 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’*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | HT1 | HT2 | HT3 | HT4 | HT5 | HT6 |
| **YEAR 7** | **TOPIC:**Introduction to science-Careers lesson: What is a scientist?**Skills & Knowledge:**Lab SafetyUsing basic science equipmentVariablesPlanning investigationsMake predictionsMake observationsUse measuring instrumentsInterpret observationsSolve problemsAnalyse dataEvaluate 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 ScienceASSESSMENT: AQA BASELINE TESTCell biologistCareers lesson: What is a Cell Biologist?**Skills & Knowledge:**Life processesStructure of plant and animal cellsMicroscopy and measuring cellsDiffusionCells, tissues, organs and organ systemsDigestive systemCirculatory and gas exchange systemsSkeletal 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 matterParticle modelParticle model of solutionsAtomic structureMoleculesSymbols 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:**ForcesExplaining motion from forcesEnergy changesMotion graphsResistive 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 PhysicsBiochemist-Careers lesson: What is a Biochemist?**Skills & Knowledge**:PhotosynthesisCellular respirationEnzymes**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 alkalispH scaleIndicatorsNeutralisation 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 weightHooke’s lawMoments**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 PhysicsGeneticistCareers lesson: What is a Geneticist?**Skills & Knowledge:**Structure and function of the genomeInheritance of characteristics Life cyclesSexual 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 fossilsStructure of the EarthPlate tectonicsIgneous rockMetamorphic rockRock cyclePhysical weathering and erosionChemical weatheringFormation 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 eventsYear 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 producedHow light travelsThe eyeColours of lightRefraction and lensesWater wavesSound wavesWave 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 PhysicsHealth scientist -Careers Lesson: What is a Health Scientist?**Skills & Knowledge:**Health and diseaseDietExercise and healthRecreational drug usePathogensPreventing 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 ChemistCareers lesson: What is an Analytical chemist?**Skills & Knowledge:**Physical and chemical changesRearrangement of atomsFormation of new substancesConservation of massCombustion reactionsEndothermic 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:**AstronomerCareers lesson: What is an Astronomer?**Skills & Knowledge:**Planets in the solar systemObjects in the night sky GravityDays 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 PhysicsPhysiotherapist-Careers lesson: What is a Physiotherapist?**Skills & Knowledge:**The Human SkeletonBones & musclesExerciseHeart DiseaseAsthma & smokingMeasuring 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 scientistCareers lesson: What is an Evolution Scientist?**Skills & Knowledge:**Environmental and inherited variationChanges in species over timeAdaptationCompetitionEvolution by natural selectionIdentifying 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:**PharmacistCareers lesson: What is a Pharmacist?**Skills & Knowledge:**SolubilityComparing solubilitySeparation techniquesEvaporation**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 ChemistryHeating engineer**Skills & Knowledge:**TemperatureHeating and coolingThermal conductionThermal stores of energyDensityPressure in liquidsConvection**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 variationChanges in species over timeAdaptationCompetitionEvolution by natural selectionIdentifying 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 FOCUSOracy: Debate ‘Should cannabis be legalised?’ | LITERACY FOCUSWriting: 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 FOCUSWriting: 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 symbolsElectric currentsVoltageStatic electricityResistanceEffects of voltage and resistance on currentSeries and parallel circuitsMagnetic fieldsElectromagnetsGenerating electricityPaying 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 elementsAtomic modelPatterns in atomic structureReactivity seriesPatterns 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 andChemistry Chapter 2: The Periodic Table  | **TOPIC:**Biology 1Chapter 1: CellsChapter 2: Cell division Chapter 3: Organisation & digestionChapter 4:Organising plants & animalsChapter 8 : Photosynthesis | **TOPIC**Biology 1Chapter 9: RespirationChapter 5: Communicable diseasesChapter 6: Preventing diseasesChapter 7: Non-communicable diseases- Revision & B1 mock exam  | **TOPIC**: Chemistry 1Chapter 1: Atomic structureChapter 2: The Periodic Table Chapter 3: Structure & BondingChapter 4: Chemical calculationsChapter 5: Chemical changes | **TOPIC**:Chemistry 1Chapter 6: ElectrolysisChapter 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 practicalOsmosis required practical  | **ASSESSMENT - DC2** GCSE TRILOGY BIOLOGY PAPER 1 | KEY PIECE: Making salts required practical | **ASSESSMENT - DC3**GCSE TRILOGY CHEMISTRY PAPER 1 |
| LITERACY FOCUSWriting: Scientific investigation keyword definitions | LITERACY FOCUSWriting : 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 FOCUSWriting: Electrolysis required practical method |
| **Enrichment** | Guest speaker: Kevin Robinson Electrician |  | Guest Speaker - Nick Priest: ParamedicYear 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 1Chapter 1 : Conservation & Dissipation of energyChapter 2: Energy transferChapter 3: Energy resourcesChapter 6 : Molecules and matter | **TOPIC:**Physics 1Chapter 4: Electric circuitsChapter 5: Electricity in the homeChapter 7: Radioactivity | **TOPIC:**Chemistry 1Complete remaining topics & mock exam revisionY10 Mocks (C1)MIB mock/next steps lessons | **TOPIC:**Chemistry 2Chapter 8 : Rates Chapter 9: Crude oil & fuelsChapter 10: Chemical analysisChapter 11: Earth’s AtmosphereChapter 12: Earth’s resources | **TOPIC:**Physics 2 Chapter 8: Forces in balanceChapter 9: MotionChapter 10: Force and motionChapter 11: Wave propertiesChapter 12: Electromagnetic waves | **TOPIC:**Physics 2Chapter 13 – ElectromagnetismP2 and C2 mock revisionMock exams (C2 & P2) |
| KEY PIECE: Density required practical | **ASSESSMENT- DC1****PHYSICS PAPER 1** | **ASSESSMENT – DC2****CHEMISTRY PAPER 1**  | KEY PIECE: Rates of reaction required practicalRf values required practicalPurifying water required practical | KEY PIECE: Hooke’s law required practicalAcceleration required practicalRipple tank required practical | **ASSESSMENT - DC3****CHEMISTRY PAPER 2****PHYSICS PAPER 2** |
| LITERACY FOCUSOracy: Debate renewable energy resources | LITERACY FOCUS Research: Chernobyl | LITERACY FOCUSReading: Exam command words | LITERACY FOCUSWriting: A letter to Donald Trump on global warming | LITERACY FOCUSWriting: Evaluating car safety engineering | LITERACY FOCUSWriting: Method for making an electromagnet  |
| **Enrichment** | STEM Ambassadors |  |  | BRITISH SCIENCE WEEK events |  |  |
| **YEAR 11** | **TOPIC:** Complete all biology paper 2 remaining unitsChapter 12: ReproductionChapter 13: VariationChapter 14: GeneticsChapter 15: AdaptationsChapter 16: Organising an ecosystemChapter 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 definitionsOracy: 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 |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Reading** | **Writing** | **Oracy** |
| **Literacy Opportunities**  | Newspaper articleBlogAcademic textResearch | MethodEvaluationNewspaper articleLetterBlog | Class debatePresentationGroup discussion |
| **Purpose**  | Access to text  | Writing at length  | Academic register  |