

Year 12 Biology Sequence

| | Content Taught | Reference | Essential Knowledge | Assessment | Rationale |
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| <p>In year 12, students further develop their understanding of all content studied in year 10 and 11 and also have the opportunity to learn new knowledge not studied before. The year 12 biology curriculum provides all students with the essential knowledge for the first year of the key stage 5 curriculum and challenges students to apply this knowledge in many new situations</p> | | | | | <p>The biomolecules unit is fundamental for the understanding of biological processes and how they work. The unit builds upon knowledge of simple biomolecules studied at KS4 such as proteins, enzymes, carbohydrates, lipids and nucleic acids. The biological molecules unit supports all the biology units studied throughout the course. Biological molecules studied in HT1 underpins subsequent study such protein synthesis, DNA</p> |
| HT1 | <p>Biological Molecules This unit focuses upon the chemical structure and function of the essential biomolecules of living organisms. The biological molecules carbohydrates, lipids and proteins and enzymes are studied. RP1 – enzymes action and RP11 – using calibration techniques are practically investigated.</p> | <p>3.1.1 3.1.2 3.1.3 3.1.4</p> | <p>Biological molecules Carbohydrates Starch, glycogen and cellulose Lipids Proteins and enzymes Enzyme action/inhibition</p> <p>Investigating factors that affect the rate of enzyme controlled reactions. Investigating and applying the use of colorimetry and calibration.</p> <p>Essential knowledge reading for consolidation: Biomolecules</p> | <p>Formative Assessment: Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p>End of topic Summative Assessments: A range of topic assessments followed by a final end of unit exam. Assessments are based upon the application of the essential knowledge</p> | |

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| | <p>Cells This unit focuses upon the structure and roles of cells within biological systems. Transport mechanisms moving biological molecules across cell membranes is studied. The cell cycle. The application and practical study of cells is covered in RP2 – optical microscopes/observing mitosis. RP3 – calibration. RP4 – permeability of cell membranes.</p> | <p>3.2.1 3.2.2 3.2.3</p> | <ul style="list-style-type: none"> • AQA 1-Biological-Molecules Summary Notes (physicsandmathstutor.com) <p>Cell Structure Transport across cell membranes. Microscopic measurements and calculations. Eukaryotic cell structure. Cell specialization and organization. Prokaryotic cells. Mitosis/Cell cycle.</p> <p>Transport across cell membranes Diffusion, osmosis and active transport Co-transport</p> <p>Cell recognition and the immune system.</p> <p>The use of optical microscopes to observe mitosis.</p> | <p>that links ideas together throughout each topic.</p> <p>Formative Assessment: Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p>End of topic Summative Assessments: A range of topic assessments followed by a final end of unit exam. Assessments are based upon the application of the essential knowledge that links ideas together throughout each topic.</p> | <p>replication and cell transport mechanisms. Biological molecules studied in HT2 underpins the further study of mass transport in plants in HT4 and the study of photosynthesis and respiration in YR13 and genetic information, variation and relationships between organism in YR13 and the control of gene expression in YR13.</p> <p>Students study the cells topic in alignment with the biomolecules unit in half term 1. The unit builds upon prior knowledge of cell structure and the cell transport mechanisms of diffusion, osmosis and active transport and the cell cycle at KS4. The cells unit supports and underpins other areas of subsequent study in the course such as organism exchange substances, mass transport, bioenergetics and organisms response to change. This unit will support and strengthen understanding leading to the unit organism exchange substances with their environment.</p> |
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| | | | <p>Producing calibration curves to determine water potential. Investigating factors affecting permeability across cell membranes.</p> <p>Essential knowledge reading for consolidation: Cells AQA 2-Cells Summary Notes (physicsandmathstutor.com)</p> | | <p>The study of cell recognition and the immune system in HT2 builds upon learning at KS4 on the study of infectious disease, immune system action, vaccination and HIV, The unit explores these topics in further depth and underpins further learning in Yr13 in the genetics, populations and evolution, ecosystems unit with the study of competition between organisms.</p> |
| HT2 | <p>Biological Molecules This unit focuses upon the chemical structure and function of the essential biomolecules of living organisms. The biological molecules nucleic acids, water and inorganic ions are studied.</p> <p>Cells</p> | <p>3.1.5 3.1.6 3.1.7 3.1.8</p> | <p>Nucleic acids Structure of RNA/DNA DNA replication Energy and ATP Water and its functions.</p> <p>Essential knowledge reading for consolidation: Biomolecules</p> <ul style="list-style-type: none"> • AQA 1-Biological-Molecules Summary Notes (physicsandmathstutor.com) | <p>Formative Assessment: Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p>End of topic Summative Assessments: A range of topic assessments followed by a final end of unit exam.</p> | <p>Students study the genetic information, and variation between organisms unit in alignment with the unit organism exchange substances with their environment in half term 3. This unit build upon the structure and function of DNA studied at KS4 and further explores in depth the process of transcription and translation during protein synthesis. This unit supports and underpins subsequent learning in the course with the study of genetics, populations and evolution in Yr13. As well as the control of gene expression unit focusing upon genetic mutation, gene expression, cancer further</p> |

