

## Reddish Vale High School Science Department 5 Year Plan 21/22

Year Group (ctrl + click to access)	<b>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.</b>
Intent, Implementation & Impact	
<a href="#">Assessment Dates</a>	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 be required 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 scheme being followed. For all testing, staff should plan and order these well in advance to allow tests to be printed for use.
<a href="#">Assessment booklets and moderation</a>	Moderation will be carried out in T&L time with staff bringing assessment booklets and resources to share and peer mark. 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 in yellow will be printed by staff as and when needed for Higher and separate science groups.
<a href="#">Homework</a>	Homework plan to follow, minimum required will be provided by the department every two weeks, however staff are encouraged to add homework where appropriate.
<a href="#">Year 7</a> <a href="#">Year 8</a>	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.
<a href="#">Year 9</a>	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.
<a href="#">Combined Science Paper 1</a>	

<a href="#"><u>Combined Science Paper 2</u></a>	<p>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.</p> <p>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)</p> <p>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.</p> <p>Assessments will take place at the end of each topic.</p>
<a href="#"><u>Triple Science Paper 1</u></a>	<p>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.</p>
<a href="#"><u>Triple Science Paper 2</u></a>	<p>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.</p> <p>Assessments will take place at the end of each topic.</p>
<a href="#"><u>Support GCSE Paper 1</u></a>	<p>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.</p>
<a href="#"><u>Support GCSE Paper 2</u></a>	<p>Assessments will take place at the end of each topic.</p>
<a href="#"><u>Entry Level Certificate/UAS</u></a>	<p>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.</p> <p>All work prior to transition to UAS follows the planned ELC pathway and ensures effective T&amp;L, much of the work can also be submitted for UAS certificates retrospectively.</p>

## **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 less often 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 now 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.

Change of exam board has altered the language requirements for the GCSE exams to allow students better access to questions and therefore a higher ability to achieve.

Student voice will form a key part of analysis of impact within the new curriculum

### Term Timeframe for lessons

Half Term	Number of weeks per half term	Number of lessons available per KS3 class	Number of lessons available per Y9/GCSE subject (eg Bio)
1	7	21	11
2	7.5	21	11
3	5	15	8
4	6	18	9
5	6	18	9
6	7	21	11
Total per year		114	59

Functional Skills:	
Literacy	Numeracy
<p><b>KS3</b> – 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.</p> <p><b>KS4</b> – 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.</p> <p>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.</p>	<p>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.</p> <p>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.</p>

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

Social	Moral	Spiritual	Cultural	Personal development & wellbeing
<p>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.</p>	<p>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.</p>	<p>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.</p>	<p>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.</p>	<p>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.</p>

**Careers / Gatsby benchmark links**

Links to careers / jobs	Careers talk (possible contacts)	Career & labour market information	Workplace visit	Encounters with further / higher education
<p>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</p>	<p>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.</p>	<p>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</p>	<p>Visits to Jodrell Bank, Manchester University for rewards and challenge trips. These allow students to see the direct application of science into workplaces.</p>	<p>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.</p>

and the possible STEM skills that make a person more 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.	We are currently looking to include skilled trades, specifically focusing on 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.	the local area and are very strongly linked to STEM.	STEM visits allow students to interact with people who have STEM linked jobs and to ask questions.	College visits for challenges throughout the year, such as Faraday challenge.
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### Assessment Dates

<b>KS3</b>	<b>Test topics</b>	<b>Date to be completed</b>
Baseline testing of year 7 and 8	Background knowledge testing for all students to identify areas of weakness to allow staff to target those areas.	w/c 13 <sup>th</sup> September
Term 1		Wednesday 22 <sup>nd</sup> December
Term 2		Friday 1 <sup>st</sup> April
Term 3		Thursday 21 <sup>st</sup> July
End of year exam	Covers all topics from the year	

<b>Year 9</b>	<b>Test topics</b>	<b>Date to be completed</b>
Topic 1	Bio – Cell Biology Chemistry – Chemistry Fundamentals Physics – Energy and Waves	Completion, testing and feedback by end of HT2
Topic 2	Biology – Disease Chemistry – Investigative Chemistry Physics – Forces, speed and moments	Completion, testing and feedback by HT4
Revision	All concepts from topic 1 and 2	June 2021
End of year exam	Exam covering multiple aspects from the year in a mixed assessment paper	

### 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			

### 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			

### 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			

## 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; year 10 and 11 also receive pre-test booklets in blue. All teachers must complete all assessments and place scores onto the assessment tracker in the data folder of science; timings will be provided for completion of the End of topic test, however there will not be any timings given for the 'yellow sheet' assessment pieces as these can be delivered at any point in the teaching of the topic when the teacher feels it is appropriate.

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 show 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 and setting questions to gain further marks. Students will then 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, or 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.

Moderation will be carried out during T&L meetings, focusing on how teachers mark questions, understanding the mark scheme and its application. 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.
- KE to bring 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 may choose to set a specific lesson at the end of blue week when they wish the homework to always be completed by or the first lesson of the red week.

Departmental homework will be based on Seneca and GCSE pod, staff will need to ensure they and their classes are signed up to Seneca teaching website. 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
Staff	
Fortnightly Hours	6 HOURS
06/09/2021	<b>Lab Safety (3 lessons)</b>
13/09/2021	Baseline Test
20/09/2021	<b>KS2 SOL (9 lessons)</b>
27/09/2021	
04/10/2021	
11/10/2021	
18/10/2021	<b>Cells (7 lessons + test)</b>
25/10/2021	October Half Term

01/11/2021	<b>Particles &amp; Their Behaviour (6 lessons + test)</b>
08/11/2021	
15/11/2021	
22/11/2021	<b>Forces (5 lessons + test)</b>
29/11/2021	
06/12/2021	<b>Health &amp; Lifestyle (6 lessons + test)</b>
13/12/2021	
20/12/2021	
27/12/2021	Christmas Holidays
03/01/2022	
10/01/2022	<b>Atoms, Elements &amp; Compounds (4 lessons + test)</b>
17/01/2022	
24/01/2022	<b>Energy (7 lessons + test)</b>
31/01/2022	
07/02/2022	
14/02/2022	February Half Term
21/02/2022	Reproduction (6 lessons + test)
28/02/2022	
07/03/2022	
14/03/2022	<b>Types of Reaction (7 lessons + test)</b>
21/03/2022	

28/03/2022	
04/04/2022	<b>Easter Holidays</b>
11/04/2022	
18/04/2022	
25/04/2022	<b>Solar System (4 lessons + test)</b>
02/05/2022	
09/05/2022	<b>Acids &amp; Alkali's (5 lessons + test)</b>
16/05/2022	
23/05/2022	
30/05/2022	May Half Term
06/06/2022	<b>Earth &amp; the Environment (6 lessons + test)</b>
13/06/2022	
20/06/2022	<b>Revision</b>
27/06/2022	
04/07/2022	<b>End of Year Test</b>
11/07/2022	
18/07/2022	
	<b>Project/Practical Skills</b>

Year 7	HT1 – 14 lessons	HT2 – 12 lessons	HT3 – 12 lessons	HT4 – 12 lessons	HT5 – 14 lessons	HT6 – 4 lessons + revision time
	<p><b>Topic1: Lab Safety</b></p> <p>Lab Safety</p> <p>Bunsen Burner</p> <p>Scientific Equipment</p> <p>Writing a Method (EXT)</p> <p><b>Topic: Cells</b></p> <p><b>Animal Cells</b></p> <p>Plant Cells</p> <p>Unicellular Cells</p> <p>Prokaryotic &amp; Eukaryotic Cells (EXT)</p> <p>Movement of Substances Across Cells (Diffusion, Osmosis, Active Transport)</p> <p>Microscopes</p> <p>Microscope Calculations</p> <p>Specialised Cells</p> <p>Stem Cells (EXT0)</p>	<p><b>Topic: Particles &amp; Their Behaviour</b></p> <p>Solids, Liquids &amp; Gases</p> <p>Changes of State</p> <p>Melting Point &amp; Boiling Point (EXT)</p> <p>Expansion &amp; Contraction</p> <p>Diffusion</p> <p>Gas Pressure</p> <p>Density</p> <p><b>Topic: Forces</b></p> <p>Identifying Forces</p> <p>Measuring Forces</p> <p>Balanced &amp; Unbalanced Forces</p> <p>Newton’s Laws (EXT)</p> <p>Hooke’s Law</p> <p>Friction (EXT)</p> <p>Streamlining (EXT)</p> <p>Moments (EXT)</p> <p>Gravity, Mass &amp; Weight</p> <p><b>Topic: Health &amp; Lifestyle</b></p> <p>Food Groups</p> <p>Balanced &amp; Unbalanced Diets</p> <p>Energy in Food</p> <p>Energy in Food Practical (EXT)</p> <p>The Digestive System</p>	<p><b>Topic: Atoms, Elements &amp; Compounds</b></p> <p>Atomic Structure</p> <p>Electron Configuration (EXT)</p> <p>Atoms &amp; Elements</p> <p>Compounds &amp; Mixtures</p> <p>Symbols &amp; Formulae</p> <p><b>Topic: Energy</b></p> <p>Energy Stores</p> <p>Energy Transfers</p> <p>Sankey Diagrams</p> <p>Efficiency</p> <p>Conduction, Convection &amp; Insulation</p> <p>Preventing Heat Loss</p> <p>Renewable &amp; Non-Renewable Energy Resources</p> <p>Nuclear Energy (EXT)</p>	<p><b>Topic: Reproduction</b></p> <p>Male &amp; Female Reproductive Systems (including Gametes)</p> <p>Fertilisation</p> <p>Pregnancy &amp; Birth</p> <p>The Menstrual Cycle</p> <p>Effects of Maternal Lifestyle (EXT)</p> <p>Pollination &amp; Seeds</p> <p>Investigating Seed Dispersal</p> <p><b>Topic: Types of Reaction</b></p> <p>Physical &amp; Chemical Reactions</p> <p>Word &amp; Symbol Equations</p> <p>Combustion</p> <p>Thermal Decomposition</p> <p>Exothermic &amp; Endothermic Reactions</p> <p>Reaction Profiles</p> <p>Gas Tests (EXT)</p> <p>Calculating Rates of Reaction (EXT)</p> <p>Factors Affecting Rates of Reaction (EXT)</p> <p>Catalysts</p> <p>Rates of Reaction – Concentration Practical (EXT)</p>	<p><b>Topic: The Solar System</b></p> <p><b>Solar System</b></p> <p>Day &amp; Night</p> <p>Seasons</p> <p>Galaxies &amp; Universe</p> <p>Light Years (EXT)</p> <p>Topic: Acids &amp; Alkali’s</p> <p>Acids &amp; Alkali’s</p> <p>Indicators (2 lessons)</p> <p>Ionisation of Acids (EXT)</p> <p>Neutralisation</p> <p><b>Topic: Earth &amp; The Environment</b></p> <p>Structure &amp; Composition of the Earth</p> <p>3 Types of Rocks &amp; The Rock Cycle</p> <p>Fossil Fuels (EXT)</p>	<p><b>Topic: Earth &amp; The Environment cont.</b></p> <p>Climate Change</p> <p>The Carbon Cycle</p> <p>Greenhouse Gases</p> <p>Recycling</p> <p><b>Topic: Revision/Investigation Lessons</b></p>

