FIRST TERM : 03 JANUARY – 23 MAY 2008 (20 weeks)
THEME: PHYSIOLOGY OF LIVING THINGS
LEARNING AREA: 1.0 TRANSPORT

Week	Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes
1	1.1 Understanding the importance of having a transport system in some multicellular organisms (2p + 1p)	Carry out activities to identify the problem that could be faced by multicellular organisms and explain how the problem is overcome in multicellular organisms as compared to unicellular organisms: a) Correlate different sizes of cubes to total surface area / volume (TSA/V) ratio, b) Discuss how the (TSA/V) ratio affects the movement of solutes to the interior of cubes, c) Relate the outcome of a) and b) to the problem faced by multicellular organisms in getting cell requirements to the cells in the interior of the organisms, d) Suggest ways to improve the movement of solutes to the interior of cubes without changing the size of cubes, e) Explain why there is a need for a transport system in some multicellular organisms.	A student is able to: • identify the problem that could be faced by multicellular organisms in obtaining their cellular requirements and getting rid of their waste products, • suggest how the problem is overcome in multicellular organisms.	TSTS • Attributing • Comparing and contrasting • Relating Noble values • Realising that science is a means to understand nature • Having critical and analytical thinking • Thinking rationally
2	1.2 Synthesising the concept of circulatory system (2p + 1p)	Read text materials and view computer simulations on circulatory system and discuss the following: a) what is a circulatory system, b) the three components of the circulatory system, i.e. medium, vessels and pump, c) blood and haemolymph as a medium of transport, d) the composition of human blood, e) the function of blood and haemolymph in transport, f) the structure of human blood vessels: arteries, veins and capillaries, g) the basic structure and function of the human heart,	A student is able to: • state what a circulatory system is, • state the three components of circulatory system in humans and animals, • state the medium of transport in humans and animals, • state the composition of human blood, • explain the function of blood and haemolymph in transport, • describe the structure of human blood vessels,	TSTS • Attributing • Comparing and contrasting • Relating • Sequencing Noble values • Appreciating and practicing clean and healthy living • Having critical and analytical thinking • Thinking rationally

		h) the circulation of blood in humans in terms of : i. pumping of the heart, ii. contraction of skeletal muscles around veins, i) the regulatory mechanism of blood pressure. Look at the heart of the fish, chicken and/or cow, and note similarities and differences in terms of size, and number of compartments. Use schematic diagrams to compare the circulatory system in the following: humans, fish and amphibians. Visualise and draw concept maps on the circulatory system in humans.	• explain how blood is propelled through the human circulatory system, • explain briefly how blood pressure is regulated, • compare and contrast the circulatory systems in the following: humans, fish and amphibians, • conceptualise the circulatory system in humans.	
3	1.3 Understanding the mechanism of blood clotting (2p)	Show photomicrographs of blood clots. Show samples of clotted blood Discuss the necessity for blood clotting with respect to: a) preventing serious blood loss, b) preventing the entry of microorganisms and foreign particles, c) maintaining blood pressure, d) maintaining circulation of blood in a closed circulatory system. Use a schematic diagram to illustrate the mechanism of blood clotting. Predict the consequences of blood clotting related problems such as haemophilia or thrombosis.	A student is able to: • explain the necessity for blood clotting at the site of damaged blood vessels • explain the mechanism of blood clotting, • predict the consequences of impaired blood clotting mechanism in an individual.	TSTS • Attributing • Sequencing • Relating • Predicting Noble values • Responsible about the safety of oneself • Appreciating and practicing clean and healthy living • Being thankful to God

