

Key Stage 4 Long Term Planning

Year 9 2020-2022 **for current year 10 and year 11 students**

Faculty Area: Biology Trilogy Science

Year 9	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Syllabus			AQA Biology - Collins - Chapter 1 - Cell Biology		AQA Biology - Collins - Chapter 2 - Photosynthesis	
Connections to prior learning						
Knowledge			Animal and plant cells Cell specialisation Cell differentiation Stem cells Eukaryotic cells Microscopy Chromosomes Mitosis and the cell cycle Stem cells		Photosynthesis Plant organs and Plant tissues. Plant transport systems Increasing food production Diffusion	
Skills			Required Practical: Microscopy AT 7 - use of appropriate apparatus, techniques and magnification, including microscopes Make observations of biological specimens and producing labelled scientific drawings Prepare slides of onion epidermis, rhubarb epidermis, cheek cells, spirogyra, moss etc. Make labelled drawings Plan investigations, make observations and analyse data Model plant and animal cells. Use bio viewers.		Required Practical: Photosynthesis AT 1 use of appropriate apparatus to make and record a range of measurements accurately, including time and volume of a gas AT 3 use of appropriate apparatus and techniques for the observation and measurement of biological changes and/or processes AT 4 safe and ethical use of living organisms (plants or animals) to measure physiological functions and responses to the environment AT 5 measurement of rates of reaction by a variety of methods including the production of gas Draw the arrangement of stomata and guard cells Using models. Plan investigations, make observations and analyse data Evaluate the use of models to represent blocked arteries	
Assessment			End of unit test for Chapter 1 - Cell Biology		End of unit test for Chapter 2 - Photosynthesis	
Homework			GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions		GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions	

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<p>Cultural enrichment including Trips, Visits, Experiences, Extra-curricular</p>	<p align="center"><u>School and University Network</u> Trip 1-Health and Medicine Trip 2-Law and Business Trip 3-Media and Higher Education</p>		
<p>Literacy</p>		<p>Use of command words and Science subject specific vocabulary Drawing an animal and a plant cell on mini white boards. Students spot the difference between the two. Complete a card sort to match the organelle to the function. Construct a table to compare animal to plant cells. Make a plant or animal cell model. Write a job description for a newspaper for each type of specialised cell Students circulate to complete a summary table on uses, pros and cons. Students prepare and present their arguments in favour of or against the use of embryonic stem cells Produce a mind map to summarise diffusion and exchange surfaces. Keywords: Active transport, Adult stem cell, Cell differentiation, Cell membrane, Chloroplast, Chromosomes, Concentration gradient, Diffusion, Embryonic stem cell, Eukaryotic cell, Magnification, Meristematic cells, Mitochondria, Mitosis, Organelle, Osmosis, Plasmid, Prokaryotic cell, Resolution, Specialised cells, Stem cell, Surface area, Surface area to volume ratio (SA:V), Therapeutic cloning, Vacuole:</p>	<p>Use of command words and Science subject specific vocabulary Label a diagram of a plant with names and functions of organs. Produce a comparison table Research where active transport occurs in plants and humans and label these on diagrams with notes. Observe a computer simulation of active transport. Keywords: Amylase, Aorta, Artery: Benign tumour, Bile, Blood, Cancer, Capillary, Cell, Communicable disease, Coronary heart disease, Enzymes, Heart, Lipase, Lock and key hypothesis, Malignant tumour, Meristem tissue, Non-communicable disease, Organs, Organ systems, Palisade mesophyll, Phloem, Protease, Pulmonary artery, Pulmonary vein, Rate of reaction, Risk factor, Spongy mesophyll, Statins, Stent, Translocation, Transpiration, Vein, Xylem.</p>
<p>Numeracy</p>		<p>Calculate the real sizes of cells and structures. differences in magnification and resolution. Use a microscope with graticule to measure cells and calculate their real size. Preparation of inoculating plates Calculate the number of bacteria in a population after a certain time given the mean division time. Calculate cross sectional area of colonies.</p>	<p>Estimate the size of the cells. Calculate surface area: volume ratios for different sized objects or using data about organisms.</p>
<p>CIAG</p>	<p>Future Morph resources aim to show students that there is a wide choice of options open to those who study sciences</p>	<p>NCW STEM lessons – where can science take you?</p>	<p>Future Morph Careers Quest-students quiz exhibitors at The Big Bang Fair about their chosen career, why they chose it and what it involves</p>