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| | <p>This unit focuses upon the structure and roles of cells within biological systems. Cell recognition and the immune system is studied including the cells of the immune system, their roles and the role of the immune system.</p> | 3.2.4 | <p>Defence mechanisms. Phagocytosis. Cells of the immune system. Antibodies. Vaccination. HIV.</p> | <p>Assessments are based upon the application of the essential knowledge that links ideas together throughout each topic.</p> <p><u>Formative Assessment:</u> Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p><u>End of topic Summative Assessments:</u> A range of topic assessments followed by a final end of unit exam. Assessments are based upon the application of the essential knowledge that links ideas together throughout each topic.</p> <p><u>Cumulative assessment 1 – summative test</u></p> | <p>genomic projects and recombinant DNA technology. Students continue the study of genetic information, variation and relationships between organism in HT4. Prior learning at KS4 on mutation, meiosis, biodiversity and taxonomy supports learning in this unit. Students further explore the causes of genetic diversity and biodiversity within ecosystems. Learning in this unit underpins further study on the course with the study of populations, evolution and ecosystems in Yr13 and the control of gene expression in Yr13.</p> <p>Students study the organisms exchange substances with their environment unit in alignment with genetic information, variation and relationships between organisms. The unit further develops learning covered at KS4 on gas exchange, breathing and digestion. This unit in HT3 supports and underpins further subsequent study in in the course in the study of mass transport and exchange</p> |
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| | | | | <p>A cumulative and summative test taken in class and covers all topics studied up to this point.</p> <p>Topics covered: Biological molecules. Cells.</p> <p>Questions are a mix of recall and application questions to assess pupils understanding of essential knowledge up to this point.</p> | <p>of substances in plants in HT4 and energy transfer and respiration in YR13.</p> <p>The continued study of this unit in HT4 focuses upon mass transport in organisms. Prior learning at KS4 on animal and plant organisation, circulation, the heart, blood vessels and plant tissues supports learning of this unit. Learning in this unit supports subsequent learning in the course in Yr13 with the study of homeostasis as part of the organisms respond to changes in their environment unit.</p> |
| HT3 | <p>Genetic Information, variation and relationships between organisms.</p> <p>This unit focuses upon biodiversity and the genetic differences and diversity between organisms. In this unit students study the structure and function of DNA in more depth focusing upon structure, genes and protein synthesis.</p> | 3.4.1 3.4.2 | <p>DNA and chromosomes. Genes and the triplet code. RNA structure. Protein synthesis.</p> <p><i>Essential knowledge reading for consolidation:</i> Genetic information, variation and relationships. AQA 4-Genetics-Biodiversity-Classification Summary Notes (physicsandmathstutor.com)</p> | <p><u>Formative Assessment:</u> Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p><u>End of topic Summative Assessments:</u> A range of topic assessments followed by a final end of unit exam. Assessments are based upon the application of the essential knowledge that links ideas together throughout each topic.</p> | <p>The energy transfer in and between organisms unit – photosynthesis. This unit further explores the transfer of energy between organisms and energy flow within cycles. Prior learning at KS4 on the topic of photosynthesis and rate limiting factors of photosynthesis supports and underpins learning in this unit. Biological molecules studies in HT1 also supports learning of this unit. This unit further supports continues learning in this unit with respiration in YR13 HT1.</p> |

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| | <p>Organism exchange substances with their environment. This unit focuses upon the study of the exchange of substances between the internal and external environments within biological systems. Gas exchange and the exchange system is studied in depth alongside digestion and the absorption of the products.</p> | 3.3.3 | <p>Exchange between environments. Gas exchange in organisms. Human gas exchange system. Enzymes and digestion. Digestion and absorption.</p> <p>Essential knowledge reading for consolidation: Organism exchange substances with their environment. AQA 3-Exchange-of-Substances Summary Notes (physicsandmathstutor.com)</p> | <p>Formative Assessment: Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p>End of topic Summative Assessments: A range of topic assessments followed by a final end of unit exam. Assessments are based upon the application of the essential knowledge that links ideas together throughout each topic.</p> | <p>The organisms respond to changes in their environments This unit studies in depth the reflex arc and the role of receptors which was underpinned by learning of the nervous system and reflex arc at KS4. Control of heart rate is also covered in depth. This unit further supports subsequent learning of course content in the study and continuation of this unit in YR13 when studying nervous coordination and muscles as well as homeostasis.</p> |
| HT4 | <p>Genetic Information, variation and relationships between organisms. This unit focuses upon biodiversity and the genetic differences and diversity between</p> | 3.4.3 3.4.5 3.4.6 3.4.7 | <p>Mutations. Meiosis. Genetic diversity. Biodiversity. Species and taxonomy. Species diversity/investigating diversity.</p> | <p>Formative Assessment: Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> | |