4	1.4 Synthesing the concept of lymphatic system (2p)	Draw a schematic diagram on the formation of interstitial fluid and lymph, and discuss the following: a) space between cells b) materials from blood capillaries entering these spaces, c) composition of interstitial fluid, d) the importance of interstitial fluid, e) the need for interstitial fluid to return to the circulatory system directly or via the lymphatic system. Discuss the following: a) the structure of the lymphatic system, b) the flow of lymph, c) the role of the lymphatic system in transport. Use a graphic organizer to compare the content of blood, interstitial fluid and lymph. Brainstorm to predict what will happen if interstitial fluid fails to return to the circulatory system. Study diagram or computer simulation on the lymphatic system, and discuss the relationship between the lymphatic system and circulatory system.	A student is able to: • describe the formation of interstitial fluid, • state the composition of interstitial fluid, state the importance of interstitial fluid, describe the fate of interstitial fluid, • describe the structure of the lymphatic system, • explain how the lymphatic system complements the circulatory system, • compare the content of blood interstitial fluid and lymph, • predict what will happen if interstitial fluid fails to return to the circulatory system, • conceptualise the relationship between the lymphatic system and circulatory system.	TSTS • Attributing • Sequencing • Comparing and contrasting • Analyzing • Relating/predicting • Conceptualizing Noble values • Being responsible about the safety of oneself and others • Appreciating and practicing clean and healthy living • Being thankful to God • Having critical and analytical thinking
	1.5 Understanding the role of the circulatory system in body defence mechanism (2p)	Discuss the necessity for a body defence mechanism in humans. Gather information and discuss the body's defence mechanism with reference to: a) first line of defense – skin, – mucous membrane, b) second line of defense – phagocytic red blood cells	A student is able to: • state another function of the circulatory system besides transport, • identify the three lines of defence mechanism of the body, • describe the process of phagocytosis, • state the meaning of antigen	TSTS • Generating ideas • Grouping and classifying • Making analogies Noble values • Being thankful to God TSTS • Comparing and contrasting • Relating • Making inferences

		c) third line of defense – lymphocytes. Draw and label the various stages of phagocytosis. Discuss the following: a) antigens, antibodies, immunity and immunization b) how antigens and antibodies are related to immunity c) the various types of immunity i. active immunity (natural, artificial) ii. passive immunity (natural, artificial) Carry out small group discussion on the following and present the findings: a) the effects of HIV on the body's immune system, b) transmission of HIV c) prevention of AIDS.	and antibody, • state the meaning of immunity and immunization, • relate antigen and antibody to immunity, • name and give examples of various types of immunity, • state the effects of human immunodeficiency virus (HIV) on the body's defence mechanism, • describe the transmission of HIV, • suggest ways to prevent the spread of acquired immune deficiency syndrome (AIDS)	• Evaluating • Making conclusion Noble values • Appreciating and practicing clean and healthy living • Being respectful and well mannered
5	1.6 Appreciating a healthy cardiovascular system (1p)	Research and discuss nutrition and lifestyle which can lead to a healthy cardiovascular system. Then select ways that are suitable and practice them.	A student is able to: • Select and practise suitable ways to maintain a healthy cardiovascular system.	TSTS • Making conclusion • Evaluating Noble values • Appreciating and practicing clean and healthy living
5	1.7 Understanding the transport of substances in plants	Discuss the following: a) the necessity for transport of substances in plants, b) the problem that could be faced by plants in transporting substances and how it is overcome in plants. Carry out the flowing activities: a) to show the presence of xylem as a continuous tube system to transport water and minerals, b) prepare slides and look at the cross section	A student is able to: • state the necessity for transport of substances in plants, • identify the vascular tissue in stem, root and leaf, • state the role of vascular tissue in the transport of substances, • describe the structure of	TSTS • Attributing (identifying characteristics of the vascular tissues) • Grouping and classifying (categorise each tissue based on certain criteria) Noble values • Appreciating the process of transportation

		(XS) and longitudinal section (LS) of a dicot stem, c) study prepared slides of XS of stem, root and leaf of a dicot plant, and draw plan diagrams. Relate the following: a) the structure of xylem to the transport of water and minerals, b) the structure of phloem to the transport of organic substances. Carry out bark ringing to show the role of phloem in the continuous transport of organic substances.	vascular tissue, • relate the structure of xylem to transport, • relate the structure of phloem to transport, • predict the effect of removing a ring of phloem tissue from a plant.	
6	**CHINESE NEW YEAR HOLIDAY**			
7	**TEST 1** **(11.02 – 15.02.2008)**			