Key Stage 4 Long Term Planning

Year 10 2020-2022

Curriculum Area: Biology Trilogy Science

Year 10	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Syllabus	AQA Biology Collins - Chapter 3 Moving and Changing Materials		AQA Biology Collins - Chapter 4 Health Matters	AQA Biology Collins - Chapter 5 Coordination and Control		AQA Biology Collins - Chapter 6 Genetics
Connections to prior learning						
Knowledge	Active transport Principles of organisation The human digestive system Properties of enzymes The circulatory system The heart and blood vessels How the lungs are adapted for efficient gas exchange. Exchange surfaces- Plants and minerals Coronary heart disease Blood Health issues and Effect of lifestyle on non-communicable diseases Cancers (malignant tumours)		Communicable diseases Culturing microorganisms Viral, bacterial and fungal diseases in humans Protist diseases Human defence systems Vaccination Antibiotics Painkillers Discovery and development of drugs	Introduction to homeostasis Structure and function of the nervous system. The brain. The eye Control of body temperature Human endocrine system Control of blood glucose concentration Water and nitrogen balance Hormones in human reproduction Contraception The use of hormones to treat infertility. The Impact of environmental change advantages and disadvantages of fertility treatment,		Genetics Sexual and asexual reproduction. Meiosis. Advantages and disadvantages of sexual and asexual reproduction Sex determination. DNA. protein synthesis. Genetic inheritance and inherited disorders. Genetic engineering Cloning.
Skills	Required Practical: Osmosis AT 1 use of appropriate apparatus to measure and record a range of measurements accurately including length, mass and volume of liquid AT 3 use of appropriate apparatus and techniques for the observation and measurement of biological changes and/or processes AT 5 measurement of rate of reaction by a variety of		Evaluate risks when growing microbial cultures. Interpret graphs Carry out research and explain application of science and personal and social implications related to diseases.	Required practical: Reaction Time AT 1 use of appropriate apparatus to make and record a range of measurements accurately including length AT 3 use of appropriate apparatus and techniques for the observation and measurement of biological changes and/or processes AT 4 safe and ethical use of a living organisms (plants or animals) to measure physiological functions and responses to the environment		Use bio-viewers, video clips or images to show chromosomes and meiosis. Use a Punnett square and a genetic cross diagram to illustrate the inheritance of sex; evaluate the chance of producing a male or female.

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	<p>methods including an uptake of water Required Practical: Food Tests AT 2 safe use of appropriate heating devices and techniques including the use of a Bunsen burner and a water bath Required Practical: Enzymes AT 1 use of appropriate apparatus to make and record a range of measurements accurately including time, temperature, volume of liquids and pH AT 2 safe use of appropriate heating devices and techniques including use of a Bunsen burner and water bath or electric heater AT 5 measurement of rates of reaction by a variety of methods including using colour change of an indicator Analyse data about cancer from cancer research site. Critically evaluate models Plan investigations, make observations and analyse data Make predictions and identify variables. Draw conclusions and give explanations for the results.. Plot and interpret graphs about enzyme activity</p>	<p>Plan investigations, make observations and analyse data Investigate the effect of disinfectants or antibiotics on bacterial growth Role play: Pharmacist/patient giving recommendation based on symptoms (cards prepared or students' own ideas).</p>	<p>Use a model to explain control systems Plan and manage a variety of stimuli to illustrate body responses.. Carry out a controlled investigation, present and analyse the results. Investigate the effect of exercise on body temperature and/or sweating. Dissection of pig's kidney Analyse urine samples and identify who each one came from. Give reasons for the conclusions.</p>	<p>Extract DNA from fruits such as onions or kiwi fruit. Use a model to identify mutations in the base sequence. Interpret genetic diagrams of Mendel's experiments.</p>
Assessment	End of unit test for Chapter 3 - Moving and Changing Materials	End of unit test for Chapter 4 - Health Matters	End of unit test for Chapter 5 - Coordination and Control	End of unit test for Chapter 6 - Genetics
Homework	GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions	GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions	GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions	GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions
Cultural enrichment including Trips, Visits, Experiences, Extra-curricular	<p>School and University Network Trip 1- Magnets and Motors Trip 2- Life on Mars</p>			

