

VCE Biology

Exam Planner

*Your guide for exam goal-setting,
preparation and success.*



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Subject: Biology

EXAM DATE

GOAL

Topic: How do Cellular Processes work	Do I have it in my notes?	Note-making deadline	Memorising deadline
The fluid mosaic model of the structure of the plasma membrane and the movement of hydrophilic and hydrophobic substances across it based on their size and polarity			
The role of different organelles including ribosomes, endoplasmic reticulum, Golgi apparatus and associated vesicles in the export of a protein product from the cell through exocytosis			
Cellular engulfment of material by endocytosis.			
Nucleic acids as information molecules that encode instructions for the synthesis of proteins in cells			
Protein functional diversity and the nature of the proteome			
The functional importance of the four hierarchical levels of protein structure			
The synthesis of a polypeptide chain from amino acid monomers by condensation polymerisation			
The structure of DNA and the three forms of RNA including similarities and differences in their subunits, and their synthesis by condensation polymerisation			
The genetic code as a degenerate triplet code and the steps in gene expression including transcription, RNA processing in eukaryotic cells and translation.			
The functional distinction between structural genes and regulatory genes			
The structure of genes in eukaryotic cells including stop and start instructions, promoter regions, exons and introns			
Use of the lac operon as a simple prokaryotic model that illustrates the switching off and on of genes by proteins (transcriptional factors) expressed by regulatory genes.			
The role of enzymes as protein catalysts in biochemical pathways			

The mode of action of enzymes including reversible and irreversible inhibition of their action due to chemical competitors at the active site, and by factors including temperature, concentration and pH			
The cycling of coenzymes (ATP, NADH, and NADPH) as loaded and unloaded forms to move energy, protons and electrons between reactions in the cell.			
The purpose of photosynthesis			
Chloroplasts as the site of photosynthesis, an overview of their structure and evidence of their bacterial origins			
Inputs and outputs of the light dependent and light independent (Calvin cycle) stages of photosynthesis in C3 plants (details of the biochemical pathway mechanisms are not required)			
Factors that affect the rate of photosynthesis, including light, temperature and carbon dioxide concentration.			
The purpose of cellular respiration			
The location of, and the inputs and outputs of, glycolysis including ATP yield (details of the biochemical pathway mechanisms are not required)			
Mitochondria as the site of aerobic cellular respiration, an overview of their structure and evidence of their bacterial origins			
The main inputs and outputs of the Krebs (citric acid) cycle and electron transport chain including ATP yield (details of the biochemical pathway mechanisms are not required)			
The location of anaerobic cellular respiration, its inputs and the difference in outputs between animals and yeasts including ATP yield			
Factors that affect the rate of cellular respiration, including temperature, glucose availability and oxygen concentration.			
Topic: How do cells communicate?	Do I have it in my notes?	Note-making deadline	Memorising deadline
The sources and mode of transmission of various signalling molecules to their target cell, including plant and animal hormones, neurotransmitters, cytokines and pheromones			
The stimulus-response model when applied to the cell in terms of signal transduction as a three-step process involving reception, transduction and cellular response			

Difference in signal transduction for hydrophilic and hydrophobic signals in terms of the position of receptors (on the membrane and in the cytosol) and initiation of transduction (details of specific chemicals, names of second messengers, G protein pathways, reaction mechanisms or cascade reactions are not required)			
Apoptosis as a natural, regulatory process of programmed cell death, initiated after a cell receives a signal from inside (mitochondrial pathway) or from outside (death receptor pathway) the cell resulting in the removal of cells that are no longer needed or that may be a threat to an organism, mediated by enzymes (caspases) that cleave specific proteins in the cytoplasm or nucleus (details of specific cytoplasmic or nuclear proteins are not required)			
Malfunctions in apoptosis that result in deviant cell behaviour leading to diseases including cancer.			
An antigen as a unique molecule or part of a molecule that initiates an immune response including the distinction between non-self antigens, self-antigens and allergens			
Invading cellular and non-cellular pathogens as a source of non-self antigens, and preventative strategies including physical, chemical and microbiological barriers in animals and plants that keep them out			
The characteristics and roles of components (macrophages, neutrophils, mast cells, dendritic cells, complement proteins) of the innate (non-specific) immune response to an antigen including the steps in the inflammatory response			
The role of the lymphatic system in the immune response including the role of secondary lymphoid tissue (with reference to lymph nodes) as the site of antigen recognition by lymphocytes, and as a transport system for antigen presenting cells including dendritic cells			
The characteristics and roles of components of the adaptive (specific) immune response including the actions of B lymphocytes and their antibodies (including antibody structure) in humoral immunity, and the actions of T helper and T cytotoxic cells in cell-mediated immunity.			
The difference between natural and artificial immunity, and active and passive strategies for acquiring immunity			
Vaccination programs and their role in maintaining herd immunity for a particular disease in the human population			

