AQA A Level Biology A Module 1: Biological molecules				
What are we learning?	**What knowledge, understanding and skills will we gain?[1]**	**What does mastery look like?[2]**	**How does this build on prior learning?[3]**	**What additional resources are available?**
Structure and function of biological molecules How enzymes work Required practical 1: Investigation into the effect of a named variable on the rate of an enzyme-controlled reaction.	**Knowledge** Monomers and polymers. Structure and function of a range of biological molecules (carbohydrates, lipids, proteins, nucleic acids, ATP); the role of water in biological systems; Structure of enzymes; factors affecting rate of enzyme reactions; coenzymes, cofactors and prosthetic groups; enzyme inhibitors **Understanding** Structures of alpha and beta glucose Comparison of eukaryotic and prokaryotic organisms; how polymerisation occurs; formation of bond by condensation and breaking by hydrolysis; how structure of biological molecules contributes to function; how genes code for proteins; why enzymes are needed in biological systems; how membranes function in biological systems; control of substances in and out of cells. **Skills**	Students will be able to: work entirely independently when carrying out practical work. work with a high level of safely, ensuring the health and safety of self and peers by carefully considering the hazards and risks associated with the task. Design robust investigations alone or as part of a student team without teacher input consistently produce accurate results Critically reflect on and evaluate results produced, and outline the steps needed to improve in future tasks.	Picks up themes from KS3 work on cells and organisation, understanding of biological molecules (Year 7, 8 and 9) Develops work from GCSE Biology from units in cell biology and organisation. Picks up themes from GCSE Chemistry on atomic structure, bonding and properties of matter as well as work on organic chemistry. Also extends the work done on chromatography in the chemical analysis unit (Year 10 and 11) Further develops the practical skills acquired in GCSE Science / Biology from both the general practical activities and specifically from the Required practicals (Year 10 and 11)	AQA Year 1 textbook AQA Year 2 textbook AQA practical skills guide AQA Mathematical skills guide

	Testing for proteins, reducing and non-reducing sugars, lipids and starch; techniques in thin-layer chromatography; following the time course of enzyme-controlled reactions			

AQA A Level Biology A Module 2: Cells				
What are we learning?	**What knowledge, understanding and skills will we gain?[1]**	**What does mastery look like?[2]**	**How does this build on prior learning?[3]**	**What additional resources are available?**
Cell structure Use of microscope Transport across a membrane Cell recognition and the immune system Cell division Required practical 2: Preparation of stained squashes of cells from plant root tips; set-up and use of an optical microscope to identify the stages of mitosis in these stained squashes and	**Knowledge** Ultrastructure of eukaryotic cells, prokaryotic cells and viruses. The use of microscopy to observe and investigate different types of cells; use and manipulation of the magnification formula; fluid mosaic model of membrane structure; factors affecting permeability; movement of molecules across membranes; cell cycle; mitosis; differentiation pathogens (bacteria, fungi, viruses and protoctista); primary defences in animals; plant defences against pathogens; primary and secondary immune response; autoimmune	Students will be able to: work entirely independently when carrying out practical work; work with a high level of safely, ensuring the health and safety of self and peers by carefully considering the hazards and risks associated with the task. Design robust investigations alone or as part of a student team without teacher input consistently produce accurate results. Critically reflect on and evaluate results produced, and outline the steps needed to improve in future tasks	Picks up themes from KS3 work on cells and organisation, practical work with microscopes, Develops work from GCSE Biology from units in infection and response, inheritance, Further develops the practical skills acquired in GCSE Science / Biology from both the general practical activities and specifically from the Required Practicals (Year 10 and 11)	AQA Year 1 textbook AQA Year 2 textbook AQA practical skills guide AQA Biology drawing skills handbook AQA Mathematical skills guide

calculation of a mitotic index. Transport across cell membranes Cell recognition in the immune system Required practical 3: Production of a dilution series of a solute to produce a calibration curve with which to identify the water potential of plant tissue. Required practical 4: Investigation into the effect of a named variable on the permeability of cell-surface membranes.	disease; vaccination; sources of medicine. **Understanding** Comparison of resolution and magnification; comparison of eukaryotic and prokaryotic organisms; how membranes function in biological systems; control of substances in and out of cells; the significance of cell division. Causes and symptoms of a variety of pathogenic diseases; how B and T lymphocytes, phagocytes and antibodies work in the immune response; comparison of natural and artificial immunity; why overuse of antibiotics is an issue; Use of antibodies in ELISA test. **Skills** Staining specimens in light microscopy; drawing of biological specimens.			

