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| **HBS 2A** | **Section A: Multiple Choice** | **Section B: Short Answer** | **Section C: Extended Answer** |
| **Cells, metabolism and regulation**  Metabolic reactions make energy and matter available for use in cells. These reactions are controlled by enzymes which are affected by various factors. Cellular structures provide for exchange of materials, metabolism and cell division (mitosis and meiosis). Efficient functioning of the body requires non-specific protection. Non-specific protection include internal and external methods.  Metabolism:   * anabolic and catabolic reactions and organelles involved. (word equations only) *e.g. mitochondria and ribosomes* * respiration (aerobic and anaerobic); inputs, outputs and organelles involved * nutrients required and their uses including carbohydrates/simple sugars, proteins/amino acids, lipids/ fatty acids and glycerols, vitamins and minerals * enzyme function including reduction in activation energy, lock and key principle * factors that affect enzyme activity including pH, temperature, cofactors, co-enzymes. |  |  |  |
| Transport:   * structure of the cell membrane as it relates to transport of materials (greater detail covered in Unit 3A) * methods of transporting materials including diffusion, facilitated diffusion, osmosis, active transport, endocytosis and exocytosis * factors affecting exchange of materials including SA/Vol ratio , concentration gradients. |  |  |  |
| Mitosis:   * function and significance of chromosome number in mitosis. |  |  |  |
| **Body systems**  The respiratory, circulatory, digestive and excretory systems are specialised to control inputs and outputs in supporting metabolism.   * Respiratory system   Structure and function related to:   * gas exchange including characteristics of respiratory surfaces * maintenance of concentration gradients in lungs including breathing and blood flow. |  |  |  |
| * Circulatory system   Structure and function related to:   * role of the heart, arteries, veins and capillaries in the circulation of blood * roles of plasma and erythrocytes in the transport of materials including oxygen, nutrients and wastes * clotting of blood at wound including fibrinogen and platelets * inflammatory response * lymphatics and white blood cells (overview only). |  |  |  |
| * Digestive system   Structure and function related to:   * mechanical digestion including teeth, bile, process of peristalsis * chemical digestion of carbohydrates, lipids and proteins including enzymes and the associated glands * absorption of nutrients * elimination. |  |  |  |
| * Excretory system   Structure and function related to:   * formation of urine in the kidney (details of the processes of filtration, re-absorption and secretion not required) * deamination of amino acids in the liver. |  |  |  |
| * Assisted protection of the body: * external *e.g. hygiene, topical preparations and barriers.* |  |  |  |
| **Inheritance**  Principles of Mendelian genetics are used to predict variations in offspring.  Inheritance:   * dominant, recessive, co-dominant, autosomal and sex linked inheritance * sex determination * monohybrid crosses using punnet squares and simple probabilities. |  |  |  |
| **Variation and evolution**  New genetic combinations are made as a result of meiosis and fertilisation, giving rise to unexpected variations. Meiosis:   * function and significance of chromosome changes in meiosis * compare mitosis and meiosis.   Variation from meiosis:   * crossing over * random assortment * non-disjunction.   Variation from fertilisation:   * random fertilisation. |  |  |  |
| **Approaches to investigating and communicating human biology**   * plan and conduct a safe investigation on a question of choice developed from a given contextual problem * use a prescribed format and trial a range of techniques to collect data * collect valid and reliable data * analyse data using rates, percentages and frequencies * refer to possible bias and experimental error * use scientific terminology and appropriate abstract concepts in discussions. |  |  |  |
| **The relevance of human biology to everyday life**  Lifestyle choices can compromise body functioning in the short-term and affect future health. Individual differences influence the technologies used to inform the diagnoses of different medical conditions.  Lifestyle choices that compromise health:   * active or sedentary lifestyle * personal hygiene * use of drugs includingalcohol and smoking * diet.   Individual differences:   * diagnosis depends upon individual differences in body form, stature and disease progression * genetic disorders linked to particular populations *e.g. Tay-Sachs, sickle cell anaemia and thalassemia.* |  |  |  |

