



Science Learning Map



Biology



Chemistry



Physics



Year	Autumn	Spring	Summer
YR7 (7 lessons over two weeks)	<ol style="list-style-type: none"> Safety in Science – Equipment and hazards. Chemical Changes (pt.1) – Types of reaction, word equations, metal reactions with acids, water and oxygen. Cell Biology – Animal and plant cells, specialised cells, unicellular organisms. Energy (pt.1) – Conduction, convection and radiation, insulation, renewable and non-renewable resources. Assessment 1 Energy Changes – endothermic and exothermic reactions. Chemical Analysis – Mixtures, solutions and solubility, evaporation, distillation, chromatography. Space – The solar system, night and day, seasons, phases of the moon. 	<ol style="list-style-type: none"> Infection and response – Microorganisms, diseases, defence against disease. Particle model of matter – The particle model, changes of state, melting and boiling points, diffusion, pressure. Atomic structure & The Periodic Table – Metals and non-metals, The periodic Table, elements, compounds and formulae, Group 1, 7 and 0 elements. Mid-year assessment Organisation (pt.1) – The skeleton, joints, muscles, the respiratory system, smoking, drugs and alcohol, plant reproduction. Waves (pt.1) – Types of wave, sound, loudness and pitch, The Electromagnetic Spectrum, echoes and ultrasound. 	<ol style="list-style-type: none"> Assessment 2 Organic Chemistry – Formation of crude oil, basic alkanes and alkenes. Ecology – Food chains and webs, ecosystems and interdependence, predator/prey cycles, adaptation, evolution, competition and extinction, biodiversity. Atomic Structure – The structure of an atom, comparing models of the atom, basic types of radiation, research project on Chernobyl. Forces (pt.1) – Force diagrams, calculating weight, contact & non-contact forces, drag forces and friction, balanced & unbalanced forces. Investigation skills – graphs, method writing, variables, calculating averages, anomalous results, conclusions, evaluations.
YR8 (7 lessons over two weeks)	<ol style="list-style-type: none"> Homeostasis & Response – Adolescence, reproductive systems, The Menstrual Cycle, Fertilisation & implantation, development of a foetus, contraception. Chemical changes (pt.2) – Acids & alkalis, the pH scale, making indicators, making salts, neutralisation. Energy (pt.2) – Calculating energy & power, cost of electricity and energy bills, energy in foods, energy stores & transfers, calculating kinetic energy and gravitational potential energy. Chemistry of the atmosphere – The atmosphere, the structure of the Earth, the rock cycle. Assessment 1 Organisation (pt.2) – cells, tissues, organs and organ systems, nutrients & a balanced diet, food tests, the digestive system, enzymes & bacteria. Electricity – Static electricity, circuit symbols & drawing circuit diagrams, measuring potential difference and current, introduction to electricity formulae and rearranging formulae. 	<ol style="list-style-type: none"> Electricity – Resistance & calculating resistance, basic calculations. Structure & properties – Properties of ionic and simple covalent substances, properties of giant covalent substances, applications of graphene. Quantitative Chemistry – Formulae, calculating relative formula mass, calculating percentage composition. Bioenergetics – Review plants cells and leaf structure, plant minerals and fertilisers, photosynthesis, limiting factors for photosynthesis, plant adaptations, aerobic respiration, anaerobic respiration. Mid-year Assessment Magnetism – Magnets and magnetic fields, electromagnets and building electromagnets, investigating electromagnets. Rate of Reaction – Basic collision theory, methods to measure rate of a reaction, investigating how concentration impact rate of reaction, catalysts. Waves (pt.2) – Types of wave, reflection, refraction, calculating speed of waves, coloured & filters, the eye. 	<ol style="list-style-type: none"> Assessment 2 Inheritance, variation & evolution – The structure of DNA, extracting DNA, inheritance, basic genetic diagrams, cell division, genetic modification & ethics, variation. Using Resources – Extracting metals, reduction, displacement, basic electrolysis. Forces (pt.2) – Calculating speed, motion graphs, acceleration & relative motion, calculating work done. Investigation skills – graphs, method writing, variables, calculating averages, anomalous results, conclusions, evaluations.
