

AAQ Applied Science Biology

Personal Learning Checklist

Unit 1

A1: Structure and function of cells and tissues

Objective	Confidence (R/A/G)		
	1	2	3
A1.1.1 Name the following structures in prokaryotic (bacterial) cells and describe their function: nucleoid, plasmids, 70S ribosomes, capsule, cell wall, cytoplasm, plasma membrane, mesosomes, flagellae, pili			
A1.1.2 Name the following organelles in eukaryotic animal cells and describe their function: plasma membrane, cytoplasm, nucleus, nucleolus, endoplasmic reticulum (smooth and rough), Golgi apparatus, vesicles, lysosomes, 80S ribosomes, mitochondria, centrioles, cilia			
A1.1.2 Name the following plant cell specific organelles and describe their function: cell wall, chloroplasts, vacuole, tonoplast, amyloplasts, plasmodesmata, pits.			
A1.2 Recognise organelles from electron micrographs and photomicrographs.			
A1.3 Describe the similarities and differences between the structure and function of plant cells and animal cells.			
A1.4 Describe and explain the responses of Gram-positive and Gram-negative bacteria when exposed to antibiotics.			
A1.5 Calculate magnification and size of cells and organelles from images.			

A2 Structure and function of specialised cells in multicellular organisms

Objective	Confidence (R/A/G)		
	1	2	3
A2.1 Explain the structure and how it relates to the function of the following specialised eukaryotic cells: palisade mesophyll cells, root hair cells, xylem cells, phloem cells, sperm and egg cells in reproduction, erythrocytes, leucocytes, thrombocytes, neurones.			

A3 Structure and function of biological tissues

Objective	Confidence (R/A/G)		
	1	2	3
A3.1 Describe the structure of the following epithelial tissue and how they relate to their function: A3.1.1 squamous as illustrated by the role of alveolar epithelium in gas exchange A3.1.2 columnar as illustrated by goblet cells and ciliated cells in the lungs to include their role in protecting lungs from pathogens.			
A3.1.3 Describe and explain the effects of chronic obstructive pulmonary disease (COPD)			
A3.2 Describe the structure of endothelial tissue, as illustrated by blood vessels in the cardiovascular system.			
A3.2.1 Identify risk factors and explain how they can lead to damage of the endothelial cells leading to the development of atherosclerosis.			
A3.3 Describe the structure of muscular tissue and how it relates to its function including the following: A3.3.1 microscopic structure of a skeletal muscle fibre A3.3.2 structural and physiological differences between fast- and slow-twitch muscle fibres and their relevance to short term and endurance-based activities			
A3.4 The structure and function of nervous tissue			
A3.4.1 non-myelinated and myelinated neurones			
A3.4.2 the conduction of a nerve impulse along an axon, to include changes in membrane permeability to sodium and potassium ions and the role of the myelination in saltatory conduction			
A3.4.3 interpretation of graphical displays of a nerve impulse			
A3.4.4 synaptic structure and the role of neurotransmitters			
A3.4.5 imbalances of brain chemicals that can contribute to ill health, including dopamine in Parkinson's disease			
A3.4.6 effects of drug interaction on synaptic transmission, to include agonists, antagonists and precursors			

B1 Structure and function of water

Objective	Confidence (R/A/G)		
	1	2	3
B1.1 Know the structure of water including: - contains hydrogen (H) and oxygen (O) atoms - structural and chemical formulae - within water molecule (covalent bonding) - polarity - hydrogen bonds between water molecules			
B1.2 Know the function of water including: - as a solvent - medium for chemical reactions and transport			

• pH regulation • electrolyte balance • temperature regulator • cohesion-tension in mass flow.			
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B2 Structure and function of carbohydrates

Objective	Confidence (R/A/G)		
	1	2	3
B2.1 Know the structure of carbohydrates including: • contain carbon @, hydrogen and oxygen atoms • monosaccharides: • α and β glucose, • galactose • fructose • ribose and deoxyribose. • disaccharides: • lactose • maltose • sucrose. • polysaccharides • Starch (amylose and amylopectin) • Cellulose • glycogen			
B2.2 Know the function of carbohydrates including: • release of energy and the production of ATP • energy storage • structural			
B2.3 Know how to use iodine and Benedict's solution as tests for presence of carbohydrates.			

