



ABBEY
COLLEGE

Aspire & Challenge

Year 10 Biology Curriculum Overview

Topic	Timing	Key knowledge and skills	Progression and links	SEND/ More able	Assessment & recording; factual recall checks
Bioenergetics	Autumn Term	<p>Students should:</p> <ul style="list-style-type: none"> Describe how the leaf is adapted for photosynthesis. Write the balanced symbol equations for photosynthesis. Describe an experiment to prove that plants carry out photosynthesis when exposed to light. Describe why low temperature, shortage of carbon dioxide, shortage of light and shortage of chlorophyll limit the rate of photosynthesis. Suggest which factor limits the rate of photosynthesis in a given situation. Interpret and explain graphs of photosynthesis rate involving one limiting factor. Describe all the ways in which plants use glucose, including how they make proteins. Evaluate risks involved in the starch test. Describe why greenhouse increase plant growth. Comment on the cost-effectiveness of adding heat, light, or carbon dioxide to greenhouses. Discuss the benefits of using greenhouses and hydroponics. Write the balanced symbol equation for respiration. Describe respiration as an exothermic reaction. Plan an investigation to include a control. Explain why heart rate, breathing rate, and breath volume change with exercise. Choose the best way to display data and calculate percentage changes. Write the balanced symbol equation for anaerobic respiration in plants and microorganisms. Compare and contrast aerobic and anaerobic respiration. Explain why muscles get tired during exercise. Describe the role of the liver in repaying the oxygen debt. Discuss whether it is possible to increase metabolism. 	<p>Numeracy</p> <ul style="list-style-type: none"> Calculating rates <p>Literacy</p> <ul style="list-style-type: none"> Use of tier three words Extended writing opportunities <p>CEIAG</p> <p>Gatsby 4 - Science and careers in agriculture</p>	<p>Challenge:</p> <ul style="list-style-type: none"> Mastery lesson aerobic vs anaerobic. Higher level questions – linking conditions and photosynthesis to yield. Rate calculations from graphs. <p>Scaffold:</p> <ul style="list-style-type: none"> Pre prepared results tables Knowledge organisers Scaffold for extended writing 	<ul style="list-style-type: none"> 5 questions to start – recall activity every lesson. Close the gap questions Self and peer feedback on tasks completed Structure strip Past paper exam Qs. Summative assessment at the end of the unit

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Infection & Response	Autumn term / Spring Term	<p>Students should:</p> <ul style="list-style-type: none"> • Be able to explain how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants. • Be able to explain how the spread of diseases can be reduced or prevented. • Know that pathogens are microorganisms that cause infectious disease. • Know that pathogens may be viruses, bacteria, protists or fungi. They may infect plants or animals and can be spread by direct contact, by water or by air. • Know that bacteria and viruses may reproduce rapidly inside the body. • Know that bacteria may produce poisons (toxins) that damage tissues and make us feel ill. • Know that viruses live and reproduce inside cells, causing cell damage. • Know that measles is a viral disease showing symptoms of fever and a red skin rash. Measles is a serious illness that can be fatal if complications arise. For this reason most young children are vaccinated against measles. The measles virus is spread by inhalation of droplets from sneezes and coughs. • Know that HIV initially causes a flu-like illness. Unless successfully controlled with antiretroviral drugs the virus attacks the body's immune cells. Late stage HIV infection, or AIDS, occurs when the body's immune system becomes so badly damaged it can no longer deal with other infections or cancers. HIV is spread by sexual contact or exchange of body fluids such as blood which occurs when drug users share needles. • Know that tobacco mosaic virus (TMV) is a widespread plant pathogen affecting many species of plants including tomatoes. It gives a distinctive 'mosaic' pattern of discolouration on the leaves which affects the growth of the plant due to lack of photosynthesis. 	<p>Numeracy</p> <ul style="list-style-type: none"> • Graph drawing • Data interpretation <p>Literacy</p> <ul style="list-style-type: none"> • Use of tier three words • Extended writing opportunities <p>CEIAG</p> <p>Gatsby 4 - Science and careers</p> <p>Careers in medicine, care, nutrition and laboratory studies.</p>	<p>Challenge:</p> <ul style="list-style-type: none"> • Describe the impact of treatments on specific diseases • Examine the ethical considerations of drug trials • Link to Aseptic Technique (B1) • Explore the impact of lifestyle choices on communicable disease • Link to Inheritance (B6) and examine the impact of genetic diseases on susceptibility to communicable disease. <p>Scaffold:</p> <ul style="list-style-type: none"> • Pre prepared results tables • Knowledge organisers • Scaffold for extended writing 	<ul style="list-style-type: none"> • 5 questions to start – recall activity every lesson. • Close the gap questions • Self and peer feedback on tasks completed • Structure strip • Past paper exam Qs. • Summative assessment at the end of the unit

