**Little Heath Sixth Form**

**Biology**

Personal Learning Checklist

**Student Name: ……………………….…………………………………..………**

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| **Unit Name:**  **Biology and Disease** | **Unit Code:**  **BIOL1** |
| *Minimum Target Grade:* | *Aspirational Target Grade:* |

*KEY:* ***Red =*** *with difficulty* ***Amber*** *= not sure* ***Green*** *= yes*

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| **GCSE Re-Cap** | |  | **Red** | **Amber** | **Green** |
| **B1 You and your genes** | * Genes code for proteins * Structural and functional proteins | |  |  |  |
| **B2 Keeping Healthy** | * Role of white blood cells in the immune system * Role of antigens and antibodies * Role of vaccinations in the body * Circulatory system – structure of blood vessels * Causes of heart disease – incl. Lifestyle factors * Epidemiological studies | |  |  |  |
| ***B4 The processes of life*** | * Enzymes are proteins that speed up the rate of reaction * Enzyme activity can be affected by temperature and pH * Enzymes can be denatured if conditions are not controlled * Structure of a typical animal cell and functions of the organelles | |  |  |  |
| ***B7 Peak performance***  ***(Triple Bio)*** | * Double circulatory system * Components of blood and their functions | |  |  |  |

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| **Knowledge/specification content (skills are highlighted in bold)** | | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| 3.1.1 Pathogens | Pathogens include bacteria, viruses and fungi. |  |  |  |  |
| Disease can result from pathogenic microorganisms penetrating any of an organism’s interfaces with the environment. These interfaces include the digestive and gas-exchange systems. |  |  |  |  |
| 3.1.1 Lifestyle | Pathogens cause disease by damaging the cells of the host and by producing toxins. |  |  |  |  |
| Lifestyle can affect human health. |  |  |  |  |
| Specific risk factors are associated with cancer and coronary heart disease. |  |  |  |  |
| Changes in lifestyle may also be associated with a reduced risk of contracting these conditions. |  |  |  |  |
| **Candidates should be able to:**  **• analyse and interpret data associated with specific risk factors and the incidence of disease recognise correlations and causal relationships.** |  |  |  |  |
| 3.1.2 The digestive  system | The gross structure of the human digestive system limited to oesophagus, stomach, small and large intestines, and rectum. |  |  |  |  |
| The glands associated with this system limited to the salivary glands and the pancreas. |  |  |  |  |
| Digestion is the process in which large molecules are hydrolysed by enzymes to produce smaller molecules that can be absorbed and assimilated. |  |  |  |  |
| 3.1.2 Proteins | Proteins have a variety of functions within all living organisms. |  |  |  |  |
| The general structure of an amino acid as  R  H2N-C-COOH  H |  |  |  |  |
| Condensation and the formation of peptide bonds linking together amino acids to form polypeptides. |  |  |  |  |
| The relationship between primary, secondary, tertiary and quaternary structure, and protein function. |  |  |  |  |
| The biuret test for proteins. |  |  |  |  |
| 3.1.2 Enzyme action | Enzymes as catalysts lowering activation energy through the formation of enzyme substrate complexes. |  |  |  |  |
| The lock and key and induced fit models of enzyme action. |  |  |  |  |
| 3.1.2 Enzyme properties | The properties of enzymes relating to their tertiary structure. |  |  |  |  |
| Description and explanation of the effects of temperature, competitive and non-competitive inhibitors, pH and substrate concentration. |  |  |  |  |
| **Candidates should be able to use the lock and key model to explain the properties of enzymes. They should also recognise its limitations and be able to explain why the induced fit model provides a better explanation of specific enzyme properties.** |  |  |  |  |
| 3.1.2 Carbohydrate  digestion | Within this unit, carbohydrates should be studied in the context of the following:  • starch, the role of salivary and pancreatic amylases and of maltase located in the intestinal epithelium  • disaccharides, sucrase and lactase. |  |  |  |  |
| Biological molecules such as carbohydrates and proteins are often polymers and are based on a small number of chemical elements. |  |  |  |  |
| Monosaccharides are the basic molecular units (monomers) of which carbohydrates are composed. |  |  |  |  |
| The structure of a-glucose as a-glucose and the linking of a-glucose by glycosidic bonds formed by condensation to form maltose and starch. |  |  |  |  |
| Sucrose is a disaccharide formed by condensation of glucose and fructose.  Lactose is a disaccharide formed by condensation of glucose and galactose. |  |  |  |  |
| Lactose intolerance. |  |  |  |  |
| Biochemical tests using Benedict’s reagent for reducing sugars and non-reducing  sugars. Iodine/potassium iodide solution for starch. |  |  |  |  |
| 3.1.3 Cells | The structure of an epithelial cell from the small intestine as seen with an optical microscope. |  |  |  |  |
| The appearance, ultrastructure and function of:  • plasma membrane, including cell-surface membrane  • microvilli  • nucleus  • mitochondria  • lysosomes  • ribosomes  • endoplasmic reticulum  • Golgi apparatus. |  |  |  |  |
| **Candidates should be able to apply their knowledge of these features in explaining adaptations of other eukaryotic cells.** |  |  |  |  |
| 3.1.3 Plasma membranes | The principles and limitations of transmission and scanning electron microscopes.  The difference between magnification and resolution. |  |  |  |  |
| Principles of cell fractionation and ultracentrifugation as used to separate cell components. |  |  |  |  |
| Glycerol and fatty acids combine by condensation to produce triglycerides.  The R-group of a fatty acid may be saturated or unsaturated.  In phospholipids, one of the fatty acids of a triglyceride is substituted by a phosphate group. |  |  |  |  |
| The emulsion test for lipids. |  |  |  |  |
