE. Students are able to achieve very different grades in each subject, however this is discouraged as colleges find it a cause for concern when students are not similarly skilled. Triple science specific lessons are highlighted to ensure staff plan ahead to engage students at these times, but also take into account those in the lesson who will need support on these specific topics. Assessments will take place at the end of each topic.
Support GCSE Paper 1 Support GCSE Paper 2	Support GCSE is aimed to ensure that less able students are 'supported' to achieve the best possible grade in their GCSEs. The content will mirror the standard GCSE spec and all students will sit the combined science foundation papers, but the teaching will be at a slower pace to ensure understanding and mastery. Key higher level concepts will be removed from the scheme to ensure adequate time can be spent on the core principles and accessible content. Assessments will take place at the end of each topic.
Entry Level Certificate/UAS	An alternate pathway for students who struggle to access the volume of content in the standard GCSE. This will run for year 10 only and will then feed into the standard GCSE, but bridge the gap in skills and knowledge for those groups that need it. Originally this started as Entry Level Certificate, however after training of staff by AQA it was advised that Unit Award Scheme would be a more relevant choice for our students and ensure they gained higher level skills to allow them to access GCSE in year 11. As such a staggered approach was taken to ensure that students were provided with a working framework to achieve the UAS certificates. Biology began UAS in November, Physics in January and Chemistry after February half term. All work prior to transition to UAS follows the planned ELC pathway and ensures effective T&L, much of the work can also be submitted for UAS certificates retrospectively.

Intent

Science is everywhere in today's world. It is part of our daily lives, from cooking and gardening, to recycling and comprehending the daily weather report, to reading a map and using a computer. Advances in technology and science are transforming our world at an incredible pace, and our children's future will surely be filled with leaps in technology we can only imagine. Being "science literate" will no longer be just an advantage but an absolute necessity. We cannot underestimate the significance of science in our world. We aim to promote a love of science and to equip pupils with the skills necessary to understand the impact of science on their lives and equip them with the skills and knowledge they need to be successful in the future

Implementation

Our intent is to engage students more actively in the sciences and ensure they are eager to attend and engage in lessons; this will be evidenced through learning walks, book trawls and most importantly student voice. Current students talk about their enjoyment of the subject in relation to practical lessons only, noting that these are relatively rare; we aim to ensure that students talk as passionately about all science lessons and are engaged in what they are learning even without a practical aspect on that day.

Schemes focus on key content with an undercurrent theme to ensure links can be made between topics and subjects. We actively link with Maths, PE and Food Technology to ensure we teach concepts in a similar way and work to support each other as subjects.

All students will be required to have a revision guide to support their learning and revision; as such exercise books should not be used as places to copy texts or make notes from a board. Instead they should contain sample questions, assessment activities and improvement which students can use for their revision to improve their progress.

Impact

Testing is now carried out at KS3 to ensure that focus and time are given to developing learners who are intrigued about the world around them, rather than students who simply have memorised answers to a test. KS4 testing will take place at the end of each topic, rather than every half term. In some cases this will mean more regular testing, but in each case students will be able to fully appreciate the relevance of the testing and can see how this will directly affect their progress and improvement.

All assessment must be followed by an opportunity to improve upon work using green pen where the teacher has gone through the answers and purple pen where the students have been given improvement questions to complete to expand their knowledge.

Student voice will form a key part of analysis of impact within the new curriculum and how we progress.

Term Timeframe for lessons 22-23

Half Term	Number of weeks per half term	Number of lessons available per KS3 class	Number of lessons available per Y9 class (NB bio, chem and phys)	Number of lessons available per GCSE class
1	7	21	28	32
2	7.5	21	28	32
3	6	18	24	27
4	5	15	20	22
5	6	18	24	27
6	7	21	28	32
Total per year		114	152	172

Functional Skills:

Literacy	Numeracy
KS3 – Keywords, understanding of key terms and accessing scientific writing are key skills at KS3. Many lessons will include the use of keywords and spellings to enable students to access a topic. Teachers will attempt to include longer sections of writing within lessons to encourage reading skill in a scientific context and attempt to encourage longer answer writing for six marker questions. **KS4** – GCSE lessons will target the skill of accessing science exam paper questions as this has been identified as a key weakness amongst students. Mock papers will be used to break down questions and identify key terms which can support students to improving their grades. 40% of the Science GCSE marks are from 'recall of knowledge', as such being able to use correct keywords/key terms is vital to achieving.	20% of the Combined Science and Separate Science GCSE marks are awarded for mathematical skill within science, as such the maths elements for all exams is very important. All SoW involve areas of application which directly link to mathematical analysis or use. Physics focuses on use of equations, re-arrangement, standard form and factors. Biology and Chemistry both use maths to rationalise key concepts and to identify changes, this includes examples such as magnification and molar quantities. Graph skills are a key point in all three subjects and appear in both paper 1 and 2. Training has been taking place and is on-going between the science and maths departments to ensure that key approaches are shared and student understanding can be consolidated between both subjects.

Contribution to students social, moral, spiritual, cultural, personal development & wellbeing

Social	Moral	Spiritual	Cultural	Personal development & wellbeing
Different opinions and beliefs are encouraged to develop different viewpoints promoting healthy dialogue. Students are encouraged to understand that there are key areas in which there is not a correct answer.	All the rules of the school and society at large are adhered to in a firm fair manner promoting equality throughout tasks, roles and discussions. Key concepts require moral viewpoints to be discussed, such as cloning, genetic modification etc, students are encouraged to gain all the facts before making decisions.	Concepts are found in key areas, particularly the juxtapose of the spiritual beliefs of some for the beginning of the universe and the scientific view point. Whilst some topics are not specifically on the SoW, teachers need to be aware of the inherent links in the topic of space, genetic engineering and others.	Cultural opinions are key within science, but are more prevalent in topics within the Biology subject. Staff are aware of key areas of focus and ensure that these are taught to ensure understanding across a variety of areas.	Pupils are regularly explained how skills from STEM can enhance their career aspirations and possibilities. Many topics also link with the world around them and understanding why things happened which allows students to ensure they look out for their own and others wellbeing.

Careers / Gatsby benchmark links

Links to careers / jobs	Careers talk (possible contacts)	Career & labour market information	Workplace visit	Encounters with further / higher education
Science displays in the department shows links to careers and further education. KS3- Lesson links to jobs are made when possible and skills are linked to other subjects and the possible STEM skills that make a person more	Educational trips and visits are booked in throughout the year which allow students to come into contact with multiple skilled professionals. This include medical mavericks, researchers, engineers and many others. We are currently looking to include skilled trades, specifically focusing on	Working with the Enterprise adviser to ensure students are aware of the careers they have access to and the surrounding employers. Health services and Manchester Airport are massive employers in the local area and are very strongly linked to STEM.	Visits to Jodrell Bank, Manchester University for rewards and challenge trips. These allow students to see the direct application of science into workplaces. STEM visits allow students to interact with people who	University of Manchester links utilised for multiple trips, include the Christmas lectures and workshops. Students see the university as an engaging place that is a possibility in their future. College visits for challenges throughout the year, such as

employable. KS4 – Key skills needed in science are highlighted as being required by all employers and colleges. Expectation by many is that students will have English, Maths and Science.	electricians and plumbers to discuss the application of the SoW into their jobs; highlighting the application of science into the real world. STEM ambassadors visit schools to provide workshops for pupils. These ambassadors have jobs which link to their session and they use the time to explain their job and how it links to STEM.		have STEM linked jobs and to ask questions.	Faraday challenge.