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Infection & Response	Autumn term / Spring Term	<ul style="list-style-type: none"> • Know that salmonella food poisoning is spread by bacteria ingested in food, or on food prepared in unhygienic conditions. In the UK, poultry are vaccinated against Salmonella to control the spread. Fever, abdominal cramps, vomiting and diarrhoea are caused by the bacteria and the toxins they secrete. • Know that Gonorrhoea is a sexually transmitted disease (STD) with symptoms of a thick yellow or green discharge from the vagina or penis and pain on urinating. It is caused by a bacterium and was easily treated with the antibiotic penicillin until many resistant strains appeared. Gonorrhoea is spread by sexual contact. The spread can be controlled by treatment with antibiotics or the use of a barrier method of contraception such as a condom • Know that rose black spot is a fungal disease where purple or black spots develop on leaves, which often turn yellow and drop early. It affects the growth of the plant as photosynthesis is reduced. It is spread in the environment by water or wind. Rose black spot can be treated by using fungicides and/or removing and destroying the affected leaves. • Know that the pathogens that cause malaria are protists. The malarial protist has a life cycle that includes the mosquito. • Know that malaria causes recurrent episodes of fever and can be fatal. The spread of malaria is controlled by preventing the vectors, mosquitos, from breeding and by using mosquito nets to avoid being bitten. • Be able to describe the non-specific defence systems of the human body against pathogens, including the: skin, nose, trachea and bronchi and the stomach. • Be able to explain the role of the immune system in the defence against disease. • Know that if a pathogen enters the body the immune system tries to destroy the pathogen. • Know that white blood cells help to defend against pathogens by: phagocytosis, antibody production and antitoxin production. 			

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Infection & Response	Autumn term / Spring Term	<ul style="list-style-type: none"> • Be able to explain how vaccination will prevent illness in an individual, and how the spread of pathogens can be reduced by immunising a large proportion of the population. • Know that vaccination involves introducing small quantities of dead or inactive forms of a pathogen into the body to stimulate the white blood cells to produce antibodies. • Explain that if the same pathogen re-enters the body the white blood cells respond quickly to produce the correct antibodies, preventing infection. • Be able to explain the use of antibiotics and other medicines in treating disease. • Know that antibiotics, such as penicillin, are medicines that help to cure bacterial disease by killing infective bacteria inside the body. • Explain that it is important that specific bacteria should be treated by specific antibiotics. • Know that the use of antibiotics has greatly reduced deaths from infectious bacterial diseases. However, the emergence of strains resistant to antibiotics is of great concern. • Explain why antibiotics cannot kill viral pathogens. • Know that painkillers and other medicines are used to treat the symptoms of disease but do not kill pathogens. • Know that it is difficult to develop drugs that kill viruses without also damaging the body's tissues. • Be able to describe the process of discovery and development of potential new medicines, including preclinical and clinical testing. • Know that traditionally drugs were extracted from plants and microorganisms. • The heart drug digitalis originates from foxgloves. • The painkiller aspirin originates from willow. • Penicillin was discovered by Alexander Fleming from the Penicillium mould. • Explain that most new drugs are synthesised by chemists in the pharmaceutical industry. However, the starting point may still be a chemical extracted from a plant. • Know that new medical drugs have to be tested and trialled before being used to check that they are safe and effective. New drugs are extensively tested for toxicity, efficacy and dose. Preclinical testing is done in a laboratory using cells, tissues and live animals. 			

