

Biology Year 10 Curriculum Overview 2023-24

Blue = Higher science content only

Yellow = Triple science content only

| | Autumn | | Spring | | Summer | |
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| | Learning Cycle 1 | Learning Cycle 2 | Learning Cycle 3 | Learning Cycle 4 | Learning Cycle 5 | Learning Cycle 6 |
| Topic | Respiration | Transport in cells, and Cells and Microscopy | Principles of Organisation | Health and Immunity | Health and Immunity continued | Ecology and Biodiversity |
| Critical Prior Knowledge | Y7 Cells Y8 Respiration and ventilation | Y7 Cells Y9 Cell structure transport, digestion Y9 Cell transport - diffusion | Y7 Digestion, respiration and ventilation Y9 Cells | Y7 Cells Y9 Cell structure | Y7 Cells Y9 Cell structure | Y8 Classification and adaptation Y8 Ecology |
| Overall Intent (Big ideas and key concepts) | Comparison of aerobic and anaerobic respiration. How the body responds to exercise and the concept of metabolism | The structure and function of sub cellular structures in eukaryotic and prokaryotic cells. The specialisation of cells to form tissues and organs, the use of microscopes to observe cells and the differences and similarities in eukaryotic and prokaryotic cells | Structure and function of the human digestive system, role of enzymes to catalyse reactions. Structural adaptations for rapid gas exchange. Heart and blood vessels, components of blood, | The definition of health as the complete physical, social and mental wellbeing. How factors interact to cause ill health including lifestyle choices and cancer. How the body prevents communicable diseases from entering via non- | Transmission, symptoms treatment of viral diseases (measles, HIV, TMV), bacterial diseases (gonorrhoea and salmonella), Fungal, diseases (black rose spot and Protist (malaria). Plant disease and defence responses. | Population issues, Pollution, Deforestation and peat destruction. Global warming, biodiversity, interdependence, sustainability. Development of fieldwork practical skills |

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| | | | | specific and specific defence systems. | Nons-specific and specific defence systems, vaccination, treatment of disease, including drug development. Monoclonal antibodies as drugs | |
| Essential Knowledge milestones (What students must master) | <p>To be able to write a word equation summarising aerobic & anaerobic respiration in animals and yeast (anaerobic). (HT- Balanced symbol equation for aerobic & anaerobic)</p> <p>To understand the role of mitochondria in respiration. To understand that reactions (like respiration) that transfer energy to the environment are exothermic.</p> <p>To know what the energy produced in respiration is used for.</p> | <p>Define the terms 'magnification' and 'resolution'</p> <p>Describe how the microscopy techniques have changed over time.</p> <p>Explain how these changes have enabled scientists to study sub-cellular structures</p> <p>Know that bacteria multiply by simple cell division.</p> <p>Describe how bacteria can be grown.</p> <p>Know procedure to prepare an uncontaminated culture.</p> <p>Explain why cultures are incubated at a</p> | <p>Understand key organs of the digestive system and their role in digestion.</p> <p>Know the key tests for Protein, Glucose, Starch and Lipids.</p> <p>Link specific shape of Active Site to the specific nature of enzymes.</p> <p>Describe the lock and key model of enzyme function.</p> <p>Explain the effect of changing temperature and pH on enzyme function.</p> <p>Recall that Iodine is used to test for starch.</p> <p>Calculate rate via $1/\text{time}$ and plot a rate graph.</p> | <p>Give a correct definition of health.</p> <p>List communicable and non communicable causes of disease and are able to relate physical and mental wellbeing.</p> <p>interpret data relating to disease.</p> <p>different types of diseases can interact and can relate this to the following examples:</p> <ul style="list-style-type: none"> - Problems with the immune system - Viruses can trigger cancer - Immune reactions can trigger allergies <p>what a risk factor is and to give some examples relating to</p> | <p>Understand how bacteria and viruses cause disease.</p> <p>Describe colds and flu as viral diseases.</p> <p>Describe the symptoms, mode of transmission, prevention and treatment for measles, HIV / AIDS</p> <p>Know that tobacco mosaic virus affects plants.</p> <p>Describe the symptoms, mode of transmission, prevention and treatment for salmonella and gonorrhoea.</p> <p>Know that few plants are affected by bacterial disease.</p> <p>One causes galls.</p> | <p>To know what an ecosystem is.</p> <p>To know what animals and plants compete for and why.</p> <p>To know what interdependence is and what happens if an ecosystem is disrupted by the removal of an organism.</p> <p>To understand the biotic and abiotic factors that influence a community.</p> <p>To be able to suggest how a change in one of these factors may affect a community.</p> <p>To know that organisms are</p> |