		Digestion Digestive Enzymes Communicable & Non-Communicable Diseases (EXT) Microorganisms (EXT) Pathogens (EXT) Antibiotics (EXT) Human Defences (EXT) Vaccinations (EXT)				
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<b>Year 8</b>	
<b>Staff</b>	6 HOURS
<b>Fortnightly Hours</b>	
06/09/2021	<b>Lab Skills (3 lessons)</b>
13/09/2021	<b>Organisation (7 lessons + test)</b>
20/09/2021	
27/09/2021	
04/10/2021	<b>The Periodic Table (8 lessons + test)</b>
11/10/2021	
18/10/2021	
25/10/2021	October Half Term
01/11/2021	<b>Waves (9 lessons + test)</b>

08/11/2021	
15/11/2021	
22/11/2021	
29/11/2021	<b>Ecosystem Processes (11 lessons + test)</b>
06/12/2021	
13/12/2021	
20/12/2021	
27/12/2021	<b>Christmas Holidays</b>
03/01/2022	
10/01/2022	<b>Chemical Reactions (7 lessons + test)</b>
17/01/2022	
24/01/2022	
31/01/2022	<b>Motion &amp; Pressure (6 lessons + test)</b>
07/02/2022	
14/02/2022	<b>February Half Term</b>
21/02/2022	<b>Inheritance &amp; Variation (5 lessons + test)</b>
28/02/2022	
07/03/2022	<b>Separation Techniques (10 lessons + test)</b>
14/03/2022	
21/03/2022	
28/03/2022	

04/04/2022	<b>Easter Holidays</b>
11/04/2022	
18/04/2022	<b>Electricity (11 lessons + test)</b>
25/04/2022	
02/05/2022	
09/05/2022	
16/05/2022	<b>Magnets (5 lessons + test)</b>
23/05/2022	
30/05/2022	<b>May Half Term</b>
06/06/2022	<b>Revision</b>
13/06/2022	
20/06/2022	<b>END OF YEAR SYNOPTIC TEST</b>
27/06/2022	<b>Project/Practical Skills</b>
04/07/2022	
11/07/2022	
18/07/2022	

<b>Year 8</b>	HT1 – 15 lessons	HT2 – 18 lessons	HT3 – 12 lessons	HT4 – 8 lessons	HT5 – 18 lessons	HT6 – 7 lessons + revision
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<p><b>Topic: Organisation</b></p> <p>Cells, Tissues, Organs, Organ Systems</p> <p>The Lungs</p> <p>Breathing</p> <p>Gas Exchange</p> <p>The Heart &amp; Circulatory System (EXT)</p> <p>Blood Cells &amp; Vessels (EXT)</p> <p>The Skeleton</p> <p>Movement – Joints</p> <p>Movement – Muscles</p> <p><b>Topic: The Periodic Table</b></p> <p>The Periodic Table</p> <p>History of the Periodic Table</p> <p>Metals &amp; Non-Metals</p> <p>Alloys (EXT)</p> <p>Ceramics (EXT)</p> <p>Polymers (EXT)</p> <p>Composites (EXT)</p> <p>Ar &amp; Mr (EXT)</p> <p>Reactivity of Group 1 (Alkali Metals)</p> <p>Reactivity of Group 7 (Halogens)</p> <p>Noble Gases</p> <p>Naming Compounds</p> <p>Writing Formulae</p>	<p><b>Topic: Waves (Light &amp; Sounds)</b></p> <p>Energy Transfers (EXT)</p> <p>Transverse &amp; Longitudinal</p> <p>Producing Sounds &amp; How Sounds Travel (one lesson)</p> <p>Hearing Sounds</p> <p>EM Spectrum</p> <p>Comparing Light &amp; Sound</p> <p>The Eye</p> <p>Reflection</p> <p>Refraction</p> <p>Seeing Colour (EXT)</p> <p>Wave Calculations</p> <p><b>Topic: Ecosystem Processes</b></p> <p>Living Processes MRS NERG</p> <p>5 Kingdoms &amp; Classes (EXT)</p> <p>Classification &amp; Keys</p> <p>Food Chains &amp; Webs (one lesson)</p> <p>Pyramids of Numbers</p> <p>Pyramids of Biomass (EXT)</p> <p>Bioaccumulation</p> <p>Competition</p> <p>Sampling Techniques (EXT)</p> <p>Aerobic Respiration</p> <p>Anaerobic Respiration</p> <p>Exercise &amp; Respiration</p>	<p><b>Topic: Ecosystem Processes</b></p> <p>Photosynthesis</p> <p>Leaf Adaptations for Gas Exchange</p> <p>Test a Leaf for Starch (EXT)</p> <p>Transpiration &amp; Translocation (EXT)</p> <p><b>Topic: Chemical Reactions (Metals)</b></p> <p>Metals &amp; Oxygen</p> <p>Metals &amp; Acid</p> <p>Acids &amp; Hydroxides</p> <p>Acids &amp; Carbonates</p> <p>Conservation of Mass</p> <p>Word &amp; Symbol Equations</p> <p>Balancing Equations (EXT)</p> <p>The Reactivity Series</p> <p>Displacement Reactions (EXT)</p> <p>Extracting Metals (EXT)</p> <p><b>Topic: Motion &amp; Pressure</b></p> <p>Speed</p> <p>Distance-Time Graphs</p> <p>Velocity-Time Graphs</p>	<p><b>Topic: Motion &amp; Pressure cont.</b></p> <p>Pressure (F/A)</p> <p>Pressure in Liquids</p> <p>Pressure in Gases</p> <p><b>Topic: Inheritance &amp; Variation</b></p> <p>Genetic Variation</p> <p>Genetic Cross Diagrams (EXT)</p> <p>Genetic Disease &amp; Sex Determination (EXT)</p> <p>Adaptations</p> <p>Natural Selection</p> <p>Selective Breeding (EXT)</p> <p>Extinction</p> <p>Biodiversity</p> <p>Extremophiles (EXT)</p>	<p><b>Topic: Separation Techniques</b></p> <p>Solubility</p> <p>Rates of Dissolving</p> <p>Solubility Curves (EXT)</p> <p>Filtration (2 lessons)</p> <p>Crystallisation (2 lessons)</p> <p>Chromatography (2 lessons)</p> <p>Distillation</p> <p><b>Topic: Electricity</b></p> <p>Atomic Structure</p> <p>Conductors &amp; Insulators</p> <p>Static Electricity</p> <p>Electrical Circuits</p> <p>Current &amp; Measuring Current (one lesson)</p> <p>Voltage &amp; Measuring Voltage (one lesson)</p> <p>Series &amp; Parallel Circuits</p> <p>Current in Parallel Circuits</p> <p>Voltage in Parallel Circuits</p>	<p><b>Topic: Electricity cont.</b></p> <p>Resistance</p> <p>Power &amp; Energy Cost Calculations</p> <p><b>Topic: Magnetism</b></p> <p>Magnetic Fields</p> <p>Magnets</p> <p>Electromagnets</p> <p>Making Magnets</p> <p>Uses of Electromagnets</p>
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Year 9	<b>Chemistry – 35 lessons</b>		<b>Physics – 35 lessons</b>		<b>Biology – 31 lessons</b>	
	1	2	3	4	5	6
	<p><b><u>Topic: Chemistry Fundamentals – 18 lessons</u></b></p> <p><b>Knowledge:</b> Changing states of matter</p> <p>Atoms and elements</p> <p>Compounds and formulae</p> <p>Pure substances and solutions</p> <p>Separation techniques</p> <p>RP: Chromatography</p> <p>Changing Atomic Theories</p> <p>Protons, Neutrons and Electrons</p> <p>Electron configuration</p>	<p><b><u>Topic: Investigative Chemistry – 17 lessons</u></b></p> <p><b>Knowledge:</b> Ionic bonding part</p> <p>Properties of ionic bonding</p> <p>Covalent bonding</p> <p>Properties of covalent structures</p> <p>Giant covalent structures</p> <p>Metallic Bonding</p> <p>Comparing and contrasting types of bonding</p> <p>Word and symbol equations</p> <p>Balancing equations</p>	<p><b><u>Topic: Physics - Energy and Waves – 18 lessons</u></b></p> <p><b>Knowledge:</b> Types of energy and energy transfers</p> <p>Open and closed systems</p> <p>Insulation</p> <p>Non-renewable resources</p> <p>Renewable resources</p> <p>Comparison of energy resources</p> <p>Work done</p> <p>Power</p> <p>Efficiency calculations</p>	<p><b><u>Topic: Forces – 17 lessons</u></b></p> <p><b>Knowledge:</b> Scalar and vector quantities</p> <p>Types of forces</p> <p>Centre of mass</p> <p>Weight</p> <p>Resultant forces</p> <p>Vector diagrams</p> <p>Speed and velocity</p> <p>Distance time graphs</p> <p>Acceleration and deceleration</p> <p>Velocity time graphs</p>	<p><b><u>Topic: Cell Biology – 16 lessons</u></b></p> <p><b>Knowledge:</b> Types of cells</p> <p>Specialised cells</p> <p>Tissues, organs and systems</p> <p>Introducing microscopes</p> <p>RP: Using Microscopes</p> <p>Types of microscope</p> <p>DNA</p> <p>Mitosis and the cell cycle</p> <p>Incredible stem cells</p> <p>Asexual reproduction</p>	<p><b><u>Topic: Communicable Diseases – 15 lessons</u></b></p> <p><b>Knowledge:</b> Health</p> <p>Bacterial diseases</p> <p>Pathogens</p> <p>Viral Diseases</p> <p>Fungal and protists</p> <p>Our barriers to diseases</p> <p>The immune system</p> <p>Vaccinations</p> <p>Medicines</p> <p>Antibiotic resistance</p>

