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| **YEAR 12 BIOLOGY OVERVIEW: Term 1 – 2, 2020**  **Home Study** | | | | | | | |
| **TERM 1 - STRAND ONE: Cellular Biology** | | | | | | | |
| **MALOR LEARNING OUTCOME: 12BIO1**  Upon successful completion of this strand, students are able to demonstrate understanding of the processes, mechanisms and significance of respiration, photosynthesis and cellular immunity | | | | | | | |
| **SUB-STRAND** | **KEY LEARNING OUTCOME** | **WEEK &**  **DATE** | **CODE** | **SPECIFIC LEARNING OUTCOME** | **SKILL LEVEL** | **RESOURCES** | **ASSESSMENTS** |
| * 1. ***Respiration*** | **12BIO1.1** At the successful completion of this topic, students are able to describe and explain the role of respiration in the production of ATP in aerobic and anaerobic respiration. | Week  1 – 2  February  3rd – 14th | * Introducing the new Year 12 Biology syllabus * Course outline: weekly outcomes; types o IA & weightings & due dates | | | | |
| 12BIO1.1.1.1 | **Define** respiration. | 1 | T1 Video 1 – respiration;  NCEA L2 Text book ;  ESA L2 Text book by Anna Roberts. | **Practical 1–**  **Making model of mitochondria**  **30%**  **Group Presentation 1:**  **(model – 10%; SLOs 1.1; 1.2x3; 2.4; 2.1; 2.2x3;2.3x3 – 20%)**  **Short Test 1: 10%**  **(1.1; 4.1, 3.1, 2.3)** |
| 12BIO1.1.1.2 | **Identify** the organelle in plant and animal cells where respiration occurs. | 1 |
| 12BIO1.1.2.4 | **Describe** the structure of mitochondria. | 2 |
| 12BIO1.1.2.1 | **List** the raw materials and products of respiration. | 2 |
| 12BIO1.1.2.2 | **Identify** the three phases of respiration: glycolysis - Krebs cycle (Citric acid cycle), the respiratory chain (the shuttle of electrons), energy transport chain; and where they occur (ridges, matrix, cytoplasm) | 2 |
| 12BIO1.1.2.3 | **Describe** the main activity or purpose of each phase of respiration: Krebs cycle, the respiratory chain, energy transport chain; | 2 |
| Week 3  February  17th – 21st | 12BIO1.1.4.1 | **Discuss** the effect of factors such as substrate and temperature on the rate of reaction. | 4 |
| 12BIO1.1.3.1 | **Compare** the products of aerobic and anaerobic respiration | 3 |
| 12BIO1.1.2.3 | **Describe** the effects of the products of aerobic and anaerobic respiration on plant and animal cells | 2 |
| * 1. ***Photosynthesis*** | **12BIO1.2** At the completion of this topic students are able to explain the process in the two phases of photosynthesis | Week 4  February  24th – 28th | 12BIO1.2.1.1 | **Define** photosynthesis | 1 | T1 Video 2 – photosynthesis;  NCEA L2 Text book ;  ESA L2 Text book by Anna Roberts. | **Quiz 1: 5%**  **(1.1; 1.2; 3.1)**  **Quiz 2: 5%**  **(1.3; 2.1; 2.2)**  **Quiz 3: 5%**  **(3.4; 2.2)**  **Quiz 4: 6%**  **(4.2; 2.3)** |
| 12BIO1.2.1.2 | **Define** the concept of a limiting factor | 1 |
| 12BIO1.2.3.1 | **Explain** the importance of photosynthesis to life on earth | 3 |
| 12BIO1.2.1.3 | **Identify** the organelles in the plant cell where photosynthesis occurs | 1 |
| 12BIO1.2.2.1 | **Describe** the structure of chloroplast. | 2 |
| 12BIO1.2.2. | **Describe** the detailed structure of chloroplast and relate features to adaptations for photosynthesis. | 2 |
| 12BIO1.2.3.4 | **Explain** how light energy is harnessed and converted into chemical energy during the light dependent reaction of photosynthesis. | 3 |
| 12BIO1.2.2.2 | **Outline** the key stages of photosynthesis | 2 |
| 12BIO1.2.4.2 | **Discuss** the effect of limiting factors such as temperature, light intensity and carbondioxide concentration on the rate of reaction. | 4 |
| 12BIO1.2.2.3 | **Identify** the factors that affect photosynthesis (eg. temperature, light intensity and carbon dioxide concentration) | 2 |
| Week 5  March  2nd – 6th | 12BIO1.2.3.2 | **Explain** the effect of light intensity, temperature and carbon dioxide concentration on the rate of photosynthesis | 3 | **Quiz 5: 6%**  **(3.2; 3.3)**  **IA 1 STARTS: 15%**  **(1.4.1.2; 1.4.2.1; 1.4.1.1; 1.4.1.3; 1.4.2.3; 1.4.2.2)** |