The deficiencies and malfunctions of the immune system as a cause of human diseases including autoimmune diseases (illustrated by multiple sclerosis), immune deficiency diseases (illustrated by HIV) and allergic reactions (illustrated by reactions to pollen)			
The use of monoclonal antibodies in treating cancer.			
Topic: How are the species related?	Do I have it in my notes?	Note-making deadline	Memorising deadline
The qualitative treatment of the causes of changing allele frequencies in a population's gene pool including types of mutations (point, frameshift, block) as a source of new alleles, environmental selection pressures on phenotypes as the mechanism for natural selection, gene flow, and genetic drift (bottleneck and founder effects) and the biological consequences of such changes in terms of increased or reduced genetic diversity			
Processes of evolution including through the action of mutations and different selection pressures on a fragmented population and subsequent isolating mechanisms (allopatric speciation) that prevent gene flow			
The manipulation of gene pools through selective breeding programs.			
significant changes in life forms in Earth's geological history including the rise of multicellular organisms, animals on land, the first flowering plants and mammals			
Evidence of biological change over time including from palaeontology (the fossil record, the relative and absolute dating of fossils, types of fossils and the steps in fossilisation), developmental biology and structural morphology			
Patterns of biological change over geological time including divergent evolution, convergent evolution and mass extinctions.			
Molecular homology as evidence of relatedness between species including DNA and amino acid sequences			
The use of phylogenetic trees to show relatedness between species			
the evolution of novel phenotypes arising from chance events within genomes, specifically sets of genes that regulate developmental processes and lead to changes in the expression of a few master genes found across the animal phyla, as demonstrated by the expression of gene BMP4 in beak formation of the Galapagos finches and jaw formation of cichlid fish in Africa.			

Shared characteristics that define primates, hominoids and hominins			
Major trends in hominin evolution from the genus Australopithecus to the genus Homo including structural, functional and cognitive changes			
The human fossil record as an example of a classification scheme that is open to interpretations that are contested, refined or replaced when new evidence challenges them or when a new model has greater explanatory power, including whether Homo sapiens and Homo neanderthalensis interbred and the placement of the Denisovans into the Homo evolutionary tree.			
Topic: How do humans impact on biological processes?	Do I have it in my notes?	Note-making deadline	Memorising deadline
The use of enzymes including endonucleases (restriction enzymes), ligases and polymerases			
Amplification of DNA using the polymerase chain reaction			
The use of gel electrophoresis in sorting DNA fragments, including interpretation of gel runs			
The use of recombinant plasmids as vectors to transform bacterial cells.			
Techniques that apply DNA knowledge (specifically gene cloning including social and ethical implications and issues			
The distinction between genetically modified and transgenic organisms, their use in agriculture to increase crop productivity and to provide resistance to insect predation and/or disease, and the biological, social and ethical implications that are raised by their use			
Strategies that deal with the emergence of new diseases in a globally connected world, including the distinction between epidemics and pandemics, the use of scientific knowledge to identify the pathogen, and the types of treatments			
The concept of rational drug design in terms of the complementary nature (shape and charge) of small molecules that are designed to bind tightly to target biomolecules (limited to enzymes) resulting in the enzyme's inhibition and giving rise to a consequential therapeutic benefit, illustrated by the Australian development of the antiviral drug Relenza as a neuraminidase inhibitor			
The use of chemical agents against pathogens including the distinction between antibiotics and antiviral drugs with reference to their mode of action and biological effectiveness			

Topic: Practical investigation	Do I have it in my notes?	Note-making deadline	Memorising deadline
Independent, dependent and controlled variables			
The biological concepts specific to the investigation and their significance, including definitions of key terms, and biological representations			
The characteristics of scientific research methodologies and techniques of primary qualitative and quantitative data collection relevant to the selected investigation, including laboratory work (biochemistry, cytology, immunology) and/or fieldwork (geomorphology); precision, accuracy, reliability and validity of data; and minimisation of experimental bias			
Ethics and issues of research including identification and application of relevant health, safety and bioethical guidelines			
Methods of organising, analysing and evaluating primary and / or secondary data to identify patterns and relationships including sources of error and limitations of data, methodologies and / or methods			
Models, theories and classification keys, and their use in organising and explaining observed phenomena and biological concepts including their limitations			
The nature of evidence that supports or refutes a hypothesis, model or theory			
The key findings of the analysis and evaluation of the investigation and their relationship to cytological, biochemical and/or evolutionary concepts			
The conventions of scientific report writing and / or scientific poster presentation including biological terminology and representations, standard abbreviations, units of measurement and acknowledgment of references.			

Practice Schedule

PRACTICE EXAM	DEADLINE
Practice Exam 1	
Practice Exam 2	
Practice Exam 3	
Practice Exam 4	
Practice Exam 5	
EXAM DATE:	

› Congratulations!

You're ready! Now relax and think about how good it will feel leaving the exam room knowing the hard work has paid off. Congratulations and good luck (not that you need it)!



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