<p>Isotopes and relative atomic mass</p> <p>The periodic table</p> <p>The modern periodic table</p> <p>Metals and non-metals</p> <p>Uses of metals and alloys</p> <p>Alkali metals</p> <p>Halogens</p> <p>Noble Gases</p> <p>Gas tests</p> <p><b>Skills:</b> Calculate the number of protons, neutrons and electrons for different elements Naming apparatus Selecting appropriate apparatus Explaining why certain apparatus is used Accuracy (comparison to true value) Select the best hypothesis based on results</p>	<p>Conservation of mass</p> <p>Metals and oxygen</p> <p>Metals and acid</p> <p>Metals and water</p> <p>Acids and bases</p> <p>Neutralisation</p> <p>RP: Soluble Salts</p> <p>Reactivity series and displacement reactions</p> <p><b>Skills:</b> Writing a method Reproducibility and repeatability Following a given method Following a given risk assessment Writing a risk assessment (hazards, risks, precautions) Explaining properties of types of bonding Reproducibility and repeatability</p>	<p>Gravitational potential energy</p> <p>Kinetic energy</p> <p>Elastic potential energy</p> <p>RP: Relationship between force and extension</p> <p>Introduction to waves Waves equation</p> <p>Measuring speed of sound</p> <p>Measuring period of a wave</p> <p>RP: Measuring speed of a wave using a ripple tank</p> <p>EM Spectrum</p> <p><b>Skills:</b> Independent, dependent and control variables Explaining differences between waves Stating the resolution Using a manual or digital scale Explaining why certain apparatus is used Bar chart</p>	<p>Terminal Velocity</p> <p>Newton's first law</p> <p>Newton's second law</p> <p>Newton's third law</p> <p>Stopping distances</p> <p>Magnets</p> <p>Electromagnets</p> <p><b>Skills:</b> Using a manual or digital scale Rearranging and using equations Stating the resolution Explaining why certain apparatus is used Sketch graph Using a manual or digital scale Making predictions from data Range electrolyte Gradient Area under a graph</p>	<p>Sexual Reproduction and Meiosis</p> <p>Sexual vs asexual reproduction</p> <p>Examples of unusual reproduction</p> <p>Inheritance (genetic cross diagrams)</p> <p>Family trees</p> <p>Genetic diseases and sex determination</p> <p><b>Skills:</b> Writing instructions Calculate uncertainty Creating own hypothesis Making scientific drawings Evaluating stem cells Explaining why certain apparatus is used</p>	<p>Developing new drugs</p> <p>Cancer</p> <p>Scatter Graphs and Health</p> <p>Frequency tables and histograms</p> <p>Analysis data</p> <p><b>Skills:</b> Plot and interpret scatter graphs showing data about health and diseases Analyse data health from frequency tables and histograms Using a given result table</p>
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<p>Paper 1 – Combined Science</p>		
<p><b>Biology – 54 lessons</b></p>	<p><b>Chemistry – 51 lessons</b></p>	<p><b>Physics – 47 lessons</b></p>

<p><u>Topic 1 - Cell biology</u></p> <ol style="list-style-type: none"> <li>Types of cell</li> <li>Specialised cells</li> <li>Introducing microscopes</li> <li>RP: Using microscopes</li> <li>Types of microscope</li> <li>Mitosis and the cell cycle</li> <li>Stem cells</li> <li>Evaluating stem cells</li> <li>Diffusion</li> <li>Surface area and volume ratio</li> <li>Diffusion in action</li> <li>Osmosis</li> <li>Osmosis in action</li> <li>RP: Osmosis investigation</li> <li>Active transport</li> </ol>	<p><u>Topic 1 - Atomic structure and the periodic table</u></p> <ol style="list-style-type: none"> <li>Atoms, elements, compounds and mixtures</li> <li>Word equations, formulas and symbol equations</li> <li>Balancing equations</li> <li>Separation techniques – Distillation and Filtration</li> <li>Separation techniques – Crystallisation and Chromatography, including RP</li> <li>Changing Atomic Theories</li> <li>Protons, Neutrons and Electrons</li> <li>Electron configuration</li> <li>Isotopes and relative atomic mass</li> <li>The development of the periodic table</li> <li>Metals and group 1</li> <li>Non-metals, group 7 and group 0.</li> </ol>	<p><u>Topic 1 – Energy</u></p> <ol style="list-style-type: none"> <li>Types of energy and energy transfers</li> <li>Conservation of energy</li> <li>Insulation</li> <li>Non-renewable resources</li> <li>Renewable resources</li> <li>Comparison of energy resources</li> <li>Work done</li> <li>Power</li> <li>Efficiency calculations</li> <li>Gravitational potential energy</li> <li>Kinetic energy</li> </ol>
<p><u>Topic 2 – Organisation</u></p> <ol style="list-style-type: none"> <li>Tissues, organs and systems</li> <li>Plant cells, tissues and organs</li> <li>Enzymes</li> <li>RP: pH and enzymes</li> <li>RP: pH and enzymes</li> <li>Digestion</li> <li>RP: Testing food groups</li> <li>The lungs</li> <li>The heart</li> <li>Blood vessels and heart rate</li> <li>Blood composition</li> <li>Cardiovascular disease</li> <li>Disease data</li> <li>Non-communicable diseases</li> <li>Cancer</li> <li>Transpiration and translocation</li> <li>Transpiration experiments</li> </ol>	<p><u>Topic 2 - Bonding, structure, and the properties of matter</u></p> <ol style="list-style-type: none"> <li>Ionic bonding</li> <li>Models and properties of ionic compounds</li> <li>Covalent bonding</li> <li>Mini Quiz</li> <li>Properties of small covalent compounds</li> <li>Diamond, Graphene and Silica</li> <li>Fullerenes and Graphite</li> <li>Metallic Structure</li> <li>Comparing and contrasting types of bonding</li> </ol>	<p><u>Topic 2 – Electricity</u></p> <ol style="list-style-type: none"> <li>Circuit symbols and drawing circuits</li> <li>Calculating current</li> <li>Current in circuits</li> <li>Series and parallel circuits</li> <li>Ohm's Law and Resistance in circuits</li> <li>RP: Factors affecting resistance</li> <li>Light Dependent Resistors Thermistors</li> <li>RP: investigating non-ohmic conductors</li> <li>Mini Quiz</li> <li>Mains electricity and AC &amp; DC and Plugs</li> <li>Power calculations</li> <li>Work done calculations</li> <li>National Grid and Transformers</li> </ol>
<p><u>Topic 3 - Infection and response</u></p> <ol style="list-style-type: none"> <li>Health</li> <li>Pathogens</li> <li>Bacterial diseases</li> <li>Viral diseases <ol style="list-style-type: none"> <li>Covid 19</li> </ol> </li> <li>Fungal and protists</li> <li>Our barriers to diseases</li> <li>White blood cells</li> <li>Vaccinations</li> <li>Antibiotics</li> </ol>	<p><u>Topic 3 – Quantitative chemistry</u></p> <ol style="list-style-type: none"> <li>Conservation of mass</li> <li>Relative formula mass and mini quiz</li> <li>Moles and amount of substances in an equation (HT only)</li> <li>Using moles to balance an equation (HT only)</li> <li>Limiting reactants (HT only)</li> <li>Concentration</li> </ol>	<p><u>Topic 3 - Particle model of matter</u></p> <ol style="list-style-type: none"> <li>Particle model – density and states</li> <li>RP : Calculating density</li> <li>Change of state</li> <li>Latent heat</li> <li>Heating and cooling graphs</li> <li>Specific heat capacity</li> <li>RP : Investigate the specific heat capacity of a given object</li> <li>Comparing specific heat capacity and latent heat (H only)</li> </ol>

<p>10. Antibiotic resistance 11. Developing new drugs 12. Data investigation</p>		<p>9. Pressure in gases</p>
<p><u>Topic 4 – Bioenergetics</u></p> <ol style="list-style-type: none"> <li>1. Photosynthesis</li> <li>2-3. RP: Photosynthesis</li> <li>4. Limiting factors (H only)</li> <li>5. Aerobic respiration</li> <li>6. Anaerobic respiration</li> <li>7. Using glucose and nitrogen in plants</li> </ol>	<p><u>Topic 4 - Chemical changes</u></p> <ol style="list-style-type: none"> <li>1. Acids and bases (F) or strong and weak acids and bases (HT)</li> <li>2. Neutralisation</li> <li>3. RP: Soluble Salts</li> <li>4. Reactions of metals</li> <li>5. Reactivity series and extraction methods</li> <li>6. Electrolysis of molten compounds</li> <li>7. Electrolysis of aqueous compounds</li> <li>8. RP: Electrolysis</li> </ol>	<p><u>Topic 4 -Atomic structure</u></p> <ol style="list-style-type: none"> <li>1. Atomic recap</li> <li>2. Changing atomic theories</li> <li>3. Atoms, electrons and energy levels</li> <li>4. Introduction to radioactive decay</li> <li>5. Alpha, beta and gamma</li> <li>6. Half life</li> <li>7. Irradiation and contamination</li> </ol>
	<p><u>Topic 5 - Energy changes</u></p> <ol style="list-style-type: none"> <li>1. Exothermic and endothermic reactions</li> <li>2. RP Temperature Changes</li> <li>3. Reaction profiles</li> <li>4. Bond energies (HT)</li> </ol>	
<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>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.</li> <li>2. Investigate what happens when aqueous solutions are electrolysed using inert electrodes.</li> <li>3. Investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals.</li> </ol>	<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>1. Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included.</li> <li>2. Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue</li> <li>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.</li> <li>4. Investigate the effect of pH on the rate of reaction of amylase enzyme</li> </ol> <p>Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.</p>	<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ol> <p>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.</p>

