

Science Curriculum Map – Year 7-11

| Year | HT1 | HT2 | HT3 | HT4 | HT5 | HT6 |
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| 7 | <p>Topic: Particles (Chemistry)</p> <ol style="list-style-type: none"> Routines and Expectations (optional) Variables Accuracy Equipment Following a method Drawing graphs Maths in Science States of matter (inc. density) Changes of state Melting and boiling points (Practical) Expansion and contractions (Demonstration) Brownian Motion and the particle model (Demonstration) Types of transport Atoms and elements Compounds and mixtures Symbols and formulae Atomic Structure | <p>Topic: Types of reaction and the periodic table (Chemistry)</p> <p>Physical and Chemical reactions</p> <ol style="list-style-type: none"> Pure substances and solubility Rates of dissolving (Practical) Filtration (Practical) Crystallisation (linking to evaporation) (Practical) Simple Distillation (Demonstration) Chromatography (Practical) Acids and Alkalis Indicators (Practical) Neutralisation (Practical) The periodic table – structure History of the periodic table Metals and non-metals Alloys (EXT) Ceramics, Polymers, Composite | <p>Topic: Forces (Physics)</p> <ol style="list-style-type: none"> Identifying forces – contact vs non-contact Balanced and unbalanced forces Resultant force Newton’s Laws (EXT) Friction- advantages and disadvantage Streamlining- everyday examples and linked to particles (EXT) (Practical) Speed calculations Distance- time graph Velocity-time graph Hooke’s Law- (Practical) Moments Gravity, weight and mass Solar system Day and night Seasons Galaxies and universe Light year | <p>Topic: Energy (Physics)</p> <ol style="list-style-type: none"> Energy Stores Energy transfers Useful and wasted energy Sankey diagrams (EXT) Efficiency calculations Energy in food Heating and thermal equilibrium Conduction, convection and radiation (Practical) Preventing heat loss- practical skills The National Grid Renewable and non-renewable Generating electricity from renewable and non-renewable sources Renewables- advantages and disadvantages Nuclear energy Calculations: power and energy costs | <p>Topic: Interdependence and cells (Biology)</p> <ol style="list-style-type: none"> Living things: MRS NERG 5 Kingdoms and classes Classification and keys Food chains Food webs Pyramids of numbers Pyramids of biomass (EXT) Environment and habitats Competition Sampling techniques (EXT) (Practical) Microscopes Animal cells (Practical) Plant cells (Practical) Microscope calculations (EXT) Prokaryotic vs eukaryotic Specialised cells Stem cells Cells, tissues, organs, systems | <p>Topic: Reproduction and Variation (Biology)</p> <ol style="list-style-type: none"> Male and female reproductive organs in humans and plants Gametes – humans and plants Fertilisation in humans Pregnancy and gestation Effect of maternal lifestyle Menstrual cycle Pollination and seed dispersal Quantitative investigations of dispersal mechanisms Genetic and environmental variation Genetic cross diagrams (EXT) Genetic diseases and sexual determination (EXT) Variation Adaptation Natural Selection Selective Breeding Endangered species and extinction Biodiversity Extremophiles (EXT) |

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| 8 | <p>Topic: Waves and Pressure (Physics)</p> <ol style="list-style-type: none"> 1. Transverse and longitudinal (EXT) 2. Producing sounds (Demonstration) 3. How sound travels 4. Hearing sounds – structure of the ear 5. Properties of sound waves (Demonstration) 6. Using sound: ultrasound and echo waves 7. Waves – EM waves (inc water waves) 8. Introduction to light 9. Comparing sound & light waves 10. Wave calculations 11. The eye (Optional Practical/demonstration) 12. Reflection (diffuse and specular)(Practical) 13. Refraction (inc. prisms) (Practical) 14. Seeing colour (EXT) (Practical) 15. Pressure (over area) (Demonstration) 16. Pressure (in liquids) (Demonstration) 17. Pressure (in gases) (Demonstration) | <p>Topic: Electricity and Magnetism (Physics)</p> <ol style="list-style-type: none"> 1. Conductors and Insulators (Practical) 2. Electrical circuits (Practical) 3. Current (Practical) 4. Potential difference 5. Measuring potential difference 6. Series and Parallel