

SRI LANKAN SCHOOL - MUSCAT			SCHEME OF WORK		ACADEMIC YEAR 2016 / 2017	
CLASS : Year 13			SUBJECT: Biology		TEACHER : Tharindu Galappaththi	
Month	No.of Periods	Unit No.	TOPIC	ILOs		Remarks
September						
School Reopens - 1st Term						
Week 1,2	10+2	5.7	Photosynthesis	Describe the overall reaction of photosynthesis as requiring energy from light to split apart the strong bonds in water molecules, storing the hydrogen in a fuel (glucose) by combining it with carbon dioxide and releasing oxygen into the atmosphere. Describe how phosphorylation of ADP requires energy and that hydrolysis of ATP provides an immediate supply of energy for biological processes.		
Week3				Eid Holidays		
Week4	10	5.8	Photosynthesis	Explain the light-dependent reactions of photosynthesis including how light energy is trapped by exciting electrons in chlorophyll and the role of these electrons in generating ATP, reducing NADP in photophosphorylation and producing oxygen through photolysis of water. Describe the structure of chloroplasts in relation to their role in photosynthesis.		
		5.3 5.4 5.10 5.11	How Ecosystems Work	Describe the terms ecosystem, community, population and habitat, habitat are controlled by biotic and abiotic factors. Describe how the concept of niche accounts for distribution and abundance of organisms in a habitat. Describe the stages of succession which result in a climax community. Describe the relationship between gross primary productivity, net primary productivity and plant respiration. Calculate the efficiency of biomass and energy transfers between trophic levels. Monthly Test		
Week5	10	5.12, 5.13, 5.14, 5.16	Global Warming-causes , effects and questions	Describe the different types of evidence for climate change and its causes (including records of carbon dioxide levels, temperature records, pollen in peat bogs and dendrochronology) recognising correlations and causal relationships. Describe the causes of anthropogenic climate change – including the role of greenhouse gases (carbon dioxide and methane) in the greenhouse effect. Describe that data can be extrapolated to make predictions and that these are used in models of future climate change. Describe that models for climate change have limitations. Describe the effects of climate change (changing rainfall patterns and changes in seasonal cycles) on plants and animals (distribution of species, development and life cycles) Explain the effect of temperature on the rate of enzyme activity and its impact on plants, animals and microorganisms. CORE PRACTICAL 11: Investigate photosynthesis using isolated chloroplasts (the Hill reaction).		
October						
Week6	10	5.21, 5.22	Global Warming-causes , effects and questions	Describe the way in which scientific conclusions about controversial issues, such as what actions should be taken to reduce climate change or the degree to which humans are affecting climate change, can sometimes depend on who is reaching the conclusions. Suggest how knowledge of the carbon cycle can be applied to methods to reduce atmospheric levels of carbon dioxide. Explain how reforestation and the use of sustainable resources including biofuels are examples of the effective management of the conflict between human needs and conservation . CORE PRACTICAL 12: Be able to investigate the effect of temperature on the rate of an enzyme-catalysed reaction, to include Q10.		