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| | <p>Define the term 'anaerobic'.</p> <p>Explain why anaerobic respiration is less efficient than aerobic respiration.</p> <p>State that anaerobic respiration in yeast is called fermentation.</p> <p>Explain why yeast is used to make bread and alcoholic drinks.</p> <p>Interpret data from yeast investigation.</p> <p>Describe and explain the changes that occur in the body during exercise.</p> <p>Design and carry out an investigation about the effects of exercise on the body.</p> <p>Present and interpret data about heart rate, breathing rate and breath volume.</p> <p>Interpret data relating to the effects of exercise on the body,</p> <p>Describe the effects of long periods of vigorous exercise on the body.</p> | <p>maximum temp of 25°C.</p> <p>Describe why uncontaminated cultures are necessary in research.</p> <p>Calculate the number of bacteria in a population (HT must be able to express the answer in standard form)</p> <p>Calculate cross sectional areas of colonies or clear areas using πr^2</p> <p>Explain ways of reducing bacterial growth.</p> <p>State why mitosis is important and where it happens in plants and animals.</p> <p>Describe the stages of the cell cycle (students only need to describe 3 stages although HT students may cope with IPMAT)</p> <p>Explain why each stage is important</p> <p>State how stem cells are different from other body cells</p> <p>Describe the functions of stem</p> | <p>Recall the main sites of enzyme production in the human body.</p> <p>Know that the function of bile is to neutralise stomach acid in the small intestine, and to emulsify fats and oils to increase the action of Lipase enzyme.</p> <p>Recap the structure and function of the heart, blood and circulatory system.</p> <p>Recap structure and function of blood components.</p> <p>Recap the structure and function of the lungs, and the breathing system.</p> <p>Understand how lungs are adapted for function.</p> <p>Link breathing and heart function via circulatory system</p> <p>Understand how an artificial pacemaker works.</p> <p>Know that natural resting hear rate is controlled by a group of cells in the</p> | <p>obesity, alcohol consumption and smoking.</p> <p>To appreciate that a causal relationship has not been established for all risk factors.</p> <p>To discuss the human and financial costs of the diseases associated with the risk factors discussed.</p> <p>To understand that cancer is the result of uncontrolled cell division.</p> <p>Describe the features of benign and malignant tumours.</p> <p>To compare benign and malignant tumours and appreciate why malignant tumours are more dangerous.</p> <p>To define the term pathogen.</p> <p>To know that diseases can be spread by bacteria, viruses, fungi and protists.</p> <p>To understand that both plants and</p> | <p>Describe the life cycle of the malarial protist.</p> <p>Describe the symptoms, mode of transmission, prevention and treatment for malaria.</p> <p>Describe athlete's foot as a fungal disease.</p> <p>Fungal diseases are common in plants, rose black spot being a common example.</p> <p>Describe the non-specific defence systems humans have including how we prevent the entry of pathogens and the role of phagocytes.</p> <p>Consider how good their recall is of the communicable diseases topic so far.</p> <p>Explain how the immune system defends against disease</p> <p>Describe what white blood cells do.</p> <p>Explain why antibodies are</p> | <p>adapted to the environment they live in.</p> <p>To be able to give examples of structural, behavioural and functional adaptations.</p> <p>To know what extremophiles are and to be able to give an example of one.</p> <p>To know that producers are the basis of every food chain.</p> <p>To know what primary, secondary and tertiary consumers are.</p> <p>To understand the relationship between predators and their prey.</p> <p>To understand how transects and quadrats are used to investigate the distribution of plants in the environment.</p> <p>To use a quadrat to sample an organism in the environment.</p> <p>To understand that materials are cycled</p> |
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| | <p>Define the term 'oxygen debt'. Explain what happens to lactic acid once exercise stops.</p> <p>Define the term 'metabolism'. Give examples of reactions in metabolism. Name some chemicals formed from glucose molecules (links to 4.4.1.3).</p> <p>Describe lipid formation from a molecule of glycerol and three molecules of fatty acids.</p> <p>Describe the use of glucose and nitrate ions to form amino acids, which form proteins.</p> <p>Describe the formation of urea.</p> | <p>cells in embryos, in adult animals and in plants</p> <p>Explain how treatment with stem cells may be use to treat people with different medical conditions.</p> <p>Describe the process of therapeutic cloning</p> <p>Evaluate the advantages and disadvantages of stem cell research by looking at the ethical and social implications as well as its use in modern medicine.</p> <p>Transport in cells:</p> <p>Describe how substances move into and out of cells by diffusion</p> <p>Identify factors that affect the rate of diffusion</p> <p>Calculate and compare surface area to volume ratios</p> <p>Describe why organisms need a large surface area to</p> | <p>right atrium – the natural pacemaker. Know the function, pros and cons of using medications such as Statins in preventing heart disease.</p> <p>Know the main causes of CHD. Evaluate the treatment of CHD by the use of medications, transplants and artificial means.</p> | <p>animals can be affected by these pathogens. Explain how the spread of disease can be reduced or prevented.</p> <p>Recall the basic features of bacteria and state how they differ from bacteria</p> | <p>specific for one pathogen/ antigen. Describe what a vaccine contains. Explain how vaccines prevent disease.</p> <p>Explain the idea of 'herd immunity'. Explain how antibiotics treat only bacterial diseases and how this has saved lives.</p> <p>Describe how antibiotic resistance arises</p> <p>Know that aspirin and digitalis come from plants.</p> <p>Describe how drugs are discovered.</p> <p>Understand that drugs need to be carefully trialled before use.</p> <p>Describe and explain the main steps needed when developing a new drug.</p> <p>Know that drugs are tested for toxicity, efficacy and dose.</p> <p>Explain the terms placebo and double-blind trial.</p> | <p>around the environment. To know how carbon and water are cycled.</p> <p>To understand the importance of microorganisms in the cycling of materials.</p> <p>To be able to describe four trophic levels.</p> <p>To know how decomposers break down material.</p> <p>To be able to construct pyramids of biomass.</p> <p>To know what a pyramid of biomass is.</p> <p>To understand why only a small proportion of biomass from each trophic level is transferred to the next.</p> <p>To be able to calculate efficiency in biomass transfers.</p> |
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| | | <p>volume ratio for exchange</p> <p>Define the term osmosis</p> <p>Explain how osmosis affects animal and plant cells.</p> <p>Recognise, draw and interpret diagrams which model osmosis</p> <p>Carry out a practical to measure the change in mass in plant tissue.</p> <p>Calculate the % change in mass and plot a suitable graph.</p> <p>Explain the data using ideas about osmosis</p> <p>Describe what active transport is and how it compares to osmosis and diffusion</p> <p>Describe the role of active transport in root hair cells, the gut and the kidney tubules</p> | | | <p>Describe what MABs are, and how they are produced.</p> <p>Describe the uses of MABs and explain how these work when given appropriate information:</p> <p>Explain why MABs are not yet widely used in the body.</p> <p>Evaluate the advantages and disadvantages of MABs.</p> | |
| Cultural Capital | Hygiene and spread of disease: Withycombe centre - clinic. | Health, diet and exercise discussions. | Hygiene and appreciation of transmission. Healthy lifestyles | Practical techniques, health and safety, development of | Practical techniques, health and safety, development of | Communication of sustainability ideas. |