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<p>Literacy</p>	<p>Use of command words and Science subject specific vocabulary Produce a flow diagram showing organisation in large organisms and relate to size. Describe the pathway of an egg sandwich from mouth to anus. Tell it as a story. Watch computer simulations to help make notes and explain the properties of enzymes. Role play – What happens to food as it moves along the digestive system? Label a diagram of the heart and colour to show oxygenated and deoxygenated blood. Carry out research using textbooks and the internet and write a report on the effects of diet, stress, smoking, alcohol and exercise on health, to include risk factors for specific diseases. Keywords: Antibiotics, Clinical drug testing, Communicable disease, Double blind trial, Gonorrhoea, Human Immunodeficiency Virus (HIV), Malaria, Measles, Non-communicable disease, Non-specific defence, Pathogens, Placebo, Preclinical drug testing, Rose black spot, Salmonella, Side effects, Tobacco Mosaic Virus (TMV), Vaccination, White blood cell.</p>	<p>Use of command words and Science subject specific vocabulary Construct a table comparing fungi, virus, bacteria and protists to include size, site of reproduction and effects in the body. Prepare advice leaflet for a doctors' surgery explaining how people can reduce their chances of catching diseases. Write a report on the investigation. Discuss the best way to present the results. Interpret graphs showing bacterial population growth Small group project using ICT, researching to find out about the symptoms, mode of transmission, prevention and treatment for measles, HIV and AIDS, salmonella and gonorrhoea. Role play – Aid workers visit a remote village to help educate residents on preventing malaria infection Interpret data about vaccination rates and reported cases of diseases, eg whooping cough. Keywords: Aerobic respiration, Anaerobic respiration, Cellular respiration, Inverse proportion, Inverse square law,</p>	<p>Use of command words and Science subject specific vocabulary Draw a flow diagram to show the main components of a control system and label with the function of each component. Required practical write up. Evaluate medical research methods. Investigate how exercise affects body temperature and/or sweating and report on the findings. Compare the actions of the endocrine system with the nervous system. Compare Type 1 and Type 2 diabetes and present the information in a suitable format. Produce a report for a teen magazine on the advantages and disadvantages of different types of contraceptives. Research the process of IVF and produce a leaflet for a doctor's surgery to describe the main stages involved in IVF treatment. Keywords: Abstinence, Adrenaline, Contraception, Coordination centres, Effectors, Follicle stimulating hormone (FSH), Gland, Glucagon, Homeostasis, *Hyperopia, In Vitro Fertilisation (IVF), Luteinising hormone (LH), Negative feedback cycle, Oestrogen, Receptors, Reflex action, Selective reabsorption, Stimuli, Target organ, Testosterone, The central nervous system (CNS), *The eye, Thyroxine, Type 1 diabetes, Type 2 diabetes,</p>	<p>Use of command words and Science subject specific vocabulary Produce a poster to compare mitosis and meiosis. Research organisms that can reproduce both sexually and asexually and produce an illustrated report. Debate: research and discuss 'DNA profiling' for health. Role play – choices for parents of a cystic fibrosis sufferer who would like another child. Produce short, headline paragraphs to represent the views of organic farmers, Food-Aid organisers, GM Research scientists and students. Keywords: Allele, Amino acids, Archaea, Asexual reproduction, Binomial system, Charles Darwin, Chromosome, Classification, Cystic fibrosis, DNA, Dominant, Embryo screening, Evolution, Evolutionary tree, Extinction, Family tree, Fertilisation, Fossil, Gametes, Gene, Genetic engineering, Genome, GM crops, Heterozygous, Homozygous, Inbreeding, Linnaean system, Meiosis, Mitosis, MRSA, Natural selection, *Non-coding DNA, Phenotype, Polydactyly, *Protein synthesis, Punnett square, Recessive, Ribosomes,</p>
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		Limiting factor, Metabolism, Oxygen debt, Photosynthesis:		Selective breeding, Sex chromosomes, Sexual reproduction, Species, Three-domain system, Variation, Vector
Numeracy	Collect, present and analyse data about health risks and diseases, looking for correlations. Measure height and weight to calculate BMI. Calculate BMI and evaluate the use of this type of measurement Calculate the rate of gas production using data obtained. Calculate rates of reaction using raw data and graphs	Calculate cross-sectional areas of colonies Interpret data about vaccination rates and reported cases of diseases, eg whooping cough, MMR.	Measure skin temperature in different conditions. Analyse data and interpret information about sweating and temperature. Plot cooling curves. Measure heart rate and/ or blood pressure	Use a Punnett square and a genetic cross diagram to illustrate the inheritance of sex; evaluate the chance of producing a male or female.. Interpret genetic diagrams of Mendel's experiments
CIAG			NCW STEM lessons – where can science take you?	Careers in Physics Lesson (Step Up resources)