Assessment Dates

KS3	Test topics	Date to be completed
Baseline testing of year 7, 8 and 9	Background knowledge testing for all students to identify areas of weakness to allow staff to target those areas.	w/c 13th September
Term 1		
Term 2		
Term 3		
End of year exam	Covers all topics from the year	

Assessment booklets and moderation

Assessment booklets in yellow are provided for all students across all year groups to ensure there is a consistent approach to long term testing and assessment of student progress. All teachers must complete all assessments and place scores onto the assessment tracker in the data folder of science;

guidance timings will be provided for completion of the 'end of topic tests' to ensure data fits with datadrops. Other assessment pieces in the yellow booklets are to also be completed in lesson time, guidance for when to do these can be found in the lesson folders.

Marking of assessment booklets is classed as priority marking for science teaching staff, book checking should be mainly carried out in lessons with teachers using stamps or similar to acknowledge good work, exemplar pieces and identify areas for improvements. Teachers should, in line with school policy, mark student work every 2-3 weeks and ensure that PP students receive priority. Assessment booklets should help to manage this expectation as the assessment pieces are timed to be used approximately every 2-3 weeks in line with teaching; teachers should mark all questions in assessment booklets, peer marking should not be used.

Teachers should mark all work in red pen with primary comments being on how students can improve their work.

- EOTTs are directly followed by 6 questions which address the core issues of the topic, after marking the test teachers should highlight the question numbers they wish students to complete as their improvements.
- When marking additional assessment pieces, teachers should set extension questions that will push students to expand upon their knowledge and improve their grade.

Students should be given sufficient time in the subsequent lesson to improve upon work themselves using resources such as exercise books and revision guides in purple pen, and work with the teacher to complete sections where correct updates are identified by the teacher and given to the class in green pen. Ideally the majority of improvements to assessment pieces should be self-improvement and in purple pen, however key topics for certain classes may need more teacher intervention and need green pen, this will be more the case with EOTT.

Moderation will be carried out during T&L meetings, focusing on how teachers mark questions, understanding the mark scheme and its application, focus on 5/6 mark questions. The majority of questions in GCSE and KS3 assessments are shorter answer questions in which moderation is more difficult, however moderation should regularly be carried out on 3-6 mark questions (with the exception of 3-4 mark maths based questions)

Moderation will be carried out in one of two ways:

- All teachers will bring a set sample from each class of a specified assessment they have completed with a class and other staff will peer mark to identify confidence in marks.
- Example assessments that have been completed by students, but not marked by the teacher; as a department we then jointly mark the work and discuss opinions on score.

Homework

Core Homework will be set by the department at the start of every 2 weeks, commencing on the Monday every Red week. Students will be expected to complete this work and be assessed by teachers in the lesson. Staff should choose to set a specific lesson in blue week when they wish the homework to always be completed. Assessment of this work should involve discussion of % and areas of weakness that needs to be re-addressed. This should then be built into the following lessons to address concerns.

Homework completion should focus on effort and time given, not an overall score. KS3 should be completing at least 30 minutes of homework, KS4 at least 45 minutes. This should be the primary focus of staff when considering detentions for homework not being completed, with scores in homework being a secondary concern that leads to intervention.

Departmental homework will be based on Seneca, staff will need to ensure they and their classes are signed up to Seneca teaching website and that teachers monitor the group to ensure all names are present. Staff should use their school email account for log in, however students should use their personal email address as this will allow them to reset passwords and log ins whenever they need without teacher intervention. Core homework will focus on retention of prior learning and will focus on topics covered in the previous term/half term.

Seneca log in session to be carried out for staff in the training days and instructions sheets for students and parents will be put onto Google classroom.

Additional Homework is to be set by teachers when appropriate to enhance learning and retention of knowledge. Core homework from the department represents the minimum expected amount of homework and should regularly be enhanced with other tasks that link to current learning. This may include worksheets and other activities and resources, but **staff are reminded that worksheets often do not match the needs of a class; whilst they represent a good potential starting point to build a homework, they should not be used in their entirety.**

Staff may choose to use AfL assessment questions, research tasks, Blooket quizzes and other items as homework.

KS3 Schemes of learning

Year 7	HT1 – 20 lessons	HT2 – 21 lessons	HT3 – 17 lessons	HT4 – 14 lessons (4 EXT)	HT5 – 17 lessons (2 EXT)	HT6 – 19 lessons + revision time
	Standards and Expectations Lab Safety	Variables Investigating diffusion Gas pressure	**Topic: Reproduction** Sexual reproduction Asexual reproduction Puberty	Making iron sulphide – EXT Chemical formulae Test	Food chains and webs Trophic levels – EXT Biotic and Abiotic factors	**Topic: Mixtures** Mixtures Solutions

	Topic1:Cells Asking Questions, Risks and Hazards Animal Cells Plant Cells Microscopes and Observing cells Maths – Decimals and Scales and SI units Writing methods Specialised Cells Organising Cells Test Feedback **Topic: Particles** States of matter The particle model Properties of matter Heating substances Melting and freezing Boiling and Condensing Diffusion	Maths - Substitution Density Measuring density Test Feedback **Topic: Forces** Forces Balanced and Unbalanced forces Accuracy and precision Resultant forces Interaction pairs Maths – Choosing a scale Springs and deformation Drag forces and friction Investigating friction Test Feedback **Autumn Assessment 2 lessons**	and reproductive systems The menstrual cycle Embryo development Maths – Results tables Plant reproduction Practical Plant reproduction Seed dispersal Test Feedback **Topic: Atoms, Elements & Compounds** Maths – Mean and Range Elements Atoms Periodic table Metals and Non-metals Reactivity of metals Compounds -	Feedback **Topic: Space** Gravity Mass and Weight Keeping in orbit – EXT Maths – Graphs The solar system Satellites – EXT Seasons Eclipses - EXT Test Feedback **Topic: Interdependence** Ecosystems Representative sampling Maths – Interpreting graphs Measuring plant distribution Measuring plant distribution analysis – EXT	Competition Test Feedback **Spring Assessment 2 lessons** **Topic: Energy** Energy and Energy stores Energy transfers Energy in food – EXT Wasted energy Efficiency Heat, Temperature and Thermal energy Temperature and particles Conductors and insulators Test Feedback	Melting and Boiling points, Purity Separation of mixtures Filtration and crystallisation Fractional distillation Chromatography Test Feedback **Topic: Electrical circuits: Current and Pd** Models of electricity Series and parallel Current Circuit components Measuring current Measuring voltage Drawing conclusions Test Feedback

