

Life and Earth Sciences



REDUCTION OF THE LIFE AND EARTH SCIENCES CURRICULUM

7th Year Basic Education

Content	Learning objectives (Skills...)	Activities	Remarks
<p>1- Nutrition</p> <p>1.2.2 Non chlorophyllic plants Fungi.</p> <ul style="list-style-type: none"> - Fungi requirements. <p>1.4 Relation between environmental conditions, body activities and nutrition</p> <p>1.4.1 Relationship between the activities of living things and use of food energy.</p> <ul style="list-style-type: none"> - Influence of habitat and temperature on the activities of organisms. <ul style="list-style-type: none"> • Endotherms. • Ectotherms 	<ul style="list-style-type: none"> - Notice that fungi require water, minerals and organic materials. - Understand that fungi (mushrooms, mold) do not require light to grow. They take ready made organic material from their surrounding media. <ul style="list-style-type: none"> - Notice that animal activity can be modified under the effect of environmental conditions. - Understand that the body temperature of ectotherms is regulated by the external environment. - Understand that endotherms always maintain a constant body temperature. - Relate the environmental temperature to body temperature of some animals. - Understand that when the environmental temperature decreases, ectotherms decrease their activity. 	<ul style="list-style-type: none"> - Observation of documents: culture and development of mold on organic media: fruit, bread, leather.... - Analysis of the results of experiments done in the presence and the absence of light. <ul style="list-style-type: none"> - Analysis of experimental results: graphs, tables. - Analysis of documents. - Give examples from every day life. - Analysis of sequences in a film. Frog, snake, butterfly, fish, snail, duck, mouse, rabbit, dog, vole... 	

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<p>- The activity of animals depends on oxygen and food uptake.</p> <p>1.4.2 From dormant life to active life : hibernation and germination.</p> <p>- Hibernation and wake up rhythm.</p>	<ul style="list-style-type: none"> - Understand that when the environmental temperature decreases, the activity of the endotherms remains constant. - Compare the environmental temperature to activity of ectothermic and endothermic animals. - Understand that the activity of organisms is related to the use of energy produced by food and oxygen consumption. - Know that endotherms increase their energy requirement of food and oxygen to overcome cold climates. - Notice that the decrease of body temperature of ectotherms reduces their energy requirements. - Identify that the increase of physical activity leads to an increase in food and oxygen needs. - Identify that the functioning of internal organs (heart, gills, brain, liver...), in both ectothermic and endothermic animals, requires the consumption of O₂ and food. - Understand that the energy of an organism is mainly produced by energy foods (carbohydrates and lipids). - Notice that the energy produced by energy foods, in the presence of oxygen, permits body functioning. - Show that the amount of energy needed depends on the type of activity performed. - Calculate the amount of energy consumed per day. - Understand that when the environmental conditions are unfavorable, some organisms decrease their nutritional function thus, entering a dormant stage of life. - Find out the hibernation characteristics of an animal. - Understand that during favorable conditions, hibernating animals, consume food from their body reserves or from their environment, increase their respiratory exchanges, and produce energy. They pass out from the dormant stage to the active stage of life. - Notice that hibernating mammals have intermittent wake up during which they come out of dormant stage of life to active stage of life. 	<ul style="list-style-type: none"> - Analysis of documents . - Analysis of graphed or tabulated data. - Look out information in a text. - Give examples from every day life. - Experimentation on the respiratory rhythm. - Use of a reference table. - Analysis of documents: bat, hedgehog... - Analysis and interpretation of graphed and tabulated data. - Analysis of sequences in a film. Hedgehog, marmot, lizard, bat, snake... 	

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- Seed germination	<ul style="list-style-type: none"> - Understand that the germination is the passage of a seed from the dormant to the active stage of life. - Determine the principal characteristics of germination. - Determine that the germination requires the following conditions: water, oxygen, and temperature and a seed able to germinate. 	<ul style="list-style-type: none"> - Give examples from everyday life - Observation and analysis of graphs and tabulated data. - Bean seed ... 	<ul style="list-style-type: none"> - Mention that buds blossoming is an example of the passage from a dormant stage of life to an active stage of life.
1.5 Nutrition and respiration : vital requirements.			
1.5.1 Importance of nutrition and respiration at the level of the organism.			
- Construction of the body.	<ul style="list-style-type: none"> - Know that all living things utilize nutrients to construct their body. 	<ul style="list-style-type: none"> - Analysis of documents - Look out information in a text. - Give examples from every day life. 	
- Energy production.	<ul style="list-style-type: none"> - Notice that living things use a part of nutrients and oxygen during respiration to produce energy that is used for various body activities and heat production. 		
1.5.2 Importance of nutrition and respiration at the level of habitat.			
- Food chains.	<ul style="list-style-type: none"> - Understand that a food chain is a series of organisms (plants and animals) where by each organism is a food for the next. - Deduce that the first food level constitutes the producers and other food levels are the consumers . - Form a simple food chain from a list of organisms living in the same habitat. 		

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<p>2- Reproduction</p> <p>2.2.2 Reproduction of non-flowering plants.</p> <ul style="list-style-type: none"> - Sporangium and spores. - Prothallus. <p>- Fertilization.</p> <p>- Development.</p> <p>2.3 Significance of reproduction.</p> <p>2.3.1 Conserving the characteristics of the species.</p> <p>2.3.2 Diversity of organisms within the same species.</p> <p>2.3.3 Selective breeding.</p>	<ul style="list-style-type: none"> - Know that some non-flowering plants reproduce by spores. - Identify a sporangium and spores. - Know that spore forming plants produce a prothallus that gives two types of gametes: the male and the female gametes. - Know that the union of a male and a female gamete gives a zygote. - Know that the development of a zygote gives an adult plant. - Observe a small fern growing from a prothallus. - Understand that both sexual and asexual reproduction maintain the characteristics of species. - Understand that sexual reproduction favors diversity among individuals within the same species while asexual reproduction maintains the characteristics of individuals from one generation to another. - Know that Man uses vegetative and sexual reproduction to produce new varieties of breeds and obtains a large number of identical organisms. 	<ul style="list-style-type: none"> - Observation of documents. - Give examples from every day life. - Look out information in a text. - Analysis of documents. Rose, wheat, potato.... 	<ul style="list-style-type: none"> - Limited to ferns. - Do not go into the details of hybridization techniques.

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Content	Learning objectives (Skills...)	Activities	Remarks
<p>3 - Interdependence of living things</p> <p>3.2 Relationships between individuals in the ecosystems.</p> <p>3.2.1 Relationships between individuals of the same species.</p> <ul style="list-style-type: none"> - Social behavior. • Social life • Importance of communication. <p>3.2.2 Relationships between individuals of different species.</p> <ul style="list-style-type: none"> - Predation. - Parasitism. - Commensalism. - Mutualism. 	<ul style="list-style-type: none"> - Recognize that social behavior is a series of behaviors and actions that express varied relationships in population of animals of the same species. - Recognize that a society is a group of individuals of the same species where each member performs a specific duty. - Identify the principal modes of social lives and specify their characteristics. - Notice that communication in social life is based on the exchange of information among the members of the society and permits the performance of vital functions. - Notice that there are several types of food relationships commensalism, predation, parasitism, mutualism. - Know that in the case of predation the predator captures its own prey and feeds on it. - Relate that the predator-prey relationships to the dynamic equilibrium between the two species. - Notice that parasitism is a close relationship between two organisms of different species where one of them, the parasite, benefits from the host, by taking its food and hurting it. - Recognize that commensalism is the relationship between two organisms of different species where one benefits from the other without harming it. - Recognize that mutualism is a permanent, association between two organisms of different species where each one benefits from the other. 	<ul style="list-style-type: none"> - Give examples from every day life. - Observation of documents. - Analysis of sequences in a film. - Look out information in a text. Fish, birds, honey bees, ants, wolves... 	<ul style="list-style-type: none"> - Restrict the discussion to: family life, groups life, and organized societies. - To be restricted to one example of each type of relationships.