B3 Structure and function of proteins

Objective	Confidence (R/A/G)		
	1	2	3
B3.1 Know the structure of protein including: • primary structure, including peptide links to give polypeptides • secondary structure, including α-helices and β-pleated sheets • tertiary structure:			

• ionic interaction • hydrogen bonding • di-sulfide bridges/bonds • van der Waal's forces. • quaternary structure, including haemoglobin • classification as globular or fibrous			
B3.2 Know the function of protein including: • muscles • enzymes • antibodies • antigens • carrier proteins • hormones • for transport of other components • body tissue growth and repair • blood clotting			
B3.3 Know how to use Biuret solution as a test for the presence of protein			

B4 Structure and function of nucleic acids

Objective	Confidence (R/A/G)		
	1	2	3
B4.1 Know the structure of nucleic acids including: • nucleotide structure (deoxyribose or ribose, phosphate and purine or pyrimidine base) • polynucleotide structure with bonds made through condensation reactions • formation of the DNA double helix through complementary base pairing • formation of RNA nucleotides			
B4.2 Know the function of nucleic acids including: • DNA in genes • RNA for protein synthesis and controlling gene expression.			

B5 Structure and function of lipids

Objective	Confidence (R/A/G)		
	1	2	3
B5.1 Know the structure of lipids including: • carbon, hydrogen and oxygen in fats, oils and waxes • saturated and unsaturated fats, and formation of diglycerides and triglycerides via esterification reactions			

B5.2 Know the function of lipids including: • energy sources and stores • insulation and organ protection • phospholipids in membranes • steroid hormones			
B5.3 Know to use emulsion tests to identify presence of lipids			

C1 Cell transport mechanisms

Objective	Confidence (R/A/G)		
	1	2	3
C1.1 Know the structure of the cell surface membrane with reference to the fluid mosaic model.			
C1.2 Know methods used to transport molecules including: - through cell membranes: • passive transport brought about by diffusion • facilitated diffusion • osmosis • active transport - bulk transport • endocytosis • exocytosis			
C1.3 Know the significance of surface area to volume ratio in living organisms.			

C2 Enzymes as biological catalysts

Objective	Confidence (R/A/G)		
	1	2	3
C2.1 Know the structure of enzymes including: • made of proteins • active site with specific tertiary structure			
C2.2 Know the function of enzymes including: • biological catalysts • collision theory • lock and key theory • formation of enzyme-substrate complex • specificity of enzymes • importance of measuring initial rates of reaction			
2.3 Know the factors affecting enzyme activity including:			

• optimum • denaturing • temperature • pH • substrate and enzyme concentration			

C3 Homeostasis

Objective	Confidence (R/A/G)		
	1	2	3
C3.1 Know the purpose of homeostasis in relation to: • optimum • stimulus • receptors/sensors • control centres • effectors • feedback.			
C3.2 Know the negative feedback loops effecting the body: • blood pressure • body fluids (osmoregulation) • gas concentration • blood sugar levels.			
C3.3 Positive feedback loops effecting the body: • blood clotting • labour contractions.			
C3.4 Know the interrelationship between nervous and endocrine system responses including: C3.4.1 role of the autonomic nervous system, breathing, heartbeat C3.4.2 role of adrenal glands (fight and flight, heart rate) C3.4.3 hypothalamus, endocrine and nervous system C3.4.4 peripheral nervous system, autonomic system, relaying information to the brain.			
C3.5 Know the sources and methods of disturbance of homeostasis including: C3.5.1 ageing, weakening of feedback loops, heart failure, diabetes C3.5.2 influence of lifestyle: • nutrition • physical activity • drug/alcohol abuse			

Key skills

Objective		Confidence (R/A/G)		
		1	2	3
Arithmetic and Numerical Computation				
Handling Data				
Algebra				
Graphs				

Geometry and Trigonometry				
Data analysis				
Literacy				
Practicals				
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