Year 8	HT1 – 21 lessons	HT2 – 21 lessons	HT3 – 18 lessons	HT4 – 15 lessons	HT5 – 18 lessons	HT6 – 13 lessons + revision
	Topic: Tissues and organs Skeletal and muscular system Investigating muscle strength Respiratory system Mechanism for breathing Gas exchange Medicinal drugs Recreational drugs Organ donation debate Test Feedback	**Topic: Movement and pressure** Speed Changing speed Distance-Time graphs Using distance-time graphs Applications of pressure Pressure Test Feedback	**Autumn Assessment** **Topic: Changing substances** Chemical changes Conservation of mass Introduction to balancing equations & balancing equations Oxidisation and reduction Burning magnesium Reaction of acids	Earth's magnetic field (EXT) Test Feedback **Topic: Life diversity** Maths – Fractions Maths - Percentages Variation Inheritance Artificial selection Natural selection	The rock cycle The water cycle (EXT) Water and living things (EXT) Air pollution (EXT) Test Feedback **Spring Assessment** **Topic: Electric circuits: Resistance**	Models of the digestive system Enzymes Digestive enzymes Investigating Amylase Plant nutrition Test Feedback **Topic: Light** Light

	Topic: Acids and alkalis pH scale Indicators Indicators praotical Neutralisation Making salts Writing methods Acids and metal carbonates Making salts from metal carbonates Test Feedback	**Topic: Respiration and Photosynthesis** Life habits and risks Aerobic respiration Anaerobic respiration Exercise and respiration Investigating muscle fatigue Uses of Anaerobic respiration Photosynthesis Investigating photosynthesis Investigating photosynthesis analysis Plant adaptations Non-photosynthetic plants Biodomes (EXT) Test Feedback	Testing for gases Test Feedback **Topic: Magnetism** Magnetism Magnetic fields Electromagnets Investigating electromagnets Investigating electromagnets analysis	Evolution Human impact of natural selection Test Feedback **Topic: Earth Systems** Igneous rocks Sedimentary rocks Metamorphic rocks	Resistance Ohm's Law Measuring resistance Resistance in a wire Resistance in series and parallel Applications of resistance Test Feedback **Topic: Nutrition** Diet and nutrition Food tests Food samples (EXT) The digestive system Small intestine	Reflection Refraction Observing refraction (EXT) Lenses Colour (EXT Test Feedback

Year 9	HT1 – 27 lessons	HT2 – 27 lessons	HT3 – 22 lessons	HT4 – 16 lessons	HT5 – 21 lessons	HT6 – 13 lessons + revision
	Topic: Growth and Differentiation Eukaryotic and prokaryotic cells Aseptic technique Growth of bacteria Microscopes	Test Feedback **Topic: Acceleration** Scalar and vector Resultant forces Resolving forces	**Topic: Introduction to quantitative chemistry** Relative formula mass Percentage by mass Conservation of mass Balancing equations Uncertainty	**Topic: Genetics** Cell cycle Meiosis Evaluating types of reproduction Development of gene theory DNA proteins and the	**Topic: Using resources** Reactions of metals Observing reactivity Using the reactivity series Treating water Testing water Using materials	**Topic: Home electricity** Mains electricity Plugs Power The cost of electricity Power in circuits Power and energy in

	Observing cells Diffusion Diffusion in living things Osmosis Osmosis practical Active transport Cell division Cancer Stem Cells Test Feedback **Topic: The periodic table** Maths – Standard Form Maths – Order of magnitude Atoms Electronic configuration Isotopes Understanding the atom Periodic table Noble gases Alkali metals Halogens Reactions of halogens (EXT) Transition metals	Newton's Third Law Newton's First Law Acceleration Acceleration investigation Velocity-Time graphs Acceleration problems (EXT) Test Feedback **Topic: Human interaction** Biodiversity How humans affect biodiversity How humans can preserve biodiversity The effect of pollution on biodiversity Global warming Taking it further with pyramids of biomass Taking it further Farming and Biotech Taking it further with food security Test Feedback **Autumn Assessment**	Introducing concentration Concentration calculations Salts Making soluble salts 1 Making soluble salts 2 Test Feedback **Topic: Heating** Internal Energy Thermal transfers 1 Thermal transfers 2 Specific heat capacity 1 Specific heat capacity 2 Specific latent heat Test Feedback	environment Genes and Alleles Punnett squares Inherited disorders Sex determination Taking it further DNA Taking it further Proteins (EXT) Test Feedback **Spring Assessment**	Life cycle assessment and reduce, reuse, recycle Evaluating impact Sources of information Test Feedback **Topic: Sound and waves** Types of waves Properties of waves Velocity of waves Reflection and refraction Investigating reflection and refraction Investigating waves Using waves Test Feedback	appliances Energy resources National grid Static electricity (EXT) Test Feedback

Paper 1 – Combined Science

Combined Science GCSE (staff to use to plan their testing schedule)

Biology	Testing Week	Chemistry	Testing Week	Physics	Testing Week
Cell Biology		Atomic Structure and periodic table		Energy	
Organisation		Bonding, structure and properties		Electricity	
Infection and response		Quantitative Chemistry		Particle model of matter	

Bioenergetics		Chemical Changes		Atomic structure	
		Energy Changes			
Homeostasis and response		The rate and extent of chemical change		Forces	
Inheritance, variation and evolution		Organic chemistry		Waves	
Ecology		Chemical analysis		Magnetism and electromagnetism	
		Chemistry of the atmosphere			
		Using resources			

Paper 1 – Combined Science

Biology – 54 lessons

Topic 1 - Cell biology

1. Types of cell
2. Specialised cells
3. Introducing microscopes
4. RP: Using microscopes
5. Types of microscope
6. Mitosis and the cell cycle
7. Stem cells
8. Evaluating stem cells
9. Diffusion
10. Surface area and volume ratio
11. Diffusion in action
12. Osmosis
13. Osmosis in action
14. RP: Osmosis investigation
15. Active transport

Topic 2 – Organisation

1. Tissues, organs and systems
2. Plant cells, tissues and organs
3. Enzymes
4. RP: pH and enzymes
5. RP: pH and enzymes
6. Digestion
7. RP: Testing food groups

Chemistry – 51 lessons

Topic 1 - Atomic structure and the periodic table

1. Atoms, elements, compounds and mixtures
2. Word equations, formulas and symbol equations
3. Balancing equations
4. Separation techniques – Distillation and Filtration
5. Separation techniques – Crystallisation and Chromatography, including RP
6. Changing Atomic Theories
7. Protons, Neutrons and Electrons
8. Electron configuration
9. Isotopes and relative atomic mass
10. The development of the periodic table
11. Metals and group 1
12. Non-metals, group 7 and group 0.