8-9	1.8 Synthesising the concept of transport of substances in plants (2p + 2p)	Discuss the following: a) the transport of organic substances in plants, b) the importance of translocation in plants. Carry out small group discussion on the following and present the findings: a) the process of transpiration b) the importance of transpiration c) the pathway of water from soil to leaves using a schematic diagram, d) the external conditions affecting the rate of transpiration Design and conduct experiments to study factors affecting the rate of transpiration, i.e.: a) air movement, b) temperature, c) light intensity, d) relative humidity. Carry out an activity to show the following: a) root pressure, b) cohesion and adhesion of water. Discuss and draw a concept map of the movement of water in plants in terms of the following: osmosis, transpiration pull, cohesion and adhesion of water, opening and closing of stomata, root pressure.	A student is able to: • state what translocation is, • explain the importance of translocation in plants, • describe the process of transpiration, • explain the importance of transpiration, • describe the pathway of water from the soil to the leaves, • state external conditions affecting transpiration, • design experiments to study factors affecting the rate of transpiration, • explain the role of root pressure in the movement of water in plants, • explain the role of cohesion and adhesion of water in the movement of water in plants, • conceptualise the transport mechanism in plants.	TSTS • Generating ideas • Relating Noble values • Being responsible towards the environment
FIRST TERM SCHOOL HOLIDAY **08.03. – 16.03.2008**				

THEME : PHYSIOLOGY OF LIVING THINGS

LEARNING AREA: 2.0 LOCOMOTION AND SUPPORT

Week	Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes
11	2.1 Undertanding support and locomotion in humans and animals (2p)	Carry out small group discussion on the following: a) the necessity for support and locomotion in humans and animals b) the problem that could be faced by humans and animals in support and locomotion c) how the above problem are overcome in humans and animals Study a model of human skeleton to identify the following: a) axial skeleton consisting of the skull, cervical vertebrae,thoracic vertebrae, lumbar vertebrae, sacrum,coccyx, sternum and ribs. Appendicular skeleton consisting of the scapula, clavicle, humerus, ulna, radius, pelvic gridle, femur, tibia and fibula	A student is able to: • Explain the necessity for support and locomotion in humans and animals • Describe problems that could be faced by humans and animals in support and locomotion • Explain how problems in support and locomotion are overcome in humans an animals Name the bones that make up the axial skeleton and appendicular skeleton of the human body.	TSTS: -attributing -problem solving Noble Values: -being responsible about the safety of oneself,others and the environment. -being thankful to God. TSTS: -comparing and contrasting -sequencing Noble Values: -having critical and analytical thinking

		Observe a chicken wing to note the position and nature of muscle,ligaments and tendons. Draw and label a simple diagram of an arm to show the arrangement of bones, skeletal muscles and tendons Briefly discuss: a) how the bones, skeletal muscles,tendons and joints bring out movement in the arm or leg, b) the necessity of nerve impulses in skeletal muscle contraction c) the antagonistic action of skeletal muscles d) all muscle has two primary proteins e) source og energy is from ATP produced in adjacent mitochondria f) the function of cartilage and synovial fluid at joints. Observe and discuss the mechanism of locomotion in a earthworm, grasshopper, fish and bird. Discuss and present findings on muscle cramp,osteoporosis,muscular dystrophy and arthritis	• Label the bones, the skeletal muscles and tendons in a diagram of the arm. • Explain how movement is brought about in a limb • State the function of cartilage and synovial fluids at joints • Describe briefly the mechanism of locomotion in an animal. State some consequences of impaired musculoskeletal system on support and locomotion.	TSTS: -atributing -making analogies Noble Values: -being cooperative -having an interest and curiosity towards the environment -being systematic TSTS: -making analogies -evaluating Noble Values: -being kind-hearted and caring.