Reduction of the Life and Earth Sciences Curriculum Of the Eighth Year Basic Education

بموجب التعميم الذي صدر عن وزير التربية رقم ٣٥/م/٩٩ تاريخ ٥ آب ١٩٩٩
ألغي تدريس الوحدة المتعلقة بالتكاثر البشري، لذلك يعتبر تعليق تدريس هذه الوحدة
بمثابة التخفيف لهذه المادة.

REDUCTION OF THE LIFE AND EARTH SCIENCES CURRICULUM

8th Year Basic Education

Content	Learning objectives (Skills...)	Activities	Remarks
<p>3- Earth and the environment</p> <p>3.3.1 Structure of the Earth - Earth's surface.</p> <p>3.3.2 The dynamics of Earth.</p> <p>- Lithospheric plates</p> <p>- Mobility of lithospheric plates.</p>	<p>- Know that the ocean floor and land differ in their morphology.</p> <p>- Identify the principal zones of oceans and land.</p> <p>- Know that the global tectonic is formed by the manifestations of surface activity of the Earth which is explained by the mobility revealed by the lithospheric plates.</p> <p>- Notice that the lithospheric plates are rigid parts, limited by geologically active zones (fronteirs).</p> <p>- Note that oceanic lithosphere is formed at a dorsal level by accretion and disappears by subduction in the mantle at the level of the breaks.</p> <p>- Note that the lithospheric plates' movement may have a consequence in opening or closing of oceans and the collision of continents.</p> <p>- Relate the subduction and the collision to the formation of mountain ranges.</p>	<p>- Analysis of a relief map of the Earth's surface.</p> <p>- Observation and analysis of documents and graphs.</p> <p>- Analysis and observations of documents, given tables and graphs.</p>	

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<p>3.4 Circulation of matter in Earth.</p> <p>3.4.1 Production and discharge of heat by Earth.</p> <p>3.4.2 Magma fabrication.</p> <p>3.4.3 Circulation of matter in subductional, collision and dorsal zones.</p>	<ul style="list-style-type: none"> - Note that the movements of material in the solid state (convection currents) leads to the discharge of heat which is of radioactive origin produced by earth. - Relate convection currents to the dense cool material and to the ascending of less dense hot material. - Relate the formation of magma to the conditions of the Earth's interior. - Note that the dorsal, subduction and collision zones produce respectively basaltic, andesitic magmas and crustal granitic magma. - Know that the circulation of matter in the solid state in the mantle results in the mobility of lithospheric plate. - Relate the circulation of matter to the formation of magmatic and metamorphic rocks. - Complete a concept map showing the circulation of matter at the frontiers of plates indicating the place of different types of rocks and showing the movements in the mantle. 	<ul style="list-style-type: none"> - Analysis of documents. - Analysis of a sequence in a film. - Analysis of experimental results. - Use of a scientific text. - Analysis of documents, tables and graphs. - Use of a text. 	<ul style="list-style-type: none"> - It is necessary to determine the quantity of heat produced by the mantle.

Content	Learning objectives(Skills...)	Activities	Remarks
<p>3.5 Geology and human responsibilities.</p> <p>3.5.1 The management of underground water of energetic rocks of soil.</p> <ul style="list-style-type: none"> - Management of energetic rocks of soil. <ul style="list-style-type: none"> • Energetic rocks. (fossil fuels) <p>• Management</p>	<ul style="list-style-type: none"> - Note that the liberation of energy by an energetic rock is due to the presence of organic matter or radioactive elements. - Know that the energy stored in coal originated from solar energy that has been initially synthesized by chlorophyllic plants and conserved by geological processes. - Identify the biological origin of coal. - Mention the steps of the formation of coal rock beds. - Note that energetic rocks are not renewable during a human life span because the formation of rock beds is a slow process. - Relate the rational management of available stored reserves to their use and to the rapidity of their discovery. 	<ul style="list-style-type: none"> - Observation and analysis of documents and given tables - Use of a text. 	<ul style="list-style-type: none"> - Mention the following examples : Coal, petroleum, minerals containing uranium. - Choosing coal as an example of energetic rocks is due to the following reasons: presence of plant fossils, its formation and study is easier than other rocks.

REDUCTION OF THE LIFE AND EARTH SCIENCES CURRICULUM

9th Year Basic Education

Content	Learning objectives (Skills ...)	Activities	Remarks
<p>1- Nutrition and metabolism</p> <p>1.2.1 Respiratory system and pulmonary ventilation</p> <p>- Pulmonary ventilation.</p> <p>1.3.1 Circulatory system</p> <p>- Arterial pressure.</p> <p>1.3.4 Adaptation of the organism to effort.</p>	<ul style="list-style-type: none"> - Know that pulmonary ventilation is the permanent partial renewal of alveolar air by the rhythmic movement of the thorax. - Notice the permanent presence of oxygen in the pulmonary alveoli. - Calculate the proportion of the renewed air knowing the volume of the residual air. - Know that the arterial pressure is the pressure exerted by the blood on the wall of the arteries. - Notice that the arterial pressure varies during the cardiac revolution between a maximum at ventricular systole and a minimum at the end of diastole. - Notice the importance of the arterial pressure for medical diagnosis. - Notice that there is a modification in the spread of the blood in the organs, at rest and during an intensive activity. - Notice that the modifications of the respiratory and cardiac rhythms are directly related to the effort done. - There is a correlation between the functioning of circulation and that of respiration in the organism. 	<ul style="list-style-type: none"> - Give examples from every day life. - Probing tables of given. - Analysis of sequences of a film. - Use a spirometer to determine the respiratory volume and analyze the obtained results. - Analysis of documents, of tables of givens and of graphs. - Measure the arterial pressure with the help of a sphygmomanometer. - Analysis of documents, of graphs and of tables of givens. 	<ul style="list-style-type: none"> - Mention the consequences of hypotension and of hypertension.

Content	Learning objectives (Skills ...)	Activities	Remarks
<p>1.5 Regulation of the internal medium: urinary function.</p> <p>1.5.1 Urinary system.</p> <p>1.5.2 Urine formation.</p>	<ul style="list-style-type: none"> - Know that the urinary excretion is the elimination, in the form of urine, of substances released in the internal medium. - Identify the principal constituents of urine. - Compare the composition of urine to that of the blood plasma. - Establish the urine-internal medium relationship. - Know that the urinary system is the group of organs that permits continuous urine formation and its periodical discharge. - Identify the different organs of the urinary system. - Draw a functional diagram of the urinary system. - Notice that urine is elaborated in a continuous fashion, by the kidneys, from the blood plasma. - Notice that this elaboration of urine is facilitated by an important vascularization of the kidneys. 	<ul style="list-style-type: none"> - Analysis of experiments done in the laboratory with the appropriate reagents to find the composition of the urine and the blood plasma. - Analysis of documents and tables of given. - Observation of the urinary system. - Analysis of documents. - Analysis of documents and of tables of given. 	