AQA A Level Biology A Module 3: Organisms exchange substances with their environment				
What are we learning?	**What knowledge, understanding and skills will we gain?[1]**	**What does mastery look like?[2]**	**How does this build on prior learning?[3]**	**What additional resources are available?**
Exchange surfaces and breathing Transport systems in animals Transport systems in plants Required practical 5: Dissection of animal or plant gas exchange system or mass transport system or of organ within such a system.	**Knowledge** Surface area to volume ratio. Gas exchange. Digestion and absorption. Mass transport in animals and plants. Specialised exchange surfaces; structures and functions of mammalian gas exchange systems; ventilation; counter-current flow; circulatory systems; blood vessels; formation of tissue fluid and lymph; structures and functions of the mammalian heart; interpreting ECG traces; oxygen and carbon dioxide transport in the blood; structures in the plant transport system; xylem and phloem; transpiration; translocation; adaptations of plants (xerophytes and hydrophytes) **Understanding** The relationship between vital capacity, tidal volume, breathing rate and oxygen uptake; how size and metabolic rate is related to the need for specialist exchange systems; mechanisms of ventilation applied to bony fish and insects; how the cardiac cycle is regulated; relating oxygen	Students will be able to: work entirely independently when carrying out practical work. Work with a high level of safely, ensuring the health and safety of self and peers by carefully considering the hazards and risks associated with the task design robust investigations alone or as part of a student team without teacher input consistently produce accurate results. Critically reflect on and evaluate results produced, and outline the steps needed to improve in future tasks	Picks up themes from KS3 work on cells and organisation, practical work with microscopes, exercise and fitness (Year 7, 8 and 9) Develops work from GCSE Biology from units in cell biology, organisation and bioenergetics, photosynthesis (Year 10 and 11) Further develops the practical skills acquired in GCSE Science / Biology from both the general practical activities and specifically from the Required Practicals (Year 10 and 11)	AQA Year 1 textbook AQA Year 2 textbook AQA practical skills guide AQA Biology drawing skills handbook AQA Mathematical skills guide

	dissociation curve for haemoglobin to needs in a foetus and an adult; why plants need a specialist transport system; factors that affect transpiration rate; unanswered questions in translocation. Unloading and loading of oxygen in relation to the oxyhaemoglobin dissociation curve Many animals are adapted to their environment by possessing different types of haemoglobin with different oxygen transport properties. **Skills** How to use and interpret traces from a spirometer; dissection of fish gills and insect trachea; microscopic examination of gas exchange surface histology; dissection and drawing of the mammalian heart; drawing and interpreting oxygen dissociation curves; dissection of plant xylem /phloem tissue; practical use of a potometer analyse and interpret data associated with specific risk factors and the incidence of cardiovascular disease recognise correlations and causal relationship			

AQA A Level Biology A Module 4: Genetic information, variation and relationships between organisms