12	2.2 Appreciating a healthy musculoskeletal system (2p)	Discuss and share ways of caring for the musculoskeletal system such as: a) following a balanced diet, b) having a good posture c) using a proper attire for daily activities d) taking appropriate precautions during vigorous activities e) practising correct and safe exercise techniques	A student is able to: • practice ways to care for the musculoskeletal system.	TSTS: -relating Noble values: -appreciating and practicing clean and healthy living
13	2.3 Understanding support in plants (2p)	Discuss the following: a) the necessity for support in plants b) what could be the support related problems faced by: i) aquatic plants ii) terrestrial plant c) how is support achieved in aquatic and terrestrial plants Carry out the following activities : a) study the adaptions for support (aerenchyma and air sacs) in floating aquatic plants, e.g. :water hyacinth. b) Study prepared slides of cross sections of old stems to identify tissue that helps in support. Investigate how support in herbaceous plants,e.g.spinach and balsam,is achieved without woody tissue.	A student is able to: • Explain the necessity for support in plants • Explain how support is achieved in aquatic plants Explain how support in terrestrial plants are achieved through tissue modifications	TSTS: -atributing -grouping -classifying -comparing and contrasting -generating ideas Noble Values : -having an interest and curiosity towards the environment -realising that science is a means to understand nature. -making inferences -relating

THEME : PHYSIOLOGY OF LIVING THINGS
LEARNING AREA : 3.0 COORDINATION AND RESPONE

Week	Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes
14 BIOLOGY F5_2007	3.1 Understanding response and coordination (2p)	Carry out small group discussion on the following and present the findings : a) external stimuli, e.g. light,sound,smell,taste, temperature,pressure and touch. b) Internal stimuli e.g sugar level in the blood and osmotic pressure of blood c) The necessity for living organisms to respond to stimuli, Carry out activities to study: a) Human and animal responses to external and internal environment, b) Plant responses to external environment View computer simulations on the pathways in detecting and responding to external and internal stimuli in humans and animals and draw schematic diagrams involving the main components. Discuss what is meant by 'coordination'	A student be able to: • List the changes in external and internal environment faced by an organism • State why organisms have to be sensitive to changes in internal and external environment • Clarify through examples the meaning of 'stimulus' and 'response' • State the main components and pathways involved in detecting and responding to changes in external environment • State the main components and pathways involved in detecting and regulating changes in internal environment • Clarify through examples the meaning of 'coordination'	**Noble value :** -cooperative -being responsible • Main components are receptors,integrating centre and effectors. • Afferent and efferent pathways are involved • In regulating the internal environment , negative feedback is involved.
15	3.2 Analysing the role of human nervous system (2p)	Discuss the role of nervous system. Draw a diagram to show the organization of the nervous system. View graphics of the brain and label the main parts of the brain, and state their respective function(s).	A student is able to : • State the role of nervous system • Draw and label a diagram to show the organization of the nervous system • Name the main parts of the brain and state their functions	**TSTS** -visualising -analysing **Noble value** -responsible -being thankful to God The parts of the brain to be

15	3.3 Analysing the role of hormones in humans (2p + 1p)	Carry out small group discussion on the following and present findings : a) what a hormone is b) what the endocrine system is c) why the endocrine system is necessary, despite having the nervous system d) the physiological processes which are not directly regulated by the nervous system e.g. menstrual cycle, development of secondary sex characteristics, growth, etc. e) how the endocrine system complements the nervous system Carry out group activity to label the main glands of the endocrine system. Name the main hormones produced by each endocrine gland. Match the hormones with their functions in the following physiological processes: (a) reproduction (b) growth (c) homeostasis Discuss how secretion of a hormone can be regulated by : 12 a) another hormone, e.g. thyroid stimulating hormone (TSH)	A student is able to : • State what a hormone is • State what the endocrine system is • State why the endocrine system is necessary • State physiological processes not directly regulated by the nervous system • Describe how the endocrine system complements the nervous system • Label the main glands of the endocrine system • Name the main hormones produced by each endocrine gland • State the functions of the hormones involved in some physiological processes • Describe briefly how secretion of hormone is regulated	**TSTS** -relating -generating ideas -analysing **Noble value** -being thankful to God -cooperative The main hormones required are : - follicle stimulating hormone - luteinising hormone - estrogen - progesterone - androgens - growth hormone - thyroid-stimulating hormone - thyroxine - insulin - glucagon - antidiuretic hormone, and - adrenaline