Content	Learning objectives (Skills ...)	Activities	Remarks
<p>1.5.3 Role of the kidneys.</p> <ul style="list-style-type: none"> - Purifying role. - Regulating role. <p>1.6 Nourishment and health.</p> <p>1.6.1 Varieties and equilibrium of nourishment</p> <ul style="list-style-type: none"> - Role of food. 	<ul style="list-style-type: none"> - Notice the toxicity of certain components of urine. - Notice that the kidneys ensure a purifying role by ridding the internal medium from a part of the wastes, especially the toxic wastes. - Notice that the kidneys ensure a regulating role by maintaining the composition of the internal medium. - Notice the change of the urinary volume after a significant up-take of water and sodium chloride. - Know that nutrition is the group of human behavior related to the consumption of food. - Relate the diversity of the organism's needs to the diversity of food. - Know that food ensures, on one hand, the growth of the organism and the renewal of cells by the help of assimilation, and on the other hand, the energy production by respiratory oxidations. - Relate the assimilation to the building food (plastic) and the production of energy to the oxidation of energy food. - Associate to each category of the simple food its energy value. 	<ul style="list-style-type: none"> - Give examples from every day life. - Analysis of documents, of tables of given, and of graphs. - Probing a scientific text. - Analysis of sequences of a film. - Give examples from every day life. - Searching in CDI. - Give examples from every day life. - Analysis of documents, of tables of given and of graphs. - Probing a text. 	

Content	Learning objectives (Skills ...)	Activities	Remarks
<p>- Food ration.</p> <p>1.6.2 Basic principle of a balanced diet.</p>	<ul style="list-style-type: none"> - Know that food ration is the nature and quantity of food to be given every day to an individual in order to satisfy his complementary and mini-mum needs of material and energy. - Determine the minimum needs of an individual which ensure the permanence of its vital functions. - Notice the complementary needs which vary from one individual to another with the activity, physiological status, the conditions of the me-dium... - Know that a balanced diet must contribute in maintaining a good health, cover the orga-nism's needs and compare the expenditure of energy and materials to the functioning of organs. - Relate the well balanced diet to the presence of carbohydrates, lipids and proteins in given proportions. - Notice that a balanced food ration provides certain nutrients that the organism cannot ma-nufacture (amino acids, water, mineral salts, vitamins, plant fibers...). - Notice that the nutritional habits are related to the cultural habits and the economic conditions of the population. - Relate the nutritional habits to the problems of malnutrition and of under nutrition. 	<ul style="list-style-type: none"> - Give examples from every day life. - Analysis of documents, of tables of given and of graphs. - Analysis of experimental results. - Use of floppy discs on food ration. - Give examples from every day life. - Analysis of documents, of tables of given and of graphs (epidemiological given, pathological cases due to nutritional deficiencies). - Use of floppy discs related to the avitaminoses. - Analysis of sequences of a film. - Searching in CDI. - Probing a text. 	

Content	Learning objectives (Skills...)	Activities	Remarks
2.2 Elaboration of the tactile sensation.	<ul style="list-style-type: none"> - Notice that the tactile sensation is done after a contact with the skin (excitation). - Notice that the elaboration of the tactile sensation necessitates three steps: the excitation of the tactile receptors which provokes a nerve message, the conduction of this message and the role played by the sensory cerebral center. - Draw a functional diagram illustrating the conduction of the tactile nerve message from its initiation until it reaches the nervous center. 	<ul style="list-style-type: none"> - Give examples from every day life. - Analysis of documents and of tables of given. 	
2.2.1 Threshold of stimulation.	<ul style="list-style-type: none"> - Know that the threshold of stimulation is the minimum intensity that a stimulation must attain for eliciting a nerve message. 	<ul style="list-style-type: none"> - Give examples from every day life. - Analysis of documents, of tables of given. 	
2.2.2 Tactile receptors.	<ul style="list-style-type: none"> - Know that the tactile receptors are the structures situated in the dermis and are sensitive to the variations of pressure. - Design and describe an experimental procedure to prove the presence of these tactile receptors. 	<ul style="list-style-type: none"> - Observation of a microscopic section of the skin. 	
2.2.3 Neuron.	<ul style="list-style-type: none"> - Notice that the neuron, characterized by at least two prolongations (nerve fibers), is a nerve cell that creates and conducts the nerve messages. - Identify the characteristics of a nerve cell. - Make a functional diagram of a neuron. 	<ul style="list-style-type: none"> - Dilaceration of a nerve. - Observation of a microscopic preparation of a nerve and of cell bodies in a section of the spinal cord. 	
2.2.4 Synapse.	<ul style="list-style-type: none"> - Notice that the synapse is a region of junction between two neurons ensuring the transmission of nerve messages. - Identify the region of junction between two neurons. 	<ul style="list-style-type: none"> - Analysis of documents. 	

Content	Learning objectives (Skills...)	Activities	Remarks
2.3 Organization of the encephalon.	<ul style="list-style-type: none"> - Notice that the human encephalon has three essential parts: the cerebrum, the cerebellum, and the medulla oblongata. - Notice that the cerebral hemispheres have different sensory areas that can be localized by the variations of the blood discharge related to the cerebral activity. - Identify the organization of the encephalon of a mammal and notice the activity of a cerebral center. 	<ul style="list-style-type: none"> - Analysis of documents: MRI = Magnetic Resonance Imagery, scintigraphy. 	
2.4 Danger of toxication: addiction to tobacco, alcohol and drugs.	<ul style="list-style-type: none"> - Notice that the function of the nervous system can be disturbed by certain substances (alcohol, tobacco, drugs), by certain elements of the environment (noise, light) and by certain life styles leading to a disequilibrium in the alternation of waking-sleeping. - Know that toxication is a repeated and abused consumption of harmful substances to the organism. - Notice that toxication leads to a dependance revealed by a physical suffering and a psycho-logical one in case of its lack. - Make a relationship between the habituation caused by addiction and the necessity to increase regularly the doses to be consumed to obtain the required effect. 	<ul style="list-style-type: none"> - Give examples from every day life. - Probing a scientific text. - Analysis of documents and tables of given. - Analysis of sequences of a film. - Searching in CDI. 	

Content	Learning objectives (Skills...)	Activities	Remarks
<p>3- Reproduction and genetics.</p> <p>3.5 Production of substances necessary for the industry of nutrition and for medicine by genetic engineering.</p> <p>3.5.1 Biomedical and agronutritional use of microorganisms.</p> <p>3.5.2 Variety and importance of the usages of microorganisms.</p>	<ul style="list-style-type: none"> - Notice that Man uses certain non-pathogenic microorganisms in biology, in medicine and in the agronutritional industry, for the manufacturing of products that are beneficial to Man. - Notice that biotechnology is the group of industrially used techniques of living beings that aim at producing certain substances necessary for Man. - Notice the means that permit the increase of the yield and the quality of the production. - Notice that the natural use of certain microorganisms permits the production of food, the industrial manufacturing of pharmaceutical substances or of substances used in the production of food. - Show that the biomedical and agronutritional use of microorganisms rests on the use of varieties that can multiply in a certain medium and transforming it. - Search for the diversity of the techniques of the usages of microorganisms. - Demonstrate that certain techniques which modify the genetic make-up of certain bacteria permit the manufacture of nutritional or vaccines... - Schematize a technique of the genetic make-up modification. 	<ul style="list-style-type: none"> - Give examples from every day life. - Probing a text. - Analysis of documents, of tables of given and of graphs. - Production of agronutritional and pharmaceutical substances; manufacturing of yoghurt, cheese, bread, antibiotics, vitamins and enzymes. - Analysis of sequences of a film. - Analysis of documents. 	<ul style="list-style-type: none"> - Include some techniques to illustrate the importance of microorganisms.

