

Purple - PSHE content

Yellow – key words

Green – Triple only

## KS 4 Science Curriculum 2022-2023 Year 10

### Curriculum Intent

The science curriculum will provide all pupils, regardless of starting point with the foundation of knowledge needed to allow them to critically analyse and engage with science, technology and nature in the modern world.

### Curriculum Implementation

Year	Start When	No of lessons	Topic	Summary	Big Questions	Assessment for learning	Key Practicals
10	Autumn	18	Infection and Response	This topic builds on the KS 3 topic of systems and health	<p>What are <b>pathogens</b> and how do they spread</p> <p><b>How can the spread of disease be prevented or reduced</b></p> <p><b>What is a virus and how do they affect infected organisms</b></p> <p>What is a Bacteria and how do they affect infected organisms</p> <p>Which diseases are caused by fungi and <b>protists</b>?</p> <p>What is a <b>non-specific</b> defence response?</p> <p>How does a specific <b>immune</b> response work?</p> <p>What is a <b>Vaccination</b> and how does it work?</p> <p>What is the difference between an <b>Antibiotic</b> and a pain killer?</p>	<p>Cold calling</p> <p>Regular check point questions in the lessons</p> <p>Trust wide standardised 45min exam question test</p>	<p><b>TRP – culturing</b></p> <p><b>Microorganisms</b></p>

					<p>How are new drugs developed?</p> <p>How do you culture microorganisms in the Lab?</p> <p>How do you measure and prevent bacterial growth?</p> <p>What are some plant diseases and how are they identified and spread?</p> <p>How can plants defend against pathogens?</p> <p>What is a monoclonal antibody?</p> <p>How can monoclonal antibodies be used?</p>		
10	Autumn	9	Energy Changes	This builds on the KS 3 topics of Chemical reactions 1 and 2	<p>Do all chemical reactions give off energy?</p> <p>What do Endothermic and Exothermic mean?</p> <p>How can we calculate the energy changes in a reaction?</p> <p>What is a Bond energy?</p> <p>How do we write a chemical formula?</p> <p>What does diatomic mean?</p> <p>What does polyatomic mean?</p> <p>What is the difference between a molecular formula and a structural formula?</p>	<p>Cold calling</p> <p>Regular check point questions in the lessons</p> <p>Trust wide standardised 45min exam question test</p>	<p>Required Practical – investigating temperature changes in reactions</p>

					<p>How can we work out the structure of a <b>compound</b> based on its formula?</p> <p>How and why do we balance <b>equations</b>?</p> <p>Why do electrons move during reactions?</p> <p>What is a half equation?</p> <p><b>What are fuel cells?</b></p> <p><b>How do batteries work?</b></p>		
10	Spring	11	Chemical Changes	This builds on the KS 3 topics of Chemical reactions 1 and 2	<p>What is the <b>reactivity</b> series?</p> <p>How can we use the reactivity series to predict reactions with water, oxygen and acid?</p> <p>What is a <b>displacement</b> reaction?</p> <p>What is a <b>redox</b> reaction?</p> <p>How do we extract metals from the Earth?</p> <p>How can we use an acid to make a <b>salt</b>?</p> <p>What is an <b>acid</b>?</p> <p>What are <b>Alkalis and Bases</b>?</p> <p>How can you create an <b>insoluble</b> salt?</p> <p>What is <b>Titration</b>?</p> <p>What happens when acids react with <b>carbonates</b>?</p>	<p>Cold calling</p> <p>Regular check point questions in the lessons</p> <p>Trust wide standardised 45min exam question test</p>	<p>Demo – Group 1 metals with water</p> <p>RP – neutralisation reaction</p> <p>Acid with carbonates reactions</p> <p>Electrolysis of brine and copper sulphate</p> <p>Titration</p>

					<p>What is <b>Neutralisation</b>?</p> <p>What is the <b>pH</b> scale?</p> <p>What is the difference between a <b>concentrated and a dilute solution</b>?</p> <p>What is the difference between a <b>strong and weak acid</b>?</p> <p>What is <b>electrolysis</b>?</p> <p>What happens at each <b>electrode</b> during Electrolysis?</p> <p>What is the difference between electrolysis of a <b>molten</b> compound or a solution?</p> <p>How do we <b>extract</b> Aluminium from its <b>ore</b>?</p>		
10	Spring	11	Electricity	<p>This topic builds on the KS3 topic of electricity and magnetism</p>	<p>identify the symbols and roles of an array of electrical <b>components</b> and use them in constructing <b>electrical circuits</b>.</p> <p>What factors affect the size of the <b>current</b>?</p> <p>How do you calculate current from <b>charge flow</b> and time?</p> <p>What is <b>resistance</b>?</p> <p>What are the current, p.d. and resistance rules for a <b>series circuit</b>?</p>	<p>Cold calling</p> <p>Regular check point questions in the lessons</p> <p>Trust wide standardised 45min exam question test</p>	<p>Required Practical – how does resistance of a wire depend on its length?</p> <p>Required Practical – What happens to current when <b>potential difference</b> across a component changes?</p>