Year 9 will follow a new order of study agreed on by all secondary school within the MAT			
YR9 (Trilogy) (9 lessons over two weeks)	<ol style="list-style-type: none"> Cell Biology (pt.1) – Animal and plant cells, Eukaryotes and prokaryotes, comparing cells, required practical for microscopy, specialised cells, chromosomes, gene and DNA, mitosis and binary fission, meristems. Atomic Structure and The Periodic Table (pt.1) – Elements, compounds and formulae, word and chemical equations, filtration, evaporation and distillation, structure of an atom and electronic configuration, comparing models of the atom, the development of the periodic table, the modern periodic table, group 1, group 7, group 0. 	<ol style="list-style-type: none"> Structure, bonding and the properties of matter (pt.2) – properties of simple covalent substances, polymers, giant covalent structures, fullerenes, metals and metallic bonding, alloys, states of matter and changes of state. Particle model of matter (pt.1) – Calculating density, required practical for density of regular and irregular objects. Atomic structure (pt.1) – Comparing models of the atom, Rutherford's scattering experiment, radioactive decay, isotopes, nuclear equations. 	<ol style="list-style-type: none"> Assessment 2 Cell Biology (pt.3) – Perfect exchange surfaces, required practical for osmosis, active transport. Chemical Changes (pt.1) – The pH scale, acids, bases and alkalis, Neutralisation, acids and carbonates, required practical for acids and metal oxides, reactions between acids and metals, reactions between metals and water, displacement, reduction, electrolysis. Electricity (pt.2) – Resistance in series, thermistors, LDR's, I/V characteristics, AC/DC mains electricity, calculating power, energy transfers in everyday appliances, $I=Qt$, $E=QV$, The National Grid.

	<ol style="list-style-type: none"> Energy (pt.1) – Energy stores and systems, energy transfers, kinetic energy, gravitational potential energy, elastic energy, Hooke’s Law, specific heat capacity. Organisation (pt.1) – Cell organisation, the digestive system, nutrients, required practical for food tests, enzymes. Structure, bonding and the properties of matter (pt.1) – ionic bonding, covalent bonding, properties of ionic compounds. Assessment 1 Electricity(pt.1) – Circuit symbols and building basic circuits, measuring current and potential difference in series and parallel circuits, calculating charge and current, resistance and Ohm’s Law, required practical for resistance of a wire. Organisation (pt.2) – Required practical for enzymes, the circulatory system, the heart, blood composition, the lungs and gas exchange. 	<ol style="list-style-type: none"> Infection and Response (pt.1) – Pathogens, communicable diseases, symptoms, treatments, prevention, fighting disease, white blood cells, vaccination, immunity. Bioenergetics (pt.1) – Plant cells and leaf structure, photosynthesis and starch test, limiting factors, required practical for photosynthesis and light intensity. Quantitative Chemistry – Conservation of mass, relative formula mass, percentage composition, mole calculations, reacting masses, titrations, calculating concentrations. Energy(pt.2) - transfers, systems, efficiency, calculating power, energy resources and their uses, trends in energy resources. Cell Biology (pt.2) – Stems cells, diffusion, osmosis, perfect exchange surfaces. 	<ol style="list-style-type: none"> Energy Changes – Endothermic and exothermic reactions, reaction profiles, required practical for energy changes, bond energy calculations. Organisation (pt.3) – Communicable and non-communicable diseases, risk factors, coronary heart disease, artificial blood, artificial hearts, artificial valves, cancer. Infection and Response (pt.2) – fighting disease, vaccination, developing drugs, drug trials, antibiotic resistance. Investigation skills – Method writing, results tables, collecting results, drawing graphs, maths skills, averages, standard form, conclusions, evaluations etc.
