Applied Medical Science Eduqas

1.1 Biological Molecules

Crompton House Biology

		R	A	G
1	the structure of nucleotides (pentose sugar, phosphate, organic base)			
2	the structure of ATP			
3	the importance of chemical energy in biological processes			
4	the central role of ATP as an energy carrier and its use in the liberation of energy for cellular activity			
5	How ATP is formed in an endergonic reaction			
6	the structure of nucleic acids: DNA bases: purines and pyrimidines (Know the difference when given structural formulae); complementary base pair rule; hydrogen bonding and the double helix; antiparallel strands;			
7	the similarities and differences in the structure of mRNA, tRNA and rRNA			
8	the structure, properties and functions of carbohydrates: monosaccharides (triose, pentose, hexose sugars); disaccharides (sucrose, lactose, maltose); polysaccharides (starch, glycogen);			
9	Recognise examples of lipids such as: triglycerides and phospholipids and give the structural formula for glycerol and the general formula for saturated fatty acid; Saturated fatty acids have only single carbon-to-carbon bonds; Mono-unsaturated fatty acids have one carbon-to carbon double bond and poly-unsaturated fatty acids contain two or more carbon-to-carbon double bonds.			
10	understand how the functions of lipids and phospholipids in cells and organisms are related to their hydrophilic and hydrophobic properties			
11	recognise examples of steroids as four ring structures and hormones are steroids including oestrogen and testosterone, which are made from cholesterol. Cholesterol is a vital component of cell membranes.			
12	Other functions of lipids should include insulation, energy storage and protection.			
13	Draw general formula of amino acids.			
14	identify amino acids if given a structural formula and a suitable table showing R groups.			
15	identify peptide, disulphide, ionic, hydrogen bonds and hydrophobic interactions between R groups at the various levels of protein structure.			
16	Be familiar with different ways of representing protein structures, including ribbon diagrams and recognise regions of molecules as having a primary structure			

17	Learners should understand the principle features of enzyme reactions to include: the collision theory; the lock and key model; the induced fit model.			
18	factors affecting enzyme reactions: Temperature; pH; substrate concentration; enzyme concentration; inhibitors; (distinguish between competitive and non-competitive inhibition, including explaining the effect of increasing substrate concentration on both. Candidates should understand that inhibition can be reversible or irreversible)			

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1.2 Human Cell Structure

Crompton House Biology

		R	A	G
1	the structure and function of the following: Plasma membrane; Nucleus; Nucleolus; Endoplasmic reticulum; Golgi apparatus; Mitochondria; Nuclear envelope;			
2	Recognise the listed organelles above on a diagram or electron micrograph of eukaryotic cells, and draw them onto a generalised diagram of a cell, understanding their relative size.			
3	The principal biochemical constituents of the cell membrane including: Channel Proteins; Carrier Proteins; Extrinsic proteins; Glycoproteins; Phospholipids; Cholesterol;			
4	Draw a simple diagram to illustrate the fluid mosaic model.			
5	Know how organelles work together to carry out functions within cells, e.g. in the synthesis and transport of biological molecules such as glycoproteins.			

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1.3 Transport systems in Cells

Crompton House Biology

		R	A	G
1	Explain movement into and out of cells: simple diffusion; osmosis; facilitated diffusion; active transport model; endo/exocytosis.			
2	the factors affecting transport: surface area; concentration gradient; temperature; size of molecule; lipid solubility; thickness of membrane.			

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1.4 Cells processing information

Crompton House Biology

		R	A	G
1	Explain semi conservative replication.			
2	draw a representative diagram of the replication fork (with a small number of nucleotides).			
3	Explain DNA transcription.			
4	Explain DNA translation.			
5	Describe ‘one gene – one protein’ hypothesis			
6	Explain Amino Acid triplet code.			