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Infection & Response	Autumn term / Spring Term	<ul style="list-style-type: none"> • Explain that clinical trials use healthy volunteers and patients. • Very low doses of the drug are given at the start of the clinical trial. • If the drug is found to be safe, further clinical trials are carried out to find the optimum dose for the drug. • In double blind trials, some patients are given a placebo. • Be able to describe how monoclonal antibodies are produced. Monoclonal antibodies are produced from a single clone of cells. The antibodies are specific to one binding site on one protein antigen and so are able to target a specific chemical or specific cells in the body. They are produced by stimulating mouse lymphocytes to make a particular antibody. The lymphocytes are combined with a particular kind of tumour cell to make a cell called a hybridoma cell. The hybridoma cell can both divide and make the antibody. Single hybridoma cells are cloned to produce many identical cells that all produce the same antibody. A large amount of the antibody can be collected and purified. • Be able to describe some of the ways in which monoclonal antibodies can be used. Some examples include: for diagnosis such as in pregnancy tests, in laboratories to measure the levels of hormones and other chemicals in blood, or to detect pathogens, in research to locate or identify specific molecules in a cell or tissue by binding to them with a fluorescent dye, to treat some diseases: for cancer the monoclonal antibody can be bound to a radioactive substance, a toxic drug or a chemical which stops cells growing and dividing. It delivers the substance to the cancer cells without harming other cells in the body. • Know that monoclonal antibodies create more side effects than expected. They are not yet as widely used as everyone hoped when they were first developed. • (HT only) Know that plant diseases can be detected by: stunted growth, spots on leaves, areas of decay (rot), growths, malformed stems or leaves, discolouration, the presence of pests. • Identification can be made by: reference to a gardening manual or website, taking infected plants to a laboratory to identify the pathogen, using testing kits that contain monoclonal antibodies. • Know that plants can be infected by a range of viral, bacterial and fungal pathogens as well as by insects. 			

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Infection & Response	Autumn term / Spring Term	<ul style="list-style-type: none"> • Know that plants can be damaged by a range of ion deficiency conditions: stunted growth caused by nitrate deficiency, chlorosis caused by magnesium deficiency. • Know that nitrate ions are needed for protein synthesis and therefore growth, and magnesium ions needed to make chlorophyll. • Be able to describe physical and chemical plant defence responses. Physical defence responses to resist invasion of microorganisms. <ul style="list-style-type: none"> • Cellulose cell walls. • Tough waxy cuticle on leaves. • Layers of dead cells around stems (bark on trees) which fall off. Chemical plant defence responses. <ul style="list-style-type: none"> • Antibacterial chemicals. • Poisons to deter herbivores. Mechanical adaptations. • Thorns and hairs deter animals. • Leaves which droop or curl when touched. • Mimicry to trick animals. 			