circuits (Practical) 7. Resistance in a circuit 8. Power in a circuit 9. Static electricity (Demonstration) 10. Magnets 11. Making Magnets 12. Drawing magnetic fields(Practical) 13. Earth's magnetic field 14. Electromagnets (Practical) 15. Using Electromagnets (inc. introduction to D.C. motors) | <p>Topic: Chemical reactions (Chemistry)</p> <ol style="list-style-type: none"> 1. Atomic Structure 2. Electronic Configuration 3. Ar and Mr (EXT) 4. Alkali metals (group 1) 5. Halogens (Group 7) 6. Noble Gases (Group 0) 7. Reactivity of Group 1 and 7 (EXT) 8. Naming compounds (EXT) 9. Writing formulae (EXT) 10. Exothermic and endothermic reactions 11. Testing for gases 12. Metals and oxygen (Practical) 13. Metals and acid reactions (Practical) 14. Acids and hydroxides 15. Acids and carbonates (Practical) 16. Combustion (Demonstration) 17. Word and symbol equations 18. Balancing equations 19. Conservation of mass | <p>Topic: Reactions and the environment (Chemistry)</p> <ol style="list-style-type: none"> 1. The Reactivity series (Practical) 2. Displacement reactions 3. Extracting metals 4. Rates of reaction (EXT) 5. Thermal decomposition and catalysts (Practical) 6. Composition of the Earth 7. Structure of the Earth 8. The Rock Cycle 9. Igneous rocks 10. Sedimentary rocks 11. Metamorphic rocks (Practical) 12. Fossil fuel formation 13. The Earth's Atmosphere 14. The carbon cycle 15. Climate change and the greenhouse effect 16. Finite resources and recycling | <p>Topic: Energy from food (Biology)</p> <ol style="list-style-type: none"> 1. Food groups 2. Balanced and unbalanced diets 3. Energy in food (Practical) 4. Tissues and organs of the digestive system (Demonstration) 5. Digestion 6. Absorption – diffusion, active transport, osmosis (EXT) 7. Enzymes in the digestive system 8. Photosynthesis 9. Investigating Photosynthesis (Practical) 10. Leaf adaptations – Gas exchange 11. Root adaptation - Absorption of water 12. Transpiration/translocation (EXT) (Practical) 13. Testing for starch (Practical) | <p>Topic: Keeping Healthy (Biology)</p> <ol style="list-style-type: none"> 1. Sub cellular structures (recap) 2. Cells, tissues, organs and systems 3. The lungs (Demonstration) 4. Breathing 5. Gas exchange 6. The heart and blood (Demonstration) 7. The circulatory system 8. The skeletal & muscular system 9. Aerobic respiration 10. Anaerobic respiration 11. Exercise and respiration (Practical) 12. Communicable vs non communicable diseases 13. Microorganisms 14. Pathogens 15. Antibiotics 16. Human defences 17. Vaccination 18. Drugs & lifestyle choices |

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| 9 | <p>Topic: Chemistry Fundamentals</p> <p>Knowledge:</p> <ol style="list-style-type: none"> 1. Changing states of matter 2. Atoms and elements 3. Compounds and formulae 4. Pure substances and solutions 5. Separation techniques (Demonstration) 6. Chromatography (R.Practical) 7. Changing Atomic Theories 8. Protons, Neutrons and Electrons 9. Electron configuration 10. Isotopes and relative atomic mass 11. The periodic table 12. The modern periodic table 13. Mini Quiz 14. Metals and non-metals 15. Uses of metals 16. Corrosion (Separate only) 17. Corrosion prevention (Separate only) (Practical) 18. Transition metals (Separate only) 19. Typical properties (Separate only) 20. Alloys 21. Properties and uses of alloys 22. Alkali metals (Demonstration) 23. Halogens 24. Noble Gases 25. Gas tests (Demonstration/Practical) | <p>Topic: Investigative Chemistry</p> <p>Knowledge:</p> <ol style="list-style-type: none"> 1. Ionic bonding part 1 2. Ionic bonding part 2 3. Properties of ionic bonding 4. Covalent bonding 5. Properties of covalent structures 6. Giant covalent structures 7. Nanoparticles (Separate only) 8. Metallic Bonding 9. Comparing and contrasting types of bonding 10. Word and symbol equations 11. Balancing equations 12. Conservation of mass 13. Metals and oxygen (Demonstration) 14. Metals and acid (Demonstration) 15. Metals and water (Demonstration) 16. Redox reactions (Higher only) 17. Acids and bases 18. Acids - weak and strong (Separate only) (Demonstration) 19. Neutralisation 20. RP: Soluble Salts 20. Reactivity series and displacement reactions (Practical) 21. Ionic half equations