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2.1&2.2 Human Physiological systems

Crompton House Biology

		R	A	G
1	Describe and explain structure and function of **Endocrine system.** - Understand the purpose of the system - Explain the role of the pancreas - the action of insulin - action of glucagon - role of the kidney - action of ADH.			
2	Describe and explain structure and function of **Nervous system.** - Understand the purpose of the system. - Describe a nerve cell structure and its functions. - Describe voluntary and involuntary responses. - Label a Nerve and know the function of its parts. - Describe how a nerve impulse is transmitted along an axon - Label a diagram of a synapse and be able to explain the role of the following in synaptic transmission: pre and post-synaptic membranes, synaptic vesicles, neurotransmitters (e.g. acetylcholine), synaptic cleft, Ca2+ channels; receptors on post-synaptic membrane. - Describe the effects of chemicals on synaptic transmission			
3	Describe and Explain the structure and function of **Musculoskeletal System.** - Understand the purpose of the system in support and locomotion. - Describe Sliding filament theory.			
4	Describe and Explain the structure and function of **Digestive System.** - Understand the purpose of the system. - Describe how the organs of the system are involved in chemical and mechanical digestion. - Describe bile production. - Describe metabolism of glucose (Pancreas and Liver in glucose regulation – Link to Endocrine system). - Understand the site and mechanism of final digestion and absorption of dipeptides, disaccharides, fatty acids and glycerol.			
5	Describe and Explain the structure and function of **Cardiovascular System.** - Understand the purpose of the system. - Describe and explain the pressure changes in the heart and blood vessels during the circulation of the blood. - Understand the myogenic nature of cardiac muscle and the transfer of electrical impulses through the heart during a heartbeat. - Describe how heartbeat is controlled and coordinated (link to unit 2 here) - State how Carbon Dioxide and Oxygen are transported in the blood.			
6	Describe and Explain the structure and function of **Lymphatic System.** - Explain how the Lymphatic system works - Explain the formation of tissue fluid. - Explain the formation of lymph.			

7	Describe and Explain the structure and function of **Respiratory System.** - Understand the purpose of the respiratory system in humans - Describe the processes of inspiration and expiration, including the role of the intercostal muscles. - Understand how breathing rate is increased or decreased. - Know the role of pulmonary surfactant.			
8	Describe and Explain the structure and function of **Integumentary system.** - Know the purpose of the skin to include thermoregulation, protection against foreign bodies, mechanical damage and solar radiation, energy storage and production of vitamin D. - Know the roles of sweating, hairs, adipose layer, blood supply in thermoregulation and the role of the hypothalamus in monitoring of blood temperature.			
9	Describe and Explain the structure and function of **Immune System.** - Know the purpose of the system. - Describe the natural barriers to reduce risk of infection. - Explain the Humoral responses to infection. - Explain cell meditated responses to infection. - Understand the differences between the primary and secondary immune responses.			

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3.1&3.2 Lifestyle Factors

Crompton House Biology

		R	A	G
1	Explain how lifestyle can affect major body systems.			
2	Understand the risk factors and consequences of the following: **Physiological effects** Coronary heart disease; Diabetes; Nutrient deficiencies; Obesity; Alcohol/drug dependency; Lung disease **Psychological effects** Stress; Depression (Please note that this list is not exhaustive and different scenarios may be supplied in the prerelease article or exam questions)			
3	Assess how lifestyle impacts health. **Lifestyle examples:** Diet; Alcohol; Recreational drugs; Smoking; Exercise/physical activity; Housing; Type of employment;			

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3.3&3.4 Communicable and Non-communicable diseases

Crompton House Biology

		R	A	G
1	Explain how pathogens can affect body systems			
2	Describe pathogen modes of infection and effect on body systems. Pathogens include: Viruses; Bacteria; Protozoan Fungal; Worms; Prions. (Please note that this list is not exhaustive and different scenarios may be supplied in the prerelease article or exam questions)			
3	Explain how non-infectious diseases can affect body systems. Non-infectious conditions include: Allergies; Autoimmune diseases; Cancer; Inherited diseases e.g. dominant, recessive and sex-linked.			

