



ABINGDON

KS3 Science (Year 8 & 9)

YEAR 8/9		SUBJECT AREA - SCIENCE
Autumn 1	<b>Food and nutrition</b>	
Knowledge	<ul style="list-style-type: none"><li>• content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed</li><li>• calculations of energy requirements in a healthy daily diet</li><li>• 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)</li><li>• the role of diffusion in the movement of materials in and between cells.</li></ul>	
Skills	<ul style="list-style-type: none"><li>• use appropriate units for area measurements</li><li>• calculate area for a variety of shapes, including rectangles and cuboids.</li></ul>	
Vocabulary	Carbohydrate Protein Fat Nutrition Digestion Vitamin Mineral	
Autumn 1	<b>Combustion</b>	
Knowledge	<ul style="list-style-type: none"><li>• the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure</li></ul>	

	<ul style="list-style-type: none"> <li>• differences between atoms, elements and compounds</li> <li>• chemical symbols and formulae for elements and compounds</li> <li>• conservation of mass changes of state and chemical reactions</li> <li>• chemical reactions as the rearrangement of atoms</li> <li>• representing chemical reactions using formulae and using equations</li> <li>• combustion, thermal decomposition, oxidation and displacement reactions</li> <li>• what catalysts do</li> <li>• exothermic and endothermic chemical reactions (qualitative)</li> <li>• the carbon cycle</li> <li>• the composition of the atmosphere</li> <li>• the production of carbon dioxide by human activity and the impact on climate.</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate.</li> <li>• interpreting line graphs</li> </ul>
Vocabulary	<p>Thermal          Combust          Exothermic          Endothermic          Carbon          Oxygen          Heat          Mass          Conservation          reaction</p>
Autumn 2	<b>Fluids</b>
Knowledge	<ul style="list-style-type: none"> <li>• 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</li> <li>• atmospheric pressure, decreases with increase of height as weight of air above decreases with height</li> <li>• pressure in liquids, increasing with depth; upthrust effects, floating and sinking</li> <li>• pressure measured by ratio of force over area – acting normal to any surface</li> </ul>

	<ul style="list-style-type: none"> <li>• conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving</li> <li>• similarities and differences, including density differences, between solids, liquids and gases</li> <li>• the difference between chemical and physical changes</li> <li>• the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice–water transition</li> <li>• atoms and molecules as particles</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• apply mathematical concepts and calculate results</li> </ul>
Vocabulary	<p>Forces Spring Pressure Weight Height Ratio depth</p>
Autumn 2	<b>Plants and their reproduction</b>
Knowledge	<ul style="list-style-type: none"> <li>• plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots</li> <li>• reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms</li> <li>• the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops</li> <li>• the importance of plant reproduction through insect pollination in human food security</li> <li>• heredity as the process by which genetic information is transmitted from one generation to the next</li> <li>• differences between species</li> <li>• the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation</li> <li>• the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements</li> <li>• apply sampling techniques.</li> </ul>

	<ul style="list-style-type: none"> <li>• use appropriate units for area measurements</li> <li>• calculate areas for squares and rectangles</li> <li>• use a sample to calculate an estimate of population size.</li> </ul>
Vocabulary	Structure Variation Continuous Discontinuous Biodiversity Pollination Fertilisation Sample population
Spring 1	<b>The periodic table</b>
Knowledge	<ul style="list-style-type: none"> <li>• a simple (Dalton) atomic model</li> <li>• differences between atoms, elements and compounds</li> <li>• chemical symbols and formulae for elements and compounds</li> <li>• chemical reactions as the rearrangement of atoms</li> <li>• representing chemical reactions using formulae and using equations</li> <li>• the varying physical and chemical properties of different elements</li> <li>• the principles underpinning the Mendeleev periodic table</li> <li>• the periodic table: periods and groups; metals and non-metals</li> <li>• how patterns in reactions can be predicted with reference to the periodic table</li> <li>• the properties of metals and non-metals</li> <li>• the chemical properties of metal and non-metal oxides with respect to acidity.</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions</li> <li>• present reasoned explanations, including explaining data in relation to predictions and hypotheses</li> <li>• evaluate data</li> </ul>
Vocabulary	Mass Number

	Electron Proton Neutron Patterns
Spring 1	<b>Light</b>
Knowledge	<ul style="list-style-type: none"> <li>• the similarities and differences between light waves and waves in matter</li> <li>• light waves travelling through a vacuum; speed of light</li> <li>• the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface</li> <li>• use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye</li> <li>• light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras</li> <li>• colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• preparing effective presentations, measuring angles</li> </ul>
Vocabulary	Speed Wavelength Prisms Refraction Reflection Retina frequency
Spring 2	<b>Breathing and respiration</b>
Knowledge	<ul style="list-style-type: none"> <li>• the role of diffusion in the movement of materials in and between cells</li> <li>• the structure and functions of the gas exchange system in humans, including adaptations to function</li> <li>• the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume</li> <li>• the impact of exercise, asthma and smoking on the human gas exchange system • the role of leaf stomata in gas exchange in plants</li> </ul>

