**St Sampson's High School – Science Department – Y11 Curriculum Implementation**

| KS4: Year 11 | Autumn | Autumn | Autumn | Autumn | Autumn | Autumn | Spring | Spring | Year 11 Progression END POINTS: |
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| **Topic Big Question Specific Focus** | **Bodies are systems** | **Reactions rearrange matter** | **Radiation transfers energy** | **Characteristics are inherited** | **Structure determines properties** | **Radiation transfers energy** | **Reactions rearrange matter** | **Earth systems interact** | **Understand**<br>**How conditions in the body are controlled**<br>**What affects the rate of a reaction**<br>**How waves transmit energy**<br>**Why organisms show variation**<br>**What hydrocarbons are**<br>**How magnets can be made**<br>**How purity and gases can be tested for**<br>**How humans are affecting the earth's resources** |
| **Curriculum Directory Area Of Study** | B5 - Homeostasis | C6 - Rates of reaction | P6 - Waves | B6 - Inheritance, variation and evolution | C7 - Organic chemistry | P7 - Magnets | C8 - Chemical analysis | C10 - Using resources | |
| **Assumed Prior Knowledge** | This unit builds on the big idea of bodies are systems, but includes prior knowledge from other big ideas including cells are alive and ecosystems recycle resources. Pupils will know about different organs in the body, respiration | Pupils will have learnt about exothermic and endothermic reactions in year 10 and drawn reaction profiles for these reactions. | Pupils will already know that waves transfer energy as well as the fundamentals of how light travels (from KS2), including what shadows are. By this point they have also been introduced to scalar and vector quantities which will help them understand the wave equation and the velocity of waves. | Pupils will already have knowledge of DNA, inheritance and variation from KS3. | Pupils will have already learnt about covalent bonds in C2 and know about fossil fuels and how they damage the atmosphere. Pupils will know about distillation which will apply to the separating of crude oil. | Pupils will have learnt about magnets and magnetism at KS3 | Pupils will have covered different methods for separating mixtures at KS3 and in year 9 | Pupils will already know about separating mixtures which they can apply to waste water treatment | |
| **Key Knowledge and Retention** | Students will learn about what homeostasis is and what the body needs to control. They will learn all about the nervous system, how reflex arcs work and carry out the required practical to test reflex times. Following this the students will learn about the endocrine system and how it differs to the nervous system. They will look at specific hormones and glands including the control of glucose and human reproduction. Students will learn what happens when these processes don't work including diabetes and for HT infertility treatment. HT students will also learn about negative feedback and how this is used to control the bodies reactions. | Students will start the module by looking at what is meant by the term 'rate of reaction' and how this can be measured. They will then move on to looking at the different things that can affect rate - concentration, pressure, surface area, temperature and catalysts. Students will revisit reaction profile diagrams in terms of activation energy and how catalysts affect this. Students will learn how to explain the rate of reaction in terms of collisions. Students will learn about reversible reactions and what happens in equilibrium. HT students will go on to look at Le Chateller's Principle and how this applies to equilibrium. Students will carry out a second required practical using a leslie cube to | Students will learn about transverse and longitudinal waves and how they are different. They will learn about the properties of each wave and how to use the period and wave speed equations. Students will look at how the ripple tank can be used to measure speed, frequency and wavelength for a required practical. The module will then look at the electromagnetic spectrum with students being able to put the waves in order, give uses/dangers, know which waves are longer/shorter and which have more/less energy. | Students will learn about the differences between sexual and asexual reproductions. They will cover the steps in meiosis and the making of gametes. Students will be taught about DNA, the genome and how genes can be dominant or recessive. Genetic crosses will be used to predict the probability of genetic outcomes from set parents. Students will learn about cystic fibrosis, polydactyly and how sex is determined. from this they will move onto variation, selective breeding and genetic engineering. Students will be taught about evolution, Darwin's theory and the evidence in the fossil record. The module finishes by looking at extinction of different living organisms and how | Students will learn what crude oil/hydrocarbons are and how they are formed. They will cover the structure, formula and properties of both alkanes and alkenes. Students will learn about how crude oil is separated using fractional distillation. The module finishes by looking at cracking, why it is carried out and the conditions needed for it. | Students will recap magnet knowledge from KS3 looking at the poles of magnets. They will look at the difference between permanent and induced magnets and magnetic field lines. Students will look at how to make electromagnets and how their strength can be increased. HT students will learn about Flemming's left-hand rule, how to use the flux density equation and how the motor effect is created. | Students will learn what is meant by a pure substance and how boiling/melting points can be used to test for one. They will look at what a formulation is and be able to give examples. Students will revisit chromatography and carry out a required practical. They will earn how to test for hydrogen, oxygen, carbon dioxide and chlorine. | Students will look at what resources humans use and how they are affecting the planet. They will learn about the steps needed to make water potable and carry out a required practical to test the purity of water. Students will go on to learn what happens to waste water and how it is treated so it can be released. HT students will look at alternative methods for the extraction of metals. Students will finish the module by learning about life cycle assessments and ways to reduce the use of the earth's resources. | |