SECOND TERMS : 19 JUNE – 14 NOVEMBER 2007 (22 WEEKS)

THEME : PHYSIOLOGY OF LIVING THINGS
LEARNING AREA : 4.0 REPRODUCTION AND GROWTH

Week	Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes
1	4.1 Analyzing gamete formation (2p)	Discuss the following about reproduction: a) the necessity to reproduce, b) the two types of reproduction c) the necessity for formation of gametes Study the diagrams of stages in the formation of a sperm and an ovum Compare the formation of a sperm with that of an ovum	A student is able to : • explain the necessity for organisms to reproduce • state types of reproduction • explain the necessity for formation of gametes • describe formation of sperm in humans • describe formation of ovum in humans • compare the formation of sperm with that of ovum	TSTS: Generating ideas Relating Visualizing Comparing & contrasting Noble values: Being thankful to God Having critical and analytical thinking Appreciating the balance of nature.
2	4.2 Analyzing the role of hormones in the menstrual cycle (2p)	Discuss the following: a) what menstruation is b) the relation between menstruation and menstrual cycle c) the importance of the menstrual cycle d) hormones involved in the menstrual cycle.	A student is able to: • state what menstruation is • relate menstruation to menstrual cycle • state the importance of the menstrual cycle • state the hormones involved in the menstrual cycle	TSTS: Analyzing Attributing Sequencing Generating ideas Making inferences Noble Values : Realizing that science is a

		Study and interpret graphs on hormonal levels on the following: a) follicle development b) ovulation a) formation of corpus luteum b) thickness of the endometrium Discuss the following : a) premenstrual syndrome b) menopause	relate hormonal levels to the development of follicles, the process of ovulation and the formation of corpus luteum • relate hormonal levels to the changes in the thickness of the endometrium • explain the role of hormones in regulating the menstrual cycle • state what premenstrual syndromes(PMS) is • state what menopause is	mean to understand nature Having critical and analytical thinking Being flexsible and open minded
2	4.2 Understanding the early development of a zygote in humans (2p)	Use diagram and computer simulations to discuss the following: a) the formation of zygote, b) the early development of a zygote as the formation of a ball of cells which becomes implanted in the wall of the uterus, c) identify morula and blastocyst from the diagrams given, d) formation of identical twins and Siamese twins. Illustrate how identical and fraternal twins are formed and give some differences between them.	A student is able to : ● describe what fertilisation is, ● describe in simple terms the early development of a zygote, ● name the two main stages in the development of a zygote in preparation for implantation, ● describe the formation of twins ● compare identical twins with fraternal twins,	TSTS : Sequencing Comparing and contrasting Noble values : Being thankful to God Being systematic

		Research and report on: a) functions of the placenta in foetal development, b) the advantages of fetus having a separate circulatory system from that of the mother.	● state the functions of the placenta in feotal development, ● explain the advantages of fetus having a separate circulatory system from that of the mother.	
3	4.3 Appreciating the contribution of science and technology to human reproduction (2p)	Research and report on : a) family planning, b) sperm bank, c) artificial insemination, d) in vitro fertilization, e) surrogate mother f) sexually transmitted diseases.	A student is able to : ● explain the contribution of science and technology to human reproduction, ● explain some moral issues related to the application of science and technology to human reproduction, ● what sexually transmitted diseases are, ● give examples of sexually transmitted diseases.	TSTS : Realizing that science is a means to understand nature Appreciating the contribution of science and technology
3	4.4 Synthesizing the concept of sexual reproduction in flowering plants (2p)	Examine a flower to identify: a) various flower parts, b) the structures which produce male and female reproductive cells. Draw diagrams to show the stages in the formation of:	A student is able to : • identify male and female structures in a flower • describe the formation of	TSTS : Visualising Attributing