				<p>What are the current, p.d. and resistance rules for a <b>parallel circuit</b>?</p> <p>What is <b>Ohms Law</b>?</p> <p>What happens to resistance when the <b>light intensity</b> increases on an <b>LDR</b>?</p> <p>What is the difference between <b>direct and alternating current</b>?</p> <p>What is the National grid?</p> <p>What are <b>transformers</b>?</p> <p>Describe the features of a mains plug.</p> <p>How are <b>energy, Power</b> and time related?</p> <p>What is <b>efficiency</b> and how is it calculated for energy and power?</p> <p><b>What is Static electricity and how is it useful?</b></p> <p><b>What is an electric field?</b></p>		
10	Spring	11	Quantitative Chemistry	<p>This topic builds on K3 the periodic table and chemical reactions 1&amp;2 as well as GCSE topics – structure and bonding, chemical changes</p> <p>What is <b>relative atomic mass</b>?</p> <p>What is <b>relative Formula mass</b>?</p> <p>How do <b>isotopes</b> affect relative mass of an element?</p> <p>What is a <b>mole</b>?</p> <p>Why do we use it in Chemistry?</p>	<p>Cold calling</p> <p>Regular check point questions in the lessons</p> <p>Trust wide standardised 45min exam question test</p>	<p>Practical – finding the equation for a reaction from reacting masses.</p> <p>TRP - titrations</p>

				<p>and energy changes.</p> <p>What is <b>Avagadro's constant</b>?</p> <p>How do you use the mole-mass equation?</p> <p>How is <b>conservation of mass</b> linked to balancing equations?</p> <p>Why will mass change in an <b>open system</b>?</p> <p>How can you use reacting mass ratios to work out the balanced equation?</p> <p><b>Why are percentage yield and atom economy important for the chemical industry?</b></p> <p>How do we calculate the exact <b>concentration</b> of a solution?</p> <p><b>What is a titration?</b></p> <p><b>How do you calculate gas concentrations?</b></p>		
10	Spring	19	Homeostasis and Response	<p>This topic builds on KS3 systems and Health as well as GCSE topics Cells and Organisation</p> <p>What is <b>Homeostasis</b> and why is it important?</p> <p>How is the structure of the <b>nervous system</b> adapted to its function?</p> <p>What is a <b>reflex arc</b> and why is it important?</p> <p>What are <b>Endocrine glands</b> and where are they found?</p>	<p>Cold calling</p> <p>Regular check point questions in the lessons</p> <p>Trust wide standardised 45min exam question test</p>	<p>RP- Reaction time</p> <p>TRP – effect of light position on shoot growth</p>

				<p>How is the correct level of <b>blood glucose</b> maintained?</p> <p>Why is it important to maintain blood glucose levels?</p> <p>What is <b>Negative feedback</b>?</p> <p>How are <b>hormones</b> involved in the human reproductive system?</p> <p>How do Hormones control the <b>menstrual cycle</b>?</p> <p>What are the 4 hormones of the menstrual cycle?</p> <p><b>What are the key parts of the Brain and how does it function?</b></p> <p><b>What can happen when the brain is damaged?</b></p> <p><b>How is the structure of the eye related to its function?</b></p> <p><b>How does the eye create an image?</b></p> <p><b>What are the common eye problems and how are they treated?</b></p> <p><b>How do hormones control plant growth?</b></p> <p><b>What is a tropism?</b></p>		
--	--	--	--	---	--	--

					<p>How can plant hormones be used commercially? - Namely; ethene, Gibberellins, Auxin</p> <p>How is body temperature monitored and maintained?</p> <p>Which waste products are removed from the human body and how?</p> <p>How is the structure of the kidney related to its function?</p> <p>What is ADH?</p> <p>What are the possible treatments for kidney failure?</p>		
10	Summer	8	Rate and extent of chemical change	<p>This topic builds on KS3 chemical reactions 1 and 2 and GCSE Chemical and Energy changes</p>	<p>How can we calculate the rate of reaction?</p> <p>How can we calculate rate of reaction from a graph?</p> <p>What is collision theory?</p> <p>How does surface area affect rate of reaction?</p> <p>How does increasing; temperature, pressure and concentration effect rate of reaction?</p> <p>What is a catalyst?</p> <p>How does a catalyst affect rate of reaction?</p> <p>How does a catalyst change a reaction profile?</p>	<p>Cold calling Regular check point questions in the lessons Trust wide standardised 45min exam question test</p>	<p>RP- measuring rate of reaction by measuring volume of gas produced</p> <p>RP-measuring rate of reaction by measuring change of colour/Turbidity</p>



					<p>How are catalysts used in industry?</p> <p>What is a reversible reaction?</p> <p>What is a closed system?</p> <p>What is dynamic equilibrium?</p> <p>What is Le Chateliers principle?</p>		
10	Summer	11	Forces	<p>This topic builds on KS3 topic forces and motion</p>	<p>What is the difference between a scalar and a vector quantity?</p> <p>Give examples of a scalar and vector quantity</p> <p>What is a force?</p> <p>Is force a scalar or vector quantity?</p> <p>What are contact and non-contact forces?</p> <p>How can we use arrows to represent forces?</p> <p>What is weight?</p> <p>What is gravitational field strength?</p> <p>How can you calculate weight?</p> <p>What is centre of mass?</p> <p>How is weight measured?</p>	<p>Cold calling</p> <p>Regular check point questions in the lessons</p> <p>Trust wide standardised 45min exam question test</p>	<p>How to find centre of mass</p> <p>RP- investigation the stretching of a spring</p>