Topic 2 - Bonding, structure, and the properties of matter

1. Ionic bonding
2. Models and properties of ionic compounds
3. Covalent bonding
4. Mini Quiz
5. Properties of small covalent compounds
6. Diamond, Graphene and Silica
7. Fullerenes and Graphite

Physics – 36 lessons

Topic 1 – Energy

1. Energy stores, transfers and conservation
2. Insulation
3. RP Insulation
4. Energy resources
5. Comparison of energy resources
6. Work done
7. Power and efficiency
8. Gravitational potential energy
9. Kinetic energy

Topic 2 – Electricity

1. Circuit symbols and drawing circuits
2. Calculating current
3. Series and parallel circuits
4. Ohm's Law and Resistance in circuits
5. Light Dependent Resistors and Thermistors
6. RP: investigating non-ohmic conductors
7. Mains electricity and AC & DC and Plugs

8. The lungs 9. The heart 10. Blood vessels and heart rate 11. Blood composition 12. Cardiovascular disease 13. Disease data 14. Non-communicable diseases 15. Cancer 16. Transpiration and translocation 17. Transpiration experiments	8. Metallic Structure 9. Comparing and contrasting types of bonding	10. Electric power and energy 11. National Grid and Transformers
<u>Topic 3 - Infection and response</u> 1. Health 2. Pathogens 3. Bacterial diseases 4. Viral diseases 4a. Covid 19 5. Fungal and protists 6. Our barriers to diseases 7. White blood cells 8. Vaccinations 9. Antibiotics 10. Antibiotic resistance 11. Developing new drugs 12. Data investigation	<u>Topic 3 – Quantitative chemistry</u> 1. Conservation of mass 2. Relative formula mass and mini quiz 3. Moles and amount of substances in an equation (HT only) 4. Using moles to balance an equation (HT only) 5. Limiting reactants (HT only) 6. Concentration	<u>Topic 3 - Particle model of matter</u> 1. Particle model – density and states 2. RP : Calculating density 3. Change of state 4. Latent heat and Heating/cooling curves 5. Specific heat capacity 6. RP : Investigate the specific heat capacity of a given object 7. Comparing specific heat capacity and latent heat (H only) 8. Pressure in gases
<u>Topic 4 – Bioenergetics</u> 1. Photosynthesis 2-3. RP: Photosynthesis 4. Limiting factors (H only) 5. Aerobic respiration 6. Anaerobic respiration 7. Using glucose and nitrogen in plants	<u>Topic 4 - Chemical changes</u> 1. Acids and bases (F) or strong and weak acids and bases (HT) 2. Neutralisation 3. RP: Soluble Salts 4. Reactions of metals 5. Reactivity series and extraction methods 6. Electrolysis of molten compounds 7. Electrolysis of aqueous compounds 8. RP: Electrolysis	<u>Topic 4 -Atomic structure</u> 1. Atomic recap 2. Changing atomic theories 3. Atoms, electrons and energy levels 4. Introduction to radioactive decay 5. Alpha, beta and gamma 6. Half-life (2 lessons if time for extra practice) 7. Irradiation and contamination
	<u>Topic 5 - Energy changes</u> 1. Exothermic and endothermic reactions 2. RP Temperature Changes 3. Reaction profiles 4. Bond energies (HT)	
<u>Core practical's</u> 1. Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate, using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution.	<u>Core practical's</u> 1. Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included. 2. Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant	<u>Core practical's</u> 1. An investigation to determine the specific heat capacity of one or more materials. The investigation will involve linking the decrease of one energy store (or work done) to the increase in temperature and subsequent increase in thermal

2. Investigate what happens when aqueous solutions are electrolysed using inert electrodes. 3. Investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals.	tissue 3. Use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein. 4. Investigate the effect of pH on the rate of reaction of amylase enzyme Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.	energy stored. 2. Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. This should include: • the length of a wire at constant temperature • combinations of resistors in series and parallel. 3. Use circuit diagrams to construct appropriate circuits to investigate the I–V characteristics of variety of circuit elements including a filament lamp, a diode and a resistor at constant temperature. Use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids. Volume should be determined from the dimensions of regularly shaped objects and by a displacement technique for irregularly shaped objects. Dimensions to be measured using appropriate apparatus such as a ruler, micrometer or Vernier callipers.

Paper 2 – Combined Science

Biology – 47 lessons	**Chemistry – 35 lessons**	**Physics – 27 lessons**
Topic 5 - Homeostasis and response 1. Homeostasis 2. The nervous system 3. Synapses 4. RP Investigating human reaction time 5. The endocrine system 6. Controlling blood glucose 7. Hormones and the menstrual cycle 8. IVF (H only) 9. Contraception 10. Negative feedback loops (H only) 11. Comparing nervous and hormonal responses	Topic 6 - The rate and extent of chemical change 1. Collision theory and measuring the rate of reaction 2. Factors affecting rates of reaction 3. RP: Factors affecting rates of reaction 1 4. RP: Factors affecting rates of reaction 2 5. Rate of reaction graphs 7. Catalyst 9. Reversible reactions and equilibriums (HT)	Topic 5 – Forces 1. Scalar and vector quantities 2. Types of forces (including weight) 3. Centre of mass 4. Resultant force 5. Vector diagrams (HT only) with Resultant force 6. Elastic objects and Hooke's Law 7. Work done 8. RP : Relationship between force and spring 9. Speed, distance, displacement, velocity 10. Circular motion (H only) 11. Distance time graphs 12. Acceleration and velocity-time graphs 13. Falling objects and terminal velocity 14. Newton's First and Second Law (with Inertia) 15. Newton's Third Law 16. Stopping and braking distance 17. Momentum calculations

Topic 6 – Inheritance, variation and evolution 1. Introduction to DNA 2. Structure of DNA 3. Mutations 4. Sexual reproduction 5. The cell cycle 6. Asexual reproduction 7. Comparing sexual and asexual reproduction 8. Inheritance 9. Family trees 10. Genetic diseases and sex determination 11. Variation 12. Natural selection and evolution 13. Genetic engineering modification 14. Selective breeding 15. Stem cells 16. Evaluating stem cells 17. Fossils 18. Speciation 19. Antibiotic resistant bacteria 20. Classification 21. Inheritance summary essay	Topic 7 – Organic chemistry 1. Crude Oil 2. Fractional Distillation 3. Alkanes and alkenes 4. Cracking 5. Combustion	Topic 6 – Waves 1. Introduction to waves 2. Wave equations 3. RP ; Measure the speed of a wave using a ripple tank and string 4. EM spectrum with dangers and uses 5. RP : IR radiation 6. Refraction
Topic 7 – Ecology 1. Competition (Need lesson) 2. Abiotic and biotic factors (Need lesson) 3. Adaptations (Need lesson) 4. Food chains (Need lesson) 5. RP Quadrats 6. Using transects (Need lesson) 7. Water cycle 8. Carbon cycle 9. Biodiversity & Human impact 10. Reducing Human impact 11. Global warming 12. Deforestation and land use 13. Pyramids of Biomass & tropic levels 14. Biomass transfer 15. Biotechnology	Topic 8 – Chemical analysis 1. Pure substances and formulations 2. RP Paper chromatography 3. Gas tests	Topic 7 – Magnetism and electromagnetism 1. Magnets and magnetic fields 2. Electromagnets 3. Motor effect 4. F = BIL (H only)
	Topic 9 – Chemistry of the atmosphere 1. The Early Earth's Atmosphere 2. Development of the atmosphere 3. Greenhouse gases, human impact and carbon footprint	

	4. Global climate change and atmospheric pollutants	
	Topic 10 – Using resources 1. Uses of metals and their alloys 2. Potable Water and waste water 3. Sewage and RP Analysing water samples 4. Phytomining and bioleaching 5. Sustainable development and reduce, Reuse, Recycle 6. Life-cycle assessment	
Core practical's 7. Plan and carry out an investigation into the effect of a factor on human reaction time 8. Measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species.	Core practical's 5. Investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity. 6. Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate Rf values. 7. Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.	Core practical's 6. Investigate the relationship between force and extension for a spring. 7. Investigate the effect of varying the force on the acceleration of an object of constant mass and the effect of varying the mass of an object on the acceleration produced by a constant force. 8. Make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements. 9. Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.

