

Combined Biology Paper 1	Confidence Level		
	Red	Amber	Green
Topic 1 – Key concepts in biology			
Explain how the sub-cellular structures of eukaryotic and prokaryotic cells are related to their functions, including: animal, plant & bacteria			
Explain how specialised cells are adapted to their functions, including: sperm, egg and ciliated epithelial cells			
Explain how changes in microscope technology, including electron microscopy, have enabled us to see cell structures with more clarity and detail than in the past			
Demonstrate an understanding of number, size and scale, including the use of estimations and explain when they should be used			
Demonstrate an understanding of the relationship between quantitative units in relation to cells, including: milli, micro, nano & pico			
<i>Core Practical: Investigate biological specimens using microscopes, including magnification calculations and labelled scientific drawings from observations</i>			
Explain the mechanism of enzyme action including the active site and enzyme specificity			
Explain how enzymes can be denatured due to changes in the shape of the active site			
Explain the effects of temperature, substrate concentration and pH on enzyme activity			
<i>Core Practical: Investigate the effect of pH on enzyme activity</i>			
Demonstrate an understanding of rate calculations for enzyme activity			
Demonstrate an understanding of rate calculations for enzyme activity			
Explain the importance of enzymes as biological catalysts in the synthesis and breakdown of carbohydrates, fats and proteins			
Explain how substances are transported into and out of cells, including by diffusion, osmosis and active transport			
<i>Core Practical: Investigate osmosis in potatoes</i>			
Calculate percentage gain and loss of mass in osmosis			
Higher Tier Only			
Complete calculations with numbers written in standard form			
Topic 2 – Cells and control			
Describe mitosis as part of the cell cycle, including the stages interphase, prophase, metaphase, anaphase and telophase and cytokinesis			
Describe the importance of mitosis in growth, repair and asexual reproduction			
Describe the division of a cell by mitosis in terms of cells formed and chromosome numbers			
Describe cancer as the result of changes in cells that lead to uncontrolled cell division			
Describe growth in plants and animals including: cell division, differentiation and elongation (plants only)			
Explain the importance of cell differentiation in the development of specialised cell			
Demonstrate an understanding of the use of percentiles charts to monitor growth			
Describe the function of embryonic stem cells in animals and meristems in plants			
Discuss the potential benefits and risks associated with the use of stem cells in medicine			
Explain the structure and function of the nervous system including neurones, synapses and neurotransmitters			
Explain the structure and function of a reflex arc including sensory, relay and motor neurones			

Topic 3 – Genetics			
Explain the role of meiotic cell division in terms of cells formed and chromosome numbers			
Describe the structure of DNA in terms of bases and bonding			
Describe what a genome and gene are and describe the role of a gene			
Explain how DNA can be extracted from fruit			
Explain why there are differences in the inherited characteristics as a result of alleles			
Explain the terms: chromosome, gene, allele, dominant, recessive, homozygous, heterozygous, genotype, phenotype, gamete and zygote			
Explain monohybrid inheritance using genetic diagrams, Punnett squares and family pedigrees			
Describe how the sex of offspring is determined at fertilisation, using genetic diagrams			
Calculate and analyse outcomes (using probabilities, ratios and percentages) from monohybrid crosses and pedigree analysis for dominant and recessive traits			
State that most phenotypic features are the result of multiple genes rather than single gene inheritance			
Describe the causes of variation that influence phenotype: genetic/environmental variation and mutations			
Discuss the outcomes of the Human Genome Project and its potential applications within medicine			
State that there is usually extensive genetic variation within a population of a species and that these arise through mutations			
Topic 4 – Natural selection and genetic modification			
Describe the differences in severity of a genetic mutation on the phenotype			
Explain Darwin's theory of evolution by natural selection			
Explain how the emergence of resistant organisms supports Darwin's theory of evolution including antibiotic resistance in bacteria			
Describe the evidence for human evolution, based on fossils, including: Ardi, Lucy and Leakey's discovery of fossils			
Describe the evidence for human evolution based on stone tools, including: a) the development of stone tools over time b) how these can be dated from their environment			
Describe how genetic analysis has led to the suggestion of the three domains rather than the five kingdoms classification method			
Explain selective breeding and its impact on food plants and domesticated animals			
Describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics			
Evaluate the benefits and risks of genetic engineering and selective breeding in modern agriculture and medicine, including practical and ethical implications			
Higher Tier Only			
Describe the main stages of genetic engineering including the use of: restriction enzymes, ligase, sticky ends and vectors			
Topic 5 – Health, disease and the development of medicines			
Describe health as defined by the World Health Organization (WHO)			
Describe the difference between communicable and non-communicable diseases			
Explain why the presence of one disease can lead to a higher susceptibility to other diseases			
Describe a pathogen as a disease-causing organism, including viruses, bacteria, fungi and protists			
Describe some common infections, including: cholera, tuberculosis, Chalara ash dieback, malaria, HIV, stomach ulcers, Ebola and state the pathogen type and details of the symptoms			

Explain how pathogens are spread and how this spread can be reduced or prevented, including: cholera, tuberculosis, Chalaria ash dieback, malaria, HIV, stomach ulcers, Ebola			
Explain how sexually transmitted infections (STIs) are spread and how this spread can be reduced or prevented, including: Chlamydia and HIV			
Describe how the physical barriers and chemical defences of the human body provide protection from pathogens			
Explain the role of the specific immune system of the human body in defence against disease, including ideas on antigens and lymphocytes			
Explain the body's response to immunisation using an inactive form of a pathogen			
Explain why antibiotics can only be used to treat bacterial infections			
Describe that the process of developing new medicines, including antibiotics, has many stages, including discovery, development, preclinical and clinical testing			
Describe that many non-communicable human diseases are caused by the interaction of a number of factors			
Explain the effect of lifestyle factors on non-communicable diseases at local, national and global levels including BMI, alcohol and smoking			
Evaluate some different treatments for cardiovascular disease, including: life-long medication, surgical procedures and lifestyle changes			