				<p>What is <b>resultant force</b> and how is it calculated in a straight line?</p> <p>How can a <b>vector diagram</b> be used to resolve forces?</p> <p>What is <b>work done</b>?</p> <p>How is work done calculated?</p> <p>What is <b>Hooke's law</b>?</p> <p>What does <b>limit of proportionality</b> mean?</p> <p>What is a <b>directly proportional</b> relationship?</p> <p>How can you calculate <b>elastic potential energy</b>?</p> <p><b>What is a moment?</b></p> <p><b>How do you calculate a moment?</b></p> <p><b>How do you calculate the effects of a set of gears?</b></p> <p><b>What is a fluid?</b></p> <p><b>What is pressure?</b></p> <p><b>How do you calculate pressure?</b></p> <p><b>How do you calculate the pressure caused by a column of water?</b></p> <p><b>What is upthrust?</b></p>		
--	--	--	--	---	--	--

					<p>What is atmospheric pressure?</p> <p>Why is atmospheric pressure different at different heights above sea level?</p>		
10	summer	14	Reproduction and Variation	<p>This topic builds on KS3 genetics and evolution, GCSE cells.</p>	<p>What are the 2 different types of reproduction?</p> <p>What is Meiosis and why is it important?</p> <p>What is DNA?</p> <p>How does the structure of DNA relate to its function?</p> <p>What is a genome?</p> <p>What is an inherited trait?</p> <p>How can we predict the probability of inheriting certain traits?</p> <p>What do the following key terms mean:</p> <ul style="list-style-type: none"> <li>-Homozygous</li> <li>-Heterozygous</li> <li>-Recessive</li> <li>-Dominant</li> </ul> <p>Genotype</p> <ul style="list-style-type: none"> <li>-Phenotype</li> </ul> <p>How can family trees be helpful?</p> <p>What is an inherited disorder?</p> <p>What are the likelihood of Cystic fibrosis or polydactyly being passed on?</p>	<p>Cold calling</p> <p>Regular check point questions in the lessons</p> <p>Trust wide standardised 45min exam question test</p>	

				<p>What is <b>embryo screening</b>?</p> <p>Why is embryo screening a contentious issue?</p> <p>What role does the environment play in our development?</p> <p>What is a <b>mutation</b>?</p> <p>What is <b>Natural selection</b>?</p> <p>What is <b>selective breeding</b>?</p> <p>Describe the impact of selective breeding on food plants and domesticated animals.</p> <p>What is a <b>GM organism</b>?</p> <p>What is <b>genetic engineering</b> and how can it be useful?</p> <p>What are some of the potential benefits and risks of GM in agriculture and medicine?</p> <p><b>Is it possible for an organism to use both sexual and Asexual reproduction?</b></p> <p><b>What is a nucleotide?</b></p> <p><b>What do bases code for?</b></p> <p><b>How is the DNA used to create proteins?</b></p> <p><b>What is transcription and translation?</b></p>		
--	--	--	--	---	--	--

					<p>Are all mutations bad?</p> <p>What is tissue culture?</p> <p>What is embryo transplantation?</p> <p>What is adult cell cloning?</p> <p>What are the potential issues with cloning?</p>		
10	Summer	7	Observing and recording motion	This topic builds on KS3 topic forces and motion	<p>What is the difference between distance and Displacement?</p> <p>Is speed a scalar or vector quantity?</p> <p>Typical values are:  walking- 1.5 m/s  running- 3 m/s  cycling- 6 m/s.</p> <p>value for the speed of sound in air is 330 m/s.</p> <p>How do you calculate speed of sound?</p> <p>What is Velocity?</p> <p>What is a Distance –time graph and what can it tell us?</p> <p>What is a Velocity-time graph and what can it tell us?</p> <p>How do you calculate acceleration?</p>	<p>Cold calling</p> <p>Regular check point questions in the lessons</p> <p>Trust wide standardised 45min exam question test</p>	<p>RP – investigating the effect of force on acceleration for an object of constant mass.</p>

				<p>How can you calculate acceleration from a graph?</p> <p>What equation can you apply to uniform acceleration?</p> <p>What is terminal velocity?</p> <p>What is Newtons First Law?</p> <p>What is Newtons second Law? What equation do you use to calculate it?</p> <p>What is Inertial Mass?</p> <p>What is Newtons Third Law?</p> <p>What is Stopping Distance made up of?</p> <p>What factors effect stopping distance?</p> <p>How do reaction times effect stopping distances?</p> <p>What is Momentum and how is it calculated?</p> <p>What is the law of Conservation of Momentum?</p> <p>How does rate of change of momentum relate to force?</p> <p>What safety features help with rate of change of momentum?</p>		
--	--	--	--	---	--	--