



### Learning Aims and Curriculum Intent:

Students are learning to master the foundations of biology, known as ‘threshold concepts’, which will provide a solid basis for beginning the IGCSE course in Year 10. This scheme was revised in 2023 to consider developments in the biological sciences and bring in an increased focus on practical skills and mathematical application (which are essential in the continuation of learning Biology). Students will learn about the discovery of cells, how these fits into organisms as systems of energy flow and building up to community-scale implications.

Term	Content, Key Questions and Knowledge	Skills	Assessment
Michaelmas	<p><b>1. Cells</b></p> <ul style="list-style-type: none"> <li>What are cells, and why do we have them?</li> <li>What are the similarities and differences between the cells of different organisms?</li> <li>What do the cells of unicellular and multicellular organisms look like?</li> <li>How do multicellular organisms develop?</li> </ul> <p><b>2. Bioenergetics</b></p> <ul style="list-style-type: none"> <li>What is metabolism?</li> <li>What is respiration?</li> <li>How do plants transfer light to chemical energy?</li> </ul> <p><b>3. Health and Disease</b></p> <ul style="list-style-type: none"> <li>Are all micro-organisms pathogens?</li> <li>How do pathogens travel?</li> <li>How can we identify the spread of disease?</li> <li>How does the human body defend itself?</li> <li>What is the difference between epidemic and pandemic?</li> <li>How can we stay safe during sexual activity?</li> <li>How do micro-organisms fight back?</li> </ul>	<ul style="list-style-type: none"> <li>Apply prior knowledge to new concepts.</li> <li>Learn definitions for (and practice remembering) new key words.</li> <li>Draw conclusions based on evidence.</li> <li>Working safely in a laboratory.</li> <li>Preparation and viewing of slides for light microscopy (single celled organisms).</li> <li>Biological drawing.</li> <li>Evaluating arguments.</li> <li>Identify turns of phrase where there is a misalignment between the definition inside and outside of the science classroom (e.g. respiration)</li> <li>Writing and balancing equations.</li> <li>Using a datalogger.</li> <li>Plan experiments considering the scientific method.</li> <li>Present and evaluate data in a scientific way (tables, graphs).</li> <li>Plan how to increase the validity of results, and suggest improvements.</li> <li>Aseptic technique in microbiology.</li> <li>Consider source reliability when using research skills.</li> </ul>	<p><b>All topics will contain an online MCQ progress quiz.</b></p> <p><b>There will be one synoptic written paper per term, the Michaelmas assessment will cover topics 1-2.</b></p> <p><b>Informal topic assessment tasks include:</b></p> <ul style="list-style-type: none"> <li>Topic 1: Multiple choice quiz.</li> <li>Topic 2: Pupils identify and correct a passage of misconceptions.</li> <li>Topic 3: Research task – drug development.</li> </ul>
Lent	<p><b>3. Health and Disease (continued)</b></p> <p><b>4. Variation and Reproduction</b></p> <ul style="list-style-type: none"> <li>How does variation arise?</li> <li>asexual and sexual reproduction in different species</li> <li>natural selection, evolution and speciation</li> </ul> <p><b>5. DNA and Gene Expression</b></p> <ul style="list-style-type: none"> <li>Why are proteins important biological molecules?</li> <li>How is DNA organised in animal and plant cells (eukaryotic cells)?</li> <li>Can we extract the DNA from cells?</li> <li>Why do cells divide?</li> <li>What happens when cells divide?</li> </ul>	<ul style="list-style-type: none"> <li>Relate prior knowledge to new contexts.</li> <li>Learn definitions for (and practice remembering) new key words.</li> <li>Draw conclusions based on evidence.</li> <li>Working safely in a laboratory.</li> <li>Compare and contrast biological processes.</li> <li>Plan experiments considering the scientific method.</li> <li>Present and evaluate data in a scientific way (tables, graphs).</li> <li>Preparation and viewing of slides for light microscopy (dividing plant cells).</li> <li>Biological drawing.</li> </ul>	<p><b>All topics will contain an online MCQ progress quiz.</b></p> <p><b>There will be one synoptic written paper per term, the Lent assessment will cover topics 3-4.</b></p> <p><b>Informal topic assessment tasks include:</b></p> <ul style="list-style-type: none"> <li>Topic 4: Plan, conduct, conclude and evaluate an experiment to compare the effects of different antibiotics on bacterial growth</li> <li>Topic 5:</li> </ul>
Trinity	<p><b>6. Biotechnology</b></p> <ul style="list-style-type: none"> <li>What is Biotechnology, and how does it benefit humans?</li> <li>How can we manipulate microbial fermentation for human benefit?</li> <li>Can we change the DNA of other organisms?</li> <li>Can we clone organisms, and what are the ethics?</li> <li>How are vaccines made?</li> </ul> <p><b>7. Humans and the Environment</b></p> <ul style="list-style-type: none"> <li>Investigate the effect of temperature on the hatching success of brine shrimps</li> </ul>	<ul style="list-style-type: none"> <li>Relate prior knowledge to new contexts.</li> <li>Learn definitions for (and practice remembering) new key words.</li> <li>Working safely in a laboratory.</li> <li>Follow instructions of an experimental method.</li> <li>Evaluate arguments for and against an idea, including scientific pros/cons as well as ethical considerations.</li> <li>Plan experiments considering the scientific method.</li> <li>Present and evaluate data in a scientific way (tables, graphs).</li> <li>Consider source reliability when using research skills.</li> </ul>	<p><b>All topics will contain an online MCQ progress quiz.</b></p> <p><b>The end of year examinations are fully synoptic and will cover topics 1-6.</b></p> <p><b>Informal topic assessment tasks include:</b></p> <ul style="list-style-type: none"> <li>Topic 6: GCSE exam-style question (10marks)</li> <li>Topic 7: Group presentation.</li> </ul>