YR9 (Biology) (3 lessons over two weeks)	<ol style="list-style-type: none"> Cell biology (pt.1) – Plant and animal cells, using microscopes and microscopy, calculating magnification, specialised cells, prokaryotic and eukaryotic cells, comparing light and electron microscopes, Chromosomes and DNA, mitosis and binary fission, stem cells and meristems, diffusion, osmosis, active transport. Assessment 1 Organisation (pt.1) – The digestive system, enzymes, nutrients in food and food tests, required practical for food tests. 	<ol style="list-style-type: none"> Infection and response (pt.1) – communicable disease, viral, fungal and bacterial diseases, investigating bacteria and growing bacteria, fighting disease and white blood cells, immunity, vaccination, drug trials. Bioenergetics (pt.1) – Plant cells and leaf structure, photosynthesis and testing a leaf for starch, limiting factors, required practical and impact of light intensity on rate of photosynthesis. 	<ol style="list-style-type: none"> Assessment 2 Cell biology (pt.2) – Required practical for osmosis, investigation skills such as graphs and data analysis, perfect exchange surfaces, Organisation (pt.2) – Structure of the lungs and gas exchange, heart structure and function, the circulatory system, blood vessels, stents and statins, artificial hearts and artificial blood, non-communicable disease and risk factors, cancer.
YR9 (Chemistry) (3 lessons over two weeks)	<ol style="list-style-type: none"> Atomic structure and The Periodic Table (pt.1) – Elements, compounds and mixtures, chemical equations and formulae, separating substances, atomic structure, electronic structure, comparing models of the atom. Bonding structure and the properties of matter (pt.1) – Formation of ions, ionic bonding, properties of ionic substances, covalent bonding, properties of simple covalent and giant covalent substances, metals and alloys, states of matter. Assessment 1 Quantitative Chemistry (pt.1) – Conservation of mass, calculating relative formula mass, calculating percentage composition, mole calculations. 	<ol style="list-style-type: none"> Chemical changes (pt.1) – Acids and alkalis, the pH scale, neutralisation, making salts, acids and carbonates, required practical for making copper sulphate, reactions of acids and metals, displacement. Energy changes – Endothermic and exothermic reactions, reaction profiles, calculating overall energy change from bond energy calculations, cell and batteries, fuel cells. 	<ol style="list-style-type: none"> Assessment 2 Atomic structure and the periodic table (pt.2) – Isotopes and calculating relative abundance, The structure and patterns in the modern Periodic table, The early Periodic table, group 1, 7 and 0 elements and patterns in their reactivity. Structure, bonding and the properties of matter (pt.2) – Structure and properties of simple molecules, structure and properties of giant covalent substances, Properties and applications of graphene and fullerenes, polymers, nanoparticles, and their uses.
YR9 (Physics) (3 lessons over two weeks)	<ol style="list-style-type: none"> Energy (pt.1) – Energy stores and systems, calculating kinetic energy and gravitational potential energy, calculating specific heat capacity, required practical for specific heat capacity, Conduction, convection, insulation. Assessment 1 Electricity (pt.1) – Static electricity, electric fields, building circuits, series and parallel circuits, measuring current and potential difference, resistance and Ohm’s law, required practical investigating how length of wire impact resistance. 	<ol style="list-style-type: none"> Particle model – calculating density for regular and non-regular shapes, required practical for density, internal energy, calculating specific latent heat, particle motion and pressure in gasses, Brownian motion. Atomic Structure – Developing the model of the atom, atomic structure, isotopes and radiation, nuclear equations. Energy (pt.2) – Energy transfers and investigating insulation, efficiency, calculating, power, energy resources and their uses. 	<ol style="list-style-type: none"> Assessment 2 Energy (pt.3) – Wind, solar and geothermal power, hydroelectric, tides and wave power, Biofuels and non-renewable resources, trends in energy resource use. Electricity (pt.2) – Resistance, required practical for resistance in series and parallel circuits, V-I graphs, thermistors, LDR’s, wiring a plug, calculating power of electrical devices, The national Grid.
