Science Curriculum Map Yellow Highlight indicates Working Scientifically curriculum areas

	Year 7	Year 8	Year 9	Year 10 (B C P = triple only)	Year 11
HT1	**Introduction** - Hazards and Safety - Science equipment - Science investigations – variables, risk assessment, drawing a results table, drawing a line graph, writing a conclusion **Cells & Theories** - 'MRS GREN' - Identification of the different parts of animal and plant cells and their functions - Use of microscope - Specialised cells and functions -Cell division including mitosis - Single celled organisms including microbes - Tissues and organs -Names and functions of plant cells -Photosynthesis and respiration in plants **Particle & Models** - Scientific ideas that have changed over time to make new observations - Properties of solids, liquids and gases - Particle model of solids, liquids and gases - Change of state - Particle theory and change of state - Pressure - Diffusion - Pure or mixture - Filtration - Crystallisation - Distillation - Chromatography	**Food, Digestion & Graphs** - Identifying food groups - Describing food tests and making observations - Balanced diet and analysing nutritional content in a meal - Poor diets and health risks including obesity, starvation and deficiency diseases - Parts of the digestive system and how food is digested - How food is absorbed in the small intestine and the structure of the villi - Function of enzymes - Effect of temperature and pH on enzymes **Heating, Cooling & Reliability** - Difference between temperature and energy - Interpreting cooling curves - Conduction - Expansion and contraction, and application to real life designs - Convection - Radiation - Change of state - Evaporation - Insulation and how insulators reduce conduction, convection and radiation - Brownian motion	**Inheritance & Theories** - Reproduction in humans - Genes, chromosomes and DNA structure - Variation between organisms - Gregor Mendel and monohybrid crosses - Natural selection - Biodiversity and maintaining biodiversity - Extinction and reasons why species become extinct **Metals and Planning** - Revision of elements and compounds - Revision of the periodic table - Properties of metals and non-metals (including ceramic, polymers, and composites) - Alloys - Nano and SI units - Revision of word and symbol equations - Reactivity series - Extraction of metals - Displacement reactions - Rusting - Thermal decomposition	**Organisation** - Cell organisation - The digestive system - Food tests: *Techniques and Safety* - Enzymes and their properties - Conditions for enzyme activity - Enzymes and digestion *Variables Errors, Improvements* - The heart and the circulatory system including pacemakers - Blood vessels - Blood - Cardiovascular diseases - Stents and statins - Artificial hearts - The structure of the lungs and the breathing system - Health and disease - Communicable and non-communicable diseases - Cancer - Plant cell organisation - Transpiration and translocation - Transpiration and stomata - Active transport **Bonding** States of matter Metallic bonding Ionic bonding Covalent bonding Simple molecules Evaluating Models Polymers Giant covalent Graphite and Graphene Nano particles (C)	**Forces and Motion** Scalar and vectors Contact and non-contact Forces Resultant force Free Body diagrams Weight and Gravity Centre of mass Work done Joules Hooke's Law: *Variables, Numeracy, Graphs* Turning force (P) Levers and Gears (P) Fluid Pressure (P) Up thrust Atmospheric pressure Displacement Speed Speed of sound Velocity D-T graphs Acceleration: *Model, Numeracy, Variables, Data loggers* V-T graphs Terminal velocity Newton's laws Stopping distances Momentum Safety features (P)