for displacement (Higher only) 22. Reactivity series and extraction methods 23. Electrolysis of molten compounds (ionic half equations - higher only) 24. Electrolysis of aqueous compounds (ionic half equations - higher only) 25. Electrolysis part 1 (R.Practical) 26. Electrolysis part 2 (R.Practical) | <p>Topic: Physics - Energy and Waves</p> <p>Knowledge:</p> <ol style="list-style-type: none"> 1. Energy stores and energy transfers 2. Open and closed systems 3. Work done 4. Power 5. Efficiency calculations 6. Insulation 7. Investigating thermal insulators (Practical – R for Separate only) 8. Gravitational potential energy 9. Kinetic energy 10. Elastic potential energy 11. Multi-step calculations (GPE/KE/EPE/Efficiency) 12. Non-renewable resources 13. Renewable resources 14. Comparison of energy resources 15. Mini Quiz 16. Introduction to waves 17. Waves equation 18. Measuring period of a wave 19. RP: Measuring speed of a wave using a ripple tank 20. Measuring the speed of sound 21. EM Spectrum | <p>Topic: Forces</p> <p>Knowledge:</p> <ol style="list-style-type: none"> 1. Scalar and vector quantities 2. Types of forces 3. Weight 4. Resultant forces 5. Vector diagrams 6. Speed and velocity 7. Distance time graphs 8. Acceleration and deceleration 9. Velocity time graphs 10. Terminal Velocity 11. Newton's first law 12. Newton's second law 13. Inertia and inertial mass ((higher only) 14. Investigate Newton's Second Law of motion (R. Practical) 15. Newton's third law 16. Stopping distances 17. Energy transfers in stopping 18. Momentum (higher only) 19. Momentum calculations (Separate only) 20. Hooke's Law 21. Relationship between force and extension 22. Circular Motion 23. Magnets 24. Magnetic fields 25. Electromagnets | <p>Topic: Cell Biology</p> <p>Knowledge:</p> <ol style="list-style-type: none"> 1. Types of cells 2. Specialised cells 3. Tissues, organs and systems 4. Introducing microscopes 5. RP: Using Microscopes 6. Types of microscope 7. DNA (bases and monomers = separate only) 8. The Human Genome 9. Mitosis and the cell cycle 10. Incredible stem cells 11. Therapeutic cloning 12. Cloning plants (separate only) 13. Cloning animals (Separate only) 14. Asexual reproduction 15. Sexual Reproduction and Meiosis 16. Sexual vs asexual reproduction 17. Examples of unusual reproduction 18. Inheritance (genetic cross diagrams) 19. Family trees 20. Genetic diseases and sex determination 21. Protein Synthesis (Separate only) | <p>Topic: Communicable Diseases</p> <p>Knowledge:</p> <ol style="list-style-type: none"> 1. Viral diseases 2. Bacterial diseases 3. Fungal and protists 4. Our barriers to diseases 5. The immune system 6. Vaccinations 7. Medicines 8. Multiplying bacteria (Separate only) 9. Culturing microorganisms 10. Investigating Antiseptics (part 1) (Practical – R. separate only) 11. Investigating antiseptics (part 2) (Practical – R. separate only) 12. Analysing Antibiotics 13. Antibiotic resistance 14. Developing new drugs (part 1) 15. Developing new drugs (part 2) 16. Monoclonal antibodies (Separate only) 17. Scatter Graphs and Health 18. Frequency tables and histograms 19. Analysis data 20. Mini Quiz 21. Plant diseases (Separate only) 22. Parts of the brain (Separate only) 23. Brain Surgery (Separate only) 24. The Eye (Separate only) 25. Myopia and hyperopia (Separate only) |

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| 10 | <p>Topic: Human Biology Knowledge:</p> <ol style="list-style-type: none"> Aerobic respiration Anaerobic respiration Fermentation (Practical) The lungs (Demonstration) The heart (Practical/Demonstration) Blood vessels and blood flow Composition of blood Cardiovascular diseases Mini Quiz Disease data 1 Disease data 2 Digestion Enzymes Testing for food groups (R.Practical) pH and Enzymes (R.Practical) Reaction rates in the body Diffusion Kidneys and the function (Separate only) Kidneys and ADH (Separate only) Dissections and Data (Separate only) Diffusion and Surface area (Practical) Diffusion in action | <p>Topic: Plant Biology Knowledge:</p> <ol style="list-style-type: none"> Food webs Predator and prey graphs Ecological Sampling techniques Quadrats (R.Practical) Distribution patterns Pyramids of biomass and tropic levels Decomposers (Separate