<b>Examples of Homework</b>	<p>Write a short piece to evaluate the limitations and ethical arguments for/against using adult stem cells in medicine.  Plan a valid experiment to demonstrate the effect of lactic acid build up in muscles.  Draw tables and graphs of experimental data collected in lesson.  Create a cartoon strip showing the process of immunological defence.  Write a practical plan on how we can compare the effectiveness of different antibiotics.  Write a newspaper article (etc.) on the ethics of cloning.  Research examples of where we use genetically modified organisms (different to those covered in lessons).</p>	
<b>Key terminology</b>	<p><u>Topic specific key words:</u> Organelle, eukaryote, prokaryote, tissue, organ, system, unicellular, multicellular, magnification, resolution, embryonic stem cell, adult stem cell, cell differentiation, specialised cell, metabolic reaction, enzyme, catalyst, active site, substrate, product, optimum, aerobic respiration, anaerobic respiration, photosynthesis, microorganism, pathogen, disease, immunity, resistance, epidemic, pandemic, variation, asexual reproduction, sexual reproduction, fertilisation, gamete, evolution, speciation, natural selection, DNA, chromosome, gene, genome, protein, gene expression, heredity, mitosis, meiosis, biotechnology, genetic modification, immobilised enzyme,</p> <p><u>Practical skills key words:</u> accuracy, reliability, validity, precision, concordance, control variable, independent variable, dependent variable, control experiment.</p>	
<b>Super-curricular enrichment and scholarly extension</b>	<ul style="list-style-type: none"> <li>• <b>Read:</b> Gut, by Giulia Enders; The Story of the Human Body OR Exercised both by Daniel Lieberman</li> <li>• <b>Watch:</b> A life On Our Planet (David Attenborough, Netflix), Un-natural Selection (Netflix), My Octopus Teacher (Netflix), Chimp Empire (Netflix), Life in Colour (David Attenborough, Netflix), Fantastic Fungi (Apple TV, Netflix), Human – The World Within (Netflix), Seaspiracy (Netflix).</li> <li>• <b>Listen:</b> BBC Inside Science, Growing science</li> <li>• <b>Visit:</b> The Science Museum - London, London Zoo, Kew Gardens - London, The Eden Project - Cornwall, The Centre of the Cell - London (public sessions during holidays), Natural History Museum – London.</li> </ul>	
<b>Useful websites</b>	<p><b>BBC Bitesize (lots of useful pages linked on the topic checklists, accessible by students on SharePoint/Teams- ask your teacher)</b></p>	
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