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HT 2	**Forces & Graphs** - Introduction to forces - Floating, sinking and upthrust - Stretching materials and Hookes's law - Deformation and compression - Friction - Balanced and unbalanced forces - Calculating and measuring speed and stopping distances **Reproduction** - Structure of a flower - Insect and wind pollination – Seed and fruit formation - Seed dispersal and its effectiveness - Human reproductive systems & fertilisation - Pregnancy and the role of the placenta - Puberty in boys and girls	**Reactions** - Physical or chemical - Revision of atoms and ions - Revision of bonds and chemical formula - Word equations - Symbol equations - Balancing equations - Burning - Metal and oxygen - Exothermic and endothermic reactions - Catalysts **Circulation & Respiration** - Structure and function of the lungs - Gas exchange system - Naming and describing the organs in the circulatory system - The skeleton, joints and muscles - Aerobic respiration - Comparing inhaled and exhaled air - Anaerobic respiration and fermentation - Smoking and its effects - Alcohol and its effects - Measuring reaction time - Illegal drugs - Testing new drugs and ethical issues with animal testing	**Light** - Luminous and non –luminous objects - Opaque, transparent and translucent objects - How a shadow is formed - Use of a ray diagram to explain the path of light - Transverse waves and how waves can be super positioned - Reflection and mirrors - Law of reflection - Lateral inversion and virtual images - Refraction and application of refraction to lenses - Parts of the eye and their functions - Focussing of light through a convex lens - Formation of an object on a pinhole camera - Dispersion - Primary and secondary colours and explaining why different objects look different colours - Use of light in communication	**Electricity** Symbols Charge Current Resistance: *Errors, Numeracy, Graphs* Ohms Law Series and Parallel LDRS and thermistors Diodes and bulbs IV graphs: *Numeracy, Graphs* AC DC Plugs Safety (P) Power Work done National Grid Static (P) Electrical fields (P) **Infection** Pathogens Culturing and bacteria numbers (B*) Numeracy, Control, Safety* Diseases Protista Body defences Vaccination Antibiotics Painkillers Developing drugs Monoclonal antibodies (B) Plant disease Plant defences (B)	**Homeostasis** Nervous system Reflex actions *Validity, errors, means* The Brain (B) Reaction times The eye (B) Endocrine system Temperature control (B) Blood glucose Water and N balance (B) ADH (B) Kidney Failure (B) Negative feedback Reproductive hormones Contraception and fertility Plant coordination (B): Validity, planning Tropisms (B) Plant hormones use (B) **Organic Chemistry** Crude oil Hydrocarbons Fractional distillation Cracking Alkenes (C) Alcohols (C) Carboxylic acids (C) Esters (C) Polymers (C) Amino acids (C) DNA (C) **Analysis** Purity Formulations Chromatography: *Numeracy, errors, Analysis* Rf values Gas tests Flame tests (C) Identifying ions (C): *Analysis, multi technique* Carbonates (C) Halides (C) Sulphates (C) Spectroscopy (C) CSI (C)

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HT3	**Atoms** - Structure of the atom - Atomic mass and calculating % mass - Periodic table - Elements - Electron structure - Ions - Compounds - Chemical bonds - Working out chemical formulae	**Earth, Space & Theories** - Naming the three different types of rocks and how they are formed - Describing physical and chemical weathering - Naming parts of the Earth and describing the composition of each part - Naming the gases in the air and explaining why the composition has changed over time - Day and night - Seasons - Differences between mass and weight - Calculating mass and weight - Explaining how distance affects orbit time - Different models of the solar system - The Sun, galaxies and the Universe	**Forces, Pressure, Moments & Patterns** - Revision of forces - Balanced forces - Motion (changed direction and speed) - Calculating speed - Distance time graphs and velocity time graphs - Terminal velocity - Relative motion - Pressure and calculating pressure - Pressure in liquids and gases - Levers - Machines - Moments	**Chemical Change** Metal oxides Reactivity series Purifying metals OIL RIG Metal + Acid Crystallisation Making salts: *Justifying Techniques, Safety* Neutralisation (C) Conc and weak acids Electrolysis: *Observing, Conclusions* Aluminium Brine Half equations **Particle Theory** Density *Numeracy, Variables Uncertainty* Particle Model Internal energy Changing state Specific Latent Heat Gas Pressure	**Waves** Types of waves Wave calculations Measuring waves: *Repeatability, Numeracy* EM spec IR and surfaces: *Validity, Resolution* Black Body (P) Refraction Radio Reflection (P) Patterns, measuring angles Sound (P) Ultrasound (P) Seismic waves (P) Lenses (P) Colour (P) **Space (P)** Solar System(P) Star Life cycle (P) Elements (P) Orbits (P) Red shift (P) Big bang (P)