What are we learning?	What knowledge, understanding and skills will we gain?[1]	What does mastery look like?[2]	How does this build on prior learning?[3]	What additional resources are available?
DNA, genes and protein synthesis Genetic diversity Biodiversity Species and taxonomy Required practical 6: Use of aseptic techniques to investigate the effect of antimicrobial substances on microbial grow	**Knowledge** What is a gene? Describing DNA Structures of RNA Protein synthesis Meiosis Transcription Translation sampling habitats; species richness and evenness; Simpson's Index of Diversity; factors affecting biodiversity; *in situ* and *ex situ* methods of maintaining biodiversity: international and local conservation efforts; biological classification systems; phylogeny environmental and genetic factors contributing to phenotypic variation; culturing microbes. **Understanding** Relate the base sequence of nucleic acids to the amino acid sequence of polypeptides, when provided with suitable data about the genetic code interpret data from experimental work investigating the role of nucleic acids. How pre-mRNA is produced. How tRNA molecules are involved in translation	Students will be able to: work entirely independently when carrying out practical work. Work with a high level of safely, ensuring the health and safety of self and peers by carefully considering the hazards and risks associated with the task design robust investigations alone or as part of a student team without teacher input consistently produce accurate results Critically reflect on and evaluate results produced, and outline the steps needed to improve in future tasks carry out statistical tests in relation to data from sampling or variation and interpret results justifiably. Complete diagrams showing the chromosome content of cells after the first and second meiotic division, when given the chromosome content of the parent cell	Picks up themes from GCSE Chemistry on chemistry of the atmosphere (Year 10 and 11) Some students taking Statistics at GCSE will be familiar with basic statistical tests but this unit builds on that knowledge Build on knowledge of antimicrobial growth from GCSE biology. Further develops the practical skills acquired in GCSE Science / Biology from both the general practical activities and specifically from the Required Practicals (Year 10 and 11)	AQA Year 1 textbook AQA Year 2 textbook AQA practical skills guide AQA Biology drawing skills handbook AQA Mathematical skills guide

	interpreting calculations involving Simpson's Index; how biodiversity can be maintained; the importance of conservation agreements to protect biodiversity; the relationship between phylogeny and classification; the evidence of evolution by natural selection; the binomial system for naming organisms; why organisms are adapted to their environment. **Skills** Examination and drawing of cells obtained by blood smears; carrying out fieldwork; generating data for calculation of Simpson's Index of Diversity; (standard deviation, Student's *t*-test, Spearman rank correlation)	Explain the different outcome of mitosis and meiosis Recognise where meiosis occurs when given information about an unfamiliar life cycle Explain how random fertilisation of haploid gametes further increases genetic variation within a species. Show understanding that adaptation and selection are major factors in evolution and contribute to the diversity of living organisms.		

AQA A Level Biology A Module 5: Energy transfer in and between organisms				
What are we learning?	**What knowledge, understanding and skills will we gain?[1]**	**What does mastery look like?[2]**	**How does this build on prior learning?[3]**	**What additional resources are available?**

Photosynthesis Respiration Energy and ecosystems Required practical 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. Required practical 8: Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts. Required practical 9: Investigation into the effect of a named	**Knowledge** Chloroplast structure and function; photosynthetic pigments; light dependent stage; fixation of carbon dioxide and the light independent stage; rate of photosynthesis; structure and function of mitochondria; glycolysis, link reaction; Kreb's cycle; oxidative phosphorylation; chemiosmosis; anaerobic respiration; respiratory quotient and substrates. Food chains and energy transfer, productivity, nutrient cycles, use of fertilisers. Eutrophication. **Understanding** How photosynthesis and respiration are inter-related; the importance of photosynthesis bioenergetically; uses of triose phosphate; factors affecting photosynthesis; the importance of cellular respiration; factors affecting the rate of respiration; the significance of different respiratory substrates; the dynamic nature of ecosystems; the nitrogen cycle and carbon cycle, phosphorus cycle; Explain how fertilisers increase productivity. **Skills** TLC of photosynthetic pigments; practical investigations using respirometers; data-logger use.	Students will be able to: work entirely independently when carrying out practical work. Work with a high level of safely, ensuring the health and safety of self and peers by carefully considering the hazards and risks associated with the task design robust investigations alone or as part of a student team without teacher input consistently produce accurate results. Critically reflect on and evaluate results produced, and outline the steps needed to improve in future tasks. Calculate net and gross production.	Picks up themes from KS3 work on organisms, respiration and photosynthesis as well as food and digestion (Year 7, 8 and 9) Develops work from GCSE Biology from units in infection and response, bioenergetics and homeostasis (Year 10 and 11) Picks up themes from GCSE Chemistry on chemical analysis (Year 10 and 11) Further develops the practical skills acquired in GCSE Science / Biology from both the general practical activities and specifically from the Required Practicals (Year 10 and 11) The work carried out in Year 1 of the A level Biology course is incorporated into the learning and understanding of this module throughout.	AQA Year 1 textbook AQA Year 2 textbook AQA practical skills guide AQA Mathematical skills guide

variable on the rate of respiration of cultures of single-celled organisms.				