Key Stage 4 Long Term Planning

Year 11 2020-2022

Curriculum Area: Biology Trilogy Science

Year 11	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1
Syllabus	AQA Biology Collins - Chapter 7 Variation and Evolution	AQA Biology Collins - Chapter 8 Ecology in Action			
Connections to prior learning					
Knowledge	Variation. Selective breeding. Evolution. Speciation. Theory of evolution. Extinction.	Classification Communities Biotic factors and Abiotic factors Distribution of organisms Adaptations Levels of organisation Producers, consumers and decomposers. Trophic levels and Pyramids of biomass How materials are cycled Decomposition Biodiversity Waste management Land use and Deforestation Global warming Maintaining biodiversity Factors affecting food security Farming techniques Sustainable fisheries Role of biotechnology			
Skills	Class survey and presentation of results. Draw a flow diagram to explain the steps involved in selective breeding. Interpret evolutionary trees. Research the work of Alfred Russel Wallace Interpret evidence relating to evolutionary theory.	Required Practical: Field Investigations AT 1 use of appropriate apparatus to make and record a range of measurements accurately including length and area AT 4 safe and ethical use of a living organism to measure			

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	Role play: life without antibiotics.	<p>physiological responses to the environment</p> <p>AT 6 application of appropriate sampling techniques to investigate the distribution and abundance of organisms in an ecosystem via direct use in the field</p> <p>Card sorting activity. Investigate the effect of planting density on height of seedlings.</p> <p>Construct food chains and identify the producer and consumers.</p>			
Assessment	End of unit test for Chapter 7 Variation and Evolution	End of unit test for Chapter 8 Ecology in Action			
Homework	GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions	GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions			
Cultural enrichment including Trips, Visits, Experiences, Extra-curricular	<p>School and University Network</p> <p>Trip 1-Young Scientist Centre (details to be confirmed)</p> <p>Trip 2-Young Scientist centre</p>				
Literacy	<p>Use of command words and Science subject specific vocabulary</p> <p>Explain the benefits and risks of selective breeding in plants and animals.</p> <p>Research and produce report on evolutionary theories, eg Darwin, Wallace and Lamarck.</p> <p>Research causes of extinction and write a report/PowerPoint presentation to present to the</p>	<p>Use of command words and Science subject specific vocabulary</p> <p>Evaluate method to estimate cover and modify to estimate a plant population on the school field.</p> <p>Compare the adaptations of herbivores, carnivores and omnivores and relate these to the food they eat.</p>			

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	<p>class. Keywords: Abiotic factors, Adaptation, predator, Biodiversity, Biotic factors, Carbon cycle, Community, Competition, Decomposers, Deforestation, Distribution, Ecosystem, Efficiency of biomass transfer, Extremophiles, Food chain,</p>	<p>Keywords: Food security, Global warming, Interdependence, Mean, Median, Microorganisms, Mode, Peatlands, Pollution, Population, Predators, Prey, Primary consumers, Producers, Quadrat, Secondary consumers, Sustainable, Tertiary consumers, Transect, Water cycle,</p>			
Numeracy	<p>Measure variation in a plant species growing in different areas of school grounds Class survey of characteristics – collate results in a table and produce a display of the results in appropriate format. continuous and discontinuous variation Interpret data about antibiotic resistance.</p>	<p>Measure height and calculate means. Present and analyse the results Analyse ecological data from quadrats and transects. Interpret various types of diagrams that illustrate the distribution of organisms in a habitat. Interpret population curves and explain predator – prey relationships Use quadrats and sensors; record and analyse results. Use a transect to investigate the change in type and number of plant species across a changing habitat, eg a footpath. Interpret various types of diagrams that illustrate the distribution of organisms in a habitat.</p>			
CIAG	<p>Studying science at KS5 lesson</p>			<p>NCW STEM lessons – where can science take you?</p>	