Year 10 & 11 will continue to follow the previous order of study to make sure they have covered all topics and are fully prepared for their GCSE exams			
YR10 (Trilogy) (9 lessons over two weeks)	<ol style="list-style-type: none"> Structure, bonding and the properties of matter – Forming ions, ionic bonding, properties of ionic substances, covalent bonding, properties of simple covalent substances, properties of giant covalent structures, metallic bonding, alloys, polymerisation, states of matter and changes of state. Bioenergetics – Plant cells and leaf structure, photosynthesis and starch test, limiting factors, required practical for photosynthesis and light intensity, respiration and metabolism, anaerobic respiration, effect of exercise. 	<ol style="list-style-type: none"> Waves – Transverse and longitudinal waves, waves experiments and the wave equation, reflection, refraction, electromagnetic waves, properties and uses of electromagnetic waves, infra-red and temperature, required practical for black silver and white cans. Chemistry of the Atmosphere – Formation of sedimentary rocks, fossil fuels, composition of the atmosphere, evolution of the atmosphere, global warming, greenhouse effect, climate change, analysing data and graphs, impact of human activities on the atmosphere, sulphur dioxide and air pollution, carbon footprint. 	<ol style="list-style-type: none"> Assessment 2 WORK EXPERIENCE Forces – Contact and non-contact forces, scale diagrams, resolving forces, weight, mass and gravity, work done and power, required practical for Hooke’s Law, calculating speed, calculating acceleration, distance-time graphs, required practical for acceleration, velocity-time graphs, Newton’s 1st Law, Newton’s 2nd Law, Newton’s 3rd Law, stopping distances, breaking and thinking distances, momentum, changes in momentum. Organic Chemistry – Crude oil, alkanes, fractional distillation, cracking, alkenes.

	<p>3. Atomic structure – Plum pudding model of the atom and Rutherford scattering, development of the nuclear model of the atom, isotopes, types of radiation, properties and uses of each type of radiation, half-life, nuclear equations, background radiation.</p> <p>4. Quantitative Chemistry – Relative formula mass, percentage composition, mole calculations, reacting masses, titrations, concentration calculations.</p> <p>5. Assessment 1</p> <p>6. Homeostasis – The nervous system, Synapses and reflexes, required practical for reaction times, the endocrine system, controlling blood glucose levels, diabetes, adrenaline and thyroxin, puberty, menstrual cycle, fertility hormones, using fertility hormones, contraception.</p> <p>7. Energy Changes – Endothermic and exothermic reactions, reaction profiles, required practical for energy changes, bond energy calculations.</p>	<p>3. Particle Model – Density and calculating density of regular and irregular objects, motion in gasses, gas pressure, internal energy, changes of state, specific latent heat.</p> <p>4. Inheritance, Variation and Evolution – Sexual/Asexual reproduction, chromosomes, DNA, proteins and genomes, Meiosis, genetic diagrams, inherited disorders, mutation, variation, antibiotic resistance, evolution, fossils, selective breeding, genetic engineering, classification.</p>	<p>5. Investigation skills – Method writing, results tables, collecting results, drawing graphs, maths skills, averages, standard form, conclusions, evaluations etc.</p>
<p>YR10 (Biology)</p>	<p>1. Homeostasis and response (pt.1) – The nervous system, synapses and reflexes, requires practical for reaction times, the brain, the eye, the endocrine system, controlling body temperature, controlling blood glucose concentration, diabetes, controlling blood water concentration.</p> <p>2. Assessment 1</p> <p>3. Homeostasis and response (pt.2) – Kidney failure and dialysis, plant hormones and auxins, puberty, the menstrual cycle, fertility hormones, using fertility hormones.</p>	<p>1. Homeostasis and response (pt.3) – Contraception, plant hormones, commercial uses for plant hormones.</p> <p>2. Inheritance, variation and evolution – DNA, protein synthesis, mutations, mitosis and meiosis, sexual and asexual reproduction, genetic diagrams, inheriting disorders, variation, evolution and natural selection, Darwin and Lamarck, extinction, selective breeding, genetic engineering, cloning.</p>	<p>1. Assessment 2</p> <p>2. WORK EXPERIENCE</p> <p>3. Ecology – Competition, food chains and webs, abiotic and biotic factors, adaptations, extremophiles, collecting ecological data, quadrats, transects, the water cycle, the carbon cycle, decay, biodiversity and waste management, global warming, deforestation, land use and peat bogs, trophic levels, pyramids of biomass, food security and farming, fish stocks, biotechnology.</p>
