Combined Science - Biology Paper 1 Higher Tier
Personal Learning Checklist (PLC)

B1 Cell Biology

Learning Objectives:	Confidence		
	R	A	G
Use the terms 'eukaryotic' and 'prokaryotic' to describe types of cells			
Describe the features of bacterial (prokaryotic) cells			
Demonstrate an understanding of the scale and size of cells and be able to make order of magnitude calculations, inc standard form			
Recall the structures found in animal and plant (eukaryotic) cells inc algal cells			
Use estimations and explain when they should be used to judge the relative size or area of sub-cellular structures			
Required practical 1: use a light microscope to observe, draw and label a selection of plant and animal cells			
Describe the functions of the structures in animal and plant (eukaryotic) cells			
Describe what a specialised cell is, including examples for plants and animals			
Describe what differentiation is, including differences between animals and plants			
Define the terms magnification and resolution			
Compare electron and light microscopes in terms of their magnification and resolution			
Carry out calculations involving magnification using the formula: magnification = size of image/ size of real object -inc standard form			
Required practical 2: investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition			
Describe how genetic information is stored in the nucleus of a cell (inc genes & chromosomes)			
Describe the processes that happen during the cell cycle, including mitosis (inc recognise and describe where mitosis occurs)			
Describe stem cells, including sources of stem cells in plants and animals and their roles			
Describe the use of stem cells in the production of plant clones and therapeutic cloning			
Discuss the potential risks, benefits and issues with using stem cells in medical research/treatments (inc diabetes and paralysis)			
Describe the process of diffusion, including examples			
Explain how diffusion is affected by different factors			
Define and explain "surface area to volume ratio", and how this relates to single-celled and multicellular organisms (inc calculations)			
Explain how the effectiveness of an exchange surface can be increased, inc examples of adaptations for small intestines, lungs, gills roots & leaves			
Describe the process of osmosis (inc calculation of water uptake & percentage gain and loss of mass of plant tissue)			
Required practical 3: investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue			
Describe the process of active transport, including examples - gut and roots			
Explain the differences between diffusion, osmosis and active transport			

B2 Organisation

Learning Objectives:	Confidence		
	R	A	G
Describe the levels of organisation within living organisms			
Describe the digestive system and how it works as an organ system (from KS3)			
Describe basic features of enzymes (inc rate calculations for chemical reactions)			
Describe the lock and key theory as a model of enzyme action and explain how the shape a of the active sites makes the enzyme specific			
Explain the effect of temperature and pH on enzymes			
Describe the digestive enzymes, including their names, sites of production and actions			
Describe how the products of digestion are used			
Describe the features and functions of bile and state where it is produced and released from			
Required practical 4: use qualitative reagents to test for a range of carbohydrates, lipids and proteins			
Required practical 5: investigate the effect of pH on the rate of reaction of amylase enzyme			
Describe the structure of the human heart and lungs (inc how lungs are adapted for gaseous exchange)			
Explain how the heart moves blood around the body (inc role and position of the aorta, vena cava, pulmonary artery & vein and coronary arteries)			
Explain how the natural resting heart rate is controlled and how irregularities can be corrected			
Describe the structure and function of arteries, veins and capillaries			
Use simple compound measures such as rate and carry out rate calculations for blood flow			
Describe blood and identify its different components, inc identifying blood cells from photographs/diagrams			
Describe the functions of blood components, including adaptations to function			
Describe what happens in coronary heart disease and what statins are used for			
Describe and evaluate treatments for coronary heart disease and heart failure (inc drugs, mechanical devices or transplant)			
Recall that heart valves can become faulty and describe the consequences of this			
Describe how patients can be treated in the case of heart failure			
Describe health and the explain causes of ill-health and the relationship between health and disease			
Describe how different types of diseases may interact and translate disease incidence information between graphical and numerical forms			
Describe what risk factors are and give examples discussing human and financial costs of non-communicable diseases at local, national and global levels			
Describe what cancer is and explain the difference between benign and malignant tumours			
Describe the known risk factors for cancer, including genetic and lifestyle risk factors			
Describe plant tissues (epidermal, palisade mesophyll, spongy mesophyll, xylem, phloem and meristem) and describe their functions			
Explain how the structure of plant tissues are related to their function within the leaf (plant organ) inc stomata and guard cells			
Recall the plant parts that form a plant organ system that transports substances around the plant			
Explain how root hair cells, xylem and phloem are adapted to their functions			
Describe the process of transpiration and translocation including the role of the different plant tissues			
Explain how the rate of transpiration can be affected by different factors (inc naming the factors)			

Describe the role of stomata and guard cells in the control of gas exchange and water loss			

B3 Infection and Response

Learning Objectives:	Confidence		
	R	A	G
Explain what a pathogen is and how pathogens are spread (inc how viruses, bacteria, protists and fungi are spread in animals and plants)			
Explain how pathogenic bacteria and viruses cause damage in the body			
Explain how the spread of diseases can be reduced or prevented			
Describe measles, HIV and tobacco mosaic virus as examples of viral pathogens			
Describe salmonella food poisoning and gonorrhoea as examples of bacterial pathogens			
Describe the signs, transmission and treatment of rose black spot infection in plants as an example of fungal pathogens			
Describe the symptoms, transmission and control of malaria, including knowledge of the mosquito vector as an example of a protists pathogen			
Describe defences that stop pathogens entering the human body (inc skin, nose, trachea & windpipe, stomach)			
Recall the role of the immune system			
Describe how white blood cells destroy pathogens			
Describe how vaccination works, including at the population level			
Explain how antibiotics and painkillers are used to treat diseases, including their limitations			
Describe how sources for drugs have changed over time and give some examples			
Describe how new drugs are tested, including pre-clinical testing and clinical trials (inc double blind trials and placebos)			

B4 Bioenergetics

Learning Objectives:	Confidence		
	R	A	G
Describe what happens in photosynthesis, including using a word equation and recognise the chemical formulas for carbon dioxide, water, oxygen & glucose			
Explain why photosynthesis is an endothermic reaction			
Recall the limiting factors of photosynthesis			
Explain how limiting factors affect the rate of photosynthesis, including graphical interpretation (limited to one factor)			
HT ONLY: Explain how the limiting factors of photosynthesis interact, inc graphical interpretation (two/three factors)			
HT ONLY: Explain how limiting factors are important to the economics of greenhouses, including data interpretation			
HT ONLY: Explain and use inverse proportion in the context of photosynthesis			
Required practical 6: investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed			
Describe how the glucose produced in photosynthesis is used by plants			
Describe what happens in respiration including using a word equation and recognise the chemical formulas for carbon dioxide, water, oxygen & glucose			

Describe aerobic and anaerobic respiration with regard to the need for oxygen, the differing products and the relative amounts of energy transferred			
Recognise the equations for aerobic respiration, anaerobic respiration in muscles and anaerobic respiration in plants and yeast cells.			
Recall what type of respiration fermentation is and its economic importance.			
Describe what happens to heart rate, breathing rate and breath volume during exercise and why these changes occur			
Explain what happens when muscles do not have enough oxygen and define the term oxygen debt			
HT ONLY: Explain what happens to accumulated lactic acid in the body			
Explain the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, proteins and lipids			
Explain what metabolism is, including examples			