Triple Science GCSE

Biology	Testing Week	Chemistry	Testing Week	Physics	Testing Week
Cell Biology		Atomic Structure and periodic table		Energy	
Organisation		Bonding, structure and properties		Electricity	
Infection and response		Quantitative Chemistry		Particle model of matter	
Bioenergetics		Chemical Changes		Atomic structure	

		Energy Changes			
Homeostasis and response		The rate and extent of chemical change		Forces	
Inheritance, variation and evolution		Organic chemistry		Waves	
Ecology		Chemical analysis		Magnetism and electromagnetism	
		Chemistry of the atmosphere		Space	
		Using resources			

Paper 1 – Triple Science

Biology – 65 lessons

Topic 1 - Cell biology

1. Types of cell
2. Specialised cells
3. Introducing microscopes
4. RP: Using microscopes
5. Types of microscope
6. Mitosis and the cell cycle
7. Multiplying bacteria (T only)
8. Culturing microorganisms (T only)
9. RP: Investigating antiseptics and writing methods
10. RP: Analysing antiseptics practical
11. Mini quiz
12. Stem cells
13. Evaluating stem cells
14. Diffusion
15. Surface area and volume ratio
16. Diffusion in action
17. Osmosis
18. Osmosis in action
19. RP: Osmosis investigation
20. Active transport

Topic 2 – Organisation

1. Tissues, organs and systems
2. Plant cells, tissues and organs
3. Enzymes
4. RP: pH and enzymes

Chemistry – 60 lessons

Topic 1 - Atomic structure and the periodic table

1. Atoms and elements
2. Compounds and formulae
3. Word and symbol equations
4. Balancing equations
5. Separation techniques
6. RP: Chromatography
7. Changing Atomic Theories
8. Protons, Neutrons and Electrons
9. Electron configuration
10. Isotopes and relative atomic mass
11. The periodic table
12. The modern periodic table
13. Metals and non-metals
14. Alkali metals (Group 1)
15. Halogens (Group 7)
16. Noble Gases (Group 0)

Topic 2 - Bonding, structure, and the properties of matter

1. Ionic bonding part 1
2. Ionic bonding part 2
3. Properties of ionic bonding
4. Covalent bonding
5. Properties of covalent structures

Physics – 38 lessons

Topic 1 – Energy

10. Energy stores, transfers and conservation
11. Insulation
12. RP Insulation
13. Energy resources
14. Comparison of energy resources
15. Work done
16. Power and efficiency
17. Gravitational potential energy
18. Kinetic energy

Topic 2 – Electricity

8. Circuit symbols and drawing circuits
9. Calculating current
10. Series and parallel circuits
11. Ohm's Law and Resistance in circuits
12. Light Dependent Resistors and Thermistors

5. RP: pH and enzymes 6. Digestion 7. RP: Testing food groups 8. The lungs 9. The heart 10. Blood vessels and heart rate 11. Blood composition 12. Cardiovascular disease 13. Disease data 1 14. Disease data 2 15. Non-communicable diseases 16. Cancer 17. Transpiration and translocation 18. Transpiration experiments	6. Giant covalent structures 7. Graphene and fullerenes 8. Metallic Bonding 9. Changing states of matter 10. Comparing and contrasting types of bonding 11. Nanoparticles (T only)	13. RP: investigating non-ohmic conductors 14. Mains electricity and AC & DC and Plugs 12. Electric power and energy 13. Equations practice 14. National Grid and Transformers 15. Electric fields and static electricity
Topic 3 - Infection and response 1. Health 2. Pathogens 3. Bacterial diseases 4. Viral diseases 4a. Covid 19 5. Fungal and protists 6. Our barriers to diseases 7. White blood cells 8. Vaccinations 9. Antibiotics 10. Antibiotic resistance 11. Developing new drugs 12. Monoclonal antibodies (T only) 13. Data 1 14. Data 2 15. Data 3 16. Plant disease (Triple only	Topic 3 – Quantitative chemistry 1. Relative Formula Mass 2. Introducing moles 3. Word equations and conservation of mass (Higher only) 4. Reacting masses 5. Balancing equations using moles (Higher only) 6. Limiting reactants (T only) 7. Calculating volume of a gas (triple only) 8. Introduction to concentration 9. Atom economy (T only) 10. Percentage yield (T only) 11. All calculations for Chemistry	Topic 3 - Particle model of matter 9. Particle model – density and states 10. RP : Calculating density 11. Change of state 12. Latent heat and Heating/cooling curves 13. Specific heat capacity 14. RP : Investigate the specific heat capacity of a given object 15. Comparing specific heat capacity and latent heat 16. Gas pressure
Topic 4 – Bioenergetics 9. Photosynthesis 2-3. RP: Photosynthesis 4. Limiting factors (H only) 5. Aerobic respiration 6. Anaerobic respiration 7. Using glucose and nitrogen in plants	Topic 4 - Chemical changes 1. Acids and bases 2. Acids - weak and strong (H only) 3. Neutralisation 4. RP: Soluble Salts 5. RP: Titrations part 1 (T only) 6. RP Titrations part 2 (T only) 7. Metals and oxygen 8. Metals and acid 9. Metals and water 10. Redox reactions (T only) 11. Reactivity series and extraction methods	Topic 4 -Atomic structure 8. Atomic recap 9. Changing atomic theories 10. Atoms, electrons and energy levels 11. Introduction to radioactive decay 12. Alpha, beta and gamma 13. Half-life (2 lessons if time for extra practice) 14. Irradiation and contamination 15. Radiation in medicine 16. Background radiation and evaluating hazards 17. Nuclear Fission and Fusion

	12. Electrolysis of molten compounds 13. Electrolysis of aqueous compounds 14. RP: Electrolysis	
	Topic 5 - Energy changes 1. Exothermic and endothermic reactions 2. RP Temperature Changes 3. Reaction profiles 4. Bond energies 5. Chemical cells and voltage (T only) 6. Rechargeable and non-rechargeable batteries (T only) 7. Fuel Cells (T only) 8. Half equations for fuel cells (T only)	
Core practical's 1. Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included. 2. Investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition.(Biology only) 3. Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue 4. Use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein. 5. Investigate the effect of pH on the rate of reaction of amylase enzyme 6. Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.	Core practical's 1. Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate, using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution. 2. Determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration. (HT only) determination of the concentration of one of the solutions in mol/dm3 and g/dm3 from the reacting volumes and the known concentration of the other solution(Chemistry only) 3. Investigate what happens when aqueous solutions are electrolysed using inert electrodes. 4. Investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals.	Core practical's 1. An investigation to determine the specific heat capacity of one or more materials. The investigation will involve linking the decrease of one energy store (or work done) to the increase in temperature and subsequent increase in thermal energy stored. 2. Investigate the effectiveness of different materials as thermal insulators and the factors that may affect the thermal insulation properties of a material.(Physics only) 3. Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. This should include: • the length of a wire at constant temperature • combinations of resistors in series and parallel. 4. Use circuit diagrams to construct appropriate circuits to investigate the I–V characteristics of variety of circuit elements including a filament lamp, a diode and a resistor at constant temperature. 5. Use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids. Volume should be determined from the dimensions of regularly shaped objects and by a displacement technique for irregularly shaped objects. Dimensions to be measured using appropriate apparatus such as a ruler, micrometer or Vernier callipers.

