

KS3 Curriculum Overview: Biology

Rationale: In Year 7, our aim is to build on the knowledge and understanding of biology gained during Key Stage 2 and provide a firm foundation for further study at GCSE. Students begin by studying plants and animals at a cellular level, and then learn how the cells work together to make tissues, organs and organ systems. Several organ systems are studied in more detail, such as the respiratory, skeletal and reproductive systems in mammals, and reproduction in plants. In Year 8, students learn about the structure and function of the digestive system in mammals, healthy lifestyle, photosynthesis, inheritance, variation, evolution and interdependence, all of which is then studied in more depth at GCSE level. Throughout the course, the scientific process is taught, with many opportunities to plan, investigate, record, conclude and evaluate practical investigations, together with the relevant maths skills, and key subject-specific vocabulary that will enable students to be scientifically literate.

Reading in the curriculum: The Sciences offer many opportunities to develop and extend students' literacy skills. There is a large amount of new, subject-specific vocabulary, and so each unit includes a glossary which students will complete and learn during the unit. Students will use texts to find out information for themselves, using the functional layout of such texts, including index, contents and glossary sections of text books used in class, and also at home in an online format. Students will also review and connect information within topics, so knowledge organisers are provided for each topic.

Connected knowledge: Topics in the Sciences do not stand alone. Each topic connects to prior knowledge from primary school, other topics learnt or still to be learnt at this school both in the Sciences and in other subjects and also in the outside world. Connected knowledge is discussed in class, starting with the Context Summary which is shared with students at the start of each topic.

Diversity: Science belongs to everyone, regardless of background, and people from all walks of life contribute to its development and reap its benefits. This is reflected in the examples used in lessons and the Scientists whose work we consider.

Term / Length of Unit	Outline	Assessment	Home Learning	Resources	Knowledge/Skills End Points	Reading in the Curriculum
Year 7 Autumn Term 1 Introduction to How Science Works (4 lessons)	<p>Introduction to Science To complement the introduction lessons in chemistry, students will learn about variables, planning experiments, drawing tables and graphs and evaluating results.</p> <p>All lessons have a practical context and are based around simple experiments that allow students to gain hands-on experience in using simple apparatus, in addition to learning some of the skills which are important in scientific investigations. The lessons are based on general science and do not have a bias towards biology.</p>	Will be assessed as part of the mid-topic test for 7B1.	Revision tasks from homework booklet	SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 1 textbook.	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> Identify independent, dependent and control variables Define keywords – variables, graph, table, units, accuracy, precision, error, method, analysis, equipment <p><u>Skills</u></p> <ul style="list-style-type: none"> Drawing graphs and tables Collecting data Planning experiments Writing methods Understanding the need for control variables Analysing and evaluating data 	Glossary, context summary, knowledge organiser and guided reading opportunities

<p>Year 7 Autumn Term 1 and 2 7 B1 7 lessons (11 including assessment and responding to feedback lessons)</p>	<p>7B1 Cells</p> <p>Students learn about the structure and function of plant, animal and unicellular cells, specialised cells in multicellular organisms, and how substances move in and out of cells.</p> <p>Students also have hands-on experience with learning how to use microscopes to study cells, learning how to prepare slides, use a microscope to view cells and how to draw scientific diagrams of cells. Students learn how to calculate total magnification.</p>	<p>Mid-point and End of topic test</p>	<p>Revision tasks from homework booklet</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 1 textbook.</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> cells as the fundamental unit of living organisms. the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts the similarities and differences between plant and animal cells the role of diffusion in the movement of materials in and between cells the structural adaptations of some unicellular organisms <p><u>Skills</u></p> <ul style="list-style-type: none"> Observe, interpret and record cell structure using a light microscope Calculate total magnification 	
<p>Year 7 Spring Term 1 and 2 7B2 7 lessons (9 including assessment and responding to feedback lessons)</p>	<p>7B2 Organisation</p> <p>Students use the knowledge gained in 7B1 about cells and specialised cells, and how they work together to form tissues, organs and organ systems. Students then learn about the respiratory and skeletal organ systems in greater depth.</p> <p>Teaching and learning methods include modelling, practical investigations into muscle strength and lung volume and dissections.</p>	<p>End of topic test</p>	<p>Revision tasks from homework booklet</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 1 textbook.</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. The skeletal and muscular systems the structure and functions of the human skeleton, to include support, protection, movement and making blood cells biomechanics – the interaction between skeleton and muscles the function of muscles and examples of antagonistic muscles. the structure and functions of the gas exchange system in humans, including adaptations to function the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases. the impact of exercise and asthma on the human gas exchange system <p><u>Skills</u></p>	<p>Glossary, context summary, knowledge organiser and guided reading opportunities</p>