Content	Learning objectives (Skills...)	Activities	Remarks
<p>3.5.3 Microorganisms.</p> <ul style="list-style-type: none"> - Systematic diversity. - Biologic diversity. - Multiplication power. 	<ul style="list-style-type: none"> - Know that all microorganisms are only observed under the microscope and that some are pathogenic, others are not. - Notice that the microorganisms belong to many varied groups: protozoa, microscopic fungi, yeasts, mosses, bacteria and viruses. - Gather the criteria that permit to classify micro-organisms. - Notice that the life styles of microorganisms are widely varied (free life, mutualism, parasitism) and are either aerobic or anaerobic. - Design an experimental procedure that permits to determine the life conditions of some micro-organisms. - Know that the microorganisms quickly reproduce asexually. - Relate the genetic identity of microorganisms to their mode of reproduction. 	<ul style="list-style-type: none"> - Give examples from every day life. - Probing a scientific text. - Analysis of documents and tables of given. 	<ul style="list-style-type: none"> - Do not go through the systematic study of micro-organisms and their characteristics. Mention their presence, their biologic and systematic diversity, and their capability of multiplication in the different techniques used. - Table of classification accessible by students is enough.

REDUCTION OF THE LIFE SCIENCE CURRICULUM

1st Year Secondary

Content	Learning Objectives (Skills...)	Activities	Remarks
<p>1- Functional organization of living things.</p> <p>1.2.2 Hormonal communication</p> <ul style="list-style-type: none"> - System of communication. • The discovery of chemical communication. • Experimental study of the chemical communication between organs. 	<ul style="list-style-type: none"> - Point out that in an organism there is a slow circulation of chemical signals that assure an exchange of information between different organs. - Analyze certain experiments that has lead to the discovery of chemical communication. - Explain how the experiment of Bayliss and Starling demonstrates that the communication between the duodenum and the pancreas is done by blood. - Deduce that a hormone is a specific chemical messenger. - Demonstrate experimentally to show that different cells in an organism can communicate with each other by chemical messages. - Analyze the consequences of the ablation of an endocrine gland. - Explain how can we remedy the consequences of the ablation of an endocrine gland. 	<ul style="list-style-type: none"> - Use of documents or getting information from a text (The work of Pavlov, Wertheimer and Lepage, and Bayliss and Starling). - Use of experimental results: consequences of ablation, grafting, injecting the extract of organs..... 	<ul style="list-style-type: none"> - The starting point of the study of hormonal communication should be a problem about development or growth: disfunctioning of thyroid, puberty..... - Limit the experimentation to a single endocrine gland: testicles or thyroid.

Content	Learning Objectives (Skills...)	Activities	Remarks
<ul style="list-style-type: none"> - Essential characteristics of the hormonal communication. • Characteristics of hormonal gland. 	<ul style="list-style-type: none"> - Understand that the cells of an endocrine gland take out from blood the necessary elements for the manufacturing of the hormones. - Point out that hormones are liberated in the extra cellular medium and then pass into the blood. - Interpret the histological characteristic of an endocrine gland by a labeled drawing from observation. - Make a diagram reviewing the steps of the functioning of the secretory cells of an endocrine gland. 	<ul style="list-style-type: none"> - Observations of commercial microscopic section of glands: thyroid, testicle. - Electron microscopic observation of secretory cells. 	<ul style="list-style-type: none"> - Specify the relations of endocrine cells with the internal medium without going through the details of functioning of thyroidal follicle or testicle.

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<ul style="list-style-type: none"> • Characteristics of the hormonal message. 	<ul style="list-style-type: none"> - Point out that the hormonal message is related to the concentration of the hormone in the interior medium that transport it. - Notice that the hormones fixes itself to the receptors of the target cells and modifies their activities. - Explain schematically the pathway of hormonal message from the endocrine cell toward the target cell. - Make a concept map to compare the two kind of communication: hormonal and nervous. 	<ul style="list-style-type: none"> - Use of documents tabulated data, graphs.... to determine the mode of action of a hormone on the target organ and the specificity of recognition of this hormone by the target organ. 	<ul style="list-style-type: none"> - Don't go through details on the recognition of the receptor hormone or the localization of these receptors. - It is necessary to establish links between the learned concepts to certain medical problems in order to motivate the students or to go through extensive study.

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<p>2- Plant productivity and environmental factors.</p> <p>2.1 Producing productive plants.</p> <p>2.1.1 Productive plants and genetic programs.</p> <p>2.1.2 Increased production of productive plants.</p> <p>2.1.3 Production of plants in a massive number.</p> <p>-Vegetative multiplication.</p> <p>- Obtaining plants by microfragments.</p>	<ul style="list-style-type: none"> - Know that plants are said to be productive when they have the ability of being cultured in an economic and productive way in a given field. - Relate the productivity of a plant to its genetic program. - Find out information that show the improvement done on a plants' productivity. - Notice that Man always resolves to improve the productivity of cultivated plants through empirical selection. - Relate the genetic selection and hybridization to the obtaining of more productive producers. - Plan for an experimental protocol to obtain a pure line. - Identify hybridization techniques and deduce their economic interests. - Appreciate the importance of the conservation of genetic diversity in a species. - Notice that Man has always used the technique of vegetative multiplication (cuttings, grafting,...) to obtain clones. - Explain how in vitro cultures of meristems, protoplast and by microcuttings, permit obtaining an entire organism identical to the mother plant. - Compare the characteristics of different multiplication techniques in vitro. - Understand that a potent cell is capable of giving individuals identical to each other and in turn identical to the mother plant (clones). - Notice the importance of the "non-stop" production of plants. 	<ul style="list-style-type: none"> - Search in a CDI (Center of documentation and information). - Use of documents. - Search in a CDI. - Observation and analysis of documents (data, tables, films, text...) for the comprehension of hybridization techniques and their economic interest. - Field observation of grafting and cuttings techniques. - Making cultures in vitro in the classroom. - Use of documents, tables and graphs about cultures in vitro concerning ornamental plants (carnation, orchids, roses,...) or food plants (potatoes, peaches, almond, strawberries...) - Getting information from a text. 	<ul style="list-style-type: none"> - Mention the very limited possibility of cloning in animals.