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4.1 Report on human health

Crompton House Biology

		R	A	G
1	Use knowledge and understanding gained in units 1, 2 and 3 to analyse qualitative and quantitative data.			
2	Process data: - Select the most appropriate graphical method (scatter diagrams, line graphs, trend lines, bar charts) - Perform calculations in a medical context (expressions in decimal and standard form, interchange ratios, fractions and percentages, find arithmetic means, make order of magnitude calculations, substitute numerical values into algebraic equations and solve them using appropriate units for physical quantities, translate information between graphical and numeric form, determine the slope of a linear graph) - use an appropriate number of significant figures when performing calculations in a medical context.			
3	Make evidence-based conclusions (comparison of data, linking of ideas, uncertainty in conclusions)			
4	Report on health: - Use appropriate spelling, grammar and structure when communicating in a medical context. - Use appropriate language style when communicating in a medical context. - Communicate in a technical and non-technical context.			

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Unit 2 NEA

Crompton House Biology

		R	A	G
1	. Explain principles of physiological measurement tests (i.e. what does the test measure and how does it do it.			
2	Be aware of the range of physiological measurement techniques - Cardiac – Blood pressure and ECGs - Respiratory – Peak flow - Neurophysiology - EEG - Audiology – otoscopy and tympanometry - GI – endoscopy (colonoscopes, gastroscopes, ERCP) - Ophthalmic – lenses and reading charts, angiographic, tonometry and visual field - Urodynamics - Vascular function			
3	Explain significance of data obtained from physiological measurement - explain the significance of results obtained in relation to normal ranges, and possible indicators of disease or disorder. - normal range • outside normal range • indicators of disease/ disorders - explain the significance of results with reference to overarching examples as noted in the content			
4	Describe limitations of physiological measurement testing			
5	Explain importance of patient confidentiality - understand that patient information is generally held under legal and ethical obligations of confidentiality - Codes of practice (e.g. NHS code of practice) - Protect information, inform, provide - Disclosure of information			
6	Describe conduct towards patients - describe and apply appropriate interpersonal skills and communication style relevant to a given patient - describe why it is important to take account of patient's age, any sensory or motor impairment, mental health needs, effect of medication, or emotional state - empathy - tone - use of language			
7	Plan to perform physiological measurement tests - plan a physiological measurement procedure - • identify information to collect • procedures and equipment • location • timing • informing individuals Procedures and			

	equipment • identifies procedures • informs technician of required equipment and times Learners should plan a physiological measurement procedure.27 Informing patients • patients • other personnel affected (e.g facilities)			
8	Use of physiological measurement equipment - use at least two pieces of equipment for the testing of two different physiological systems			
9	Record results from physiological measurement tests			
10	Be able to report on physiological measurement testing - be aware of the difference between primary and secondary data. - calculate means for readings they have taken			
11	Make evidence based conclusions about the “health” of individuals - comparison of data to expected norms, considering age, gender, ethnicity - comparison of data to previous test results: patient history - link findings to expected physiology and possible pathology - any uncertainty in conclusions			
12	Evaluate information from physiological measurement tests - evaluate the data they actually have from the testing of patients. - consider how valid data is considering any factors affecting the testing they undertook			
13	Communicate in writing - make use of appropriate scientific and technical language when considering the audience for the communication. So in writing a report to the head of department at the hospital, learners should be using terms such as hypertension, bradycardia, tachycardia etc. When communicating to patients the style of language would be significantly different to that used with colleagues			