| 12BIO1.2.3.3 | **Explain** the relationship between the light and the dark phases of photosynthesis | 3 |
|  | 12BIO1.2.4.1 | **Discuss** the results of an investigation into the effects of a factor on the rate of photosynthesis | 4 |
| ***1.3 Cellular immunity*** | **12BIO1.3** At the completion of this sub-strand, students are able to describe and explain the functions of antibodies | Week 6  March  9th – 13th | 12BIO1.3.2.1 | **Describe** the properties of antibodies | 2 | Internet  T1 Video 3 –  Antibodies, vaccination,  B lymphocytes  T lymphocytes,  Antigen-presenting cells,  Memory cells | **Quiz 6: 5%**  **(2.1; 3.1)**  **Quiz 7: 5%**  **(3.2; 1.1; 1.2)**  **Quiz 8: 6%**  **(2.3; 2.4)** |
| 12BIO1.3.3.1 | **Explain** how the properties of antibodies are used inthe protection of the organism | 3 |
| 12BIO1.3.3.2 | **Explain** the reason for mass production of a specific type of antibody to an antigen | 3 |
| 12BIO1.3.1.1 | **Define** phagocytosis | 1 |
| 12BIO1.3.1.2 | **Define** Vaccination | 1 |
| 12BIO1.3.2.3 | **Describe** the role of B lymphocytes, T lymphocytes, antigen-presenting cells and memory cells in specific primary and secondary immune response. | 2 |
| 12BIO1.3.2.4 | **Describe** the modes of actions of antibiotics such as penicillin on bacteria | 2 |
| 12BIO1.3.2.2 | **Describe** the function of LTc: agents for maintaining the integrity of cell populations 1 | 2 |
| 12BIO1.3.3.3 | **Explain** the mechanism of LT4 in all acquired immune responses triggered by the intrusion of an antigen | 3 |
| ***1.4 Practical Skills*** | **12BIO1.4**  Students are able to report on practical activities carried out to investigate biological principles | Week 7  March  16th – 20th | 12BIO1.4.1.1 | State the aim of a practical investigation | 1 | NCEA L2 Text book ;  Internet | **Short Test 2: 10%**  **(1.3.1.1; 1.3.2.3; 1.3.2.2; 1.3.3.3)**  **IA 1 ENDS:**  (1.4.2.4; 1.4.3.1; 1.4.4.2; 1.4.2.5) |
| 12BIO1.4.1.2 | Identify/State the topic of interest in the practical/laboratory activity. | 1 |
| 12BIO1.4.2.1 | Describe the main idea of the practical activity | 2 |
| 12BIO1.4.1.3 | State a possible hypothesis for the practical activity. | 1 |
| 12BIO1.4.2.2 | Outline the procedure or methodology of the investigation or practical activity. | 2 |
| 12BIO1.4.2.3 | List the equipment/materials or resources used during activity. | 2 |
| 12BIO1.4.2.6 | Draw a diagram of the experimental set up. | 2 |
| 12BIO1.4.2.4 | Present the results of the practical activity in an acceptable format (table or graph) | 2 |
| 12BIO1.4.3.1 | Explain the results of the practical activity. | 3 |
| 12BIO1.4.3.2 | Make references based on the results. | 3 |
| 12BIO1.4.4.1 | Evaluate the results and make recommendations for change. | 4 |
| 12BIO1.4.2.5 | Acknowledge sources of information referred to for the practical and reporting. | 2 |
|  | 12BIO1.4.4.2 | Discuss the results and draw conclusions. | 4 |

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| **STRAND TWO: Genetics** | | | | | | | |
| **MAJOR LEARNING OUTCOME:** **12BIO2**  Upon successful completion of this strand, students are able to demonstrate understanding of the molecular structure and function of genes, the control of genes, heredity and variation in living organisms and gene behaviour in the context of a cell or organism. | | | | | | | |
| **SUB-STRAND** | **KEY LEARNING OUTCOME** | **WEEK & DATE** | **CODE** | **SPECIFIC LEARNING OUTCOME** | **SKILL LEVEL** | **RESOURCES** | **ASSESSMENTS** |
| ***2.1 Mendelian inheritance*** | **12BIO2.1** Upon successful completion of this substrand, students are able to discuss Mendel’s experiments, results and conclusions and explain Mendel’s three principles. | Week  8 - 9  March 23rd  – April  3rd | 12BIO2.1.2.1 | **Describe** Mendel’s crosses and results | 2 | NCEA L2 Text book ; | **Lesson Activity 2.1** |