## Paper 2 – Combined Science

<b>Biology – 47 lessons</b>	<b>Chemistry – 35 lessons</b>	<b>Physics – 37 lessons</b>
<p><u>Topic 5 - Homeostasis and response</u></p> <ol style="list-style-type: none"> <li>1. Homeostasis</li> <li>2. The nervous system</li> <li>3. Synapses</li> <li>4. RP Investigating human reaction time</li> <li>5. The endocrine system</li> <li>6. Controlling blood glucose</li> <li>7. Hormones and the menstrual cycle</li> <li>8. IVF (H only)</li> <li>9. Contraception</li> <li>10. Negative feedback loops (H only)</li> <li>11. Comparing nervous and hormonal responses</li> </ol>	<p><u>Topic 6 - The rate and extent of chemical change</u></p> <ol style="list-style-type: none"> <li>1. Collision theory and measuring the rate of reaction</li> <li>2. Factors affecting rates of reaction</li> <li>3. RP: Factors affecting rates of reaction 1</li> <li>4. RP: Factors affecting rates of reaction 2</li> <li>5. Rate of reaction graphs</li> <li>7. Catalyst</li> <li>9. Reversible reactions and equilibriums (HT)</li> </ol>	<p><u>Topic 5 – Forces</u></p> <ol style="list-style-type: none"> <li>1. Scalar and vector quantities</li> <li>2. Types of forces</li> <li>3. Centre of mass</li> <li>4. Weight</li> <li>5. Resultant force</li> <li>6. Vector diagrams (HT only)</li> <li>7. Elastic objects and Hooke's Law</li> <li>8. RP : Relationship between force and spring</li> <li>9. Speed, distance, displacement, velocity</li> <li>10. Circular motion (H only)</li> <li>11. Distance time graphs</li> <li>12. Acceleration</li> <li>13. Velocity time graphs</li> <li>14. Mini quiz</li> <li>15. Falling objects</li> <li>16. Newton's First and Second Law</li> <li>17. Inertia and inertial mass</li> <li>18. RP : Investigating Newton's Second Law</li> <li>19. Newton's Third Law</li> <li>20. Stopping distance</li> <li>21. Momentum calculations</li> </ol>
<p><u>Topic 6 – Inheritance, variation and evolution</u></p> <ol style="list-style-type: none"> <li>1. Introduction to DNA</li> <li>2. Structure of DNA</li> <li>3. Mutations</li> <li>4. Sexual reproduction</li> <li>5. The cell cycle</li> <li>6. Asexual reproduction</li> <li>7. Comparing sexual and asexual reproduction</li> <li>8. Inheritance</li> <li>9. Family trees</li> <li>10. Genetic diseases and sex determination</li> <li>11. Variation</li> <li>12. Natural selection and evolution</li> <li>13. Genetic engineering modification</li> <li>14. Selective breeding</li> <li>15. Stem cells</li> </ol>	<p><u>Topic 7 – Organic chemistry</u></p> <ol style="list-style-type: none"> <li>1. Crude Oil</li> <li>2. Fractional Distillation</li> <li>3. Alkanes and alkenes</li> <li>4. Cracking</li> <li>5. Combustion</li> </ol>	<p><u>Topic 6 – Waves</u></p> <ol style="list-style-type: none"> <li>1. Introduction to waves</li> <li>2. Wave equations</li> <li>3. Measuring speed of sound</li> <li>4. Measuring period of a wave</li> <li>5. RP ; Measure the speed of a wave using a ripple tank and string</li> <li>6. EM spectrum</li> <li>7. Dangers and Uses of EM spectrum</li> <li>8. RP : IR radiation</li> </ol>

<ul style="list-style-type: none"> <li>16. Evaluating stem cells</li> <li>17. Fossils</li> <li>18. Speciation</li> <li>19. Antibiotic resistant bacteria</li> <li>20. Classification</li> <li>21. Inheritance summary essay</li> </ul>		
<p><u>Topic 7 – Ecology</u></p> <ul style="list-style-type: none"> <li>1. Competition (Need lesson)</li> <li>2. Abiotic and biotic factors (Need lesson)</li> <li>3. Adaptations (Need lesson)</li> <li>4. Food chains (Need lesson)</li> <li>5. RP Quadrats</li> <li>6. Using transects (Need lesson)</li> <li>7. Water cycle</li> <li>8. Carbon cycle</li> <li>9. Biodiversity &amp; Human impact</li> <li>10. Reducing Human impact</li> <li>11. Global warming</li> <li>12. Deforestation and land use</li> <li>13. Pyramids of Biomass &amp; tropic levels</li> <li>14. Biomass transfer</li> <li>15. Biotechnology</li> </ul>	<p><u>Topic 8 – Chemical analysis</u></p> <ul style="list-style-type: none"> <li>1. Pure substances and formulations</li> <li>2. RP Paper chromatography</li> <li>3. Gas tests</li> </ul>	<p><u>Topic 7 – Magnetism and electromagnetism</u></p> <ul style="list-style-type: none"> <li>1. Magnets</li> <li>2. Electromagnets</li> <li>3. Motor effect</li> <li>4. <math>F = BIL</math> (H only)</li> <li>5. Applications of the motor effect and generators</li> </ul>
	<p><u>Topic 9 – Chemistry of the atmosphere</u></p> <ul style="list-style-type: none"> <li>1. The Early Earth's Atmosphere</li> <li>2. Development of the atmosphere</li> <li>3. Greenhouse gases, human impact and carbon footprint</li> <li>4. Global climate change and atmospheric pollutants</li> </ul>	
	<p><u>Topic 10 – Using resources</u></p> <ul style="list-style-type: none"> <li>1. Uses of metals and their alloys</li> <li>2. Potable Water and waste water</li> <li>3. Sewage and RP Analysing water samples</li> <li>4. Phytomining and bioleaching</li> <li>5. Sustainable development and reduce, Reuse, Recycle</li> <li>6. Life-cycle assessment</li> </ul>	
<p><u>Core practical's</u></p> <ul style="list-style-type: none"> <li>7. Plan and carry out an investigation into the effect of a factor on human reaction time</li> </ul>	<p><u>Core practical's</u></p> <ul style="list-style-type: none"> <li>5. Investigate how changes in concentration affect the rates of reactions by a method involving</li> </ul>	<p><u>Core practical's</u></p> <ul style="list-style-type: none"> <li>6. Investigate the relationship between force and extension for a spring.</li> </ul>

<p>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.</p>	<p>measuring the volume of a gas produced and a method involving a change in colour or turbidity.</p> <p>6. Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate R<sub>f</sub> values.</p> <p>7. Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.</p>	<p>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.</p> <p>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.</p> <p>9. Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.</p>
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<h2 style="color: #4F81BD;">Paper 1 – Triple Science</h2>		
<p><b>Biology – 65 lessons</b></p>	<p><b>Chemistry – 60 lessons</b></p>	<p><b>Physics – 64 lessons</b></p>
<p><u>Topic 1 - Cell biology</u></p> <ol style="list-style-type: none"> <li>1. Types of cell</li> <li>2. Specialised cells</li> </ol>	<p><u>Topic 1 - Atomic structure and the periodic table</u></p> <ol style="list-style-type: none"> <li>1. Atoms and elements</li> <li>2. Compounds and formulae</li> </ol>	<p><u>Topic 1 – Energy</u></p> <ol style="list-style-type: none"> <li>1. Types of energy and energy transfers</li> <li>2. Open and closed systems</li> </ol>