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Ecology	Summer term	<p>Students should:</p> <ul style="list-style-type: none"> Define the terms community, population, habitat, ecosystem, abiotic factor, biotic factor. Describe what a stable community is and give an example. Suggest how one species relies on another. Describe how a factor influences the distribution of organisms. Record measurements of abiotic factors. Explain how to use a quadrat and transect to estimate population size. Design a method to estimate a population using a sampling technique. Calculate range, mean, median and mode in order to analyse results. Use information to suggest factors that animals are competing for in a given habitat. Explain tactics that help an animal compete for a resource. Describe how the distribution of a species has changed because of competition. Suggest factors that plants are competing for in a given habitat. Explain why plants use seed dispersal. Describe the methods plants use to outcompete others or avoid competition. Suggest features that an organism may have in order to survive in a given habitat. Explain how adaptations allow an organism to survive in its habitat. Classify adaptations as structural, behavioural or functional. Calculate surface area to volume ratio. Describe how animals are adapted to live in hot, dry and cold habitats. Explain how a plant adaptation allows it to survive in its habitat. Explain why plants need to reduce water loss by transpiration. Display data using a graph and describe what it shows. Identify producers, primary consumers, secondary consumers, tertiary consumers, predators and prey in a food web. 	<p>Numeracy</p> <ul style="list-style-type: none"> Analysing graphs <p>Literacy</p> <ul style="list-style-type: none"> Use of tier three words Extended writing opportunities 	<p>Challenge:</p> <ul style="list-style-type: none"> Required practical – Sampling techniques. Required practical – the effect of temperature on pH Higher level questions – explaining the effects of changes to ecosystems <p>Scaffold:</p> <ul style="list-style-type: none"> Pre prepared tables Knowledge organisers Scaffold for extended writing 	<ul style="list-style-type: none"> 5 questions to start – recall activity every lesson. Close the gap questions Self and peer feedback on tasks completed Structure strip Past paper exam Qs. Summative assessment at the end of the unit

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Ecology	Summer term	<ul style="list-style-type: none"> • Describe what happens to a population in a food web when another changes. • Plot data as a line graph and explain the pattern of predator and prey populations. • Explain why decomposers are important to a stable ecosystem. • Explain the importance of recycling substances. • Describe the events in the decay cycle. • Describe the events in the carbon cycle. • Explain why the carbon cycle is vital to life on Earth. • Write word equations for photosynthesis, respiration and combustion. • Identify factors that speed up or slow down decay. • Choose a suitable dependent variable and plan a way to measure it accurately. • Plot a line graph with more than one line plotted on the same axes. • Describe why a good level of biodiversity is important to the future of the human species. • Describe some effects of human population growth. • Analyse and interpret data and information concerning human population growth. • Describe how sewage, fertilisers, pesticides and herbicides pollute the land and water. • Describe the process of eutrophication and bioaccumulation. • Draw conclusions from data. • Describe how acid rain is formed. • Plan an investigation to find out how acid rain affects the germination of seeds. • Choose a suitable method for analysing data. • Explain the effects of deforestation and peat removal. • Categorise reasons for and effects of deforestation as environmental, social, economic and/or political. • Describe why there is a conflict between using peat to increase food production and the need to conserve peat bogs. • Use the terms greenhouse effect, global warming and climate change correctly. • Describe in detail the biological consequences of global warming. • State some examples of environmental changes that affect the distribution of species in an ecosystem. • Explain how humans can cause environmental changes. • Describe an example of how environmental change has affected the distribution of species. 			

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Ecology	Summer term	<ul style="list-style-type: none"> • Describe programmes to reduce negative effects on ecosystems and explain how they work. • Use information to explain the conflicting pressures on maintaining biodiversity. • Number the trophic levels on a food chain, food web and pyramid of biomass. • Describe how decomposers feed. • Use data to draw a pyramid of biomass and explain what it shows. • Calculate the percentage of biomass passed between trophic levels. • Calculate the efficiency of transfers with guidance. • Explain how the loss of biomass at each trophic level affects the number of organisms at each level. • Define sustainable food production and describe how it could help increase food security. • Explain how factors affect food security. • Present information based on research. • Explain why there could be more food for everyone if we ate less meat. • Explain why there are ethical objections to some 'factory farming' techniques. • Explain how 'factory farming' techniques increase rate of growth. • Describe the reasons why fish stocks in the ocean are decreasing. • Describe the techniques used to conserve fish stocks. • Describe how mycoprotein is produced. 			