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HT4	**Electricity & Reliability** - Circuit symbols and circuits - Measuring current - Measuring voltage - Measuring resistance - Series circuits - Parallel circuits - Fruit cells - Static Electricity - Dangers of electricity - Plugs & fuses	**Sound & Numeracy** - Definition of sound and how it is created - Sound as a longitudinal wave - Pitch, frequency and amplitude - Calculating the speed of sound - Echoes - Parts of the ear and how we hear - Effect of loudness on hearing - Ultrasound and ethics of the mosquito sound box	**Electricity & Reliability** - Properties of magnets - Magnetic fields - Electromagnets - DC Motors - Voltage - Series and parallel circuits - Resistance and calculating resistance - Renewable and non-renewable energy sources - Generating electricity	**Quantitative Chemistry and energy** Conservation of mass Equations Ar, Mr, Empirical formula (C) Changes in Mass Moles Calculating masses Moles Concentration % yield (C) Atom economy (C) Titrations (C) Gases and moles (C) Exothermic and endothermic Reaction profiles Calculating energy changes: *RA, Errors, Resolution, Graphs* Cells and batteries (C) Fuel Cells (C)	**Inheritance** DNA Structure (B) Reproduction Asexual vs Sexual (B) Meiosis Protein synth (B) Inheritance Gender Genetic disorders Screening Mendel (B) GM Cloning (B) Variation Selective breeding Extinction Mutation Natural selection Speciation (B) Darwin (B) Evolutionary trees Fossils Resistant Bacteria **Magnetism** Magnets Fields Current Motor Effect Magnetic Flux density Generators (P) Microphones (P) Transformers (P)

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HT5	**Energy & Numeracy** - Types of energy stores and the 4 transfer mechanisms - Drawing and interpreting energy transfer diagrams - Energy change (Conversion of units and comparison of energy at the start and end of a system) - Interpreting and drawing Sankey diagrams and calculating efficiency - Renewable and non-renewable energy resources, including advantages and disadvantages - Application of equations to calculate the cost of electricity	**Microbes, Diseases & Patterns** - Microbes and how they are different to animal and plant cells - Categorisation of microbes using the 5 kingdom system - Estimation of the size of microbes - Uses of microbes (fermentation) - Aseptic techniques for growing bacteria - Work of Semmelweiss - Naming particular diseases and how they are spread - Role of white blood cells - Vaccination - Antibiotics - History of disease	**GCSE START: Cells** Cells Microscopy and magnification Primitive cells Specialised cells Chromosomes Mitosis Stem cells Diffusion Osmosis Active transport **GCSE Atoms** Atomic structure Atomic theory changes Periodic table Elements and compounds Word and symbol equations Mixtures and separation Metals and non-metals Group 1 Group 0 Group 7 Transition metals (C)	**Bioenergetics** Photosynthesis: *Graphs, Numeracy* Rate of photosynthesis Limiting factors Uses of Glucose Aerobic respiration Anaerobic respiration Exercise Metabolism **Radioactivity** Atoms and Isotopes Development of atomic theory Radioactive decay Handling Isotopes Nuclear decay equations Half Life Irradiation and contamination Fission and Fusion (P) Uses (P)	**Atmosphere & Resources** Atmosphere Algae Greenhouse effect Human impact on the environment Climate change Carbon footprints Burning fuels Polluting gases Earth's resources Water purification *Numeracy, Safety,* Sewage treatment Bioleaching and phytomining Life cycle analysis Recycling Corrosion (C) Alloys Polymers(C) Haber Process (C) Fertilisers (C)

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HT6	**Ecology, Variation & explaining patterns** - Variation between species and measuring variation - Adaptations of plants and animals - Adaptations to feeding of animals - Changes to habitats - Food chains and food webs - Evidence for food webs - Classification and understanding how to interpret a key - Classification of vertebrates - Classification of invertebrates - Classification of plants - Behaviour (Innate and learned)	**Acids and Planning** - Acids and alkalis - pH scale - Indicators - Neutralisation - Base/alkali + acid - Metal + acid - Metal carbonate + acid **Ecology & Planning** - Photosynthesis - Limiting factors affecting photosynthesis - Animal classification - Different sampling methods - Sampling using a quadrat - Pyramid of numbers and pyramid of biomass - Bioaccumulation - Physical factors which affect the environment (abiotic factors) - Living factors and populations (biotic factors)	**GCSE Energy** Stores and transfers KE, GPE Specific Heat Capacity: *Numeracy, Graphs, Errors* Work done Power Conservation of energy Efficiency Insulation (P): *Variables,* Energy resources	**Ecology** Classification Communities Biotic and Abiotic factors Distribution: *Area, Numeracy, Sampling,* Adaptations: animals, plants, extreme. Levels of organisation Food chains Trophic levels and pyramids (B) Nutrient cycles Decomposition (B*): Control,* Biodiversity Waste Management Land use and deforestation Global warming Maintaining biodiversity Impact of environmental change (B) Food security (B) Farming (B) Fisheries (B) Biotechnology (B) **Rates** Measuring rate *Graphs, Safety, Variables, errors and end points* Collison theory Temperature Concentration Pressure Surface area Catalysts Reversible reactions Le Chatelier's Equilibriums	