

## Biology GCSE - Personal Learning Checklist

### AQA Biology (8461) from 2016 Topic B4.1 Cell biology - Paper 1

**Remember to test yourself by doing an exam question!**

#### AQA Biology (8461) from 2016 Topic B4.1 Cell biology

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4.1.1 Cell structure	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		
	<b>Required practical 1:</b> 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		
	<b>Bio ONLY:</b> Describe how bacteria reproduce and the conditions required		
	<b>Bio ONLY:</b> Describe how to prepare an uncontaminated culture		
	<b>Bio ONLY:</b> Calculate cross-sectional areas of colonies or clear areas around colonies using $\pi r^2$		
	<b>Bio ONLY:</b> Calculate the number of bacteria in a population after a certain time if given the mean division time		
	<b>Bio &amp; HT ONLY:</b> Express answers for last two points in standard form		
	<b>Required practical 2:</b> investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition		

4.1.2 Cell division	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)		

4.1.3 Transport in cells	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)		
	<b>Required practical 3:</b> 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		

#### AQA Biology (8461) from 2016 Topic B4.2 Organisation

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4.2.1 Principles of organisation & 4.2.2 Animal tissues, organs and organ systems	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 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		
	<b>Required practical 4:</b> use qualitative reagents to test for a range of carbohydrates, lipids and proteins		
	<b>Required practical 5:</b> 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		

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<b>4.2.3 Plant tissues, organs and system</b>	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			

**AQA Biology (8461) from 2016 Topic B4.3 Infection and response**

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<b>4.3.1 Communicable diseases</b>	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)			

<b>4.3.2 Monoclonal antibodies</b>	Bio & HT ONLY: Describe what monoclonal antibodies are and why they are useful			
	Bio & HT ONLY: Describe how monoclonal antibodies are produced			
	Bio & HT ONLY: Explain how monoclonal antibodies are used for diagnosis, research, chemical testing and disease treatments			
	Bio & HT ONLY: Evaluate the advantages and disadvantages of monoclonal antibodies (inc side effects)			
	Bio & HT ONLY: Describe some observable signs of plant disease, and how plant diseases can be identified			

<b>4.3.3 Plant disease</b>	Bio ONLY: Give examples of plant pathogens			
	Bio ONLY: Give examples of plant ion deficiencies and their effects			
	Bio ONLY: Describe physical, chemical and mechanical defence responses of plants			

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<b>4.4.1 Photosynthesis</b>	AQA Biology (8461) from 2016 Topic B4.4 Bioenergetics			
	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			

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<b>4.4.2 Respiration</b>	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			