AQA A Level Biology A Module 6: Organisms respond to changes in their environments				
What are we learning?	What knowledge, understanding and skills will we gain?[1]	What does mastery look like?[2]	How does this build on prior learning?[3]	What additional resources are available?
Homeostasis Excretion Neuronal communication Hormonal communication Plant and animal responses to stimuli Required practical 10: Investigation into the effect of an environmental variable on the	**Knowledge** Cell signalling; homeostatic principles; endotherms and ectotherms; structure and function of mammalian liver; water potential control; kidney failure and treatment; excretory products in diagnostic testing; structures and functions of mammalian neuronal system; generation and maintenance of nerve impulses; synapses; osmoregulation; mammalian glands; diabetes and treatment; plant response types; auxins and other plant hormones; structure and function of human brain; coordination of human endocrine and nervous system; muscle contraction in humans; neuromuscular junctions. **Understanding**	Students will be able to: work entirely independently when carrying out practical work. Work with a high level of safely, ensuring the health and safety of self and peers by carefully considering the hazards and risks associated with the task. Design robust investigations alone or as part of a student team without teacher input consistently produce accurate results. Critically reflect on and evaluate results produced, and outline	Picks up themes from KS3 work on organisms, as well as evolution and ecology. Some students will have carried out basic field work (Year 7, 8 and 9) Develops work from GCSE Biology from units in homeostasis Picks up themes from GCSE Chemistry on organic chemistry (Year 10 and 11) Further develops the practical skills acquired in GCSE Science / Biology from	AQA Year 1 textbook AQA Year 2 textbook AQA practical skills guide AQA Biology drawing skills handbook AQA Mathematical skills guide

movement of an animal using either a choice chamber or a maze. Required practical 11: Production of a dilution series of a glucose solution and use of colorimetric techniques to produce a calibration curve with which to identify the concentration of glucose in an unknown 'urine' sample.	Why homeostasis is necessary; applying temperature control mechanism strategies to different organisms; why excretion is important; comparison of different dialysis methods and transplantation; pregnancy testing and anabolic steroid analysis by GC-MS; comparison of myelinated and non-myelinated neurones, neurotransmitter function; pancreas function and adrenal glands; comparison of type I and II diabetes; how apical dominance is controlled; seed germination and stem elongation; commercial use of plant hormones; how heart rate is controlled; Taxes and kineses as simple responses that can maintain a mobile organism in a favourable environment. **Skills** Microscopic examination and drawing of histology of liver; microscopic examination and drawing of histology of kidney; pregnancy testing; microscopic examination and drawing of histology of pancreatic tissue; investigations into phototropism and geotropism; the examination of stained sections or photomicrographs of skeletal muscle.	the steps needed to improve in future tasks carry out statistical tests in relation to data from sampling or genetics data and interpret results justifiably	both the general practical activities and specifically from the Required Practicals (Year 10 and 11) Some students taking Statistics at GCSE will be familiar with basic statistical tests, but this unit builds on that knowledge The work carried out in Year 1 of the A level Biology course is incorporated into the learning and understanding of this module throughout.	

AQA A Level Biology A Module 7: Genetics, populations, evolution and ecosystems				
What are we learning?	What knowledge, understanding and skills will we gain?[1]	What does mastery look like?[2]	How does this build on prior learning?[3]	What additional resources are available?