<ol style="list-style-type: none"> <li>3. Introducing microscopes</li> <li>4. RP: Using microscopes</li> <li>5. Types of microscope</li> <li>6. Mitosis and the cell cycle</li> <li>7. <a href="#">Multiplying bacteria (T only)</a></li> <li>8. <a href="#">Culturing microorganisms (T only)</a></li> <li>9. RP: Investigating antiseptics and writing methods</li> <li>10. RP: Analysing antiseptics practical</li> <li>11. Mini quiz</li> <li>12. Stem cells</li> <li>13. Evaluating stem cells</li> <li>14. Diffusion</li> <li>15. Surface area and volume ratio</li> <li>16. Diffusion in action</li> <li>17. Osmosis</li> <li>18. Osmosis in action</li> <li>19. RP: Osmosis investigation</li> <li>20. Active transport</li> </ol>	<ol style="list-style-type: none"> <li>3. Word and symbol equations</li> <li>4. Balancing equations</li> <li>5. Separation techniques</li> <li>6. RP: Chromatography</li> <li>7. Changing Atomic Theories</li> <li>8. Protons, Neutrons and Electrons</li> <li>9. Electron configuration</li> <li>10. Isotopes and relative atomic mass</li> <li>11. The periodic table</li> <li>12. The modern periodic table</li> <li>13. Metals and non-metals</li> <li>14. Alkali metals (Group 1)</li> <li>15. Halogens (Group 7)</li> <li>16. Noble Gases (Group 0)</li> </ol>	<ol style="list-style-type: none"> <li>3. Insulation</li> <li>4. <a href="#">RP: Investigating thermal insulators (T only)</a></li> <li>5. Non-renewable resources</li> <li>6. Renewable resources</li> <li>7. Comparison of energy resources</li> <li>8. Work done</li> <li>9. Power</li> <li>10. Efficiency calculations</li> <li>11. Gravitational potential energy</li> <li>12. Kinetic energy</li> </ol>
<p><u>Topic 2 – Organisation</u></p> <ol style="list-style-type: none"> <li>1. Tissues, organs and systems</li> <li>2. Plant cells, tissues and organs</li> <li>3. Enzymes</li> <li>4. RP: pH and enzymes</li> <li>5. RP: pH and enzymes</li> <li>6. Digestion</li> <li>7. RP: Testing food groups</li> <li>8. The lungs</li> <li>9. The heart</li> <li>10. Blood vessels and heart rate</li> <li>11. Blood composition</li> <li>12. Cardiovascular disease</li> <li>13. Disease data 1</li> <li>14. Disease data 2</li> <li>15. Non-communicable diseases</li> <li>16. Cancer</li> <li>17. Transpiration and translocation</li> <li>18. Transpiration experiments</li> </ol>	<p><u>Topic 2 - Bonding, structure, and the properties of matter</u></p> <ol style="list-style-type: none"> <li>1. Ionic bonding part 1</li> <li>2. Ionic bonding part 2</li> <li>3. Properties of ionic bonding</li> <li>4. Covalent bonding</li> <li>5. Properties of covalent structures</li> <li>6. Giant covalent structures</li> <li>7. Graphene and fullerenes</li> <li>8. Metallic Bonding</li> <li>9. Changing states of matter</li> <li>10. Comparing and contrasting types of bonding</li> <li>11. <a href="#">Nanoparticles (T only)</a></li> </ol>	<p><u>Topic 2 – Electricity</u></p> <ol style="list-style-type: none"> <li>1. Electrical circuits Introduction</li> <li>2. Calculating current</li> <li>3. Current in circuits</li> <li>4. Series and parallel circuits</li> <li>5. Ohm’s Law</li> <li>6. Resistance in circuits</li> <li>7. RP: Factors affecting resistance</li> <li>8. Light Dependent Resistors</li> <li>9. Thermistors</li> <li>10. RP: investigating non-ohmic conductors</li> <li>12. Mini Quiz</li> <li>13. Mains electricity and AC &amp; DC</li> <li>14. Plugs</li> <li>15. Power calculations</li> <li>16. Work done calculations</li> <li>17. Equations practice</li> <li>18. National Grid and Transformers</li> <li>19. <a href="#">Transformers structure and equation (T only)</a></li> <li>20. <a href="#">Transformers power equation (T only)</a></li> </ol>
<p><u>Topic 3 - Infection and response</u></p> <ol style="list-style-type: none"> <li>1. Health</li> <li>2. Pathogens</li> <li>3. Bacterial diseases</li> <li>4. Viral diseases</li> <li>4a. Covid 19</li> <li>5. Fungal and protists</li> <li>6. Our barriers to diseases</li> </ol>	<p><u>Topic 3 – Quantitative chemistry</u></p> <ol style="list-style-type: none"> <li>1. Relative Formula Mass</li> <li>2. Introducing moles</li> <li>3. Word equations and conservation of mass (Higher only)</li> <li>4. Reacting masses</li> <li>5. Balancing equations using moles (Higher only)</li> <li>6. <a href="#">Limiting reactants (T only)</a></li> </ol>	<p><u>Topic 3 - Particle model of matter</u></p> <ol style="list-style-type: none"> <li>1. Particle model – density and states</li> <li>2. RP : Calculating density</li> <li>3. Change of state</li> <li>4. Latent heat</li> <li>5. Heating and cooling graphs</li> <li>6. Specific heat capacity</li> </ol>

<ul style="list-style-type: none"> <li>7. White blood cells</li> <li>8. Vaccinations</li> <li>9. Antibiotics</li> <li>10. Antibiotic resistance</li> <li>11. Developing new drugs</li> <li>12. Monoclonal antibodies (T only)</li> <li>13. Data 1</li> <li>14. Data 2</li> <li>15. Data 3</li> <li>16. Plant disease (Triple only)</li> </ul>	<ul style="list-style-type: none"> <li>7. Calculating volume of a gas (triple only)</li> <li>8. Introduction to concentration</li> <li>9. Atom economy (T only)</li> <li>10. Percentage yield (T only)</li> <li>11. All calculations for Chemistry</li> </ul>	<ul style="list-style-type: none"> <li>7. RP : Investigate the specific heat capacity of a given object</li> <li>8. Comparing specific heat capacity and latent heat (H only)</li> <li>9. Pressure in gases</li> <li>10. Gas pressure part 2 (T only)</li> </ul>
<p><u>Topic 4 – Bioenergetics</u></p> <ul style="list-style-type: none"> <li>9. Photosynthesis</li> <li>2-3. RP: Photosynthesis</li> <li>4. Limiting factors (H only)</li> <li>5. Aerobic respiration</li> <li>6. Anaerobic respiration</li> <li>7. Using glucose and nitrogen in plants</li> </ul>	<p><u>Topic 4 - Chemical changes</u></p> <ul style="list-style-type: none"> <li>1. Acids and bases</li> <li>2. Acids - weak and strong (H only)</li> <li>3. Neutralisation</li> <li>4. RP: Soluble Salts</li> <li>5. RP: Titrations part 1 (T only)</li> <li>6. RP Titrations part 2 (T only)</li> <li>7. Metals and oxygen</li> <li>8. Metals and acid</li> <li>9. Metals and water</li> <li>10. Redox reactions (T only)</li> <li>11. Reactivity series and extraction methods</li> <li>12. Electrolysis of molten compounds</li> <li>13. Electrolysis of aqueous compounds</li> <li>14. RP: Electrolysis</li> </ul>	<p><u>Topic 4 -Atomic structure</u></p> <ul style="list-style-type: none"> <li>1. Atomic recap</li> <li>2. Changing atomic theories</li> <li>3. Atoms, electrons and energy levels</li> <li>4. Introduction to radioactive decay</li> <li>5. Alpha, beta and gamma</li> <li>6. Half life</li> <li>7. Irradiation and contamination</li> <li>8. Using radiation in medicine (T only)</li> <li>9. Background radiation (T only)</li> <li>10. Evaluating hazards (T only)</li> <li>11. Radiation – practice exam questions</li> <li>12. Mini quiz</li> <li>13. Nuclear fission and fusion – part 1(T only)</li> <li>14. Fission and fusion – part 2 (T only)</li> </ul>
	<p><u>Topic 5 - Energy changes</u></p> <ul style="list-style-type: none"> <li>1. Exothermic and endothermic reactions</li> <li>2. RP Temperature Changes</li> <li>3. Reaction profiles</li> <li>4. Bond energies</li> <li>5. Chemical cells and voltage (T only)</li> <li>6. Rechargeable and non-rechargeable batteries (T only)</li> <li>7. Fuel Cells (T only)</li> <li>8. Half equations for fuel cells (T only)</li> </ul>	
<p><u>Core practical's</u></p> <ul style="list-style-type: none"> <li>1. Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included.</li> <li>2. Investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition.(Biology only)</li> </ul>	<p><u>Core practical's</u></p> <ul style="list-style-type: none"> <li>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.</li> <li>2. Determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration. (HT only) determination of the</li> </ul>	<p><u>Core practical's</u></p> <ul style="list-style-type: none"> <li>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.</li> </ul>

<ol style="list-style-type: none"> <li>3. Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue</li> <li>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.</li> <li>5. Investigate the effect of pH on the rate of reaction of amylase enzyme</li> <li>6. Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.</li> </ol>	<p style="text-align: center;">concentration of one of the solutions in mol/dm<sup>3</sup> and g/dm<sup>3</sup> from the reacting volumes and the known concentration of the other solution(Chemistry only)</p> <ol style="list-style-type: none"> <li>3. Investigate what happens when aqueous solutions are electrolysed using inert electrodes.</li> <li>4. Investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals.</li> </ol>	<ol style="list-style-type: none"> <li>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)</li> <li>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.</li> <li>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.</li> <li>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.</li> </ol>
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## Paper 2 – Triple Science

<b>Biology – 66 lessons</b>	<b>Chemistry – 53 lessons</b>	<b>Physics – 66 lessons</b>
<p><u>Topic 5 - Homeostasis and response</u></p> <ol style="list-style-type: none"> <li>1. Homeostasis</li> <li>2. The nervous system</li> <li>3. Synapses</li> <li>4. RP Investigating human reaction time</li> <li>5. <a href="#">Parts of the brain (T only)</a></li> <li>6. <a href="#">Brain surgery (T only)</a></li> <li>7. <a href="#">The eye (T only)</a></li> <li>8. <a href="#">Myopia and hyperopia ( only)</a></li> <li>9. <a href="#">Thermoregulation (T only)</a></li> <li>10. The endocrine system</li> <li>11. Controlling blood glucose</li> <li>12. <a href="#">Controlling water (T only)</a></li> <li>13. Hormones and the menstrual cycle</li> <li>14. IVF (H only)</li> <li>15. Contraception</li> <li>16. Negative feedback loops (H only)</li> <li>17. Comparing nervous and hormonal responses</li> </ol>	<p><u>Topic 6 - The rate and extent of chemical change</u></p> <ol style="list-style-type: none"> <li>1. Measuring the rate of reaction</li> <li>2. Factors affecting rates of reaction</li> <li>3. Drawing rates of reaction graphs</li> <li>4-6. RP: Factors affecting rates of reaction</li> <li>7. Catalysts</li> <li>8. <a href="#">Le Chateliers Principle (T only)</a></li> <li>9. Reversible reactions</li> </ol>	<p><u>Topic 5 – Forces</u></p> <ol style="list-style-type: none"> <li>1. Scalar and vector quantities</li> <li>2. Types of forces</li> <li>3. Centre of mass</li> <li>4. Weight</li> <li>5. Resultant force</li> <li>6. Vector diagrams (HT only)</li> <li>7. Elastic objects and Hooke's Law</li> <li>8. Work done</li> <li>9. RP : Relationship between force and spring</li> <li>10. <a href="#">Pressure in liquids and hydraulics (T only)</a></li> <li>11. <a href="#">Leavers and gears (T only)</a></li> <li>12. <a href="#">Leavers and gears (T only)</a></li> <li>13. <a href="#">Pressure at different depths (T only)</a></li> <li>14. <a href="#">The atmosphere (T only)</a></li> <li>15. <a href="#">Floating and sinking (T only)</a></li> <li>16. Speed, distance, displacement, velocity</li> <li>17. Circular motion (H only)</li> </ol>

