 2020-2021 Y7 Long Term Plan: Science

‘*To be curious about the world around us, to learn through scientific discovery, and to be the scientists and innovators of the future’*

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|  | HT1 | | HT2 | | HT3 | | HT4 | | HT5 | HT6 |
| **YEAR 7** | **TOPIC:**  Introduction to science  -Careers lesson: What is a scientist?  **Skills & Knowledge:**  Lab Safety  Using basic science equipment  Variables  Planning investigations  Make predictions  Make observations  Use measuring instruments  Interpret observations  Solve problems  Analyse data  Evaluate scientific evidence  **Purpose:**  -Ensures all pupils have core skills and a common language for investigations  -Addresses inconsistencies in previous Science experience and corrects misconceptions around fair testing, repeatability and validity  -These concepts cover the Scientific Method which underpins all Science  ASSESSMENT: AQA BASELINE TEST  Cell biologist  Careers lesson: What is a Cell Biologist?  **Skills & Knowledge:**  Life processes  Structure of plant and animal cells  Microscopy and measuring cells  Diffusion  Cells, tissues, organs and organ systems  Digestive system  Circulatory and gas exchange systems  Skeletal system  **Purpose:**  **-**Build on KS2 curriculum to link life processes with the concept of cells and how they are arranged to form whole organisms.  -Essential concepts of cell structure to be covered before teaching Biochemist (Y7) unit and Health Scientist (Y8)  -These concepts are revisited in GCSE Biology  -Science story for Cell Biologist scientists to cover the development of Cell Theory and Microscopes | | **TOPIC**:  Molecular chemist  -Careers lesson: What is a Molecular Chemist?  **Skills & Knowledge:**  States of matter  Particle model  Particle model of solutions  Atomic structure  Molecules  Symbols and formulae  **Purpose:**  -Build on the KS2 curriculum topics of States of Matter and Properties and Changes of Materials  -Essential concepts to be developed before teaching Acid Scientist (Y7), Analytical Chemist (Y8) and Periodic Table Chemist (Y8)  -Develop key concepts to support learning and understanding in GCSE Chemistry  -These concepts are revisited and further developed in GCSE Chemistry | | **TOPIC:**  Force scientist 1  -Careers lesson: What is a Force Scientist?  **Skills & Knowledge:**  Forces  Explaining motion from forces  Energy changes  Motion graphs  Resistive forces  **Purpose:**  **-**Build on the KS2 curriculum topics of States of Forces  -Develop key concepts to support learning and understanding in GCSE Physics  -These concepts are revisited and further developed in GCSE Physics  Biochemist  -Careers lesson: What is a Biochemist?  **Skills & Knowledge**:  Photosynthesis  Cellular respiration  Enzymes  **Purpose:**  **-**Links to Cell Biologist unit to build on understanding of nutrition, respiration and growth in plants and animals  -Biochemical processes are studied further in GCSE Biology (Organisation and Bioenergetics)  . | | **TOPIC:**  Acid scientist  -Careers lesson: What is an Acid Scientist?  **Skills & Knowledge:**  Acids and alkalis  pH scale  Indicators  Neutralisation  Making salts  **Purpose:**  **-**Revisit and further develop the concepts covered in Molecular Chemist (Y7)  -Essential concepts to be developed before teaching Analytical Chemist (Y8) and Periodic Table Scientist (Y8)  -Develop key concepts to support learning and understanding in GCSE Chemistry  -These concepts are revisited and further developed in GCSE Chemistry | | **TOPIC:**  Force scientist 2  -Careers lesson: What is a Force Scientist?  **Skills & Knowledge:**  Mass and weight  Hooke’s law  Moments  **Purpose:**  **-**Build on the KS2 curriculum topics of States of Forces  -Develop key concepts to support learning and understanding in GCSE Physics  -These concepts are revisited and further developed in GCSE Physics  Geneticist  Careers lesson: What is a Geneticist?  **Skills & Knowledge:**  Structure and function of the genome  Inheritance of characteristics  Life cycles  Sexual and asexual reproduction  **Purpose:**  -Links to KS2 curriculum through teaching of life cycles  -Builds on prior knowledge from KS2 and Cell Biologist to link DNA in cells to inherited characteristics, fertilisation and reproduction  -Links to Evolution Scientist in Y8  -Will be revisited at GCSE (Inheritance and Variation and Evolution)  - Story of Crick, Watson and Franklin and their discovery of DNA | **TOPIC:**  Geologist:  -Careers lesson: What is a Force Scientist?  **Skills & Knowledge:**  Rock or mineral?  Sedimentary rocks and fossils  Structure of the Earth  Plate tectonics  Igneous rock  Metamorphic rock  Rock cycle  Physical weathering and erosion  Chemical weathering  Formation of fossil fuels  **Purpose:**  -Prior learning KS2 - Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.  -Prior learning KS2 - describe in simple terms how fossils are formed when things that have lived are trapped within rock  -Future learning: KS4 Biology Fossils and Extinction  -Links to convection in KS3 heating engineer topic and KS4 Physics P2 Energy transfer by heating  -Future learning links to KS4 Chemistry: Finite and renewable resources, and Crude oil and fuels. |
| **KEY PIECE:**  -Equipment identification  -Labelling plant & animal cells | | **ASSESSMENT- DC1** Assess Introduction to Science, Cell Biologist, Molecular chemist | | **KEY PIECE:**  Distance-time graphs | | **ASSESSMENT- DC2** Assess Force Scientist 1, Biochemist, Acid Scientist | | **KEY PIECE:**  Hooke’s Law investigation | **ASSESSMENT- DC3** Assess Force Scientist 2, Geneticist, Geologist |
| LITERACY FOCUS:  Writing: Letter from Robert Hooke on the discovery of cells | | LITERACY FOCUS:  Oracy: Debate ‘Is plastic really a problem?’ | | LITERACY FOCUS:  Writing: A method for testing a leaf for starch | | LITERACY FOCUS:  Writing: 6 Mark Question to compare the use of universal indicator and a data logger to measure pH | | LITERACY FOCUS:  Oracy: Genetic engineering debate | LITERACY FOCUS:  Writing: 6 mark question to describe the processes involved in the cycling of rocks |
| **Enrichment** | Guest speaker: Keith Watling: Prosthetic limbs (TBC)  Pluck dissection Y7 - MSR | |  | | STEM Roadshow BAE Systems & RAF | | BRITISH SCIENCE WEEK events  Year 7 Museum of Science and Industry trip | |  |  |
| **KS3 Science Club every Wednesday 2:45-3:45pm S4** | | | | | | | | | |
| **YEAR 8** | **TOPIC:**  Sound & Light engineer  -Careers lesson: What is a Sound & Light Engineer?  **Skills & Knowledge:**  How sound is produced  How light travels  The eye  Colours of light  Refraction and lenses  Water waves  Sound waves  Wave model of light  **Purpose:**  **-**Build on the KS2 curriculum topics of States of Sound and Light  -Develop key concepts to support learning and understanding in GCSE Physics  -These concepts are revisited and further developed in GCSE Physics  Health scientist  -Careers Lesson: What is a Health Scientist?  **Skills & Knowledge:**  Health and disease  Diet  Exercise and health  Recreational drug use  Pathogens  Preventing infection in animals and plants  **Purpose:**  -Recreational drugs topic is no longer in the GCSE content, so it is covered here and in the PSHE curriculum  -Builds on knowledge from the Cell Biologist unit in Y7, so that pupils can appreciate the structure of pathogens at a cellular level  -Links to Infection & Response and Bioenergetics in GCSE Biology  -Promotes healthy lifestyle (links to PSHE) | **TOPIC:**  Analytical Chemist  Careers lesson: What is an Analytical chemist?  **Skills & Knowledge:**  Physical and chemical changes  Rearrangement of atoms  Formation of new substances  Conservation of mass  Combustion reactions  Endothermic and exothermic reactions  Precipitation reactions  **Purpose:**  **-**Revisit and further develop the concepts covered in Molecular Chemist (Y7) and Acid Scientist (Y7)  -Essential concepts to be developed before teaching Pharmacist (Y8) and Periodic Table Scientist (Y8)  -Develop key concepts to support learning and understanding in GCSE Chemistry  -These concepts are revisited and further developed in GCSE Chemistry | | **TOPIC:**  Astronomer  Careers lesson: What is an Astronomer?  **Skills & Knowledge:**  Planets in the solar system  Objects in the night sky  Gravity  Days and seasons.  **Purpose:**  **-**This area sparks great interest in pupils to increase their understanding of their place in the Universe  -Develop key concepts to support learning and understanding in GCSE Physics  -These concepts are revisited and further developed in GCSE Physics  Physiotherapist  -Careers lesson: What is a Physiotherapist?  **Skills & Knowledge:**  The Human Skeleton  Bones & muscles  Exercise  Heart Disease  Asthma & smoking  Measuring lung capacity  **Purpose**:  -Develops and understanding of working in caring professions and the responsibilities.  -Develops students understanding of the importance of an active lifestyle (links to PHSE)  -Builds on knowledge from the Cell Biologist unit in Y7  -Links to Infection & Response and Bioenergetics in GCSE Biology | | **TOPIC:**  Evolution scientist  Careers lesson: What is an Evolution Scientist?  **Skills & Knowledge:**  Environmental and inherited variation  Changes in species over time  Adaptation  Competition  Evolution by natural selection  Identifying and classifying organisms  **Purpose:**  -Links to KS2 using keys to identify organisms and basic classification  -Revisited in GCSE Ecology and Inheritance Variation & Evolution-Story of Darwin to support pupil understanding of the importance of his discoveries and why he was ridiculed at the time | | **TOPIC:**  Pharmacist  Careers lesson: What is a Pharmacist?  **Skills & Knowledge:**  Solubility  Comparing solubility  Separation techniques  Evaporation  **Purpose:**  **-**Revisit and further develop the concepts covered in Molecular Chemist (Y7), Acid Scientist (Y7) and Analytical Chemist (Y8)  -Essential concepts to be developed before teaching Periodic Table Scientist (Y8)  -Develop key concepts to support learning and understanding in GCSE Chemistry  -These concepts are revisited and further developed in GCSE Chemistry  Heating engineer  **Skills & Knowledge:**  Temperature  Heating and cooling  Thermal conduction  Thermal stores of energy  Density  Pressure in liquids  Convection  **Purpose:**  **-**These topics build on material from Y7  -Develop key concepts to support learning and understanding in GCSE Physics  -These concepts are revisited and further developed in GCSE Physics | | **TOPIC:**  Ecologist  **Skills & Knowledge:**  Environmental and inherited variation  Changes in species over time  Adaptation  Competition  Evolution by natural selection  Identifying and classifying organisms  **Purpose:**  -Pupils should be familiar with food chains and habitats from KS2, this topic deepens their understanding by introducing the concept of food webs and looking at how populations can be affected by changing conditions  -Encourage pupils to think more widely about habitats and species by considering global biodiversity and human impacts  -Links to Evolution Scientist in Y8 and will be revisited in Ecology at GCSE |