Content	Learning Objectives (Skills...)	Activities	Remarks
<p>2.2 Influence of environmental factors on the production of productive plants.</p> <p>2.2.1 Productivity of a culture and limiting factors.</p> <ul style="list-style-type: none"> - Notion of productivity. - Factors of productivity. <ul style="list-style-type: none"> • Factors related to photosynthesis. • Other factors - Notion of a limiting factor <p>2.2.2 Action on environmental factors.</p> 	<ul style="list-style-type: none"> - Know that the productivity is the total increase of plant biomass per unit area (hectar) and per unit time (year). - Differentiate between the notion of productivity and the notion of turn over. - Point out factors related to photosynthesis that affect plant productivity. - Deduce the influence of each factor on this productivity. - Draw a graph representing the variation of intensity of photosynthesis versus each one of the factors affecting photosynthesis. - Point out the influence of biotic factors and factors related to climatic conditions or the physical qualities of soil on plant productivity. - Know that the limiting factor is a factor that should have the priority to be improved because it limits the productivity. - Plan for an experimental protocol to show clearly and rapidly a limiting factor. - Point out that Man can optimize the production of a plant species by acting on limiting factor (s). - Specify the characteristics of different cultural practices (field cultures, green house cultures, cultures without soil). - Identify environmental factors where Man can act to improve the productivity in each of the cultural practices. - Mention uncontrollable environmental factors in the case of field cultures. 	<ul style="list-style-type: none"> - Look out information in a text. - Observation of documents or the use of a text. - Experimental study of the action of light, temperature and the CO₂ concentration or bicarbonates in the medium, on the intensity of photosynthesis (experimentation assisted by computer or other means). - Analysis of tables and graphs. - Getting information from a text or analysis of documents. - Experimentation on the combined influence of light and CO₂ concentration in the medium, on the intensity of photosynthesis. - Analysis of tables and graphs. - Getting information from a text. - Analysis of tables and graphs. - Visits to places where ornamental plants are produced. - Interpretation of experimental results (field cultures, green house cultures, or without soil cultures). 	<ul style="list-style-type: none"> - Restrict laboratory work to the study of only two factors. - Green house, plastic tunnels, agronomic research institute.... - Mention the technique of carbon manure that is sometimes used in green houses.

Content	Learning Objectives (Skills...)	Activities	Remarks
<p>3- Management and protection of the environment</p> <p>3.1.3 Management and protection of fresh water habitats</p> <ul style="list-style-type: none"> - Water protection against pollution. • Reduction of organic pollution. <ul style="list-style-type: none"> • Reduction of water beds pollution by nitrates. • Reduction of Eutrophication. <p>3.2 Degradation, management, and protection of soil.</p> <p>3.2.1 Soils as organized evolving systems.</p> <ul style="list-style-type: none"> - Organization of a soil. <ul style="list-style-type: none"> - Physio-chemical study of soil. • Study of the chemical composition of soil. 	<ul style="list-style-type: none"> - Notice that the treatment of waste water in the purification stations and the techniques of lagooning are at the base of the fight against organic pollution. - Compare the functioning of a purification station and the lagooning technique to the natural auto-purification of a water stream. - Label a concept map of a purification station. - Recognize that the "inhabitant- equivalent" corresponds to the daily wastes or pollutants released by a permanent inhabitant of a collectivity (166 gms). - Relate certain agricultural practices such as the retention and fractionation of fertilizers, and installing winter cultures, to the reduction of water tables pollution. - Relate dephosphatation in the purification stations and washing water to the reduction of eutrophication. - Notice that soil is generally organized in a horizon characterized by their structure and texture. - Identify the different soil horizons in a soil profile. - Recognize that the soil components are mineral (sand, silt, clay) and organic in nature (organic debris and humus). - Show the fundamental constituents of soil. 	<ul style="list-style-type: none"> - A visit to a purification station. - Analysis of sequences in a film. - Observation and analysis of documents. - Use of a scientific text. - Analysis of tables and graphs. - Field observation or analysis of documents concerning a soil vertical section. - Experimental study of the main organic and mineral constituents of a soil. 	

Content	Learning Objectives (Skills...)	Activities	Remarks
<ul style="list-style-type: none"> • Physical study of soil. - Formation of soils. • Factors of formation. • Mechanisms of the formation. - Evolution of soils. 	<ul style="list-style-type: none"> - Relate the texture of soil to its granulometric composition and its structure, to the humic clay complex. - Relate the texture and structure to the porosity, permeability, capacity of water retention and absorption of soil. - Make a relationship between the structure and the fertility of agricultural lands. - Notice that soil is the result of the surface alteration (weathering) of parent sandstone rocks under the combined action of climatic factors (precipitation and temperature) and living things. - Relate the mechanism of soil formation to the degradation of rocks and to the processes of mineralization and humification. - Notice that parent soilstone rock degradation (weathering) is due to physical and chemical processes. - Recognize the role of microorganisms in the transformation of organic matter as a result of mineralization and humus formation. - Recognize that soil is a dynamic system that evolves under the action of environmental factors. - Differentiate between an evolved soil from a non-evolved soil. 	<ul style="list-style-type: none"> - Tactile discrimination of soil texture. - Observation of documents or microscopic observation of soil structure. - Measurement of porosity of soils and their capacity of water retention. - Measurement of the calcium concentration in a soil. - Observation of documents. - Analysis of sequences in a film. - Use scientific documents. - Use a key to determine the fauna in a soil. 	<ul style="list-style-type: none"> - Make a link with the second part of the program: plant production and environmental factors. - Limit the study to microorganisms that are responsible for mineralization and to the detritivores that assure the decomposition of leaves. - All the steps of evolution of soil starting from rocks to climatic soil (brown soil for example) are not required.

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Content	Learning Objectives (Skills...)	Activities	Remarks
<p>3.2.2 Soils as fragile ecosystems.</p> <ul style="list-style-type: none"> - Soils and vegetal production. • Forests as balanced ecosystems. • Cultivated soils: agrosystems in disequilibrium. 	<ul style="list-style-type: none"> - Precise the composition of the mineral reserves of forest soil. - Relate the uptake of the mineral reserves of soil and the mineralization of litter to the dynamic equilibrium of a forest ecosystem. - Identify the different steps of the cycle of a biogenic element. - Notice that equilibrium of mineral reserves in soil is ensured by natural processes that obtain a supplementary intake of biogenic elements. - Notice that crops take from a medium a major part of organic matter that must be compensated by intakes of mineral elements. - Identify the role of fertilizers in the conservation of the favorable structure of soil (stabilized wet-clay complex) and in restoring the biogenic elements. - Compare between an ecosystem in equilibrium and an agrosystem which is not in equilibrium. 	<ul style="list-style-type: none"> - Observation and analysis of documents. - Use of CDROM to simulate the carbon and nitrogen cycles. - Analysis of graphs and experimental results. - Inquiry to discover the functioning and contribution of agronomic laboratory in Lebanon in making agricultural land fertile. 	