<ul style="list-style-type: none"> <li>18. Tropisms (T only)</li> <li>19. Uses of plant hormones (T only)</li> <li>20. RP Germination (T only)</li> <li>21. RP Germination part 2 (T only)</li> </ul>		<ul style="list-style-type: none"> <li>18. Distance time graphs</li> <li>19. Acceleration</li> <li>20. Velocity time graphs</li> <li>21. Mini quiz</li> <li>22. Falling objects</li> <li>23. Newton's First Law</li> <li>24. Newton's Second Law</li> <li>25. Inertia and inertial mass</li> <li>26. RP : Investigating Newton's Second Law</li> <li>27. Newton's Third Law</li> <li>28. Stopping distance</li> <li>29. Breaking distance</li> <li>30. Graphs and forces (T only)</li> <li>31. Momentum calculations</li> <li>32. Momentum and safety features (T only)</li> </ul>
<p style="text-align: center;"><u>Topic 6 – Inheritance, variation and evolution</u></p> <ul style="list-style-type: none"> <li>1. Introduction to DNA</li> <li>2. Structure of DNA</li> <li>3. Protein synthesis (T only)</li> <li>4. Mutations</li> <li>5. Sexual reproduction</li> <li>6. The cell cycle</li> <li>7. Asexual reproduction</li> <li>8. Comparing sexual and asexual reproduction</li> <li>9. Examples of unusual reproduction (T only)</li> <li>10. Inheritance</li> <li>11. Family trees</li> <li>12. Genetic diseases and sex determination</li> <li>13. Mendel (T only)</li> <li>14. Variation</li> <li>15. Natural selection and evolution</li> <li>16. Genetic engineering modification</li> <li>17. Selective breeding</li> <li>18. Cloning (T only)</li> <li>19. Stem cells</li> <li>20. Evaluating stem cells</li> <li>21. Fossils</li> <li>22. Speciation</li> <li>23. Antibiotic resistant bacteria</li> <li>24. Classification</li> <li>25. Inheritance summary essay</li> </ul>	<p style="text-align: center;"><u>Topic 7 – Organic chemistry</u></p> <ul style="list-style-type: none"> <li>1. Crude Oil</li> <li>2. Fractional Distillation and the fractions</li> <li>3. Cracking 1</li> <li>4. Alkanes and alkenes</li> <li>5. Properties of alkanes and alkenes</li> <li>6. Combustion</li> <li>7. Alkene reactions (T only)</li> <li>8. Alcohols (T only)</li> <li>9. Making alcohols by fermentation (T only)</li> <li>10. Carboxylic acids (T only)</li> <li>11. Addition polymerisation (T only)</li> <li>12. Condensation polymerisation (T only)</li> <li>13. Amino acids (T only)</li> </ul>	<p style="text-align: center;"><u>Topic 6 – Waves</u></p> <ul style="list-style-type: none"> <li>1. Introduction to waves</li> <li>2. Wave equations</li> <li>3. Measuring speed of sound</li> <li>4. Measuring period of a wave</li> <li>5. RP ; Measure the speed of a wave using a ripple tank and speed</li> <li>6. Using sound waves for detection and exploration (T only)</li> <li>7. EM spectrum</li> <li>8. Radios (T only)</li> <li>9. Sound waves (T only)</li> <li>10. RP : IR radiation</li> <li>11. Reflection of light (T only)</li> <li>12. Refraction of light (T only)</li> <li>13. RP : Investigating reflection and refractions (T only)</li> <li>14. Concave and convex ray diagrams (T only)</li> <li>15. Magnification (T only)</li> <li>16. Colour (T only)</li> <li>17. Black bodies and radiation on Earth (T only)</li> </ul>
<p style="text-align: center;"><u>Topic 7 – Ecology</u></p> <ul style="list-style-type: none"> <li>1. Competition</li> <li>2. Abiotic and biotic factors</li> <li>3. Adaptations</li> </ul>	<p style="text-align: center;"><u>Topic 8 – Chemical analysis</u></p> <ul style="list-style-type: none"> <li>1. RP Paper chromatography</li> <li>2. Gas tests</li> <li>3. Testing for ions (T only)</li> </ul>	<p style="text-align: center;"><u>Topic 7 – Magnetism and electromagnetism</u></p> <ul style="list-style-type: none"> <li>1. Magnets</li> <li>2. Electromagnets</li> <li>3. Electromagnetic fields</li> </ul>

<ol style="list-style-type: none"> <li>4. Food chains</li> <li>5. RP Quadrats</li> <li>6. Using transects</li> <li>7. Water cycle</li> <li>8. Carbon cycle</li> <li>9. Decay (T only)</li> <li>10. RP Decay – part 1</li> <li>11. RP Decay – part 2</li> <li>12. Biodiversity &amp; Human impact</li> <li>13. Reducing Human impact</li> <li>14. Biogas generators (Triple only)</li> <li>15. Global warming</li> <li>16. Deforestation and land use</li> <li>17. Pyramids of Biomass &amp; tropic levels</li> <li>18. Biomass transfer</li> <li>19. Food security (T ONLY)</li> <li>20. Biotechnology</li> </ol>	<ol style="list-style-type: none"> <li>4. RP Testing for ions (T only)</li> </ol>	<ol style="list-style-type: none"> <li>4. Uses of electromagnets (T only)</li> <li>5. Motor effect</li> <li>6. F = BIL (H only)</li> <li>7. Applications of the motor effect and generators</li> <li>8. Generating electricity (T only)</li> <li>9. Transformers power equation (T only)</li> <li>10. Transformers structure and equation (T only)</li> </ol>
	<p><u>Topic 9 – Chemistry of the atmosphere</u></p> <ol style="list-style-type: none"> <li>1. The Early Earth's Atmosphere</li> <li>2. Theories of the atmosphere</li> <li>3. The Greenhouse Effect</li> <li>4. Evidence for the greenhouse effect</li> <li>5. Effects of global warming</li> <li>6. The Harmful Effects of Combustion</li> <li>7. Resources used by Humans</li> </ol>	<p><u>Topic 8 – Space (T only)</u></p> <ol style="list-style-type: none"> <li>1. The solar system</li> <li>2. Life cycle of a star</li> <li>3. Orbits</li> <li>4. Orbits 2</li> <li>5. Red shift and expanding Universe</li> <li>6. The Big Bang theory</li> <li>7. Dark mass and dark energy</li> </ol>
	<p><u>Topic 10 – Using resources</u></p> <ol style="list-style-type: none"> <li>1. Ceramics and polymers (T only)</li> <li>2. Uses of metals</li> <li>3. Corrosion (T only)</li> <li>4. Corrosion prevention (T only)</li> <li>5. Transition metals (T only)</li> <li>6. Typical properties (T only)</li> <li>7. Alloys</li> <li>8. Properties and uses of alloys (T only)</li> <li>9. Potable Water</li> <li>10. Waste and sewage</li> <li>11. Evaluating potable water methods</li> <li>12. RP Analysing water samples</li> <li>13. Phytomining and bioleaching</li> <li>14. Life Cycle Assessment</li> <li>15. Reduce, Reuse, Recycle</li> <li>16. Important materials</li> <li>17. Thermosetting and thermos-softening polymers (T only)</li> <li>18. The Haber process 1 (T only)</li> <li>19. The Haber process 2 (T only)</li> </ol>	

20. NPK Fertilisers		
<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>Plan and carry out an investigation into the effect of a factor on human reaction time.</li> <li>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)</li> <li>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.</li> <li>Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change. (Biology only)</li> </ol>	<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>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.</li> <li>Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate Rf values.</li> <li>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)</li> <li>Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.</li> </ol>	<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>Investigate the relationship between force and extension for a spring.</li> <li>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.</li> <li>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.</li> <li>Investigate the reflection of light by different types of surface and the refraction of light by different substances. (Physics only)</li> <li>Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.</li> </ol>

Paper 1 – Support Science		
Biology – 38 lessons	Chemistry – 39 lessons	Physics – 40 lessons
<p><u>Topic 1 - Cell biology</u></p> <ol style="list-style-type: none"> <li>Types of cell</li> <li>Specialised cells</li> <li>Introducing microscopes</li> <li>RP: Using microscopes</li> <li>Types of microscope</li> <li>Diffusion</li> <li>Diffusion in action</li> <li>Osmosis</li> <li>Osmosis in action</li> <li>RP: Osmosis investigation</li> </ol>	<p><u>Topic 1 - Atomic structure and the periodic table</u></p> <ol style="list-style-type: none"> <li>Atoms and elements</li> <li>Compounds and formulae</li> <li>Word and symbol equations</li> <li>Balancing equations</li> <li>Separation techniques</li> <li>RP: Chromatography</li> <li>Changing Atomic Theories</li> <li>Protons, Neutrons and Electrons</li> <li>Electron configuration</li> <li>Isotopes and relative atomic mass</li> <li>The periodic table</li> </ol>	<p><u>Topic 1 – Energy</u></p> <ol style="list-style-type: none"> <li>Types of energy and energy transfers</li> <li>Insulation</li> <li>Non-renewable resources</li> <li>Renewable resources</li> <li>Comparison of energy resources</li> <li>Work done</li> <li>Power</li> <li>Efficiency calculations</li> <li>Gravitational potential energy</li> <li>Kinetic energy</li> </ol>