| The arrangement of phospholipids, proteins and carbohydrates in the fluid-mosaic model of membrane structure. |  |  |  |  |
| The role of the microvilli in increasing the surface area of cell-surface membranes. |  |  |  |  |
| 3.1.3 Diffusion | Diffusion is the passive movement of substances down a concentration gradient.  Surface area, difference in concentration and the thickness of the exchange surface affect the rate of diffusion. |  |  |  |  |
| The role of carrier proteins and protein channels in facilitated diffusion. |  |  |  |  |
| **Candidates should be able to use the fluid-mosaic model to explain appropriate properties of plasma membranes**. |  |  |  |  |
| 3.1.3 Osmosis | Osmosis is a special case of diffusion in which water moves from a solution of higher water potential to a solution of lower water potential through a partially permeable membrane. |  |  |  |  |
| **Candidates will not be expected to recall the terms hypotonic and hypertonic. Recall of isotonic will be expected.** |  |  |  |  |
| 3.1.3 Active transport | The role of carrier proteins and the transfer of energy in the transport of substances against a concentration gradient. |  |  |  |  |
| 3.1.3 Absorption | Absorption of the products of carbohydrate digestion.  The roles of diffusion, active transport and co-transport involving sodium ions. |  |  |  |  |
| 3.1.3Cholera | The cholera bacterium as an example of a prokaryotic organism.  The structure of prokaryotic cells to include cell wall, cell-surface membrane, capsule, circular DNA, flagella and plasmid.  Cholera bacteria produce toxins which increase secretion of chloride ions into the lumen of the intestine. This results in severe diarrhoea.  The use of oral rehydration solutions (ORS) in the treatment of diarrhoeal diseases. |  |  |  |  |
| **Candidates should be able to discuss**  **• the applications and implications of science in developing improved oral rehydration solutions** |  |  |  |  |
| **• ethical issues associated with trialling improved oral rehydration solutions on humans.** |  |  |  |  |
| 3.1.4 Lung function | The gross structure of the human gas exchange system limited to the alveoli, bronchioles, bronchi, trachea and lungs. |  |  |  |  |
| The essential features of the alveolar epithelium as a surface over which gas exchange takes place. |  |  |  |  |
| The exchange of gases in the lungs. |  |  |  |  |
| Pulmonary ventilation as the product of tidal volume and ventilation rate. |  |  |  |  |
| The mechanism of breathing. |  |  |  |  |
| 3.1.4 The biological basis of lung disease | The course of infection, symptoms and transmission of pulmonary tuberculosis. |  |  |  |  |
| The effects of fibrosis, asthma and emphysema on lung function. |  |  |  |  |
| **Candidates should be able to**  **• explain the symptoms of diseases and conditions affecting the lungs in terms of gas exchange and respiration** |  |  |  |  |
| **• interpret data relating to the effects of pollution and smoking on the incidence of lung disease** |  |  |  |  |
| **• analyse and interpret data associated with specific risk factors and the incidence of lung disease** |  |  |  |  |
| **• recognise correlations and causal relationships.** |  |  |  |  |
| 3.1.5 Heart structure and  function | The gross structure of the human heart and its associated blood vessels in relation to function. |  |  |  |  |
| Pressure and volume changes and associated valve movements during the cardiac  cycle. |  |  |  |  |
| Myogenic stimulation of the heart and transmission of a subsequent wave of electrical activity.  Roles of the sinoatrial node (SAN), atrioventricular node (AVN) and bundle of His. |  |  |  |  |
| Cardiac output as the product of heart rate and stroke volume. |  |  |  |  |
| **Candidates should be able to analyse and interpret data relating to pressure and volume changes during the cardiac cycle.** |  |  |  |  |
| 3.1.5 The biological basis  of heart disease | Atheroma as the presence of fatty material within the walls of arteries.  The link between atheroma and the increased risk of aneurysm and thrombosis. |  |  |  |  |
| Myocardial infarction and its cause in terms of an interruption to the blood flow to heart muscle. |  |  |  |  |
| Risk factors associated with coronary heart disease: diet, blood cholesterol,  cigarette smoking and high blood pressure. |  |  |  |  |
| **Candidates should be able to describe and explain data relating to the**  **relationship between specific risk factors and the incidence of coronary heart**  **disease.** |  |  |  |  |
| 3.1.6 Principles of  immunology | Phagocytosis and the role of lysosomes and lysosomal enzymes in the subsequent destruction of ingested pathogens. |  |  |  |  |
| Definition of antigen and antibody. |  |  |  |  |
| Antibody structure and the formation of an antigen-antibody complex. |  |  |  |  |
| The essential difference between humoral and cellular responses as shown by  B cells and T cells. |  |  |  |  |
| The role of plasma cells and memory cells in producing a secondary response. |  |  |  |  |
| The effects of antigenic variability in the influenza virus and other pathogens on immunity. |  |  |  |  |
| The use of vaccines to provide protection for individuals and populations against  disease. |  |  |  |  |
|  | The use of monoclonal antibodies in enabling the targeting of specific substances and cells. |  |  |  |  |
| **Candidates should be able to**  **• evaluate methodology, evidence and data relating to the use of vaccines and**  **monoclonal antibodies** |  |  |  |  |
| **• discuss ethical issues associated with the use of vaccines and monoclonal**  **antibodies** |  |  |  |  |
| **• explain the role of the scientific community in validating new knowledge about**  **vaccines and monoclonal antibodies, thus ensuring integrity** |  |  |  |  |
| **• discuss the ways in which society uses scientific knowledge relating to vaccines**  **and monoclonal antibodies to inform decision-making.** |  |  |  |  |

**Grade tracking:**

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*Note: You should discuss this checklist regularly with your subject teacher/mentor*