only) Plant cells, tissues and organs Osmosis Osmosis 1 (R. Practical) Osmosis 2 (R.Practical) Active transport Transpiration & Translocation Transpiration investigation (Practical) Photosynthesis Photosynthesis (R. Practical) Using glucose and nitrogen in plants Limiting factors (higher only) Inverse square law (higher only) Mini Quiz Tropisms (Separate only) Plant hormones (Separate only) Germination 1 (Separate only) (R.Practical) Germination 2 (Separate only) (R. Practical) Carbon Cycle Water cycle Decay (Separate only) Biogas generators (Separate only) Decay part 1 (Separate only) (R. Practical) Decay part 2 (Separate only) (R. Practical) Biodiversity and human impact Maintaining biodiversity Food security (Separate only) | <p>Topic: Nuclear and Thermal Physics Knowledge:</p> <ol style="list-style-type: none"> EM Spectrum Investigating IR radiation (Separate only) (R.Practical) Reflection of light (Separate only) Refraction of light (Separate only) Investigating reflection and refraction of light (separate only) (R.Practical) Lenses (Separate only) (Demonstration) Magnification (Separate only) Colour (Separate only) Atomic physics Radioactive decay The three types of decay Nuclear equations Half life Half life calculations Contamination and Irradiation Uses of radiation Background radiation Evaluating hazards Nuclear Fission and Fusion (Separate only) Mini Quiz Particle model - density and states Changes of state Heating and temperature Calculating density (R.Practical) Pressure in gases Work done and pressure (Separate only) Calculating Pressure (Separate only) Pressure at different depths (Separate only) (Demonstration) Floating and sinking (Separate only) The Atmosphere (Separate only) Mini Quiz Specific heat capacity Investigating specific heat capacity (R.Practical) Latent heat Heating and cooling graphs | <p>Topic: Electricity and Astrophysics Knowledge:</p> <ol style="list-style-type: none"> Electrical Circuits Introduction Calculating current Current in circuits (practical) Potential Difference in circuits (practical) Resistance in circuits Factors affecting resistance (R.Practical) Ohm's Law Light Dependent Resistors (Demonstration) Thermistors (Demonstration) Investigating non-Ohmic conductors (R.Practical) Mini Quiz Mains electricity and AC & DC Plugs (Practical) Power calculations Work done calculations Equations practice National Grid and Transformers Transformers structure and equation (Separate only) Transformers power equation (Separate only) Solar System (Separate only) Life Cycle of a star (Separate only) Orbits (Separate only) Orbits 2 (Separate only) Red Shift and Expanding Universe (Separate only) The Big Bang Theory (Separate only) Dark Mass and Dark Energy (Separate only) Black bodies (Separate only) Radiation and the Earth (Separate only) | <p>Topic: Reacting Substances Knowledge:</p> <ol style="list-style-type: none"> Exothermic and endothermic reactions Temperature Changes (R.Practical) Reaction profiles Bond energies Chemical cells and voltage (separate only) Rechargeable and non-rechargeable batteries (separate only) Fuel Cells (Separate only) Half equations for fuel cells (Separate only) Measuring the rate of reaction Factors affecting rates of reaction Drawing rates of reaction graphs Factors affecting rates of reaction (R.Practical) Catalysts Mini Quiz Reversible reactions (Demonstration) Chatelier Principle (higher only) Factors affecting equilibrium (higher only) Word equations and conservation of mass Relative Formula Mass Reacting Masses (higher only)* Calculating mass of a solute Calculating moles in a solution (higher only) Using titration to calculate concentration (Separate only) Titrations Part 1 (separate only) (R.Practical) Titrations Part 2 (separate only) (R.Practical) Explaining concentration (higher only) Calculating gas volume from relative formula mass (Separate only) Calculating gas volumes from balanced equations (Separate only) Testing for ions (Separate only) Testing for ions part 1 (Separate only) (R.Practical) Testing for ions part 2 (Separate only) (R.Practical) | <p>Topic: Humans and the Earth Knowledge:</p> <ol style="list-style-type: none"> The Early Earth's Atmosphere Theories of the atmosphere The Greenhouse