

## Topic Lists for Science

You can be tested on any of the content from Paper 2. Key component knowledge to focus on for the PPE in Feb is listed below.

### Check you look at the correct column

	Combined Science Higher	Combined Science Foundation	Separate Science Higher	Separate Science Foundation
<b>Biology</b>	Genetics – what is DNA Chromosomes Genome Alleles Punnett Squares Contraception – Hormonal and Non hormonal <b>Required Practical – investigating distribution using a Quadrat Square.</b> Biodiversity – how do we increase this in UK? GM – advantages/ disadvantages Peat bogs, aerobic respiration and how this increases. Climate Change Types of adaptation Biotic and Abiotic Classification Evolution Fossil and fossil formation Mutations	Diabetes – what this is Role of insulin Farming – use of herbicides and pesticides. Food chains Food webs Biodiversity What is peat, its role and uses Carbon Cycle – inputs and outputs decomposers <b>Required Practical – investigating distribution using a Quadrat Square.</b> Biodiversity GM – advantages/ disadvantages Contraception – Hormonal and Non hormonal Genetics – what is DNA Chromosomes Genome Alleles Evolution in bacteria and fossils	Fossils Classification <b>Required Practical – investigating distribution using a Quadrat Square.</b> Abiotic and Biotic factors Tropisms – what these are <b>Required Practical – investigating hormones and how seedlings grow with direction of light</b> Genetic Engineering Biodiversity and Peat Bogs Meiosis Asexual and Sexual reproduction <b>Required Practical – Reaction time</b> Punnett Squares – Alleles, Genotype, Phenotype, Dominant, Recessive Diabetes Chromosomes, Genes, Genome Genetic coding	Genetics – what is DNA Chromosomes Genome Alleles Punnett Squares <b>Reaction time practical</b> Function of kidneys Water balance Protein synthesis DNA structure Resistant Bacteria Trophic levels Pyramids of biomass Food chains Evolution and Classification. <b>Required Practical – investigating distribution using a Quadrat Square.</b> <b>Required Practical – investigating hormones and how seedlings grow with direction of light</b>

	Diabetes – what is Type 1 and Type 2 – how do you know you have this Glucogen and Glucagon			
<b>Chemistry</b>	Alkanes: general formula and examples Viscosity and temperature Composition changes from early Earth to today Greenhouse gases Finite resources Hydrocarbons Fractional composition and calculations Petrochemical industry products Cracking hydrocarbons: catalytic and thermal cracking Test for alkenes Formulations Energy changes in reversible reactions Le Chatelier's principle Effect of catalyst on rate Balanced equation Variables: dependent, control Gas tests Mole calculations, mass in kg	Formation of crude oil Hydrocarbons Composition of crude oil Apparatus and measurements Variables Gas tests Calculating mean rate of reaction Factors affecting rate Formulations (e.g., screenwash) Molecular formula and atom counting Combustion Global climate change Reversible reactions Potable water Waste water treatment Natural and synthetic materials Recycling and reusing clothes Cracking alkanes Test for alkenes Alkanes Investigating viscosity and temperature Interpreting graphs and trends Changes in atmospheric composition (early Earth vs today) Reducing methane emissions Sulfur dioxide emissions	<b>Practical Skills:</b> Variables in experiments (dependent variable) Accuracy in measurements (burette vs measuring cylinder) Evaporation and calculating mass of dissolved solids <b>Quantitative Chemistry:</b> Calculating mean concentration (g/dm <sup>3</sup> ) Gas volume calculations using molar volume <b>Organic Chemistry:</b> Fractional distillation of crude oil Changes of state during separation Hydrocarbons: molecular and displayed formulae Naming hydrocarbons Combustion of hydrocarbons (balancing equations) Unsaturated hydrocarbons (alkenes) Reactions of alkenes (with chlorine, steam) Polymers: addition and condensation Amino acids and proteins Thermosetting vs thermosoftening polymers <b>Chemistry of the Atmosphere:</b>	<b>Chemical Analysis:</b> Flame tests for metal ions Tests for carbonate, sulfate, and halide ions Precipitation reactions Chromatography (paper chromatography, R <sub>f</sub> values) Pure substances and gas chromatography <b>Organic Chemistry:</b> Alkanes and alkenes (formulae, uses) Cracking of hydrocarbons Test for alkenes Combustion of hydrocarbons (balancing equations) Effect of temperature on rate in cracking <b>Quantitative Chemistry:</b> Calculating energy released from given masses Mass and ratio calculations in alloys Mean change calculations from data tables Concentration calculations (g/dm <sup>3</sup> ) <b>Chemical Changes:</b> Reversible reactions and their representation Exothermic and endothermic reactions