	<ul style="list-style-type: none"> <li>• aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life</li> <li>• a word summary for aerobic respiration</li> <li>• the process of anaerobic respiration in humans and microorganisms, including fermentation, and a word summary for anaerobic respiration</li> <li>• the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review</li> <li>• apply mathematical concepts and calculate results.</li> </ul>
Vocabulary	<p>Oxygen  Carbon dioxide  Lungs  Aveoli  Gas exchange  Respiration  Aerobic  anaerobic</p>
Spring 2	<b>Metals and their uses</b>
Knowledge	<ul style="list-style-type: none"> <li>• chemical symbols and formulae for elements and compounds</li> <li>• the concept of a pure substance</li> <li>• mixtures, including dissolving</li> <li>• the identification of pure substances</li> <li>• representing chemical reactions using formulae and using equations</li> <li>• combustion, thermal decomposition, oxidation and displacement reactions</li> <li>• reactions of acids with metals to produce a salt plus hydrogen</li> <li>• the varying physical and chemical properties of different elements</li> <li>• the properties of metals and non-metals</li> <li>• the order of metals and carbon in the reactivity series.</li> </ul>

Skills	<p>make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements.</p> <ul style="list-style-type: none"> <li>• identify the ranges of readings in data</li> <li>• explain why data with a small range is of good quality</li> <li>• calculate means and explain their use</li> <li>• identify anomalous results in data.</li> </ul>
Vocabulary	<p>Displacement          Thermal          Decomposition          Physical          Chemical          Metals          Non-metals</p>
Summer 1	<b>Energy transfers</b>
Knowledge	<ul style="list-style-type: none"> <li>• comparing power ratings of appliances in watts (W, kW)</li> <li>• comparing amounts of energy transferred (J, kJ, kWh)</li> <li>• domestic fuel bills, fuel use and costs</li> <li>• 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; such transfers tending to reduce the temperature difference: use of insulators</li> <li>• energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change</li> <li>• 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</li> <li>• using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• substituting values in simple formulae and solving resulting equations</li> <li>• understanding percentages</li> <li>• drawing and interpreting scale drawings</li> </ul>

	<ul style="list-style-type: none"> <li>• choosing and using a suitable level of accuracy for measurements.</li> </ul>
Vocabulary	Temperature Thermal Insulators Transfer Power watts
<b>Summer 1</b>	<b>Unicellular organisms</b>
Knowledge	<ul style="list-style-type: none"> <li>• cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope</li> <li>• 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</li> <li>• the similarities and differences between plant and animal cells</li> <li>• the process of anaerobic respiration in humans and microorganisms, including fermentation, and a word summary for anaerobic respiration</li> <li>• the role of diffusion in the movement of materials in and between cells</li> <li>• the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism</li> <li>• the structural adaptations of some unicellular organisms</li> <li>• the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms</li> <li>• the carbon cycle (Chemistry).</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• identify pie charts</li> <li>• describe what a certain pie chart shows</li> <li>• extract simple information from pie charts</li> <li>• present data in pie charts</li> <li>• identify when to use a pie chart.</li> </ul>
Vocabulary	Photosynthesis Energy Respiration



	<p>Diffusion          Organisation          Carbon cycle          Cells          Tissues</p>
<b>Summer 2</b>	<b>Rocks</b>
Knowledge	<ul style="list-style-type: none"> <li>• the composition of the Earth</li> <li>• the structure of the Earth</li> <li>• the rock cycle and the formation of igneous, sedimentary and metamorphic rocks</li> <li>• Earth as a source of limited resources and the efficacy of recycling.</li> </ul>
Skills	<p>how the scientific method is adapted for mainly observational sciences, such as geology.</p> <ul style="list-style-type: none"> <li>• interpreting more complex graphs</li> <li>• substituting into formulae.</li> </ul>
Vocabulary	<p>Igneous          Sedimentary          Metamorphic          Cycle          Composition</p>
Summer 2	<b>Earth and space</b>
Knowledge	<ul style="list-style-type: none"> <li>• non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity</li> <li>• magnetic poles, attraction and repulsion</li> <li>• magnetic fields by plotting with compass, representation by field lines</li> <li>• Earth's magnetism, compass and navigation</li> <li>• gravity force, weight = mass <math>\times</math> gravitational field strength (g), on Earth <math>g = 10 \text{ N/kg}</math>, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)</li> <li>• our Sun as a star, other stars in our galaxy, other galaxies</li> <li>• the seasons and the Earth's tilt, day length at different times of year, in different hemispheres</li> <li>• the light year as a unit of astronomical distance.</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• using ratios to compare quantities</li> </ul>

	<ul style="list-style-type: none"><li>• writing one number as a fraction of another and converting fractions to decimals</li><li>• substituting values into simple formulae and solving resulting equations</li><li>• drawing line graphs and scatter graphs, and using these to draw conclusions.</li></ul>
Vocabulary	Planets Gravity Moon Hemisphere Light Year Newton