Paper 2 – Triple Science

Biology – 66 lessons

Topic 5 - Homeostasis and response

1. Homeostasis
2. The nervous system
3. Synapses
4. RP Investigating human reaction time
5. Parts of the brain (T only)
6. Brain surgery (T only)
7. The eye (T only)
8. Myopia and hyperopia (only)
9. Thermoregulation (T only)
10. The endocrine system
11. Controlling blood glucose
12. Controlling water (T only)
13. Hormones and the menstrual cycle
14. IVF (H only)
15. Contraception
16. Negative feedback loops (H only)
17. Comparing nervous and hormonal responses
18. Tropisms (T only)
19. Uses of plant hormones (T only)
20. RP Germination (T only)
21. RP Germination part 2 (T only)

Topic 6 – Inheritance, variation and evolution

1. Introduction to DNA
2. Structure of DNA
3. Protein synthesis (T only)
4. Mutations
5. Sexual reproduction
6. The cell cycle
7. Asexual reproduction
8. Comparing sexual and asexual reproduction
9. Examples of unusual reproduction (T only)
10. Inheritance
11. Family trees
12. Genetic diseases and sex determination
13. Mendel (T only)
14. Variation
15. Natural selection and evolution
16. Genetic engineering modification
17. Selective breeding
18. Cloning (T only)

Chemistry – 53 lessons

Topic 6 - The rate and extent of chemical change

1. Measuring the rate of reaction
2. Factors affecting rates of reaction
3. Drawing rates of reaction graphs

4-6. RP: Factors affecting rates of reaction

7. Catalysts
8. Le Chateliers Principle (T only)
9. Reversible reactions

Topic 7 – Organic chemistry

1. Crude Oil
2. Fractional Distillation and the fractions
3. Cracking 1
4. Alkanes and alkenes
5. Properties of alkanes and alkenes
6. Combustion
7. Alkene reactions (T only)
8. Alcohols (T only)
9. Making alcohols by fermentation (T only)
10. Carboxylic acids (T only)
11. Addition polymerisation (T only)
12. Condensation polymerisation (T only)
13. Amino acids (T only)

Physics – 43 lessons

Topic 5 – Forces

18. Scalar and vector quantities
19. Types of forces (including weight)
20. Centre of mass
21. Vector diagrams with Resultant force
22. Elastic objects and Hooke's Law
23. Work done
24. RP : Relationship between force and spring
25. Pressure in liquids and hydraulics
26. Levers and gears
27. Pressure at different depths
28. Speed, distance, displacement, velocity
29. Circular motion (H only)
30. Distance time graphs
31. Acceleration and velocity-time graphs
32. Falling objects and terminal velocity
33. Newton's First and Second Law (with Inertia)
34. Newton's Third Law
35. Stopping and braking distance
36. Momentum calculations
37. Momentum and safety (Newton's second and momentum)

Topic 6 – Waves

7. Introduction to waves
8. Wave equations
9. RP ; Measure the speed of a wave using a ripple tank and string
10. EM spectrum with dangers and uses
11. Use of sound and radio waves
12. RP : IR radiation
13. Refraction and reflection
14. RP Refraction and reflection
15. Concave and convex lenses with Ray diagrams
16. Magnification and Colour

19. Stem cells 20. Evaluating stem cells 21. Fossils 22. Speciation 23. Antibiotic resistant bacteria 24. Classification 25. Inheritance summary essay		
Topic 7 – Ecology 1. Competition 2. Abiotic and biotic factors 3. Adaptations 4. Food chains 5. RP Quadrats 6. Using transects 7. Water cycle 8. Carbon cycle 9. Decay (T only) 10. RP Decay – part 1 11. RP Decay – part 2 12. Biodiversity & Human impact 13. Reducing Human impact 14. Biogas generators (Triple only) 15. Global warming 16. Deforestation and land use 17. Pyramids of Biomass & tropic levels 18. Biomass transfer 19. Food security (T ONLY) 20. Biotechnology	Topic 8 – Chemical analysis 1. RP Paper chromatography 2. Gas tests 3. Testing for ions (T only) 4. RP Testing for ions (T only)	Topic 7 – Magnetism and electromagnetism 5. Magnets and magnetic fields 6. Electromagnets and uses 7. Motor effect 8. F = BIL (H only) 9. Application of motor effect 10. Transformers 11. Generators
	Topic 9 – Chemistry of the atmosphere 1. The Early Earth's Atmosphere 2. Theories of the atmosphere 3. The Greenhouse Effect 4. Evidence for the greenhouse effect 5. Effects of global warming 6. The Harmful Effects of Combustion 7. Resources used by Humans	Topic 8 – Space (T only) 1. The solar system 2. Life cycle of a star 3. Orbits 4. Red shift and expanding Universe 5. The Big Bang theory 6. Dark mass and dark energy
	Topic 10 – Using resources 1. Ceramics and polymers (T only) 2. Uses of metals 3. Corrosion (T only) 4. Corrosion prevention (T only) 5. Transition metals (T only) 6. Typical properties (T only) 7. Alloys 8. Properties and uses of alloys (T only)	

	9. Potable Water 10. Waste and sewage 11. Evaluating potable water methods 12. RP Analysing water samples 13. Phytomining and bioleaching 14. Life Cycle Assessment 15. Reduce, Reuse, Recycle 16. Important materials 17. Thermosetting and thermos-softening polymers (T only) 18. The Haber process 1 (T only) 19. The Haber process 2 (T only) 20. NPK Fertilisers	
Core practical's 7. Plan and carry out an investigation into the effect of a factor on human reaction time. 8. Investigate the effect of light or gravity on the growth of newly germinated seedlings. Record results both as length measurements and as accurate, labelled biological drawings to show the effects.(Biology only) 9. Measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species. 10. Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.(Biology only)	Core practical's 5. Investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity. 6. Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate Rf values. 7. Use of chemical tests to identify the ions in unknown single ionic compounds covering the ions from sections Flame tests through to Sulfates. (Chemistry only) 8. Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.	Core practical's 6. Investigate the relationship between force and extension for a spring. 7. Investigate the effect of varying the force on the acceleration of an object of constant mass and the effect of varying the mass of an object on the acceleration produced by a constant force. 8. Make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements. 9. Investigate the reflection of light by different types of surface and the refraction of light by different substances. (Physics only) 10. Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.