Week 7	10	5.17, 5.18, 5.19	Speciation and Evolution	Describe how evolution (a change in the allele frequency) can come about through gene mutation and natural selection. Explain and evaluate the role of the scientific community (scientific journals, the peer review process, scientific conferences) in validating new evidence, including proteomics and genomics, that supports the accepted scientific theory of evolution. Explain how isolation reduces gene flow between populations leading to allopatric or sympatric speciation. CORE PRACTICAL 13: Be able to investigate the effects of temperature on the development of organisms (such as seedling growth rate, brine shrimp hatch rates).
Week 9	10	6.1, 6.2, 6.3, 6.4	Forensic investigation and analysis of DNA	Describe how to determine the time of death of a mammal by examining the extent of Explain Explain decomposition, stage of succession, forensic entomology, body temperature and degree of muscle contraction. Describe the role of microorganisms in the decomposition of organic matter and the recycling of carbon. Describe how DNA profiling is used for identification and determining genetic relationships between organisms (plants and animals). Describe how DNA can be amplified using the polymerase chain reaction (PCR). CORE PRACTICAL 14: Understand how to use gel electrophoresis to separate DNA fragments of different length. Monthly Test
November				
Week 10	10	6.5, 6.6, 6.7, 6.11	Microorganisms and diseases/ people versus pathogens	Compare the structure of bacteria and viruses. Describe how Mycobacterium tuberculosis (TB) and Human Immunodeficiency Virus (HIV) infect human cells, causing a sequence of symptoms that may result in death. Describe the non-specific responses of the body to infection, including inflammation, lysozyme action, interferon, and phagocytosis. Name the major routes pathogens may take when entering the body. Describe the role of barriers in protecting the body from infection, including the roles of skin, stomach acid, and gut and skin flora
Week 11	10	6.8, 6.9, 6.12,6 .13 6.14	Microorganisms and diseases	Describe the roles of antigens and antibodies in the body's immune response including the involvement of plasma cells, macrophages and antigen-presenting cells. Describe the differences between the roles of B cells (including B memory and B effector cells) and T cells (T helper, T killer and T memory cells) in the body's immune response. Describe how individuals may develop immunity (natural, artificial, active, passive). Describe how the theory of an 'evolutionary race' between pathogens and their hosts is supported by the evasion mechanisms shown by pathogens. Describe the difference between bacteriostatic and bactericidal antibiotics. CORE PRACTICAL 15: Investigate the effect of different antibiotics on bacteria. Monthly test
Week 12	10	6.18- 6.20	Forensic investigation and analysis of DNA	Describe how one gene can give rise to more than one protein through post-transcriptional changes to messenger RNA (mRNA). Note: details of protein synthesis are now taught at AS so might need revision here. Apply understanding of the contributory causes of hospital acquired infections have led to codes of practice regarding antibiotic prescription and hospital practice that relate to infection prevention and control.
Week 13	10	7.3	Muscle and movement	CORE PRACTICAL 10: Be able to carry out a study on the ecology of a habitat, including using quadrats and transects to determine distribution and abundance of organisms, and measuring abiotic factors appropriate to the habitat. Describe the way in which muscles, tendons, the skeleton and ligaments interact to enable movement, including antagonistic muscle pairs, extensors and flexors. Describe the process of contraction of skeletal muscle in terms of the sliding filament theory, including the role of actin, myosin, troponin, tropomyosin, calcium ions (Ca ²⁺), ATP and ATPase.

		7.4.7.5, 7.6		Describe the structure of a muscle fibre. Understand the structural and physiological differences between fast and slow twitch muscle fibres. Describe the overall reaction of aerobic respiration as splitting of the respiratory substrate, including glucose, to release carbon dioxide as a waste product and reuniting of hydrogen with atmospheric oxygen with the release of a large amount of energy.	
December					
Week 14				Revision	
Week 15				1st term tests	
Week 16				1st term tests	
Week 17				Paper correction, School closes	
Week 18				December Vacation	
January					
Week 19				Vacation	
Week 20	10	7.3, 7.47.5, 7.6	Cellular Respiration - The energy supply	<p>School Reopens</p> <p>Describe the roles of glycolysis in aerobic and anaerobic respiration, including the phosphorylation of hexoses, the production of ATP, reduced coenzyme, pyruvate and lactate (details of intermediate stages and compounds are not required).</p> <p>CORE PRACTICAL 16: Investigate rate of respiration practically.</p> <p>Describe the role of the link reaction and the Krebs cycle in the complete oxidation of glucose and formation of carbon dioxide (CO₂), ATP, reduced NAD and reduced FAD (names of other compounds are not required) and why these steps take place in the mitochondria, unlike glycolysis which occurs in the cytoplasm. Describe that respiration is a many-stepped process with each step controlled and catalysed by a specific intracellular enzyme. explain how ATP is synthesised by oxidative phosphorylation associated with the electron transport chain in mitochondria, including the role of chemiosmosis and ATP synthase.</p>	
Week 21	10	7.7.7.8, 7.9	The Heart ,energy and exercise	<p>Describe the myogenic nature of cardiac muscle. Describe how the normal electrical activity of the heart coordinates the heart beat, including the roles of the sinoatrial node (SAN), the atrioventricular node (AVN), the bundle of His and the Purkyne fibres.</p> <p>Explain how the use of electrocardiograms (ECGs) can aid the diagnosis of cardiovascular disease (CVD) and other heart conditions. Calculate cardiac output. Describe how variations in ventilation and cardiac output enable rapid delivery of oxygen to tissues and the removal of carbon dioxide from them, including how the heart rate and ventilation rate are controlled and the roles of the cardiovascular control centre and the ventilation centre in the medulla oblongata.</p>	
Week 22	10	7.11, 7.127.13	Health, exercise and sport	<p>CORE PRACTICAL 17: Investigate the effects of exercise on tidal volume, breathing rate, respiratory minute ventilation and oxygen consumption using data from spirometer traces.</p> <p>Describe the principle of negative feedback in maintaining systems within narrow limits.</p> <p>Describe homeostasis and its importance in maintaining the body in a state of dynamic equilibrium during exercise, including the role of the hypothalamus and the mechanisms of thermoregulation. Describe the analysis and interpretation of data relating to possible disadvantages of exercising too much (wear and tear on joints, suppression of the immune system) and exercising too little (increased risk of obesity, cardiovascular disease (CVD) and diabetes), recognising correlation and causal relationships.</p> <p>Monthly Test</p>	
February					