<p>YR10 (Chemistry)</p>	<p>1. Rate of reaction – Collision theory, required practical concentration, surface area, temperature, catalysts, calculating rate of reaction from graphs, tangents, reversible reactions, Le Chateliers Principle.</p> <p>2. Assessment 1</p> <p>3. Chemical analysis (pt.1) – Purity and formulations, chromatography and Rf values, testing for gases.</p>	<p>1. Chemical analysis (pt.2) – testing for cations flame tests, testing for cations precipitation, testing for anions carbonates, testing for anions sulphates, testing for anions halides, required practical testing for unknown compounds s=using chemical tests, flame emission spectroscopy.</p> <p>2. Organic chemistry – Crude oil and alkanes, fractional distillation, cracking, alkenes, testing for saturation, addition polymerisation, hydrogenation, making ethanol ethane and fermentation, alcohols, carboxylic acids, esters.</p>	<p>1. Assessment 2</p> <p>2. WORK EXPERIENCE</p> <p>3. Chemistry of the atmosphere – Composition of the atmosphere, evolution of the atmosphere, global warming, data analysis from tables and graphs, impact of human activities on the atmosphere, peat bogs, carbon footprint, the greenhouse effect, plastics and recycling.</p>
<p>YR10 (Physics)</p>	<p>1. Space physics – The universe and the solar system, lifecycle of stars, orbits and satellites, The Big Bang Theory, Evidence for The Big Bang Theory.</p> <p>2. Forces (pt.1) – Contact and non-contact forces, weight, mass and gravity, centre of mass, force diagrams, resolving forces, scaled balanced forces, work done, Hooke’s Law.</p> <p>3. Assessment 1</p> <p>4. Forces (pt.2) – Required practical for Hooke’s Law, moments, fluid pressure, distance, displacement, speed and velocity.</p>	<p>1. Forces (pt.3) – distance-time graphs, acceleration, velocity-time graphs, required practical for acceleration, terminal velocity, Newton’s 1st Law, Newton’s 2nd Law, stopping distances, thinking and breaking distances, momentum, change in momentum, car safety and momentum.</p>	<p>2. Assessment 2</p> <p>3. WORK EXPERIENCE</p> <p>4. Magnetism and electromagnets – Permanent and induced magnets, electromagnetism theory, investigating electromagnets, the motor effect theory, building an electric motor, loudspeakers, the generator effect, microphones, transformers.</p>
<p>YR11 (Trilogy) (8 lessons over two weeks)</p>	<p>1. Rate of Reaction – collision theory, required practical investigating concentration, temperature, surface area, catalysts, calculating rate of reaction from a graph, tangents and gradients, endothermic and exothermic reactions, Le Chatelier’s Principle.</p> <p>2. Magnetism and Electromagnets – Permanent and induced magnets, electromagnets, investigating electromagnets, right hand rule, the motor effect, left hand rule, electric motors, applications of the motor effect.</p> <p>3. Using Resources – Finite and renewable resources, reuse and recycle, life cycle assessments, potable water and waste water treatments, required practical purification, required practical finding mass of a solute.</p> <p>4. Assessment 1</p>	<p>1. Inheritance, Variation and Evolution – Sexual/Asexual reproduction, chromosomes, DNA, proteins and genomes, Meiosis, genetic diagrams, inherited disorders, mutation, variation, antibiotic resistance, evolution, fossils, selective breeding, genetic engineering, classification.</p> <p>2. Assessment 2</p> <p>3. Revision - Lessons will be revision based until the GCSE exams. These lessons will be determined from analysis of both sets of mock exams using questions level analysis (QLA’s) to inform teachers and students of topics and skills that need extra attention during lessons and intervention.</p>	<p style="text-align: center;">TBD</p> <p style="text-align: center;">Lessons will be revision based until the GCSE exams. These lessons will be determined from analysis of both sets of mock exams using questions level analysis (QLA’s) to inform teachers and students of topics and skills that need extra attention during lessons and intervention.</p>