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Unit 3 NEA

Crompton House Biology

		R	A	G
1	Describe variables affecting research - Independent - Dependent - Extraneous			
2	Justify the research hypothesis			
3	Explain significance of data obtained from physiological measurement - explain the significance of results obtained in relation to normal ranges, and possible indicators of disease or disorder. - normal range • outside normal range • indicators of disease/ disorders - explain the significance of results with reference to overarching examples as noted in the content			
4	Justify the research hypothesis - define and distinguish between o null hypotheses o alternative hypotheses o one tailed hypotheses o two tailed hypotheses - demonstrate understanding of these terms by proposing a suitable hypothesis for an experiment/research - justify research hypothesis by showing linking to the research question			
5	Justify selection of sampling methods - use the terms listed to describe different sampling techniques available together with potential advantages and disadvantages of each. o target population and sample o random sampling o snowball sampling o opportunity sampling o self-selected sampling			
6	Explain selection of research methods - apply their understanding of the two approaches to research by selecting a suitable approach to collecting useful and relevant information towards a research question - describe and distinguish between both quantitative and qualitative methods - learners should be familiar with o quantitative methods (e.g. laboratory experimentation, epidemiological, closed questionnaires) o qualitative methods (e.g. participant observation, non-participant observation, structured interview, unstructured interview) - explain the most suitable type of approach to answer a research question (relevance to research question and hypothesis)			

7	Evaluate how ethical issues affect research - aware of the ethical implications of proposed research. They should be aware that the participants in a study need to be protected with regard to their dignity, rights, safety and well-being. - be aware that areas which must be addressed before research is initiated include: informed consent; confidentiality; protection of participants including data protection; right to withdraw; potential benefits (social/scientific value) and potential harm. - Evaluation in terms of: • social / scientific value • care and protection of research participants • confidentiality • informed consent • working with vulnerable individuals (including children)			
8	be aware that research proposals are examined in the UK by Health Boards research ethics committee (a group of people appointed to review research proposals to assess formally if the research is ethical).			
9	Plan to collect data - the ability to plan to collect data. The assessment criterion requires that learners are able to plan to collect both qualitative and quantitative data. - Present a plan in a series of sequential steps with meaningful timescales for each step			
10	Produce documentation to collect data - documents e.g. questionnaires, interviewer documentation • clarity • suitability and relevance for purpose • completeness			
11	Obtain data that is suitable and sufficient			
12	Explain significance of terms used in data analysis - s need to be familiar with the meaning and implications of each the terms listed o type I errors, type II errors • demand characteristics • reliability (internal reliability, external reliability) • validity (internal validity, external validity) • bias (including researcher/observer bias) • confidence limits • significance levels • correlation (positive correlation, negative correlation, no correlation) • dispersion			
13	Explain selection of statistical methods used to analyse data - explaining why they have selected and used particular statistical methods - distinguish between the mode, median and mean. - recognise the best measure of central tendency in particular cases, e.g. where there is a symmetric / skewed distribution, normal continuous data, ordinal data - aware that range is a single number representing the spread of data (difference between highest and lowest score), standard deviation and variance are a measure of the dispersion/spread from a mean. - recognise that inferential statistics allow them to generalise their findings from the sample data to the larger population and help assess the strength of the relationship between the independent variables, and the dependent variables. - recognise the characteristics of a normal distribution (symmetry at the mean value; the curve end points or “tails” meet the x-axis; the shape of the curve should be bell-shaped) and recognise skewed distributions. They should also recognise both positive and negative skewed distributions.			

	- recognise that different statistical tests apply, and the one used depends upon what we are trying to show, the type of data, etc. - aware of the distinction between parametric and non-parametric tests - explanation for their use of statistical methods must be in terms of data type (normally distributed, skewed distribution, ordinal, nominal data etc), methodology; sampling method and size.			
14	Analyse data using statistical methods - correctly using appropriate statistical methods to obtain meaningful information - Statistical methods • mean, mode, median • measures of dispersion (variance, range, standard deviation) • normal distribution curves, skewed distribution curves • probability • significance levels • confidence limits • parametric test • specific non-parametric inferential test • correlation - give a detailed analysis of data – appropriateness and accuracy			
15	Make meaningful conclusions backed by data/data analysis			
16	Evaluate procedures in terms of cost, time, effectiveness etc) and consider the limitations of research (sufficiency, suitability, validity etc)			
17	Use mathematical notations and sig figs			
18	Present data visually - tables - graphs			
19	Communicate outcome of research to individuals and groups - Scientifically literate - Basic scientific understanding communicate the outcome of work through a report or a presentation - Clarity - Language style - SPaG - Technical and scientific vocab - Evidence based - Relevant info			