		a) pollen grains from pollen mother cell, b) embryo sac from embryo sac mother Describe briefly what happens at each stage in both a.) and b.). Conduct an activity to observe the germination of pollen grains in sugar solution. Discuss the following: a) the formation of two male nuclei from the generative nucleus b) the formation of a zygote, c) the formation of triploid nucleus Discuss and draw a concept map of double fertilization in flowering plants. Examine the structure of fruits, e.g. mango, long beans, and relate them to the flower parts: a) seed from the ovule b) seed coat from the integument fruit from the ovary Discuss the importance of double fertilization for the survival of flowering plants	pollen and grain • describe the formation of embryo sac in the ovule • describe the formation of pollen tube • describe the formation of zygote • describe the formation of triploid nucleus • conceptualize double fertilization • relate the structure of a fruit to the flower parts Explain the importance of double fertilization for the survival of flowering plants.	Having critical and analytical thinking Noble values : Realising science is a means to understand nature
4	4.6 Understanding growth in multicellular organisms (2p)	Discuss the necessity for growth. Carry out small group discussion on growth in terms of: a.) growth being an irreversible process b.) increase in the number of cells c.) increase in cell size d.) cell differentiation	A student is able to: • explain briefly the necessity for growth in organisms • explain what growth is	TSTS : Generating ideas Communication Being cooperative

		Study diagrams or prepared slides to identify the growth zones at root tip and shoot tip.		
	4.7 Understanding the growth curve (2p)	Generate ideas on the appropriate parameters used in the measurement of growth. Conduct an activity to study the growth of a plant, e.g. onion, maize, or balsam. Study and interpret the data on growth in humans and discuss the following : a) the shape of growth curve b) phases of growth, c) the relationship between the phases of growth and the growth curve. Study and interpret a growth curve of an insect and relate the shape of the curve to its growth	A student is able to : ● Identify the parameter used in the measurement of growth, ● describe the sigmoid growth curve of an organism, ● relate the shape of the growth curve to the growth phases of an organism, ● explain the shape of the growth curve of an insect	The parameters that can be used include height, length, volume, dry mass, and fresh mass
5	4.8 Understanding primary and secondary growth in plants (2p)	Discuss the types of growth in plants. Conduct a field study to identify plant that undergo primary and secondary growth. Examine prepare slides or diagrams of a cross section of a young stem, matured stem, young root, matured root, in dicots to identify the primary and secondary tissues. Research and report on the following: a) relate primary growth to height, support and transport of substances, b) relate secondary growth to additional support and transport, c) state the importance of vascular cambium and cork cambium to secondary growth, d) compare plants that undergo secondary growth	A student is able to: ● state the types of growth in plants, ● state what primary and secondary growth are, ● name the tissues involved in primary and secondary growth, ● state the location of the tissues involved in primary and secondary growth, ● explain the importance of primary growth, ● explain the importance of	Identifying

		with those that do not, e) the economic importance of plants that undergo secondary growth.	secondary growth, • compare and contrast plants that undergo secondary growth with plants that do not undergo secondary growth, • state the economic importance of plants that undergo secondary growth	Comparing and contrasting

THEME : VARIATION AND INHERITANCE
LEARNING AREA : 5.0 INHERITANCE

WEEK	LEARNING OBJECTIVES	SUGGESTED LEARNING ACTIVITIES	LEARNING OUTCOMES	NOTES
6	1.1 Synthesising the concept of inheritance based on Mendel's experiment. (2p + 2p)	Discuss the following base on examples: a) inheritance, b) characters and traits. Study diagrams showing the results of Mendel's monohybrid cross experiment, then discuss the following: a) characters and traits in Mendel's experiments, b) there is a hereditary factor that determines a particular character, c) dominant traits and recessive traits, d) genes and alleles, e) dominant alleles and recessive alleles, f) phenotype and genotype,	A student is able to : • state what is meant by inheritance, • differentiate traits from characters, • identify characters and traits in Mendel's experiments, • state that there is a hereditary factor that determines a particular character, • identify dominant and recessive traits, • explain genes and alleles, • explain dominant alleles and recessive alleles, • state the meaning of	TSTS ▪ Relating ▪ Making analogy Noble Values ▪ Being thankful to God .