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| **HBS 2B** | **Section A: Multiple Choice** | **Section B: Short Answer** | **Section C: Extended Answer** |
| **Cells, metabolism and regulation**  Genes determine a cell’s structure and function. Differentiation of stem cells produces different cells and tissues.  DNA:   * structure of DNA including base pair model * locations in the cell including nucleus and mitochondria * role of DNA in the cell * DNA replication—base pair model. |  |  |  |
| Differentiation:   * differentiation forming embryonic germ layers * tissues formed from the primary germ layers * types of stem cells and their potency * importance of stem cells *e.g. cord blood*   teratogenic effects on stem cells |  |  |  |
| **Body systems**  Reproductive systems are specialised for gamete production, fertilisation and support for pregnancy and birth. Reproduction is controlled by hormones. Environmental factors can influence human development from implantation to infancy. Body systems differentiate, grow and develop at different rates during life from fertilisation.  Reproductive systems:   * structure and function of male and female reproductive systems * spermatogenesis and oogenesis * hormonal control of menstrual and ovarian cycles and spermatogenesis. |  |  |  |
| Development:   * implantation and development of the placenta * significant developments in embryonic and foetal stages * changes to a female during pregnancy * birth process * comparison of foetal and neonate circulation * patterns and milestones of development in infants. |  |  |  |
| Environmental factors:   * care of the unborn child *e.g. risks associated with smoking, alcohol and other drug use* * the effect of various types of teratogens. |  |  |  |
| Reproductive technologies related to:   * STI's * contraception * infertility *e.g. IVF, GIFT donors* * conception * maintenance of pregnancy including ultrasound, foetal monitoring and hormonal intervention. |  |  |  |
| **Inheritance**  Changes in DNA (mutations) are caused by a variety of factors. Mutations affect cellular and body functions. Genetic counselling uses information from pedigrees, genetic testing to provide an analysis of the risk associated with some of these mutations.  Mutations:   * causes of mutations * changes in the DNA sequence * conditions caused by mutations including somatic *e.g. cancer* and germ line *e.g. PKU* * chromosomal mutations including analysis of karyotypes. |  |  |  |
| Pedigrees:   * construction and interpretation of pedigrees for autosomal and sex-linked conditions * probabilities of producing affected offspring for autosomal and sex linked inheritance * inheritance of mitochondrial DNA. |  |  |  |
| Genetic testing of parents and offspring for:   * gene and chromosomal abnormalities.   Human Genome Project:   * information provided by the Human Genome Project * range of possible uses for this information. |  |  |  |
| **Variation and evolution**  The changing environment influences survival of genetic variations.  Variations and the environment:   * new variations due to mutations may be advantageous or disadvantageous to survival * differential survival of genotypes/phenotypes *e.g. lethal recessives* * teratogens: the range of actions and their effects. |  |  |  |
| **Approaches to investigating and communicating human biology**   * plan and conduct a safe investigation on a question of choice, developed from a given contextual problem * trial a range of techniques to collect data * analyse data using rates, percentages and frequencies * present information using appropriate symbols, terminology and conventions * consider experimental errors and the ramifications of results that support or disprove hypotheses * discuss different perspectives of a problem. |  |  |  |
| **The relevance of human biology to everyday life**  The rate of change in human biology means that there is a range of alternative treatments available. Each treatment has its risks, ethical concerns and benefits based on individual variations and the condition being treated. Health choices can be based on myths or misconceptions about human biology.  Medical technologies:   * sex selection of embryo to avoid genetic disease * birth control methods * stem cell collection for future use *e.g. cord blood banks* * treatment for various genetic diseases.   Health choices:   * pregnant women *e.g. warnings on food labels, drugs, alcohol and smoking* * performance enhancing *e.g. steroid use* * parent’s choice for infants *e.g. diet and immunisation choices.* |  |  |  |