Support Science GCSE

Biology	Testing Week	Chemistry	Testing Week	Physics	Testing Week

Cell Biology		Atomic Structure and periodic table		Energy	
Organisation		Bonding, structure and properties		Electricity	
Infection and response		Quantitative Chemistry		Particle model of matter	
Bioenergetics		Chemical Changes		Atomic structure	
		Energy Changes			
Homeostasis and response		The rate and extent of chemical change		Forces	
Inheritance, variation and evolution		Organic chemistry		Waves	
Ecology		Chemical analysis		Magnetism and electromagnetism	
		Chemistry of the atmosphere			
		Using resources			

Paper 1 – Support Science

Biology – 38 lessons

Topic 1 - Cell biology

1. Types of cell
2. Specialised cells
3. Introducing microscopes
4. RP: Using microscopes
5. Types of microscope
6. Diffusion
7. Diffusion in action
8. Osmosis
9. Osmosis in action
10. RP: Osmosis investigation

Chemistry – 39 lessons

Topic 1 - Atomic structure and the periodic table

1. Atoms and elements
2. Compounds and formulae
3. Word and symbol equations
4. Balancing equations
5. Separation techniques
6. RP: Chromatography
7. Changing Atomic Theories
8. Protons, Neutrons and Electrons
9. Electron configuration
10. Isotopes and relative atomic mass
11. The periodic table
12. The modern periodic table
13. Metals and non-metals
14. Alkali metals (Group 1)
15. Halogens (Group 7)
16. Noble Gases (Group 0)

Physics – 40 lessons

Topic 1 – Energy

1. Types of energy and energy transfers
2. Insulation
3. Non-renewable resources
4. Renewable resources
5. Comparison of energy resources
6. Work done
7. Power
8. Efficiency calculations
9. Gravitational potential energy
10. Kinetic energy

Topic 2 – Organisation 1. Tissues, organs and systems 2. Plant cells, tissues and organs 3. Enzymes 4. RP: pH and enzymes 5. Digestion 6. RP: Testing food groups 7. The lungs 8. The heart 9. Blood vessels and heart rate 10. Blood composition 11. Cardiovascular disease 12. Non-communicable diseases 13. Cancer 14. Transpiration and translocation 15. Transpiration experiments	Topic 2 - Bonding, structure, and the properties of matter 1. Ionic bonding part 1 2. Properties of ionic bonding 3. Covalent bonding 4. Properties of covalent structures 5. Giant covalent structures 6. Metallic Bonding 7. Changing states of matter	Topic 2 – Electricity 1. Electrical circuits Introduction 2. Calculating current 3. Current in circuits 4. Series and parallel circuits 5. Resistance in circuits 6. RP: Factors affecting resistance 7. Light Dependent Resistors 8. Thermistors 10-11 RP: investigating non-ohmic conductors 11. Mini Quiz 12. Mains electricity and AC & DC 13. Plugs 14. Power calculations 15. Work done calculations 16. National Grid and Transformers
Topic 3 - Infection and response 1. Health 2. Pathogens 3. Bacterial diseases 4. Viral diseases 5. Our barriers to diseases 6. White blood cells 7. Vaccinations 8. Antibiotics 9. Developing new drugs	Topic 3 – Quantitative chemistry 1. Relative Formula Mass 2. Introducing moles 3. Reacting masses 4. Introduction to concentration 5. Percentage yield	Topic 3 - Particle model of matter 1. Particle model – density and states 2. RP : Calculating density 3. Change of state 4. Latent heat 5. Heating and cooling graphs 6. Specific heat capacity 7. RP : Investigate the specific heat capacity of a given object
Topic 4 – Bioenergetics 1. Photosynthesis 2. RP: Photosynthesis 3. Aerobic respiration 4. Anaerobic respiration	Topic 4 - Chemical changes 1. Acids and bases 2. Neutralisation 3. RP: Soluble Salts 4. Metals and oxygen 5. Metals and acid 6. Metals and water 7. Reactivity series and extraction methods 8. RP: Electrolysis part 1 9. RP: Electrolysis part 2	Topic 4 -Atomic structure 1. Atomic recap 2. Changing atomic theories 3. Introduction to radioactive decay 4. Alpha, beta and gamma – part 1 5. Alpha, beta and gamma – part 2 6. Half life 7. Irradiation and contamination
	Topic 5 - Energy changes 1. Exothermic and endothermic reactions 2. RP Temperature Changes	
Core practical's 4. Preparation of a pure, dry sample of a soluble salt	Core practical's 5. Use a light microscope to observe, draw and label	Core practical's 8. An investigation to determine the specific heat

from an insoluble oxide or carbonate, using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution. 5. Investigate what happens when aqueous solutions are electrolysed using inert electrodes. 6. Investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals.	a selection of plant and animal cells. A magnification scale must be included. 6. Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue 7. Use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein. 8. Investigate the effect of pH on the rate of reaction of amylase enzyme Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.	capacity of one or more materials. The investigation will involve linking the decrease of one energy store (or work done) to the increase in temperature and subsequent increase in thermal energy stored. 9. Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. This should include: • the length of a wire at constant temperature • combinations of resistors in series and parallel. 10. Use circuit diagrams to construct appropriate circuits to investigate the I–V characteristics of variety of circuit elements including a filament lamp, a diode and a resistor at constant temperature. Use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids. Volume should be determined from the dimensions of regularly shaped objects and by a displacement technique for irregularly shaped objects. Dimensions to be measured using appropriate apparatus such as a ruler, micrometer or Vernier callipers.

Paper 2 – Support Science

Biology – 27 lessons	Chemistry – 28 lessons	Physics – 28 lessons
<u>Topic 5 - Homeostasis and response</u> 1. Homeostasis 2. The nervous system 3. RP Investigating human reaction time 4. The endocrine system 5. Controlling blood glucose 6. Hormones and the menstrual cycle 7. Contraception	<u>Topic 6 - The rate and extent of chemical change</u> 1. Measuring the rate of reaction 2. Factors affecting rates of reaction 3. Drawing rates of reaction graphs 4-6. RP: Factors affecting rates of reaction 7. Catalyst	<u>Topic 5 – Forces</u> 1. Scalar and vector quantities 2. Types of forces 3. Centre of mass 4. Weight 5. Resultant force 6. Elastic objects and Hooke's Law 7. Work done 8. RP : Relationship between force and spring 9. Speed, distance, displacement, velocity 10. Distance time graphs 11. Acceleration 12. Velocity time graphs 13. Mini quiz 14. Falling objects 15. Newton's First Law 16. Newton's Second Law

		17. RP : Investigating Newton's Second Law 18. Newton's Third Law 19. Stopping distance 20. Breaking distance
Topic 6 – Inheritance, variation and evolution 1. Introduction to DNA 2. Asexual reproduction 3. Comparing sexual and asexual reproduction 4. Inheritance 5. Variation 6. Natural selection 7. Evolution 8. Selective breeding 9. Fossils 10. Classification	Topic 7 – Organic chemistry 1. Crude Oil 2. Fractional Distillation and the fractions 3. Cracking 4. Alkanes and alkenes 5. Properties of alkanes and alkenes 6. Combustion	Topic 6 – Waves 1. Introduction to waves 2. Wave equations 3. Measuring speed of sound 4. RP ; Measure the speed of a wave using a ripple tank and speed 5. EM spectrum 6. RP : IR radiation
Topic 7 – Ecology 1. Competition 2. Abiotic and biotic factors 3. Adaptations 4. Food chains 5. RP Quadrats 6. Water cycle 7. Carbon cycle 8. Biodiversity & Human impact 9. Global warming 10. Deforestation and land use	Topic 8 – Chemical analysis 1. RP Paper chromatography	Topic 7 – Magnetism and electromagnetism 1. Magnets 2. Electromagnets
	Topic 9 – Chemistry of the atmosphere 1. The Early Earth's Atmosphere 2. Theories of the atmosphere 3. The Greenhouse Effect 4. Effects of global warming 5. The Harmful Effects of Combustion 6. Resources used by Humans	
	Topic 10 – Using resources 1. Uses of metals 2. Alloys 3. Potable Water 4. Waste and sewage 5. RP Analysing water samples 6. Life Cycle Assessment	

	7. Reduce, Reuse, Recycle 8. Important materials	
Core practical's 9. Plan and carry out an investigation into the effect of a factor on human reaction time 10. Measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species.	Core practical's 8. Investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity. 9. Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate Rf values. 10. Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.	Core practical's 10. Investigate the relationship between force and extension for a spring. 11. Investigate the effect of varying the force on the acceleration of an object of constant mass and the effect of varying the mass of an object on the acceleration produced by a constant force. 12. Make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements. 13. Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.