WEEK	LEARNING OBJECTIVES	SUGGESTED LEARNING ACTIVITIES	LEARNING OUTCOMES	NOTES
			phenotype, • state the meaning of genotype, • relate allele combination to genotype, • relate phenotype to genotype,	
		g) homozygote and heterozygote,	• state the meaning of homozygote and heterozygote,	
		h) phenotypic ratio and genotypic ratio in the first and second filial generation,	• determine the phenotypic ratio of the first filial generation and second filial generation, • determine the genotypic ratio of the first filial generation and second filial generation,	
		i) the importance of meiosis I in the segregation of alleles, j) meaning of monohybrid inheritance.	• state the meaning of monohybrid inheritance,	
		Conduct an activity using coloured buttons/beans to illustrate Mendel's First Law. Discuss Mendel's First Law as The Law of Segregation. Study diagrams showing the results of Mendel's	• conceptualise Mendel's First Law,	TSTS ▪ Attributing ▪ Relating ▪ Predicting

WEEK	LEARNING OBJECTIVES	SUGGESTED LEARNING ACTIVITIES	LEARNING OUTCOMES	NOTES
		dihybrid cross experiment, then discuss the following: a) meaning of dihybrid inheritance, b) the importance of meiosis in terms of independent assortment of chromosomes. Discuss Mendel's Second Law as The Law of Independent Assortment.	• state the meaning of dihybrid inheritance, • conceptualise Mendel's Second Law.	Noble Values ▪ Being objective Teaching aids ▪ text book ▪ transparency ▪ news paper cutting ▪ LCD Projector ▪ internet
7	1.2 Understanding inheritance (2p)	Discuss the following base on examples : a) blood groups and Rhesus factor (Rh factor) b) inheritance of ABO blood group in humans Examine a drawing of a micrograph of human chromosomes and: a) determine the number of chromosomes b) arrange the homologous pairs based on the location of the centromere and size of chromosomes. c) identify autusomes and sex chromosomes. Compare the karyotypes of a normal human being with that of a person with Down's syndrome. Draw a schematic diagram to show the following : a) sex determination in off-springs, b) sex-linked and inheritance of haemophillia and colour blindness.	A student is able to : • State the blood groups in the ABO system and Rhesus factor in humans, • Explain the inheritance of ABO blood group in humans, • Differentiate autosomes from sex chromosomes, • Identify the different humans karyotypes, • Explain sex determination in off-springs,	TSTS ▪ Attributing ▪ Generating ideas Noble Values ▪ Having an interest and curiosity ▪ Appreciating the balance of nature TSTS ▪ Sequencing ▪ Grouping & classifying ▪ Relating Noble Values ▪ Being systematic ▪ Being diligent & persevering