Effect Effects of global warming Reducing our carbon footprint The Harmful Effects of Combustion Resources used by humans Sustainable development Potable Water Desalination Evaluating potable water methods Analysing water samples (R.Practical) Waste Water Sewage Treatment Mini Quiz Phytomining and bioleaching Life Cycle Assessment Reduce, Reuse, Recycle Ceramics (Separate only) Polymers (Separate only) Thermosetting and thermosetting polymers (Separate only) Glass (Separate only) Reducing our human impact (Separate only) The Haber process 1 (Separate only) Conditions graphs (Separate only) The Haber process 2 (Separate only) NPK Fertilisers (separate only) Atom economy (Separate only) Percentage yield (Separate only) |

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| 11 | <p>Topic: Using biology to our advantage</p> <p>Knowledge:</p> <ol style="list-style-type: none"> 1. Classification 2. Natural selection and evolution 3. Comparing theories of evolution (separate only) 4. Evidence for evolution 5. Genetic cross diagrams part 1 6. Genetic cross diagrams part 2 7. Mendal and inheritance (separate only) 8. Selective breeding 9. Genetic engineering and modification 10. Inheritance summary essay 11. The nervous system & synapses 12. Conscious and unconscious reponses 13. Investigating human reaction time (R. Practical) part 1 14. Investigating human reaction time (R. Practical) part 2 15. Homeostasis 16. Thermoregulation (Separate only) 17. Mini Quiz (optional) 18. The Endocrine system 19. Negative feedback loops (higher only) 20. Controlling glucose 21. Diabetes 22. Controlling water (Separate only) part 1 23. Controlling water (Separate only) part 2 24. Hormones and the Menstrual cycle 25. Contraception 26. IVF (higher only) 27. Embryo screening 28. Comparing nervous and hormonal responses | <p>Topic: Organic Chemistry & polymers</p> <p>Knowledge:</p> <ol style="list-style-type: none"> 1. Ionic bonding recap 2. Metallic bonding recap 3. Covalent bonding recap 4. Crude Oil 5. Alkanes 6. Alkenes 7. Bromine Test (Practical) 8. Fractional Distillation 9. The Fractions 10. Cracking 1 11. Cracking 2 12. Polymers (Combined only) 13. Reducing our human impact (Combined only) 14. Organic Compound diagrams (Separate only) 15. Alkene reactions 1 (Separate only) (Practical) 16. Alkene reactions 2 (Separate only) 17. The Alcohols (Separate only) (Practical) 18. Alcohol reactions (Separate only) 19. Fermentation (Separate only) 20. Carboxylic acid reactions (Separate only) 21. Carboxylic acid and water (Separate only) 22. Esters (Separate only) (Demonstration) 23. Addition Polymerisation (Separate only) 24. Condensation Polymerisation (Separate only) 25. Amino Acids and Polymerisation (Separate only) 26. Polymers in food (Separate only) | <p>Topic: Application of forces & waves</p> <p>Knowledge:</p> <ol style="list-style-type: none"> 1. Magnets 2. Magnetic fields 3. Electromagnets (Demonstration) 4. The Motor Effect (Flemings' left hand rule) (Demonstration) 5. Magnetic Flux Density (higher only) 6. Generating electricity (Demonstration) 7. National Grid and Transformers 8. Transformer structure (Separate only) 9. Transformer power equation (Separate only) 10. Applications of the motor effect and generator effect (Separate only) 11. Radio waves (higher only) 12. Sound waves (Separate only) 13. Uses of sound waves (Separate only) 14. Vector diagrams (separate only) 15. Moments (Separate only) 16. Levers and gears (Separate only) 17. Static electricity (Separate only) (Demonstration) 18. Electric field patterns (Separate only) <p>*lots of these topics covered earlier in the curriculum but revisited here because they are difficult concepts for students.</p> | <p>Interleaved practice and application to different contexts</p> <p>Address gaps in knowledge and build on links between different topics when applied to a range of scenarios</p> <p>Biology Paper 2</p> <p>Chemistry Paper 2</p> <p>Physics Paper 2</p> <p>Paper 2 mock exams</p> | <p>Interleaved practice and application to different contexts</p> <p>Address gaps in knowledge and build on links between different topics when applied to a range of scenarios</p> <p>Physics Paper 1</p> <p>Chemistry Paper 1</p> <p>Biology Paper 1</p> | |