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| | | measure which types of surfaces absorb/emit radiation. | | living organisms are classified. | | | | |
| **Tier 2 Vocabulary** | Command words - Analyse, Calculate, Comment, Compare, Complete, Deduce, Define, Describe, Design, Determine, Draw, Estimate, Evaluate, Explain, Give, Identify, Justify, Label, List, Name, Outline, Predict, Show, Sketch, State, Suggest<br>Other keywords - Validity, Interval, anomalies, hypothesis, systematic error, reliability, accuracy, resolution, prediction, reproducible, repeatable, random error, precision, range<br>Independent variable, Dependent variable, Control variable | | | | | | | |
| | Tissue<br>Concentration<br>Organ | Collision<br>Frequency<br>Pressure<br>Product<br>Surface area | Energy<br>Waves<br>Medium<br>Frequency<br>Normal<br>Absorb<br>Boundary<br>Emit | | Cracking<br>Saturated | Attract<br>Coil<br>Conductor<br>Core<br>Current<br>Field<br>Mass<br>Motor<br>Permanent<br>Pole<br>Repel<br>Temporary | Pure<br>Mixture | Melting<br>Recycle<br>Renewable |
| **Tier 3 Vocabulary** | Adrenaline<br>Axon<br>Carbohydrate<br>Central nervous system<br>Dendrites<br>Diabetes<br>Diffusion<br>Effector<br>Endocrine system<br>Gland<br>Glandular tissue<br>Glucagon<br>Glucose<br>Glycogen<br>Homeostasis<br>Hormone<br>Insulin<br>Liver<br>Motor neurone<br>Myelin Sheath<br>Negative feedback<br>Neurone<br>Neurotransmitter<br>Oestrogen<br>Optimum<br>Organ system<br>Pancreas<br>Peripheral nervous system<br>Photosynthesis<br>Reaction time<br>Receptor<br>Reflex action<br>Relay neurone<br>Secrete<br>Sensory neurone<br>Stimulus | Activation energy<br>Catalyst<br>Concentration<br>Endothermic<br>Enzyme<br>Equilibrium<br>Exothermic<br>Fertiliser<br>Formulation<br>Gradient<br>Le Chatelier's principle<br>Molecule<br>Neutralisation<br>Reactant<br>Reaction profile<br>Reversible reaction<br>Tangent<br>Turbidity | Reflection<br>Pitch<br>Velocity<br>Displacement<br>Vibrate<br>Echo<br>Refraction<br>Transverse<br>Longitudinal<br>Compression<br>Rarefaction<br>Oscillation<br>Wavelength<br>Amplitude<br>Ultrasound<br>Transmission<br>Electromagnetic waves<br>Mechanical waves<br>Superposition<br>Constructive and destructive Interference<br>Phase<br>Density | Alleles Asexual reproduction Bases (DNA) Cloning Cystic fibrosis Dominant allele Genetic engineering Genotype Heterozygous Homozygous Nucleotide Phenotype Polydactyly Punnett square diagram Recessive Sex chromosomes Sexual reproduction Therapeutic cloning | Alkane<br>Alkene<br>Catalyst<br>Combustion<br>Covalent bonding<br>Crude oil<br>Fractional distillation<br>Functional group<br>Homologous series<br>Hydrocarbon<br>Intermolecular forces<br>Molecule<br>Monomer<br>Physical property<br>Polymer<br>Unsaturated<br>Viscosity | Bar magnet<br>Contact force<br>Electromagnet<br>Force<br>Field lines<br>Generator Geographic pole Gravitational Field strength<br>Gravity<br>Induced<br>Like (poles)<br>Magnet<br>Magnetic field<br>Magnetic flux density<br>Non-contact force<br>Repulsion<br>Solenoid<br>Steel<br>Transformer | Oxygen<br>Hydrogen<br>Carbon dioxide<br>Chlorine<br>Chromatography<br>Formulation<br>Solvent<br>Stationary phase<br>Mobile phase<br>Compound<br>Separation | Boiling point<br>Condensation<br>Distillation<br>Evaporation<br>Fossil fuel<br>Landfill<br>Melting point<br>Non-renewable<br>Physical change<br>Semi-permeable membrane<br>Biodegradable<br>Borosilicate glass<br>Composite<br>Desalination<br>Displacement<br>Finite<br>Furnace<br>Life Cycle Assessment (LCA)<br>Matrix<br>Potable<br>Reactivity Series<br>Reinforcement<br>Reverse Osmosis<br>Rusting<br>Screening<br>Sewage<br>Sterilisation | |

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| | Synapse<br>Testosterone<br>Thermoregulation<br>Thyroid gland<br>Thyroxine | | | | | | | | |
| **Literacy Strategy Focus** | Do Now's contain literacy questions, some lesson presentations include a vocabulary slide which breaks keywords down and looks at other meanings, keywords are in bold on slides and often include definition | | | | | | | | |
| **Progression waypoints** | • Some topics have a pre quiz to test for prior knowledge<br>• At the start of lessons the Do Now contains questions on previous topics.<br>• Throughout the lesson there are questions to check understanding.<br>• Homeworks including the use of Seneca, carousel and exam questions | | | | | | | | |
| **Formal Assessments:** | Mock exams in october and january<br>end of topic tests | | | | | | | | |