Cellular control Inherited change Populations and evolution Populations in ecosystems Required practical 12: Investigation into the effect of a named environmental factor on the distribution of a given species.	**Knowledge** Variation, natural selection and evolution; speciation; ecosystem types; biomass transfer; recycling; succession; sampling for abundance and distribution; population size; interactions between populations; conservation and preservation; sustainability. **Understanding** Explaining monohybrid, dihybrid, multiple alleles, sex-linkage and codominance; epistasis; the ethical considerations around the use of artificial selection; how gene sequencing has led to prediction of protein structure and artificial biology; limiting factors in a population; social, economic and ethical reasons for conservation of resources; management of environment with reference to case studies from around the world. Isolation and speciation in populations. Stages of succession. **Skills** Drawing genetic diagrams to show inheritance; use of χ^2 tests to determine significance in genetic outcomes; applying calculations of Hardy-Weinberg to allele frequencies in populations; the use of gel	Students will be able to: work entirely independently when carrying out practical work. Work with a high level of safely, ensuring the health and safety of self and peers by carefully considering the hazards and risks associated with the task design robust investigations alone or as part of a student team without teacher input consistently produce accurate results. Critically reflect on and evaluate results produced, and outline the steps needed to improve in future tasks. Carry out statistical tests in relation to data from sampling or genetics data and interpret results justifiably.	Picks up themes from KS3 work on organisms, as well as evolution and ecology. Develops work from GCSE Biology from units in infection and response, inheritance and ecology (Year 10 and 11) Further develops the practical skills acquired in GCSE Science / Biology from both the general practical activities and specifically from the Required Practicals (Year 10 and 11) Some students taking Statistics at GCSE will be familiar with basic statistical tests, but this unit builds on that knowledge The work carried out in Year 1 of the A level Biology course is incorporated into the learning and understanding of this module throughout.	AQA Year 1 textbook AQA Year 2 textbook AQA practical skills guide AQA Mathematical skills guide

	electrophoresis in separating nucleic acid fragments; working with microorganisms using serial dilution methods and aseptic technique; use of field sampling techniques to measure abundance and distribution of organisms. Using quadrat frames, point quadrats, transects and other sampling methodology; application of statistical methods in sampling and in data derived from variation studies.			

AQA A Level Biology A Module 8: The control of gene expression				
What are we learning?	**What knowledge, understanding and skills will we gain?[1]**	**What does mastery look like?[2]**	**How does this build on prior learning?[3]**	**What additional resources are available?**
Gene expression Recombinant DNA technology Cloning and biotechnology	**Knowledge** Gene mutations, splicing DNA, stem cells gene mutations; regulation of gene expression; regulation of protein synthesis; cell differentiation regulation of protein synthesis. Epigenetics Cancer Genome projects In vivo – use of vectors In vitro gene cloning	Students will be able to: work entirely independently when carrying out practical work. Work with a high level of safely, ensuring the health and safety of self and peers by carefully considering the hazards and risks associated with the task design robust investigations alone or as part of a student team without teacher input	Picks up themes from KS3 work on cells. Develops work from GCSE Biology from units in infection and response, inheritance and (Year 10 and 11) Picks up themes from GCSE Biology on generic modification (Year 10 and 11)	AQA Year 1 textbook AQA Year 2 textbook AQA practical skills guide AQA Mathematical skills guide

	DNA sequencing; DNA profiling and uses; polymerase chain reaction and applications; genetic engineering; genetic fingerprinting gene therapy; plant cloning; animal cloning; microorganisms in biotechnological processes. **Understanding** Classification of tumours and role of oncogenes. How pluripotent and totipotent cells are used to treat disorders What is small interfering RNA Ethical considerations around the use of genetic engineering; plant cloning techniques (micro propagation, cuttings, tissue culture; animal cloning techniques (embryo twinning, enucleation, somatic cell transfer); micros used in medicine and food production. How genetic counselling is used. Explain epigenetic control of the genome. **Skills** drawing genetic diagrams to show inheritance; use of χ^2 tests to determine significance in genetic outcomes; applying calculations of Hardy-Weinberg to allele frequencies in populations; the use of	consistently produce accurate results. Critically reflect on and evaluate results produced, and outline the steps needed to improve in future tasks. Carry out statistical tests in relation to data from sampling or genetics data and interpret results justifiably.	Further develops the practical skills acquired in GCSE Science / Biology from both the general practical activities and specifically from the Required Practicals (Year 10 and 11) The work carried out in Year 1 of the A level Biology course is incorporated into the learning and understanding of this module throughout.	

	gel electrophoresis in separating nucleic acid fragments; working with microorganisms using serial dilution methods and aseptic technique; use of field sampling techniques to measure abundance and distribution of organisms.			