Week 23	10	7.14,7.15,7.16,8.1,8.2,8.7	Health, exercise and sport	Describe how medical technology, including the use of keyhole surgery and prostheses, is enabling those with injuries and disabilities to participate in sports. Discuss different ethical positions relating to whether the use of performance-enhancing substances by athletes is acceptable. Explain how genes can be switched on and off by DNA transcription factors including hormones. Describe the structure and function of sensory, relay and motor neurones including the role of Schwann cells and myelination. Describe how the nervous systems of organisms can cause effectors to respond to a stimulus. Describe how the pupil dilates and contracts. Describe how co-ordination is brought about through nervous and hormonal control in animals.
Week 24	10	8.3,8.4,8.5,8.6	How the nervous system works/ Sensitivity in Plants	Describe how a nerve impulse (action potential) is conducted along an axon including changes in membrane permeability to sodium and potassium ions and the role of the myelination. Describe the structure and function of synapses in nerve impulse transmission, including the role of neurotransmitters, including acetylcholine. Explain how the nervous systems of organisms can detect stimuli with reference to rods in the retina of mammals, the roles of rhodopsin, opsin, retinal, sodium ions, cation channels and hyperpolarisation of rod cells in forming action potentials in the optic neurones. Describe how phytochrome and IAA bring about responses in plants to environmental cues, including their effects on transcription.
Week 25	10	8.8,8.9,8.10,8.11,8.12	Brains and behaviour	Describe the location and functions of the cerebral hemispheres, hypothalamus, cerebellum and medulla oblongata in the human brain. Describe how magnetic resonance imaging (MRI), functional magnetic resonance imaging (fMRI), positron emission tomography (PET) and computed tomography (CT) scans are used in medical diagnosis and the investigation of brain structure and function. Explain what happens during the critical period so that mammals can develop their visual capacities to the full. Describe the role animal models have played in the research into human brain development and function, including Hubel and Wiesel's experiments with monkeys and kittens. Discuss the moral and ethical issues relating to the use of animals in medical research from two ethical standpoints Monthly Test
Week 26	10	8.13,8.14,8.15	Brains and behaviour /Brains, the genome and medicine	Understand how animals, including humans, can learn by habituation. CORE PRACTICAL 18: Investigate habituation to a stimulus. Describe how imbalances in certain, naturally occurring, brain chemicals can contribute to ill health, including dopamine in Parkinson's disease and serotonin in depression, and to the development of new drugs. Describe the effects of drugs on synaptic transmissions, including the use of L-Dopa in the treatment of Parkinson's disease and the action of MDMA in Ecstasy.
March				
Week 27	10	8.16,8.17,8.18,8.19	Brains, the genome and medicines	Describe how the outcomes of genome sequencing projects are being used in the development of personalised medicine and the social, moral and ethical issues this raises. Explain how drugs can be produced using genetically modified organisms (plants, animals and microorganisms). Evaluate the risks and benefits associated with the use of genetically modified organisms. Describe the methods used to investigate the contributions of nature and nurture to brain development, including evidence from the abilities of new-born babies, animal experiments, studies of individuals with damaged brain areas, twin studies and crosscultural studies
Week 28				Revision
Week 29				Mock Examination
Week 30				Mock Examination
April				
Week 31				Mock Examination
Week 32				Paper correction and report work
Week 33				April vacation

				School Reopens - 3rd Term	
Week 34				Seminar vacation	
Week 35				Seminar vacation	
May					
Week 36				IAL Examination	