| 12BIO2.1.3.4 | **Explain** how genotype is linked to phenotype | 3 |
| 12BIO2.1.1.2 | **Define** segregation, independent assortment, crossing over, incomplete dominance, codominance, allele, sex-linked genes | 1 |
| 12BIO2.1.2.2 | **Determine** which phenotypes are dominant and which are recessive from given genetic cross results | 2 |
| 12BIO2.1.1.1 | **Define** the terms: dominant and recessive alleles, heterozygous, homozygous, multiple alleles, genotype, phenotype | 1 |
| 12BIO2.1.2.3 | **Describe** Mendelian characteristicsusing the termsdominant and recessive alleles, heterozygous, homozygous, multiple alleles, genotype and phenotype | 2 |
| 12BIO2.1.2.4 | **Describe** the features of the following phenomena: complete dominance, incomplete dominance, codominance | 2 |
|  | 12BIO2.1.3.1 | **Discuss examples** of complete dominance, incomplete dominance and codominance | 4 |
|  | 12BIO2.1.3.2 | **Distinguish** betweenmonohybrid crosses from dihybrid crosses | 3 |
|  | 12BIO2.1.4.1 | **Evaluate** a punnet square to determine the characteristics of offsprings of a genetic cross | 4 |
| ***2.2 Diversity and relatedness of organisms*** | **12BIO2.2**  Upon successful completion of this sub-strand students are able to explain the anatomical similarities and the genetic control during embryonic development in vertebrates. | Week  10 – 11  April 6th – 17th | 12BIO2.2.2.1 | **Describe** the anatomical similarities in vertebrates that result in a common plan of organization | 2 | Internet;  NCEA L2 Text book ; | Lesson Activity 2.2 |
| 12BIO2.2.3.1 | **Compare** the position of the spinal cord in a mouse and a frog | 3 |
| 12BIO2.2.2.2 | **Describe** the different stages of the embryonic development in vertebrates | 2 |
| 12BIO2.2.3.2 | **Explain** the establishment of the organizational plan following a determined genetic program | 3 |
| 12BIO2.2.1.1 | **Define** homeotic genes | 1 |
| 12BIO2.2.3.3 | **Explain** the control of homeotic genes on major body plans | 3 |
| 12BIO2.2.3.4 | **Explain** the similarities or difference between the different levels of organisation | 3 |
| 12BIO2.2.2.3 | **List/Describe** the different levels of organization(cells, DNA and organism) leading to common origin of species | 2 |
| **STRAND THREE: Organism Level Biology** | | | | | | | |
| **MAJOR LEARNING OUTCOME: 12BIO3**  Upon successful completion of this strand, students are able demonstrate understanding of the level of organization among plants and animals and their structure and function in relation to a selection of vital processes. | | | | | | | | |
| **SUB-STRAND** | **KEY LEARNING OUTCOME** | **WEEK & DATE** | **CODE** | **SPECIFIC LEARNING OUTCOME** | **SKILL LEVELS** | **RESOURCES** | **ASSESSMENTS** | |
| ***3.1 Plant form and function*** | **12BIO3.1** Upon completion of this topic, students are able to describe and explain diversity in leaf, stem and root structure and function in various plant phyla. | Week  12 – 13  April 20th – May 1st | 12BIO3.1.3.1 | **Compare** specific features of leaf structure including the organisation of the vascular tissue (xylem and phloem) | 3 | Internet;  NCEA L2 Text book | **Lesson Activity 3.1** | |
| 12BIO3.1.2.2 | **Describe** a named specific feature of the leaf structure | 2 |
| 12BIO3.1.1.1 | **Name** a specific feature in the structure of a leaf | 1 |
| 12BIO3.1.3.2 | **Compare** specific stem structure including the organisation of the vascular tissue and pith | 3 |
| 12BIO3.1.2.3 | **Describe** a named specific feature of the stem structure | 2 |
| 12BIO3.1.1.2 | **Name** a specific feature in the structure of a stem | 1 |
| 12BIO3.1.3.3 | **Relate** these features of adaptation to their environment | 3 |
| 12BIO3.1.2.1 | **Describe** specific features of root structure including the vascular tissue (stele), pith, cortex and endodermis | 2 |