| KEY PIECE:  Splitting white light using a prism | **ASSESSMENT- DC1**  Assess Sound & light, Health Scientist, Analytical chemist | | KEY PIECE:  Chicken wing dissection to explain antagonistic muscle pairs | | **ASSESSMENT- DC2**  Assess Astronomer, Physio, Evolution Scientist | | KEY PIECE:  Identify separation techniques | | **ASSESSMENT- DC3**  Assess Pharmacist, Ecologist, Heating Engineer |
| LITERACY FOCUS  Oracy: Debate ‘Should cannabis be legalised?’ | LITERACY FOCUS  Writing: 6 mark question Plan an investigation to show how the mass of magnesium affects temperature change in a reaction | | LITERACY FOCUS :  Reading: Newspaper article on the 50th Anniversary of the moon landing | | LITERACY FOCUS  Writing: A letter from Charles Darwin on his voyage round Galapagos | | LITERACY FOCUS  Writing: 6 mark question method used to make copper sulphate crystals/ density required practical | | LITERACY FOCUS  Reading: An article on the human impact on biodiversity |
| **Enrichment** |  |  | | STEM Roadshow BAE Systems & RAF -28th Jan | | BRITISH SCIENCE WEEK events | |  | |  |
| **KS3 Science Club every Wednesday 2:45-3:45pm S4** | | | | | | | | | |
| **YEAR 9** | ***Continue KS3***  **TOPIC:**  Electrician  -Careers lesson: What is an Electrician?  **Skills & Knowledge:**  Making simple circuits and circuit symbols  Electric currents  Voltage  Static electricity  Resistance  Effects of voltage and resistance on current  Series and parallel circuits  Magnetic fields  Electromagnets  Generating electricity  Paying for electricity  **Purpose:**  -Revisit and further develop the links to Ks2 curriculum  -Develop key concepts to support learning and understanding in GCSE Physics  -These concepts are revisited and further developed in GCSE Physics Chapter 4: Electric circuits and  Chapter 5: Electricity in the home  -To understand how we pay for electricity as a life skill | | **Continue KS3**  **TOPIC:**  Periodic Table Scientist  -Careers lesson: What is an Electrician?  **Skills & Knowledge:**  Patterns in physical properties of elements  Atomic model  Patterns in atomic structure  Reactivity series  Patterns in chemical properties of elements  **Purpose:**  -Revisit and further develop the concepts covered in Molecular Chemist (Y7), Acid Scientist (Y7), Pharmacist (Y8) and Analytical Chemist (Y8)  -Develop key concepts to support learning and understanding in GCSE Chemistry  -These concepts are revisited and further developed in GCSE Chapter 1: Atomic structure and  Chemistry Chapter 2: The Periodic Table | | **TOPIC:**  Biology 1  Chapter 1: Cells  Chapter 2: Cell division  Chapter 3: Organisation & digestion  Chapter 4:Organising plants & animals  Chapter 8 : Photosynthesis | | **TOPIC**  Biology 1  Chapter 9: Respiration  Chapter 5: Communicable diseases  Chapter 6: Preventing diseases  Chapter 7: Non-communicable diseases  - Revision & B1 mock exam | | **TOPIC**:  Chemistry 1  Chapter 1: Atomic structure  Chapter 2: The Periodic Table  Chapter 3: Structure & Bonding  Chapter 4: Chemical calculations  Chapter 5: Chemical changes | **TOPIC**:  Chemistry 1  Chapter 6: Electrolysis  Chapter 7: Energy changes  -Revision and C1 mock paper |
| KEY PIECE:  Identify electrical symbols and state uses | | **ASSESSMENT - DC1**  Assess Electrician & Periodic Table Scientist | | KEY PIECE:  Microscopy required practical  Osmosis required practical | | **ASSESSMENT - DC2**  GCSE TRILOGY BIOLOGY PAPER 1 | | KEY PIECE:  Making salts required practical | **ASSESSMENT - DC3**  GCSE TRILOGY CHEMISTRY PAPER 1 |
| LITERACY FOCUS  Writing: Scientific investigation keyword definitions | | LITERACY FOCUS  Writing : Newspaper article on the history of the periodic table | | LITERACY FOCUS  Writing: Osmosis required practical method | | LITERACY FOCUS  Oracy: Vaccinations debate | | LITERACY FOCUS  Writing: Nano science 6 mark question | LITERACY FOCUS  Writing: Electrolysis required practical method |