Unit Award Scheme – Paper 1

Biology – 37 lessons	**Chemistry – 34 lessons**	**Physics – 35 lessons**
Topic 1 - Cell biology 1. Types of cell 2. Specialised cells 3. Stem Cells 4. Mitosis 5. Introducing microscopes 6. RP: Using microscopes 7. Diffusion 8. Osmosis 9. RP: Osmosis investigation 10. Active Transport	Topic 1 - Atomic structure and the periodic table 1. Atoms and elements 2. Compounds and formulae 3. Word and symbol equations 4. Balancing equations 5. Separation techniques 6. RP: Chromatography 7. Changing Atomic Theories 8. Protons, Neutrons and Electrons 9. Electron configuration 10. Isotopes and Ions 11. The periodic table 12. The modern periodic table 13. Metals and non-metals 14. Alkali metals (Group 1)	Topic 1 – Energy 1. Types of energy and energy transfers 2. Insulation 3. Non-renewable resources 4. Renewable resources 5. Comparison of energy resources 6. Work done 7. Power 8. Efficiency calculations 9. Gravitational potential energy 10. Kinetic energy

	15. Halogens (Group 7) 16. Noble Gases (Group 0)	
Topic 2 – Organisation 1. Tissues, organs and systems 2. Enzymes 3. RP: pH and enzymes 4. Digestion 5. RP: Testing food groups 6. The lungs 7. The heart 8. Blood vessels. heart rate and Blood composition 9. Cardiovascular disease 10. Non-communicable diseases - Smoking 11. Cancer 12. Transpiration and translocation 13. Transpiration experiments	Topic 2 - Bonding, structure, and the properties of matter 1. Ionic bonding 2. Properties of ionic bonding 3. Covalent bonding 4. Properties of covalent structures 5. Giant covalent structures 6. Metallic Bonding 7. Changing states of matter	Topic 2 – Electricity 1. Electrical circuits Introduction 2. Calculating current 3. Current in circuits 4. Series and parallel circuits 5. Resistance in circuits 6. RP: Factors affecting resistance 7. RP: investigating non-ohmic conductors 8. Mains electricity and AC & DC 9. Plugs 10. Power calculations 11. Work done calculations 12. National Grid and Transformers
Topic 3 - Infection and response 1. Health 2. Pathogens 3. Bacteria and viruses 4. Covid 5. Our barriers to diseases 6. Medicines 7. White blood cells 8. Vaccinations 9. Antibiotics	Topic 3 – Quantitative chemistry 1. Relative Formula Mass 2. Reacting masses 3. Introduction to concentration	Topic 3 - Particle model of matter 1. Particle model – density and states 2. RP : Calculating density 3. Change of state 4. Latent heat 5. Heating and cooling graphs 6. Specific heat capacity 7. RP : Investigate the specific heat capacity of a given object
Topic 4 – Bioenergetics 1. Photosynthesis 2. RP: Photosynthesis 3. Minerals for healthy growth in plants 4. Aerobic respiration 5. Prac: Respiration	Topic 4 - Chemical changes 1. Acids and bases 2. Neutralisation 3. RP: Soluble Salts 4. Metals and oxygen 5. Metals and acid 6. Metals and water	Topic 4 -Atomic structure 1. Atomic recap 2. Changing atomic theories 3. Introduction to radioactive decay 4. Alpha, beta and gamma 5. Half life 6. Irradiation and contamination
	Topic 5 - Energy changes 1. Exothermic and endothermic reactions 2. RP Temperature Changes	

Unit Award Scheme – Paper 2

Biology – lessons	**Chemistry – lessons**	**Physics – lessons**
Topic 5 - Homeostasis and response	Topic 6 - The rate and extent of chemical change	Topic 5 – Forces

1. Homeostasis 2. The nervous system 3. RP Investigating human reaction time 4. The endocrine system 5. Controlling blood glucose 6. Hormones and the menstrual cycle 7. Contraception	1. Measuring the rate of reaction 2. Factors affecting rates of reaction 3. Drawing rates of reaction graphs 4-6. RP: Factors affecting rates of reaction 7. Catalyst	1. Scalar and vector quantities 2. Types of forces 3. Centre of mass 4. Weight 5. Resultant force 6. Elastic objects and Hooke's Law 7. Work done 8. RP : Relationship between force and spring 9. Speed, distance, displacement, velocity 10. Distance time graphs 11. Acceleration 12. Velocity time graphs 13. Mini quiz 14. Falling objects 15. Newton's First Law 16. Newton's Second Law 17. RP : Investigating Newton's Second Law 18. Newton's Third Law 19. Stopping distance 20. Breaking distance
<u>Topic 6 – Inheritance, variation and evolution</u> 1. Introduction to DNA 2. Asexual reproduction 3. Comparing sexual and asexual reproduction 4. Inheritance 5. Variation 6. Natural selection 7. Evolution 8. Selective breeding 9. Fossils 10. Classification	<u>Topic 7 – Organic chemistry</u> 1. Crude Oil 2. Fractional Distillation and the fractions 3. Cracking 4. Alkanes and alkenes 5. Properties of alkanes and alkenes 6. Combustion	<u>Topic 6 – Waves</u> 1. Introduction to waves 2. Wave equations 3. Measuring speed of sound 4. RP ; Measure the speed of a wave using a ripple tank and speed 5. EM spectrum 6. RP : IR radiation
<u>Topic 7 – Ecology</u> 1. Competition 2. Abiotic and biotic factors 3. Adaptations 4. Food chains 5. RP Quadrats 6. Water cycle 7. Carbon cycle 8. Biodiversity & Human impact 9. Global warming 10. Deforestation and land use	<u>Topic 8 – Chemical analysis</u> 1. RP Paper chromatography	<u>Topic 7 – Magnetism and electromagnetism</u> 1. Magnets 2. Electromagnets
	<u>Topic 9 – Chemistry of the atmosphere</u>	

	1. The Early Earth's Atmosphere 2. Theories of the atmosphere 3. The Greenhouse Effect 4. Effects of global warming 5. The Harmful Effects of Combustion 6. Resources used by Humans	
	<u>Topic 10 – Using resources</u> 1. Uses of metals 2. Alloys 3. Potable Water 4. Waste and sewage 5. RP Analysing water samples 6. Life Cycle Assessment 7. Reduce, Reuse, Recycle 8. Important materials	