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| | Importance of vaccination, medicines and their uses and dangers. | | | fine motor and dexterity skills | fine motor and dexterity skills | |
| Assessment Points | <p>In class teacher led reviews and formative feedback – this low-risk challenge and review environment for pupils will include:</p> <ul style="list-style-type: none"> - recap recall quick starters, homework (Educake) (know) - review tasks, multiple choice and extended questions (extend) - in class exam style questions (apply) <p>Through rigorous, reliable and accessible assessment</p> <ul style="list-style-type: none"> - Formal assessments at the end of every unit of work (Mastery assessments – 10 question recall) across all 3 science subjects - End of learning cycle assessments (Progress check tests – a longer exam style question paper) | | | | | |
| Connection to future learning (When is this developed / revisited)? | GCSE: respiration, enzymes, digestion, exchange surfaces. A level biology – respiration, uses of ATP. | Y10 Cells and microscopy Y11 – Dip back questioning in assessments. Y11 Genes and DNA During lesson revision (LPG) | Y10 Exchange surfaces, Cell division Y11 Reproduction Y11 Homeostasis | Y10 Principles of organisation A level Biology – Mass transport | Y11 Natural selection MRSA A level Biology - immunity | Y11 Ecology - competition and adaptation in plants, plant cloning (interdependence) |

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| ECC Student Characteristics | Through these units we will encourage students to work hard and be resilient individuals who embrace challenge and through their creativity and endeavours become reflective learners . Mastering the key concepts of each topic before being able to build on these ideas as they are interleaved through other units later in the course. |
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