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Content	Learning Objectives (Skills...)	Activities	Remarks
<ul style="list-style-type: none"> - Degradation of soils by Man's action <ul style="list-style-type: none"> • Intensive agriculture and erosion • Deforestation. • Overgrazing • Chemical and biological degradation of soils. - Protection of soils. 	<ul style="list-style-type: none"> - Know that deforestation, mechanization and intensive cultures, overgrazing and unfavorable climatic factors lead to desertification and soil erosion. - Relate running water and intensive monocultures to erosion. - Identify reasons and consequences of deforestation. - Relate overgrazing to desertification. - Recognize that chemical and biological degradation of soil are due to salinity and the utilization of pesticides. - Relate micro-irrigation and utilization of biodegradable products respectively to the decrease of salinity and the maintenance of microfauna and microflora of soil. - Indicate the principal methods used by Man to protect soil (crop rotation, controlling running water, respecting the forests covers, amending by humus or calcareous substances). - Recognize that Man should have a responsible behavior towards equilibrium in nature. 	<ul style="list-style-type: none"> - Direct observation or analysis of aerial photographs concerning soil degradation and its consequences. - Inquiry on deforestation in Lebanon. - Analysis of documents to show the impact of soil degradation on water tables and productivity..... - Analysis of documents - Analysis of a text. - Research on pesticides used in Lebanon. - Analysis of documents. - Analysis of sequences in a film. 	<ul style="list-style-type: none"> - Underline the importance of ploughing with the direction of inclination in agricultural practices.

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Content	Learning objectives (Skills ...)	Activities	Remarks
	<ul style="list-style-type: none"> - Specify the notion of «identity markers». - Notice that organogenesis, and growth require nutrients as a source of materials and energy. - Notice that most of the cells of the organism are being constantly renewed while their characteristics are conserved. - Notice that the cells of an organism contain the same genetic information that ensures the conservation of the biological identity during the development and the renewal of cells. 	<ul style="list-style-type: none"> - Getting information from: <ul style="list-style-type: none"> • using results of grafts (between identical twins, between fraternal twins) • tables about blood composition that show the nature of placental exchanges. - Observing sections of the skin during regeneration, and smears of bone marrow, and tissue cultures. - Observing microscopic preparations and using documents that show mitotic division. - Observing electronographic duplication of chromosomes. 	<ul style="list-style-type: none"> - Emphasize the placental organization. - Present to the students the characteristics of the animal cell and mention the different techniques of the micorscopic observations.

Content	Learning objectives (Skills ...)	Activities	Remarks
<p>1.2 Molecular renewal and energetic metabolism</p> <p>1.2.4 Energy metabolism in Man. ✓</p> <ul style="list-style-type: none"> - Nature and origins of energy metabolites. • Various metabolites. • Storing organs. • The liver: the organ that regulates glycemia. - Metabolism of muscle cells. • Muscle fiber: a very differentiated cell. 	<ul style="list-style-type: none"> - Note that many cells are capable of using the various metabolites «glucose, fatty acids, amino acids»? - Note that the nerve cells and the blood cells use only glucose. - Compare the amount of glucose in the blood of a fasting individual and after a meal rich in carbohydrates. - Analyzing the composition of plasma metabolites. - Identify the organs that store glucose (liver, muscles, and adipose tissue). - Note that the primordial role of the liver is the continuous furnishing of glucose despite the irregular uptakes. - Note that the variation in the amount of glycogen in the liver is highly related to the nutritive uptake of carbohydrates. - Relate glycogenesis and glycogenolysis to the presence of enzymes in the liver. - Note that the muscle fiber is a specialized cell having a particular structure and chemical composition. - Label a schematic drawing of a muscle fiber. - Label the ultra structure of a muscle fiber. 	<ul style="list-style-type: none"> - Getting information from document, graphs and tables. - Getting information from a text. - Interpreting the results of blood analysis. - Analyzing the experimental results of graphs and of tables of givens. - Experimentation to give an evidence of the hepatic glycogen. - Using documents and tables of givens related to the storing and the production of glucose by the liver. - Microscopic observation of a muscle fiber. - Observing an electronography of a muscle fiber. 	<ul style="list-style-type: none"> - Emphasize the role of the liver as a fundamental organ of adjusting the glucose uptake to the cells. - Emphasize the structure of the muscle fiber to explain the mechanism of contraction

Content	Learning objectives (Skills ...)	Activities	Remarks
<p>2- Interdependence of living things and their relationship with the environment.</p> <p>2.2 Energy flow and the carbon cycle.</p> <p>2.2.1 Tropical organization of an ecosystem.</p> <p>2.2.2 Energy flow in an ecosystem.</p>	<ul style="list-style-type: none"> - Know that the trophical relationships between all the living things of an ecosystem, ensure a transfer of materials which favors a flow of energy. - Differentiate between primary productivity and secondary one, producers and consumers. - Notice that there is a progressive decrease of biomass starting from producers until the final consumer, in an ecosystem of dynamic equilibrium. - Illustrate the complexity of the trophical relationships in an ecosystem by ecological pyramids. - Compare the pyramid of biomass to pyramids of productivity, - Notice that every energetic conservation (photosynthesis, biological oxidation...) liberates heat. - Know that the primary production, conditions the flow of energy in an ecosystem. - Notice that the quantitative study of the energy flow in an ecosystem allows the establishment of energy relationships at equilibrium. - Establish a relationship between the heat lost and energy conservation in an ecosystem, which explains the release of external energy. 	<ul style="list-style-type: none"> - Getting information from a text. - Probing through documents, graphs, and givens about the net and the crude photosynthetic turnover and on the ecological turnover. - Interpreting tables of givens related to the ecological pyramids. - Getting information from documents, graphs, and tables of givens. - Analyzing a concept map of energy in an ecosystem. 	<ul style="list-style-type: none"> - Guide the students to reflect upon the use of natural resources by Man.

7.1

Content	Learning objectives (Skills ...)	Activities	Remarks
2.2.3 The carbon cycle in an ecosystem.	<ul style="list-style-type: none"> - Recognize that the energy flow maintains the cycles of materials and in particular the carbon cycle in an ecosystem in equilibrium. - Notice that autotrophs change the mineral carbon they have in the oxidized form as carbon dioxide into organic carbon. - Notice that carbon is restored to the environment, principally, in the form of carbon dioxide by the catabolism of living things. - Identify the essential role of the microorganismic decomposers in the mineralization of carbon. - Relate the phase of mineral carbon reduction during photosynthesis to the mineralization phase of organic carbon during metabolic processes. - Draw the carbon cycle in an ecosystem. - Recognize that the recycling of the organic carbon into mineral carbon in an ecosystem is done by energy loss in the form of non retainable heat. - Notice that the solar energy is the «motor» of the carbon cycle. 	<ul style="list-style-type: none"> - Getting information from documents and tables of given relative to the passage of «mineral» carbon to «organic» carbon and vice-versa. - Probing through documents and givens on the importance of the metabolism of microorganisms found in the soil. - Analyzing documents. - Getting information from a text. 	

2.9

Content	Learning objectives (Skills ...)	Activities	Remarks
3.1.3. Food is a source of nutrients.	<ul style="list-style-type: none"> - Know that the foods rich in carbohydrates are mainly of plant origin. - Notice that the foods rich in lipids are grains, meat, eggs, and fish. - Notice that all the foods containing proteins in variable proportions and those that are highly rich in proteins, contain little carbohydrate and lipid reserves. - Know that food is a source of nutrients. - Specify that nutrients (oses, amino acids, fatty acids and glycerol...) obtained by food digestion, are necessary for the structural composition and the functioning of the organism. - Note that amino acids are «plastic food» for the renewal of cells and the synthesis of numerous substances (enzymes, hormones...). - Relate the movement and the heat production of an organism to the necessity for an energy source. - Make a concept map showing that food is a source of nutrients. 	<ul style="list-style-type: none"> - Using information from a text or from tables of givens that group the foods according to their origin or their richness in carbohydrates, lipids and protein. - Using information from a text. - Analyzing documents, tables of givens, and graphs about the fate of proteins, lipids, and carbohydrates during digestion. 	
3.2 Basic principles of a well balanced diet.			
3.2.1 A nutrition of sufficient quantity.	<ul style="list-style-type: none"> - Note that the first principle of a well balanced diet is to cover, not excessively nor defficiently, the energy expenditures of an organism. - Notice that the energy need varies from one individual to another. - Relate the variations of energy needs to the adaptation of the food ration pertaining to the individual. 	<ul style="list-style-type: none"> - Using information from a text. - Searching in CDI. - Getting information from a document or from tables of givens. 	