	<ol style="list-style-type: none"> <li>12. The modern periodic table</li> <li>13. Metals and non-metals</li> <li>14. Alkali metals (Group 1)</li> <li>15. Halogens (Group 7)</li> <li>16. Noble Gases (Group 0)</li> </ol>	
<u>Topic 2 – Organisation</u> <ol style="list-style-type: none"> <li>1. Tissues, organs and systems</li> <li>2. Plant cells, tissues and organs</li> <li>3. Enzymes</li> <li>4. RP: pH and enzymes</li> <li>5. Digestion</li> <li>6. RP: Testing food groups</li> <li>7. The lungs</li> <li>8. The heart</li> <li>9. Blood vessels and heart rate</li> <li>10. Blood composition</li> <li>11. Cardiovascular disease</li> <li>12. Non-communicable diseases</li> <li>13. Cancer</li> <li>14. Transpiration and translocation</li> <li>15. Transpiration experiments</li> </ol>	<u>Topic 2 - Bonding, structure, and the properties of matter</u> <ol style="list-style-type: none"> <li>1. Ionic bonding part 1</li> <li>2. Properties of ionic bonding</li> <li>3. Covalent bonding</li> <li>4. Properties of covalent structures</li> <li>5. Giant covalent structures</li> <li>6. Metallic Bonding</li> <li>7. Changing states of matter</li> </ol>	<u>Topic 2 – Electricity</u> <ol style="list-style-type: none"> <li>1. Electrical circuits Introduction</li> <li>2. Calculating current</li> <li>3. Current in circuits</li> <li>4. Series and parallel circuits</li> <li>5. Resistance in circuits</li> <li>6. RP: Factors affecting resistance</li> <li>7. Light Dependent Resistors</li> <li>8. Thermistors</li> <li>10-11 RP: investigating non-ohmic conductors</li> <li>11. Mini Quiz</li> <li>12. Mains electricity and AC &amp; DC</li> <li>13. Plugs</li> <li>14. Power calculations</li> <li>15. Work done calculations</li> <li>16. National Grid and Transformers</li> </ol>
<u>Topic 3 - Infection and response</u> <ol style="list-style-type: none"> <li>1. Health</li> <li>2. Pathogens</li> <li>3. Bacterial diseases</li> <li>4. Viral diseases</li> <li>5. Our barriers to diseases</li> <li>6. White blood cells</li> <li>7. Vaccinations</li> <li>8. Antibiotics</li> <li>9. Developing new drugs</li> </ol>	<u>Topic 3 – Quantitative chemistry</u> <ol style="list-style-type: none"> <li>1. Relative Formula Mass</li> <li>2. Introducing moles</li> <li>3. Reacting masses</li> <li>4. Introduction to concentration</li> <li>5. Percentage yield</li> </ol>	<u>Topic 3 - Particle model of matter</u> <ol style="list-style-type: none"> <li>1. Particle model – density and states</li> <li>2. RP : Calculating density</li> <li>3. Change of state</li> <li>4. Latent heat</li> <li>5. Heating and cooling graphs</li> <li>6. Specific heat capacity</li> <li>7. RP : Investigate the specific heat capacity of a given object</li> </ol>
<u>Topic 4 – Bioenergetics</u> <ol style="list-style-type: none"> <li>1. Photosynthesis</li> <li>2. RP: Photosynthesis</li> <li>3. Aerobic respiration</li> <li>4. Anaerobic respiration</li> </ol>	<u>Topic 4 - Chemical changes</u> <ol style="list-style-type: none"> <li>1. Acids and bases</li> <li>2. Neutralisation</li> <li>3. RP: Soluble Salts</li> <li>4. Metals and oxygen</li> <li>5. Metals and acid</li> <li>6. Metals and water</li> <li>7. Reactivity series and extraction methods</li> <li>8. RP: Electrolysis part 1</li> <li>9. RP: Electrolysis part 2</li> </ol>	<u>Topic 4 -Atomic structure</u> <ol style="list-style-type: none"> <li>1. Atomic recap</li> <li>2. Changing atomic theories</li> <li>3. Introduction to radioactive decay</li> <li>4. Alpha, beta and gamma – part 1</li> <li>5. Alpha, beta and gamma – part 2</li> <li>6. Half life</li> <li>7. Irradiation and contamination</li> </ol>
	<u>Topic 5 - Energy changes</u> <ol style="list-style-type: none"> <li>1. Exothermic and endothermic reactions</li> <li>2. RP Temperature Changes</li> </ol>	

<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>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.</li> <li>Investigate what happens when aqueous solutions are electrolysed using inert electrodes.</li> <li>Investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals.</li> </ol>	<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included.</li> <li>Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue</li> <li>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.</li> <li>Investigate the effect of pH on the rate of reaction of amylase enzyme</li> </ol> <p>Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.</p>	<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>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.</li> <li>Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. This should include: <ul style="list-style-type: none"> <li>the length of a wire at constant temperature</li> <li>combinations of resistors in series and parallel.</li> </ul> </li> <li>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.</li> </ol> <p>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.</p>

## Paper 2 – Support Science

<b>Biology – 27 lessons</b>	<b>Chemistry – 28 lessons</b>	<b>Physics – 28 lessons</b>
<p><u>Topic 5 - Homeostasis and response</u></p> <ol style="list-style-type: none"> <li>Homeostasis</li> <li>The nervous system</li> <li>RP Investigating human reaction time</li> <li>The endocrine system</li> <li>Controlling blood glucose</li> <li>Hormones and the menstrual cycle</li> <li>Contraception</li> </ol>	<p><u>Topic 6 - The rate and extent of chemical change</u></p> <ol style="list-style-type: none"> <li>Measuring the rate of reaction</li> <li>Factors affecting rates of reaction</li> <li>Drawing rates of reaction graphs</li> <li>4-6. RP: Factors affecting rates of reaction</li> <li>Catalyst</li> </ol>	<p><u>Topic 5 – Forces</u></p> <ol style="list-style-type: none"> <li>Scalar and vector quantities</li> <li>Types of forces</li> <li>Centre of mass</li> <li>Weight</li> <li>Resultant force</li> <li>Elastic objects and Hooke's Law</li> <li>Work done</li> <li>RP : Relationship between force and spring</li> <li>Speed, distance, displacement, velocity</li> <li>Distance time graphs</li> </ol>

		<ul style="list-style-type: none"> <li>11. Acceleration</li> <li>12. Velocity time graphs</li> <li>13. Mini quiz</li> <li>14. Falling objects</li> <li>15. Newton's First Law</li> <li>16. Newton's Second Law</li> <li>17. RP : Investigating Newton's Second Law</li> <li>18. Newton's Third Law</li> <li>19. Stopping distance</li> <li>20. Breaking distance</li> </ul>
<u>Topic 6 – Inheritance, variation and evolution</u> <ul style="list-style-type: none"> <li>1. Introduction to DNA</li> <li>2. Asexual reproduction</li> <li>3. Comparing sexual and asexual reproduction</li> <li>4. Inheritance</li> <li>5. Variation</li> <li>6. Natural selection</li> <li>7. Evolution</li> <li>8. Selective breeding</li> <li>9. Fossils</li> <li>10. Classification</li> </ul>	<u>Topic 7 – Organic chemistry</u> <ul style="list-style-type: none"> <li>1. Crude Oil</li> <li>2. Fractional Distillation and the fractions</li> <li>3. Cracking</li> <li>4. Alkanes and alkenes</li> <li>5. Properties of alkanes and alkenes</li> <li>6. Combustion</li> </ul>	<u>Topic 6 – Waves</u> <ul style="list-style-type: none"> <li>1. Introduction to waves</li> <li>2. Wave equations</li> <li>3. Measuring speed of sound</li> <li>4. RP ; Measure the speed of a wave using a ripple tank and speed</li> <li>5. EM spectrum</li> <li>6. RP : IR radiation</li> </ul>
<u>Topic 7 – Ecology</u> <ul style="list-style-type: none"> <li>1. Competition</li> <li>2. Abiotic and biotic factors</li> <li>3. Adaptations</li> <li>4. Food chains</li> <li>5. RP Quadrats</li> <li>6. Water cycle</li> <li>7. Carbon cycle</li> <li>8. Biodiversity &amp; Human impact</li> <li>9. Global warming</li> <li>10. Deforestation and land use</li> </ul>	<u>Topic 8 – Chemical analysis</u> <ul style="list-style-type: none"> <li>1. RP Paper chromatography</li> </ul>	<u>Topic 7 – Magnetism and electromagnetism</u> <ul style="list-style-type: none"> <li>1. Magnets</li> <li>2. Electromagnets</li> </ul>
	<u>Topic 9 – Chemistry of the atmosphere</u> <ul style="list-style-type: none"> <li>1. The Early Earth's Atmosphere</li> <li>2. Theories of the atmosphere</li> <li>3. The Greenhouse Effect</li> <li>4. Effects of global warming</li> <li>5. The Harmful Effects of Combustion</li> <li>6. Resources used by Humans</li> </ul>	
	<u>Topic 10 – Using resources</u>	

	<ol style="list-style-type: none"> <li>1. Uses of metals</li> <li>2. Alloys</li> <li>3. Potable Water</li> <li>4. Waste and sewage</li> <li>5. RP Analysing water samples</li> <li>6. Life Cycle Assessment</li> <li>7. Reduce, Reuse, Recycle</li> <li>8. Important materials</li> </ol>	
<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>9. Plan and carry out an investigation into the effect of a factor on human reaction time</li> <li>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.</li> </ol>	<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>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.</li> <li>9. Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate R<sub>f</sub> values.</li> <li>10. Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.</li> </ol>	<p><u>Core practical's</u></p> <ol style="list-style-type: none"> <li>10. Investigate the relationship between force and extension for a spring.</li> <li>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.</li> <li>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.</li> <li>13. Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.</li> </ol>

