



**What pupils learn at KS3**

Year Group	 <b>Autumn term (approx. 8-9 weeks)</b>		
<b>Baseline Assessment - start of year</b>			
7	<b>Cells, tissues and organs - topic 1</b> Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope. The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts. The similarities and differences between plant and animal cells.  <i>Making a model cell</i>	<b>Particle model - topic 2</b> The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure.  Changes of state in terms of the particle model.  <i>Life cycle of an ice cube/clear and cloudy ice</i>	<b>Energy - topic 3</b> Energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change. Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions.  <i>Where does electricity come from?</i>
<b>End of rotation 1 test - (topics 1-3)</b> <b>Autumn/Spring term (approx. 8-9 weeks)</b>			
7	<b>Reproduction - topic 4</b> Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.  <i>The race to make a baby</i>	<b>Mixtures and Separation - topic 5</b> Mixtures, including dissolving. The concept of a pure substance. Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography.  <i>Desert Island Risks</i>	<b>Forces - topic 6</b> Forces as pushes or pulls, arising from the interaction between two objects. Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces, forces associated with deforming objects; stretching and squashing - springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. Forces measured in Newtons, measurements of stretch or compression as force is changed, force-extension linear relation; Hooke's Law as a special case.  <i>Journey of a car</i>
<b>End of rotation 2 test- (topics 4-6)</b> <b>Spring/Summer term (approx. 8-9 weeks)</b>			
7	<b>Muscles and Bones - topic 7</b> The structure and functions of the human skeleton, to include support, protection, movement and making blood cells Biomechanics - the interaction between skeleton and muscles, including the measurement of force exerted by different muscles. The function of muscles and examples of antagonistic muscles. The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases (aerobic respiration in living organisms).  <i>Muscle memory</i>	<b>Acids and Alkalis - topic 8</b> Defining acids and alkalis in terms of neutralisation reactions. The pH scale for measuring acidity/alkalinity; and indicators. Using acids and alkalis. Antacids  <i>Which antacid is best?</i>	<b>Electricity - topic 9</b> Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current Differences in resistance between conducting and insulating components (quantitative).  <i>Investigating the brightness of bulbs</i>
<b>End of Year 7 test- (topics 1-9)</b> <b>Summer term (approx. 8-9 weeks)</b>			
7	<b>Ecosystems - topic 10</b> The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation. The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops  <i>The rock pool food web</i>	<b>Atoms, elements and compounds - topic 11</b> A simple (Dalton) atomic model. Differences between atoms, elements and compounds. Chemical symbols and formulae for elements and compounds. Conservation of mass changes of state and chemical reactions.  <i>Element cubes fact file</i>	<b>Sound - topic 12</b> Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound. Sound needs a medium to travel, the speed of sound in air, in water, in solids. Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. Auditory range of humans and animals.  <i>Designing ear defenders</i>
<b>End of rotation test 3 (topics 10-12)</b>			

Year Group	Autumn term (approx. 8-9 weeks)		
8	<p><b>Food and nutrition - topic 1</b></p> <p>Content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed.</p> <p>Calculations of energy requirements in a healthy daily diet</p> <p>The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases.</p> <p>The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts).</p> <p><i>Journey of a cheese sandwich</i></p>	<p><b>The periodic table - topic 2</b></p> <p>The varying physical and chemical properties of different elements. The principles underpinning the Mendeleev Periodic Table. The Periodic Table: periods and groups; metals and non-metals. How patterns in reactions can be predicted with reference to the Periodic Table. The properties of metals and non-metals.</p> <p>Chemical reactions as the rearrangement of atoms.</p> <p>Representing chemical reactions using formulae and using equations.</p> <p><i>Mendeleev. Element top trumps</i></p>	<p><b>Fluids - topic 3</b></p> <p>Changes with temperature in motion and spacing of particles. Internal energy stored in materials. The differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density. Conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving. Similarities and differences, including density differences, between solids, liquids and gases. Atmospheric pressure, decreases with increase of height as weight of air above decreases with height. Pressure in liquids, increasing with depth; upthrust effects, floating and sinking. Pressure measured by ratio of force over area.</p> <p><i>Goldfinger's demise</i></p>
<p><b>End of rotation 1 test - (topics 1-3)</b></p> <p><b>Autumn/Spring term (approx. 8-9 weeks)</b></p>			
8	<p><b>Breathing and respiration - topic 4</b></p> <p>The structure and functions of the gas exchange system in humans, including adaptations to function. The impact of exercise, asthma and smoking on the human gas exchange system. Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life.</p> <p>A word summary for aerobic respiration. The process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration.</p> <p>The differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.</p> <p><i>What happens when we exercise?</i></p>	<p><b>Combustion - topic 5</b></p> <p>The use of carbon in obtaining metals from metal oxides. Properties of ceramics, polymers and composites (qualitative). Exothermic and endothermic chemical reactions (qualitative). Combustion, thermal decomposition, oxidation and displacement reactions.</p> <p><i>Hand warmers and drinks coolers.</i></p>	<p><b>Light - topic 6</b></p> <p>Light waves travelling through a vacuum; speed of light. The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing; the human eye. Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. Colours and the different frequencies of light, white light and prisms; differential colour effects in absorption and diffuse reflection.</p> <p><i>Light effects</i></p>
<p><b>End of rotation 2 test- (topics 4-6)</b></p> <p><b>Spring/Summer term (approx. 8-9 weeks)</b></p>			
8	<p><b>Plants and their reproduction - topic 7</b></p> <p>Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.</p> <p><i>The life cycle of plants</i></p>	<p><b>Metals and their Uses - topic 8</b></p> <p>Reactions of acids with metals to produce a salt plus hydrogen. Reactions of acids with alkalis to produce a salt plus water. Oxidation and displacement reactions. The order of metals and carbon in the reactivity series</p> <p><i>How do we prevent rusting?</i></p>	<p><b>Energy transfer - topic 9</b></p> <p>Comparing energy values of different foods (from labels) (kJ). Comparing power ratings of appliances in watts (W, kW). Comparing amounts of energy transferred (J, kJ, kW hour). Domestic fuel bills, fuel use and costs. Heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation.</p> <p><i>Heat in the kitchen</i></p>
<p><b>End of Year 8 test- (topics 1-9)</b></p> <p><b>Summer term (approx. 8-9 weeks)</b></p>			
8	<p><b>Unicellular Organisms - topic 10</b></p> <p>The structural adaptations of some unicellular organisms. The five kingdoms. The structure of bacteria, virus and fungi. What are pathogens and how does the body react to them.</p> <p><i>The Science Museum - Kingdoms</i></p>	<p><b>Rocks - topic 11</b></p> <p>The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. Earth as a source of limited resources and the efficacy of recycling. The composition of the atmosphere. The production of carbon dioxide by human activity and the impact on climate.</p> <p><i>Make a choc cycle</i></p>	<p><b>Earth and Space - topic 12</b></p> <p>Our Sun as a star, other stars in our galaxy, other galaxies. The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. The light year as a unit of astronomical distance.</p> <p><i>The final frontier</i></p>
<p><b>End of rotation test 3 (topics 10-12)</b></p>			