	<p>Avogadro constant and number of atoms</p> <p>Recycling methods: bioleaching</p> <p>Phytomining: reasons for limited use</p>	<p>Changes in nitrogen and carbon dioxide over time</p> <p>Causes of atmospheric changes</p> <p>Graph plotting and interpreting data</p> <p><b>Chemical Analysis:</b></p> <p>Tests for metal ions (precipitate tests, flame tests)</p> <p>Tests for carbonate ions</p> <p><b>Rate of Reaction:</b></p> <p>Effect of catalysts on rate</p> <p>Reaction profiles</p> <p>Calculating rate from graphs</p> <p>Effect of temperature on rate</p> <p><b>Using Resources:</b></p> <p>Evaluation of materials (aluminium vs wood)</p> <p>Corrosion protection</p> <p>Formulations (paints)</p> <p>Industrial Processes</p> <p>Haber process</p> <p>Conditions and equilibrium</p> <p>Sustainability in ammonia production</p>	<p><b>Chemistry of the Atmosphere:</b></p> <p>Changes in carbon dioxide and nitrogen over time</p> <p>Causes of atmospheric changes</p> <p>Gases in early atmosphere</p> <p>Photosynthesis producing oxygen</p> <p><b>Using Resources:</b></p> <p>Properties and uses of building materials (cement, concrete, steel, bricks)</p> <p>Composites and their components</p> <p>Alloys (gold)</p> <p>Why alloys are harder than pure metals</p> <p>Sustainability and disposal of materials (aluminium vs wood)</p> <p>Formulations (paints)</p> <p>Industrial Processes</p> <p>Haber process (conditions, sources of elements)</p> <p>Role of catalysts</p> <p>Trends in ammonia production</p> <p>Fertilisers and compounds containing nitrogen</p>	
<b>Physics</b>	<p>Speed equation</p> <p>Resultant forces</p> <p>D/t graphs</p> <p>Newton's 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> Laws</p> <p>Stopping distances</p> <p>Acceleration</p> <p>Momentum</p> <p>EM waves: properties, uses, danger</p> <p>Wave speed calculations</p>	<p><b>Resultant forces</b></p> <p><b>Contact/ non-contact forces</b></p> <p><b>Velocity</b></p> <p><b>Newton's second law</b></p> <p><b>Variables and practical skills</b></p> <p><b>Visible</b></p> <p><b>EM waves: properties, uses, dangers</b></p> <p><b>Weigh, mass and gravitational field strength</b></p> <p><b>Acceleration</b></p> <p><b>Work done = force x distance</b></p>	<p>Longitudinal v transverse waves – similarities and differences</p> <p>Variables and Errors in investigations</p> <p>Lenses – convex v concave</p> <p>Ray diagrams</p> <p>Red shift</p> <p>Velocity v speed</p> <p>Force diagrams – arrows to show direction and magnitude of force</p> <p>Terminal velocity</p> <p>Vector Diagrams</p>	<p>Wave diagrams and labels</p> <p>Contact v non contact forces</p> <p>Distance time graphs</p> <p>Velocity time graphs</p> <p>Solar system</p> <p>Life cycle of a star</p> <p>Red shift</p> <p>Lenses – convex v concave</p> <p>Filters</p> <p>Magnetic materials</p> <p>Bar Magnets</p> <p>Electromagnets</p>

Refraction Magnetic fields of a wire Magnetic flux density Motor effect Energy and temperature Practical skills Speed time graph Work done = force x distance Scalars and vectors	Vectors/ scalars Displacemetn/ distance Magnetic fields/ plotting lines Magnetic properties Wave speeds Wave periods Speed equation Resultant forces d/t graphs Stopping distances Road safety	Motor effect Right Hand Rule Upthrust and atmospheric pressure Transformers and importance of ac supply.	Moments Longitudinal v transverse waves Variables and errors in investigations
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