	<p>5. Forces – Contact and non-contact forces, scale diagrams, resolving forces, weight, mass and gravity, work done and power, required practical for Hooke’s Law, calculating speed, calculating acceleration, distance-time graphs, required practical for acceleration, velocity-time graphs, Newton’s 1st Law, Newton’s 2nd Law, Newton’s 3rd Law, stopping distances, breaking and thinking distances, momentum, changes in momentum.</p>		
<p>YR11 (Biology)</p>	<p>1. Cell biology – Movement in and out of cells, mitosis and binary fission, stem cells.</p> <p>2. Organisation – Required practical for enzymes, cardiovascular system, Required practical for food tests, transpiration and translocation.</p> <p>3. Assessment 1</p> <p>4. Infection and Response – Diseases, fighting diseases, developing drugs, monoclonal antibodies, plant defences.</p>	<p>1. Homeostasis and Response – The nervous system, the brain, the eye, the endocrine system, controlling temperature, blood glucose, blood water concentration, fertility.</p> <p>2. Inheritance, Variation & Evolution – DNA structure, mutations, reproduction, meiosis, genetic diagrams, evolution, selective breeding, genetic modification, cloning.</p> <p>3. Assessment 2</p> <p>4. Ecology – Required practical for quadrats, line transects, explaining ecosystems, required practical for decay, the water cycle and the carbon cycle, maintaining biodiversity, trophic levels and pyramids of biomass, food security and biotechnology.</p>	<p>TBD</p> <p>Lessons will be revision based until the GCSE exams. These lessons will be determined from analysis of both sets of mock exams using questions level analysis (QLA’s) to inform teachers and students of topics and skills that need extra attention during lessons and intervention.</p>
<p>YR11 (Chemistry)</p>	<p>1. Quantitative chemistry – Relative formula mass, percentage composition, moles and reacting masses, yield and atom economy, gases and solutions, titration, concentration calculations.</p> <p>2. Assessment 1</p> <p>3. Chemical changes – Required practical for making salts, electrolysis.</p> <p>4. Using Resources – Potable water, waste water, lifecycles.</p>	<p>1. Structure, bonding and properties of matter – Ionic bonding, covalent bonding, comparing structures of diamond, graphite, graphene, properties of ionic substances and simple covalent substances.</p> <p>2. Chemical changes – Electrolysis, redox reactions.</p> <p>3. Assessment 2</p> <p>4. Rate of Reaction – Equilibrium, The Haber Process.</p> <p>5. Organic Chemistry – Alkanes, fractional distillation, alkenes, polymers.</p>	<p>TBD</p> <p>Lessons will be revision based until the GCSE exams. These lessons will be determined from analysis of both sets of mock exams using questions level analysis (QLA’s) to inform teachers and students of topics and skills that need extra attention during lessons and intervention.</p>
<p>YR11 (Physics)</p>	<p>1. Atomic structure – Modern theory of the atom, development of the model of the atom, types of radiation, uses of radiation, nuclear equations, half-life, background radiation and contamination, Chernobyl and nuclear power, nuclear fission, nuclear fusion.</p> <p>2. Energy – Energy stores and transfers, conduction, convection, insulation, required practical for specific heat capacity, energy sources.</p> <p>3. Assessment 1</p> <p>4. Electricity – Series and parallel circuits, required practical for investigating resistance, electricity equations, static electricity and electric fields.</p> <p>5. Particle model of matter – Required practical for density, internal energy, specific latent heat calculations, gas motion and pressure.</p>	<p>1. Atomic structure – types of radiation, structure of the atom, nuclear equations, half-life, contamination, nuclear fission, nuclear fusion.</p> <p>2. Forces – Contact and non-contact forces, weight, mass and gravity, force diagrams, Hooke’s Law, fluid pressure, moments, motion graphs, Newton’s Laws, stopping distances, momentum.</p> <p>3. Space Physics – Lifecycle of stars, orbits and satellites, evidence for The Big Bang Theory.</p> <p>4. Assessment 2</p> <p>5. Waves – Types of wave and properties, EM waves, lenses.</p> <p>6. Magnetism and Electromagnetism – Magnets and electromagnets, the motor effect, Electromagnetic induction, transformers.</p>	<p>TBD</p> <p>Lessons will be revision based until the GCSE exams. These lessons will be determined from analysis of both sets of mock exams using questions level analysis (QLA’s) to inform teachers and students of topics and skills that need extra attention during lessons and intervention.</p>