| 12BIO3.1.1.3 | **Name** a specific feature of the root structure | 1 |
| 12BIO3.1.3.4 | **Explain** the functions of leaf, steam and root in various plant phyla | 3 |
| **TERM 2 – STRAND THREE: Organism Level Biology (continue….)** | | | | | | | | |
| ***3.2 Animal circulatory systems*** | **12BIO3.2** At the completion of this topic students are able to explain why animals above a certain size require an internal transport system | Week  1 – 2  May  18th – 29th | 12BIO3.2.4.1 | **Discuss** the difference in efficiency between closed single, closed double and open circulatory systems, using specific examples | 4 | Internet;  NCEA L2 Text book | Lesson Activity 3.2 | |
| 12BIO3.2.2.1 | **List** the differences identified in relation to size and mobility of an insect, fish and human. | 2 |
| 12BIO3.2.3.2 | **Explain** how the efficiency of the circulatory system of an insect relates to its size and mobility. | 3 |
| 12BIO3.2.3.3 | **Explain** how the efficiency of the circulatory system of a fish relates to its size and mobility. | 3 |
| 12BIO3.2.3.4 | **Explain** how the efficiency of the circulatory system of a human relates to its size and mobility. | 3 |
| 12BIO3.2.2.2 | **Tabulate** the differences of theefficiency of the circulatory system in an insect, fish and human. | 2 |
| 12BIO3.2.1.1 | **Identify** organisms with 2,3 and 4 chambered hearts | 1 |
| 12BIO3.2.1.2 | **Define** open/closed circulatory system | 1 |
| 12BIO3.2.3.6 | **Differentiate** between a single and a double circulatory system. | 3 |
| 12BIO3.2.2.4 | **Describe** the features of a single/double circulatory system | 2 |
| 12BIO3.2.4.1 | **Discuss** reasons as to why animals above a certain size require an internal transport systemusing examples | 4 |
| ***3.3 Excretion in animals*** | **12BIO3.3** At the completion of this topic students are able to state and explain the process involved in the production of carbon dioxide, water and nitrogenous wastes | Week  3 – 4  June  1st – 12th | 12BIO3.3.1.1 | **List** the main excretory organs in a fish, insect and human | **1** | Internet;  NCEA L2 Text book | **Lesson Activity 3.3** | |
| 12BIO3.3.1.2 | **Identify** the excretory product of fish, insects and humans. | **1** |
| 12BIO3.3.2.1 | **Describe** the structure of the main excretory organs or systems in fish, insects and humans | **2** |
| 12BIO3.3.2.2 | **Describe** the function of these specific excretory organs in fish, insects and humans | **2** |
| 12BIO3.3.3.1 | **Explain** the process involved in the production of carbon dioxide, water and nitrogenous wastes from fish, insects and humans | **3** |
| 12BIO3.3.4.1 | **Discuss** the efficiency of the excretory system of an organism and relate it to its environment in relation to carbon dioxide, water and nitrogenous waste: ammonia (fish), uric acid (insects) or urea (humans) | 4 |
| ***3.4 Nervous System*** | **12BIO3.4** At the completion of this topic, students are able to describe the structure and function of the nervous system. | Week  5 – 7  June 15th – July  3rd | 12BIO3.4.2.1 | **Describe** the structure of neurons | 2 | Internet;  NCEA L2 Text book | Lesson Activity 3.4 | |
| 12BIO3.4.2.2 | **Describe** the characteristics of neurons | 2 |
| 12BIO3.4.3.1 | **Explain** the mechanism of nervous signal production and transmission. | 3 |
| 12BIO3.4.1.1 | **Define** action potential, resting potential | 1 |
| 12BIO3.4.3.2 | **Differentiate** between an action potential and a resting potential | 3 |
| 12BIO3.4.3.3 | **Differentiate** the actions of neuro- transmitters between an action potential and a resting potential | 3 |
| 12BIO3.4.3.4 | **Explain** the function ofchemical messengers provided by the nervous system | 3 |
| 12BIO3.4.4.1 | Discuss how the nervous, excretory and circulatory systems in a named animal work together to maintain a constant body environment | 4 |