Unit Award Scheme – Paper 1		
Biology – 37 lessons	Chemistry – 34 lessons	Physics – 35 lessons
<p><u>Topic 1 - Cell biology</u></p> <ol style="list-style-type: none"> <li>1. Types of cell</li> <li>2. Specialised cells</li> <li>3. Stem Cells</li> <li>4. Mitosis</li> <li>5. Introducing microscopes</li> <li>6. RP: Using microscopes</li> <li>7. Diffusion</li> <li>8. Osmosis</li> </ol>	<p><u>Topic 1 - Atomic structure and the periodic table</u></p> <ol style="list-style-type: none"> <li>1. Atoms and elements</li> <li>2. Compounds and formulae</li> <li>3. Word and symbol equations</li> <li>4. Balancing equations</li> <li>5. Separation techniques</li> <li>6. RP: Chromatography</li> <li>7. Changing Atomic Theories</li> <li>8. Protons, Neutrons and Electrons</li> </ol>	<p><u>Topic 1 – Energy</u></p> <ol style="list-style-type: none"> <li>1. Types of energy and energy transfers</li> <li>2. Insulation</li> <li>3. Non-renewable resources</li> <li>4. Renewable resources</li> <li>5. Comparison of energy resources</li> <li>6. Work done</li> <li>7. Power</li> <li>8. Efficiency calculations</li> </ol>

<p>9. RP: Osmosis investigation 10. Active Transport</p>	<p>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) 15. Halogens (Group 7) 16. Noble Gases (Group 0)</p>	<p>9. Gravitational potential energy 10. Kinetic energy</p>
<p><u>Topic 2 – Organisation</u></p> <ol style="list-style-type: none"> <li>1. Tissues, organs and systems</li> <li>2. Enzymes</li> <li>3. RP: pH and enzymes</li> <li>4. Digestion</li> <li>5. RP: Testing food groups</li> <li>6. The lungs</li> <li>7. The heart</li> <li>8. Blood vessels. heart rate and Blood composition</li> <li>9. Cardiovascular disease</li> <li>10. Non-communicable diseases - Smoking</li> <li>11. Cancer</li> <li>12. Transpiration and translocation</li> <li>13. Transpiration experiments</li> </ol>	<p><u>Topic 2 - Bonding, structure, and the properties of matter</u></p> <ol style="list-style-type: none"> <li>1. Ionic bonding</li> <li>2. Properties of ionic bonding</li> <li>3. Covalent bonding</li> <li>4. Properties of covalent structures</li> <li>5. Giant covalent structures</li> <li>6. Metallic Bonding</li> <li>7. Changing states of matter</li> </ol>	<p><u>Topic 2 – Electricity</u></p> <ol style="list-style-type: none"> <li>1. Electrical circuits Introduction</li> <li>2. Calculating current</li> <li>3. Current in circuits</li> <li>4. Series and parallel circuits</li> <li>5. Resistance in circuits</li> <li>6. RP: Factors affecting resistance</li> <li>7. RP: investigating non-ohmic conductors</li> <li>8. Mains electricity and AC &amp; DC</li> <li>9. Plugs</li> <li>10. Power calculations</li> <li>11. Work done calculations</li> <li>12. National Grid and Transformers</li> </ol>
<p><u>Topic 3 - Infection and response</u></p> <ol style="list-style-type: none"> <li>1. Health</li> <li>2. Pathogens</li> <li>3. Bacteria and viruses</li> <li>4. Covid</li> <li>5. Our barriers to diseases</li> <li>6. Medicines</li> <li>7. White blood cells</li> <li>8. Vaccinations</li> <li>9. Antibiotics</li> </ol>	<p><u>Topic 3 – Quantitative chemistry</u></p> <ol style="list-style-type: none"> <li>1. Relative Formula Mass</li> <li>2. Reacting masses</li> <li>3. Introduction to concentration</li> </ol>	<p><u>Topic 3 - Particle model of matter</u></p> <ol style="list-style-type: none"> <li>1. Particle model – density and states</li> <li>2. RP : Calculating density</li> <li>3. Change of state</li> <li>4. Latent heat</li> <li>5. Heating and cooling graphs</li> <li>6. Specific heat capacity</li> <li>7. RP : Investigate the specific heat capacity of a given object</li> </ol>
<p><u>Topic 4 – Bioenergetics</u></p> <ol style="list-style-type: none"> <li>1. Photosynthesis</li> <li>2. RP: Photosynthesis</li> <li>3. Minerals for healthy growth in plants</li> <li>4. Aerobic respiration</li> <li>5. Prac: Respiration</li> </ol>	<p><u>Topic 4 - Chemical changes</u></p> <ol style="list-style-type: none"> <li>1. Acids and bases</li> <li>2. Neutralisation</li> <li>3. RP: Soluble Salts</li> <li>4. Metals and oxygen</li> <li>5. Metals and acid</li> <li>6. Metals and water</li> </ol>	<p><u>Topic 4 -Atomic structure</u></p> <ol style="list-style-type: none"> <li>1. Atomic recap</li> <li>2. Changing atomic theories</li> <li>3. Introduction to radioactive decay</li> <li>4. Alpha, beta and gamma</li> <li>5. Half life</li> <li>6. Irradiation and contamination</li> </ol>
	<p><u>Topic 5 - Energy changes</u></p> <ol style="list-style-type: none"> <li>1. Exothermic and endothermic reactions</li> <li>2. RP Temperature Changes</li> </ol>	

## Unit Award Scheme – Paper 2

<b>Biology – lessons</b>	<b>Chemistry – lessons</b>	<b>Physics – lessons</b>
<p><u>Topic 5 - Homeostasis and response</u></p> <ol style="list-style-type: none"> <li>1. Homeostasis</li> <li>2. The nervous system</li> <li>3. RP Investigating human reaction time</li> <li>4. The endocrine system</li> <li>5. Controlling blood glucose</li> <li>6. Hormones and the menstrual cycle</li> <li>7. Contraception</li> </ol>	<p><u>Topic 6 - The rate and extent of chemical change</u></p> <ol style="list-style-type: none"> <li>1. Measuring the rate of reaction</li> <li>2. Factors affecting rates of reaction</li> <li>3. Drawing rates of reaction graphs</li> <li>4-6. RP: Factors affecting rates of reaction</li> <li>7. Catalyst</li> </ol>	<p><u>Topic 5 – Forces</u></p> <ol style="list-style-type: none"> <li>1. Scalar and vector quantities</li> <li>2. Types of forces</li> <li>3. Centre of mass</li> <li>4. Weight</li> <li>5. Resultant force</li> <li>6. Elastic objects and Hooke's Law</li> <li>7. Work done</li> <li>8. RP : Relationship between force and spring</li> <li>9. Speed, distance, displacement, velocity</li> <li>10. Distance time graphs</li> <li>11. Acceleration</li> <li>12. Velocity time graphs</li> <li>13. Mini quiz</li> <li>14. Falling objects</li> <li>15. Newton's First Law</li> <li>16. Newton's Second Law</li> <li>17. RP : Investigating Newton's Second Law</li> <li>18. Newton's Third Law</li> <li>19. Stopping distance</li> <li>20. Breaking distance</li> </ol>
<p><u>Topic 6 – Inheritance, variation and evolution</u></p> <ol style="list-style-type: none"> <li>1. Introduction to DNA</li> <li>2. Asexual reproduction</li> <li>3. Comparing sexual and asexual reproduction</li> <li>4. Inheritance</li> <li>5. Variation</li> <li>6. Natural selection</li> <li>7. Evolution</li> <li>8. Selective breeding</li> <li>9. Fossils</li> <li>10. Classification</li> </ol>	<p><u>Topic 7 – Organic chemistry</u></p> <ol style="list-style-type: none"> <li>1. Crude Oil</li> <li>2. Fractional Distillation and the fractions</li> <li>3. Cracking</li> <li>4. Alkanes and alkenes</li> <li>5. Properties of alkanes and alkenes</li> <li>6. Combustion</li> </ol>	<p><u>Topic 6 – Waves</u></p> <ol style="list-style-type: none"> <li>1. Introduction to waves</li> <li>2. Wave equations</li> <li>3. Measuring speed of sound</li> <li>4. RP ; Measure the speed of a wave using a ripple tank and speed</li> <li>5. EM spectrum</li> <li>6. RP : IR radiation</li> </ol>
<p><u>Topic 7 – Ecology</u></p> <ol style="list-style-type: none"> <li>1. Competition</li> <li>2. Abiotic and biotic factors</li> <li>3. Adaptations</li> <li>4. Food chains</li> <li>5. RP Quadrats</li> </ol>	<p><u>Topic 8 – Chemical analysis</u></p> <ol style="list-style-type: none"> <li>1. RP Paper chromatography</li> </ol>	<p><u>Topic 7 – Magnetism and electromagnetism</u></p> <ol style="list-style-type: none"> <li>1. Magnets</li> <li>2. Electromagnets</li> </ol>

<ul style="list-style-type: none"> <li>6. Water cycle</li> <li>7. Carbon cycle</li> <li>8. Biodiversity &amp; Human impact</li> <li>9. Global warming</li> <li>10. Deforestation and land use</li> </ul>		
	<p><u>Topic 9 – Chemistry of the atmosphere</u></p> <ul style="list-style-type: none"> <li>1. The Early Earth's Atmosphere</li> <li>2. Theories of the atmosphere</li> <li>3. The Greenhouse Effect</li> <li>4. Effects of global warming</li> <li>5. The Harmful Effects of Combustion</li> <li>6. Resources used by Humans</li> </ul>	
	<p><u>Topic 10 – Using resources</u></p> <ul style="list-style-type: none"> <li>1. Uses of metals</li> <li>2. Alloys</li> <li>3. Potable Water</li> <li>4. Waste and sewage</li> <li>5. RP Analysing water samples</li> <li>6. Life Cycle Assessment</li> <li>7. Reduce, Reuse, Recycle</li> <li>8. Important materials</li> </ul>	