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Content	Learning objectives (Skills ...)	Activities	Remarks
<p>3.2.2 Evaluation of the qualitative needs.</p>	<ul style="list-style-type: none"> - Classify foods according to their nutritive qualities. - Emphasize the importance of food deficiencies in the study of food needs. - Emphasize the importance of vitamins as cofactors in the enzymatic reactions. - Identify the principal role of certain vitamins and their food sources. - Note the fragility of vitamins and the ways of their preservation. - Notice that the absence of certain amino acids (lysine, leucine...) that are not synthesized by the organism produce deficiency diseases. - Specify that malnutrition is as serious as under-nutrition. - Note that the organism is not capable of synthesizing certain fatty acids that are indispensable to the organism. 	<ul style="list-style-type: none"> - Analyzing document using tables of givens graphs or a text related to the: <ul style="list-style-type: none"> • nutritive quality of food. • richness of certain foods in vitamins. • influence of vitamins on an organism. • importance of certain fatty acids essential to an organism. • importance of fluorine on dental caries. 	<ul style="list-style-type: none"> - Stress on the vitamins: A,B,C,D and K.

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Content	Learning objectives (Skills ...)	Activities	Remarks
3.2.3 Balanced food rations.	<ul style="list-style-type: none"> - Identify the importance of mineral elements (iodine, fluorine, iron, sodium, calcium...) whose total absence provokes serious disorders. - Know that the non digestable fibers that are abundant in «green» foods, facilitate the intestinal transit. - Relate the balanced food rations to a qualitative and quantitative balance between the uptake and the expenditure. - Relate the principles of dietitics to the: <ul style="list-style-type: none"> • quantitative equilibrium in the input and the expenditure. • equilibrium of uptake of animal and plant proteins. • equilibrium of uptake of saturated fatty acids and the polyunsaturated fatty acids, (ratio $\frac{P}{S} = 0.5 - 0.7$). - Relate the varied and balanced food rations to the needs of the organism. - Know how to apply the principles of dietitics, taking into consideration the feeding habits pertaining to the family and the region; and the life styles of the individuals. 	<ul style="list-style-type: none"> - Getting information, using and analyzing documents, tables of givens and graphs related to the: <ul style="list-style-type: none"> • comparison of the varied food rations (work, an old man, chils..). • using charts of evaluation of foods. • setting up food rations according to needs. 	<ul style="list-style-type: none"> - S: saturated fatty acids. - P: polyunsaturated fatty acids.

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Human Reproduction

All the unit concerning Human Reproduction is suspended.

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REDUCTION OF THE LIFE SCIENCE CURRICULUM

2nd Year Secondary - Humanities

Content	Learning objectives (Skills ...)	Activities	Remarks
<p>1. Reproduction and heredity</p> <p>1.3.2- Medically assisted procreation technique.</p> <p>1.3.3- Birth control and bioethical problems</p> <p>1.4- Sexually transmitted diseases</p>	<ul style="list-style-type: none"> - Point out that the use of medically assisted procreation technique is a procedure capable of alleviating sterility in certain couples. - Recognize that birth control often poses serious ethical, psychological and jurisdictional problems which may not be solved. - Point out that abortion is not a contraceptive method, and that if it is performed within legal limits, it permits termination of a risky pregnancy. - Recognize that sexually transmitted diseases (STD) are infectious diseases transmitted by sexual contact between an infected person and another healthy one. - Notice that sexually transmitted diseases affect males and females. 	<ul style="list-style-type: none"> - Analysis of a table of data relevant to artificial procreation methods. - Observation of documents - Getting information from a text or a document. - Getting information from a text. 	<ul style="list-style-type: none"> - Mention the current medically assisted procreation methods: artificial insemination, in vitro fertilization.... - IUD: intrauterine device.

<p>1.5- Chromosomes</p> <p>1.5.1- Human karyotype</p>	<ul style="list-style-type: none"> - Recognize that STD are caused by different pathogenic agents. - Identify a few STD. - Notice that most STD result in sterility and sometimes death. - Point out that prevention of STD starts with information which permits everybody to assume full responsibility in his sexual relations. - Recall that chromosomes are located in the cell nucleus. - Note that all human beings have the same number of chromosomes. - Point out that a karyotype is the chromosome complement of a somatic cell arranged in pairs by order of size and form. - Identify sex chromosomes and autosomes. 	<ul style="list-style-type: none"> - Observation of micrographs showing the causative microorganisms of certain STD. - Analysis of a table of data relevant to STD. - Analysis of sequence in a film or projection slides. - Search for information about STD (prevention campaigns, pamphlets...) - Observation of a document showing a human karyotype. - Observation of a male human karyotype and a female one. 	<ul style="list-style-type: none"> - AIDS will be studied under the immunity part. - Note that AIDS is the most serious STD disease because no treatment exists actually up till now. - Develop the subject of prevention because the number of STD sufferers is increasing.
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<p>1.5.2- Transmission of chromosomes through sexual reproduction</p>	<ul style="list-style-type: none"> - Note that meiosis results in the formation of gametes. - Point out that meiosis reduces the number of chromosomes to the half and consequently every gamete receives one member from every pair of chromosomes. - Demonstrate the role of chromosomes in the determination of sex. 	<ul style="list-style-type: none"> - Analysis of a document - Interpretation of the results of a chromosomal analysis. 	
<p>1.5.3- Chromosomes and gene transmission</p>	<ul style="list-style-type: none"> - Recognize that the principal constituent of chromosomes is DNA. - Describe the structure of DNA. - Point out that the order of nitrogenous bases in DNA varies infinitely. - Notice that DNA is the hereditary material - Know that the chromosomes carry the hereditary factors (genes). - Point out that a gene is a segment of DNA which determines a certain hereditary characteristic. 	<ul style="list-style-type: none"> - Getting information from a text or a document about DNA structure. 	