WEEK	LEARNING OBJECTIVES	SUGGESTED LEARNING ACTIVITIES	LEARNING OUTCOMES	NOTES
8	1.2 Understanding genes and chromosomes (2p)	Gather information and discuss: a) hereditary disease such as thalassaemia, Research and report on : a) unit of inheritance b) the location of genes Construct a model of deoxyribonucleic acid (DNA) and discuss : a) the structure of nucleotides b) the structure of polynucleotides c) double helix structure of DNA Draw a schematic diagram and relate how a trait is manifested from the basic unit of heritance in terms of : a) chromosomes to DNA b) DNA to gene c) gene to protein d) protein to the trait of an organism Research and report on the following : a) DNA fingerprinting b) the human genome project c) potential of stem cell research d) genetic engineering i . gene therapy ii. genetically modified organisms iii. genetically modified food iv. medicine (production of insulin) Discuss the implications of the above to mankind. Conduct a forum or debate on ethical and moral issues in the application of knowledge in genetics. Visit research centres that conduct research in	• Explain sex-linked inheritance using examples. • Describe hereditary disease, A student is able to : • State the unit of inheritance, • State the location of genes, • Describe the structure of deoxyribonucleic acid (DNA), • Describe in simple terms the manifestation of a trait of an organism from the basic unit of inheritance, • Explain briefly the importance of genetics to mankind, • Describe the application and abuse of knowledge in genetics, • Argue on the need for ethics and moral in the application	▪ Being cooperative Teaching Aids ▪ Text book ▪ CD Roms ▪ News paper cutting TSTS ▪ Attributing ▪ Grouping and classifying ▪ Synthesizing ▪ Visualizing. Noble Values ▪ Appreciating the contribution of science and technology ▪ Having an interest and curiosity towards the environment ▪ appreciating the balance of nature Teaching aids ▪ text book ▪ transparency ▪ news paper cutting ▪ LCD Projector ▪ internet

WEEK	LEARNING OBJECTIVES	SUGGESTED LEARNING ACTIVITIES	LEARNING OUTCOMES	NOTES
		genetic engineering.	of genetics	

THEME: VARIATION AND INHERITANCE
LEARNING AREA: 6.0 VARIATION

Week	Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes
8	2.1 Understanding variation in organisms (2p)	Discuss the importance of variation in organisms. Conduct an activity to investigate variation in humans and present the data graphically. Discuss continuous and discontinuous variation based on the graph. Compare continuous variation with discontinuous variation.	A students is able to: • state the importance of variation in organisms, • give examples of variation in humans, • state the types of variation, • compare continuous variation with discontinuous variation	Thinking skills: • Observing • Classifying • Comparing & contrasting Sc. Attitude/Noble Value • Being honest and accurate • Being thankful to God • Being cooperative • Being respectful
9	2.2 understanding the causes of variation (2p)	Discuss the causes of variation in terms of: a) genetic factors, b) environmental factors. Discuss the effects of genetic factor on variation. Conduct an activity, such as role- playing or model-building, to show the process of genetic recombination.	A students is able to: • state the factors causing variation, • explain the effects of genetic factors on variation,	Thinking skills: • Attributing • Relating Sc. Attitude/ Noble Value • Love and respect each other • Being kind-hearted and caring • Being thankful to God
		Conduct an activity to study the effects of different environmental factors on the variation of plants.	A students is able to: • explain the effects of	• Predicting • Making hypothesis

		Discuss the following: a) chromosomemal mutation, b) gene mutation Discuss examples of mutation and mutagens. Discuss the importance of variation in the survival of a species.	environmental factors on variation. • explain the effects of the interaction between genetic factors and environmental factors on variation, • explain mutation, • explain the importance of variation in the survival of species.	Sc. Attitude/ Noble Value • Appreciating the balance of nature.
9	2.3 Be respectful towards one another despite variation. (1p)	Participate in games and club activities involving individuals from various ethic groups. Conduct a sketch to show respect for all God's creation.	A students is able to: • accept that people are different, • respect each other.	Thinking skills: • Generating ideas Sc. Attitude/ Noble Value • Love and respect each other • Being kind-hearted and caring • Being thankful to God • Being cooperative.
SECOND TERM SCHOOL HOLIDAY 16 – 24 AUGUST 2008				
10 - 11	**REVISION FOR TRIAL EXAMINATION**			
12 - 14	**TRIAL EXAMINATIONS 2008 3 – 23 SEPTEMBER 2008**			
15 - 18	**REVISION FOR SPM EXAMINATION**			
19 - 21	**INTENSIVE REVISION PROGRAMME (3 WEEKS)**			

22	**SPM EXAMINATION 2008**
END YEAR SCHOOL HOLIDAY **15 NOVEMBER 2008 – 2 JANUARY 2008**	