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| <p>organisms. In this unit students study genetic diversity, mutation and biodiversity of organisms. The application and practical study of aseptic technique and the effects of antimicrobial agents upon microbial growth is investigated in RP6 in this unit.</p> <p>Organism exchange substances with their environment. This unit focuses upon the study of the exchange of substances between the internal and external environments within biological systems. Mass transport mechanisms in both animal and plant systems is studied in this unit. The heart, blood vessels and plant transport mechanisms are all studied in depth.</p> | <p>3.3.4</p> | <p>Essential knowledge reading for consolidation: Genetic information, variation and relationships. AQA 4-Genetics-Biodiversity-Classification Summary Notes (physicsandmathstutor.com)</p> <p>Haemoglobin. Circulatory system in mammals. The heart/cardiac cycle. Blood vessels. Xylem and phloem – plant transport.</p> <p>Essential knowledge reading for consolidation: AQA 6-Responding-to-Changes-in-the-Environment Summary Notes (physicsandmathstutor.com)</p> | <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p>End of topic Summative Assessments: A range of topic assessments followed by a final end of unit exam. Assessments are based upon the application of the essential knowledge that links ideas together throughout each topic.</p> <p>Formative Assessment: Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p>End of topic Summative Assessments:</p> | |
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| | | | | <p>A range of topic assessments followed by a final end of unit exam. Assessments are based upon the application of the essential knowledge that links ideas together throughout each topic.</p> <p><u>Cumulative assessment 2 – summative test</u></p> <p>A cumulative and summative test taken in class and covers all topics studied up to this point.</p> <p>Topics covered: Biological molecules. Cells. Organisms exchange substances with their environment. Genetic information, variation and relationships between organisms.</p> <p>Questions are a mix of recall and application questions to assess pupils understanding of essential knowledge up to this point.</p> | |
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| HT5 | <p>Energy Transfer in and between organisms. This unit focuses upon the process of photosynthesis. The light dependent and light independent reactions are studied in depth. The practical application of photosynthesis is also investigated through RP7 – chromatography of plant pigments</p> | 3.5.1 | <p>Overview of photosynthesis. Light dependent reaction. Light independent reaction.</p> <p>Essential knowledge reading for consolidation: AQA 5-Energy-Transfers-In-and-Between-Organisms Summary Notes (physicsandmathstutor.com)</p> | <p>Formative Assessment: Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p>End of topic Summative Assessments: A topic assessment followed by a final end of unit exam. Assessments are based upon the application of the essential knowledge that links ideas together throughout each topic.</p> | |
| | <p>Organisms respond to changes in their environments. This unit looks at biological organisms and their responses to</p> | 3.6.1 | <p>Survival and response. Plant growth factors. Reflex arc. Receptors. Control of heart rate.</p> <p>Essential knowledge reading for consolidation:</p> | <p>Formative Assessment: Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> | |

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| | stimuli within their environments. | | AQA 6-Responding-to-Changes-in-the-Environment Summary Notes (physicsandmathstutor.com) | <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p>End of topic Summative Assessments: A topic assessment followed by a final end of unit exam. Assessments are based upon the application of the essential knowledge that links ideas together throughout each topic.</p> | |
| HT6 | <p>Energy Transfer in and between organisms. This unit focuses upon the process of photosynthesis. The practical application of photosynthesis is also investigated through RP7 – use of chromatography and investigation of plant pigments and also RP8 – investigating factors affecting rate of dehydrogenase in chloroplasts.</p> | 3.5.1 | <p>Practical application. RP-7 Use of chromatography to investigate the pigments isolated from leaves of different plants, eg, leaves from shade-tolerant and shade-intolerant plants or leaves of different colours. RP8 - Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts.</p> | <p>Cumulative assessment 3 – summative test A cumulative and summative test taken in class and covers all topics studied up to this point. 2 exams – AQA AS Mock exam papers. Topics covered: All topics AS Level – Paper 1. Biological molecules. Cells.</p> | |
| | <p>Organisms respond to changes in their environments.</p> | 3.6.1 | <p>RP-10 Investigation into the effect of an environmental variable on the movement of an</p> | | |

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| | <p>This unit looks at biological organisms and their responses to stimuli within their environments. Students to practically investigate change to an environment and measure/observe organism response in RP-10.</p> | | <p>animal using either a choice chamber or a maze.</p> | | |
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