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9	<p><b>Growing our food - topic 1</b></p> <p>Plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots. The role of leaf stomata in gas exchange in plants. The reactants in, and products of, photosynthesis, and a word summary for photosynthesis. The dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere. The adaptations of leaves for photosynthesis.</p> <p>Hydroponics</p>	<p><b>Making materials - topic 2</b></p> <p>The properties of metals and non-metals The properties of polymers and smart materials. What is nanotechnology? What are atoms and ions?</p> <p>How smart are materials</p>	<p><b>Force and motion - topic 3</b></p> <p>Moment as the turning effect of a force. Speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time). The representation of a journey on a distance-time graph.</p> <p>Design the fastest..... Or Distance-time graph for journey to school</p>
End of rotation 1 test - (topics 1-3)			
Autumn/Spring term (approx. 8-9 weeks)			
9	<p><b>Genetics and evolution- topic 4</b></p> <p>Heredity as the process by which genetic information is transmitted from one generation to the next. A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation.</p> <p>Confused of Orpington</p>	<p><b>Reactivity - topic 5</b></p> <p>Representing chemical reactions using formulae and using equations. Energy changes on changes of state. The reactivity series and displacement reactions. How metals are extracted. Percentage loss or gain. What is equilibria?</p> <p>Who was Fritz Haber?</p>	<p><b>More electricity - topic 6</b></p> <p>Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects. The idea of electric field, forces acting across the space between objects not in contact. Earth's magnetism, compass and navigation. The magnetic effect of a current, electromagnets, D.C. motors.</p> <p>Resistance investigation</p>
End of rotation 2 test- (topics 4-6)			
Spring/Summer term (approx. 8-9 weeks) Practical module and revision for end of KS3 test			
9	<p><b>Key practical skills (Biology, Chemistry and Physics)</b></p> <p>Making a prediction using scientific ideas, writing a method with appropriate equipment and variables identified, risk assessment, table of results, safely performing practical to obtain valid results, graph drawing, conclusion, evaluation of work. Followed by revision of KS3 Biology, Chemistry and Physics</p>		
End of KS3 test- (all topics from Year 7-9)			
Summer term (approx. 8-9 weeks) Begin GCSE topics			
9	Ecology	Chemistry of the atmosphere	Energy

## **Key:**

Formal written tests

Examples of teacher assessment within the topic that may be used in addition to homework.

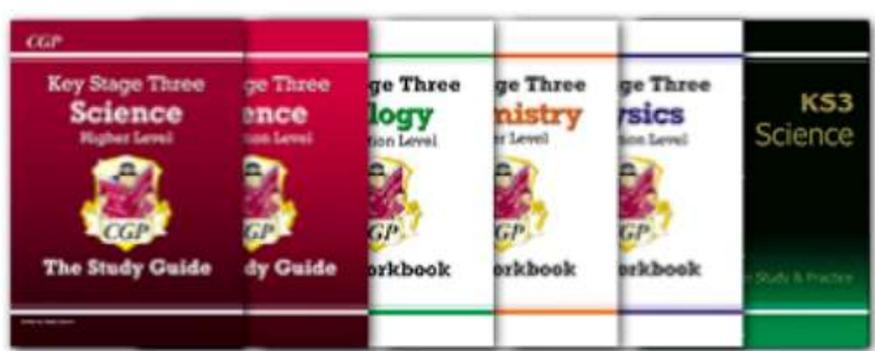
Within each topic there is a working scientifically strand that involves investigation through practical work.

## **Useful books:**

Text books: Year 7 – Exploring Science 7, Year 8 – Exploring Science 8, Year 9 – Exploring Science 9 (all published by Pearson).



KS3 revision guides – we recommend the CGP publications; study guides and workbooks (written for the new curriculum in 2016).



## **Useful websites:**

1. BBC Bitesize for KS3 is an excellent resource containing information, videos and tests that pupils can use throughout a topic and to help with revision:  
<https://www.bbc.com/education/subjects/zng4d2p>
2. Science in Action videos are useful 20 mins videos on many of the topics covered in KS3:  
<https://www.youtube.com/playlist?list=PLup0Lr9nAYyQPrsd9tBUaLjTD8ARIT4I8>