| **Enrichment** | Guest speaker: Kevin Robinson Electrician | |  | | Guest Speaker - Nick Priest: Paramedic  Year 9 Museum of Science & Industry Trip | | BRITISH SCIENCE WEEK events  Year 9 MMU Trip: The hunt for aliens and their worlds (Speaker from Jodrell bank) | |  |  |
| **Y9 CREST AWARDS club Every Tuesday 2:45-3:45 S4** | | | | | | | | | |
| **YEAR 10** | **TOPIC:**  Physics 1  Chapter 1 : Conservation & Dissipation of energy  Chapter 2: Energy transfer  Chapter 3: Energy resources  Chapter 6 : Molecules and matter | | **TOPIC:**  Physics 1  Chapter 4: Electric circuits  Chapter 5: Electricity in the home  Chapter 7: Radioactivity | | **TOPIC:**  Chemistry 1  Complete remaining topics & mock exam revision  Y10 Mocks (C1)  MIB mock/next steps lessons | | **TOPIC:**  Chemistry 2  Chapter 8 : Rates  Chapter 9: Crude oil & fuels  Chapter 10: Chemical analysis  Chapter 11: Earth’s Atmosphere  Chapter 12: Earth’s resources | | **TOPIC:**  Physics 2  Chapter 8: Forces in balance  Chapter 9: Motion  Chapter 10: Force and motion  Chapter 11: Wave properties  Chapter 12: Electromagnetic waves | **TOPIC:**  Physics 2  Chapter 13 – Electromagnetism  P2 and C2 mock revision  Mock exams (C2 & P2) |
| KEY PIECE:  Density required practical | | **ASSESSMENT- DC1**  **PHYSICS PAPER 1** | | **ASSESSMENT – DC2**  **CHEMISTRY PAPER 1** | | KEY PIECE:  Rates of reaction required practical  Rf values required practical  Purifying water required practical | | KEY PIECE:  Hooke’s law required practical  Acceleration required practical  Ripple tank required practical | **ASSESSMENT - DC3**  **CHEMISTRY PAPER 2**  **PHYSICS PAPER 2** |
| LITERACY FOCUS  Oracy: Debate renewable energy resources | | LITERACY FOCUS  Research: Chernobyl | | LITERACY FOCUS  Reading: Exam command words | | LITERACY FOCUS  Writing: A letter to Donald Trump on global warming | | LITERACY FOCUS  Writing: Evaluating car safety engineering | LITERACY FOCUS  Writing: Method for making an electromagnet |
| **Enrichment** | STEM Ambassadors | |  | |  | | BRITISH SCIENCE WEEK events | |  |  |
| **YEAR 11** | **TOPIC:**  Complete all biology paper 2 remaining units  Chapter 12: Reproduction  Chapter 13: Variation  Chapter 14: Genetics  Chapter 15: Adaptations  Chapter 16: Organising an ecosystem  Chapter 17: Biodiversity and ecosystems | | **TOPIC:**  Y11 Mock exams    Complete P2 and C2 content | | **TOPIC**  Skills and recall lessons  -Maths skills  -Graph skills  **-**Variables  -Method writing  **-**Equipment  **-**Command words | | **TOPIC**  -Mock exam revision B1, C1, P1 recall  -Year 11 mocks (B1, P1 & C1)  -MIB mock/next steps lessons | |  |  |
| KEY PIECE:  Sampling required practical | | **ASSESSMENT – DC1**  **BIOLOGY PAPER 2**  **PHYSICS PAPER 2 CHEMISTRY PAPER 2** | | KEY PIECE:  Identifying scientific equipment, uses, and units  Drawing a line graph | | **ASSESSMENT – DC2**  **BIOLOGY PAPER 1**  **CHEMISTRY PAPER 1**  **PHYSICS PAPER 1** | |  |
| LITERACY FOCUS:  Reading: Genetics key word definitions  Oracy: Stem cells debate | | LITERACY FOCUS : Reading- exam command words definitions | | LITERACY FOCUS;  Writing: Scientific method writing | | LITERACY FOCUS:  Reading – Exam technique, evaluating, and command words | |  |
| **Enrichment** | STEM Ambassadors | |  | |  | | BRITISH SCIENCE WEEK events | |  |  |

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|  | **Reading** | **Writing** | **Oracy** |
| **Literacy Opportunities** | Newspaper article  Blog  Academic text  Research | Method  Evaluation  Newspaper article  Letter  Blog | Class debate  Presentation  Group discussion |
| **Purpose** | Access to text | Writing at length | Academic register |