					<ul style="list-style-type: none"> Simple measurements of lung volume including the measurement of force exerted by different muscles 	
<p>Year 7 Summer Term 1 and 2 7B3 9 lessons (13 including 2x assessment and responding to feedback lessons)</p>	<p>7B3 Reproduction</p> <p>Following on from 7B2, another organ system is studied in greater depth. Reproduction is studied first in humans, then in plants.</p> <p>Teaching and learning methods include video clips, annotated diagrams, animations, demo examples of contraceptives and practical investigations into dispersal mechanisms of seeds.</p>	<p>Mid-point and end of topic test End of Year exam</p>	<p>Revision tasks from homework booklet</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 1 textbook.</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> 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 reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal. <p><u>Skills</u></p> <ul style="list-style-type: none"> Quantitative investigation of some dispersal mechanisms. 	<p>Glossary, context summary, knowledge organiser and guided reading opportunities</p>
<p>Year Autumn Term 1 and 2 8B1 9 lessons (13 including 2x assessment and responding to feedback lessons)</p>	<p>8B1 Health and Lifestyle</p> <p>Following on from Year 7, another organ system is studied in greater depth – the digestive system. Links are made to healthy eating and the wider choices around healthy lifestyles.</p> <p>Teaching and learning methods include video clips, animations, dissections, modelling the digestive system, research using the internet and practical investigations into qualitative food test.</p>	<p>Mid-point and end of topic test</p>	<p>Revision tasks from homework booklet</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 2 textbook.</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases 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) the importance of bacteria in the human digestive system the impact of smoking on the human gas exchange system the effects of recreational drugs (including substance misuse) on 	<p>Glossary, context summary, knowledge organiser and guided reading opportunities</p>

					<p>behaviour, health and life processes.</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> calculations of energy requirements in a healthy daily diet 	
<p>Year Spring Term 1 and 2 8B2 11 lessons (15 including 2x assessment and responding to feedback lessons)</p>	<p>8B2 Ecosystem processes</p> <p>Moving away from organ systems, students begin to study cellular processes – photosynthesis, and aerobic and anaerobic respiration (conceptually more difficult topics). Students investigate the adaptations of leaves as an organ adapted to carry out photosynthesis.</p> <p>Interdependence of organisms is studied by looking at food webs and chains within ecosystems.</p> <p>Teaching and learning methods include video clips, animations, demonstrations, fieldwork and practical investigations into factors affecting photosynthesis and adaptations of leaves for photosynthesis.</p>	<p>Mid-point and end of topic test</p>	<p>Revision tasks from homework booklet</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 2 textbook.</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> 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. the role of leaf stomata in gas exchange in plants. aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life 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 the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism. the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops 	<p>Glossary, context summary, knowledge organiser and guided reading opportunities</p>

					<ul style="list-style-type: none"> the importance of plant reproduction through insect pollination in human food security how organisms affect, and are affected by, their environment, including the accumulation of toxic materials. <p><u>Skills</u></p> <ul style="list-style-type: none"> Identifying the independent, dependent and control variables in an investigation into rate of photosynthesis, and recording data in a table and graph. Using a microscope to view impressions of stomata Calculations of number of stomata on upper and lower side of a leaf 	
<p>Year Summer Term 1 and 2 8B3 8 lessons (10 including 2x assessment and responding to feedback lessons)</p>	<p>8B3 Adaptation and Inheritance</p> <p>The final chapter studied in Year 8 is the most difficult in terms of content as students need to grasp the abstract contents of inheritance and evolution, and variation, which is easier to observe and understand. Students are also introduced to the idea that scientific discoveries are developed and refined over time, and are often collaborative.</p> <p>Teaching and learning methods include video clips, animations, models and practical investigations looking at different types of variation and modelling natural selection.</p>	<p>End of topic test End of Year exam</p>	<p>Revision tasks from homework booklet</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 2 textbook.</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> 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 differences between species 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 changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction 	<p>Glossary, context summary, knowledge organiser and guided reading opportunities</p>

					<ul style="list-style-type: none"> the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material. <p><u>Skills</u></p> <ul style="list-style-type: none"> 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 make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements 	
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