<p>1.6- Genetic and chromosomal abnormalities</p> <p>1.6.1- Chromosomal aberrations</p>	<ul style="list-style-type: none"> - Recognize that chromosomal aberrations include all the abnormalities of number and structure of chromosomes. - Find out that the aberrations affecting the number of chromosomes arise from accidents occurring during parental meiosis. - Notice that an abnormality in meiosis leads to a bad consequence in the expected baby. - Point out that trisomy-21 (Down's syndrome) is the most frequent chromosomal aberration. - Identify trisomy-21. - Compare the course of normal meiosis to the abnormal one which leads to trisomy-21. - Point out the common characteristics to all persons having trisomy-21. - Notice that trisomy-21 is not hereditary and that its frequency increases with the age of the mother. - Notice that the sex chromosomes may also present abnormality. 	<ul style="list-style-type: none"> - Analysis of documents which reveal the consequence of abnormality during the formation of gametes through meiosis. - Analysis of a table showing the frequency of different chromosomal abnormalities. - Analysis of a relevant document. - Analysis of documents. - Getting information from a text. - Analysis of a graph. - Analysis of karyotypes with abnormalities in the sex chromosomes. 	<ul style="list-style-type: none"> - Do not develop the subject of the aberrations affecting the structure of chromosomes.
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1.6.2- Gene abnormalities	<ul style="list-style-type: none"> - Notice that a mutated gene results in a genetic disease. - Notice that genetic diseases are transmitted hereditarily. 	<ul style="list-style-type: none"> - Analysis of a document related to sickle-cell anemia or thalassaemia. - Analysis of pedigrees. 	
1.6.3- Prenatal diagnosis	<ul style="list-style-type: none"> - Recognize that prenatal diagnosis aims at anticipating the appearance of an abnormality from the embryonic stage of development. - Point out that prenatal diagnosis includes a group of methods for detection of fetal abnormality. - Notice that prenatal diagnosis is carried out when a risky pregnancy is suspected. 	<ul style="list-style-type: none"> - Observation of a document or sequence in a film. 	<ul style="list-style-type: none"> - Mutation: modification in the structure of a gene. - Evoke the risks of marriage among relatives. - Pedigree: genealogical tree
1.7- Human diversity 1.7.1- Polymorphism and uniqueness of man 1.7.2- Cause of genetic diversity 1.7.3- Consequence of genetic polymorphism	<ul style="list-style-type: none"> - Notice that human beings present a very great variability. - Recognize that interchromosomal and intrachromosomal mixing results in unique individuals. - Notice that genetic polymorphism offers advantages to the individual and to the species as well. 	<ul style="list-style-type: none"> - Analysis of photographic documents - Analysis of documents related to heterozygous individuals. - Drawing information out of a text. 	<ul style="list-style-type: none"> - Mention the role of mutations. - Mention, as an

			example, that the DNA is a real “genetic imprint”
Contents	Learning Objectives (Skills ...)	Activities	Remarks
2- Immunology and Health 2.3- Deficiencies and disorders of the immune system 2.3.1- Allergies 2.3.2- Auto-immune diseases 2.4- Immune response supports	<ul style="list-style-type: none"> - Recognize that allergy is an immediate reaction to an allergen. - Identify the two phases of an allergic reaction: sensitization and reaction. - Explain the mechanism of an allergic reaction. - Recognize that auto-immune diseases in certain persons are due attacks made on them by their own immune systems. - Note that it is important to support the immunity system in case of deficiency and failure. 	<ul style="list-style-type: none"> - Observation of a photographic document showing allergic manifestations in a human. - Analysis of documents relative to allergens and to the reactions which they induce. - Observation and analysis of a document showing the phases of allergy. - Getting information from a text. - Observation of documents on auto-immune diseases or a table of data. 	<ul style="list-style-type: none"> - Mention the existence of a genetic predisposition to allergy. - Mention that allergic reactions may be reduced by antihistaminic medicines.

2.4.1- vaccination	<ul style="list-style-type: none"> - Recognize that there are three ways to support the immunity system: vaccination, serotherapy and bone marrow transplantation. - Recognize that vaccination is a way of prevention which consists of inducing an immune reaction by introduction of an attenuated antigen or a killed one (vaccine) - Notice that vaccination launches an unimmediate immune response but with a long-lasting effect. 		<ul style="list-style-type: none"> - Mention that there is an obligatory timetable for vaccination in Lebanon.
2.4.2- Serotherapy	<ul style="list-style-type: none"> - Notice that serotherapy launches an immediate reaction but a short lasting one. - Notice that serotherapy is a curative method which consists of injecting specific antibodies to the antigen in action. 		
2.4.3- Bone marrow transplantation	<ul style="list-style-type: none"> - Recognize that bone marrow transplantation is a recent technique which provides an organism deprived of immunity defenses with cells that can reconstruct these defenses. 	<ul style="list-style-type: none"> - Observation and analysis of a document showing transplantation. - Getting information from a text. 	<ul style="list-style-type: none"> - Note that the currently used sera of human origin are gradually replacing the sera of animal origin.

REDUCTION OF THE LIFE SCIENCE CURRICULUM

3rd Year Secondary - Life Science Series

Content	Learning objectives (Skills...)	Activities	Remarks
<p>1- Genetics</p> <p>1.3 Genetic diversity of populations.</p>	<ul style="list-style-type: none"> - Know that a population is a group of individuals of the same species who live and reproduce by interbreeding in a well defined medium. - Notice that this group of individuals share a "gene pool" proper to the population. - Notice that in any population there is a genetic variation known as polymorphism. - Establish a relationship between the selective pressure exerted by the environmental factors and the increase in the frequency of certain alleles in defined populations. - Point that the migration tends to decrease the genetic divergences between the populations of a species. - Notice that natural selection stresses the genetic divergence in the case where the populations are placed in different environmental conditions. - Infer that there are no specific alleles that define a certain human population. - Notice that human populations differ in the relative frequency of alleles of certain genes. - Deduce that the notion of race is perfectly arbitrary and without scientific foundation. 	<ul style="list-style-type: none"> - Analysis of documents, of tables of given and graphs. - Probing a text. - Searching in CDI. <ul style="list-style-type: none"> - Analysis of documents, tables of given and graphs. - Searching in CDI. - Probing a text. 	

Content	Learning objectives (Skills...)	Activities	Remarks
<p>4- Systems of regulation and functional unity of the organism.</p> <p>4.2 Regulation of the arterial pressure.</p> <p>4.2.1 Measure and variations of the arterial pressure.</p>	<ul style="list-style-type: none"> - Know that the measure of the arterial tension is estimating, in a direct manner, the blood pressure in the humeral artery. - Compare the maximal or systolic arterial pressure to the minimal or diastolic pressure. - Mention the techniques permitting a direct measure of the pressure inside the circulatory system. - Notice the normal and the pathological variations of arterial pressure. - Locate the intracardiac innervation and specify its role in the cardiac revolution. - Draw a functional diagram of the extracardiac innervation, sympathetic and parasympathetic. - Prove the action of the nervous centers and of the sympathetic and parasympathetic nerves on the cardiac frequency and the motor activity of blood vessels. - Infer that the sympathetic centers are cardio-accelerators and vaso-motor and that the medullary parasympathetic are cardio-moderators. - Identify the different physiological parameters that can influence the arterial pressure. 	<ul style="list-style-type: none"> - Analysis of results of: <ul style="list-style-type: none"> • recordings of pressure in the different parts of the circulatory system. • the arterial pressure in function of activities, constraints... - Analysis of experimental results relative to the cardiac automatism. - Analysis of documents and of tables of given. - Methodical analysis of experiments of stimulation and of sectioning. - Analysis of the experimental results and of the clinical observations (cardiac flow, vasoconstriction, vasodilation, atherosclerosis,...). 	<ul style="list-style-type: none"> - Recall the anatomy and physiology of the heart and that of the vascular system.

Content	Learning objectives (Skills...)	Activities	Remarks
<p>4.2.2 Reflex controls of the arterial pressure.</p>	<ul style="list-style-type: none"> - Prove the organization of the regulating system of the arterial pressure. - Relate between the variation of the arterial pressure from its "reference value" and the mechanism of the nervous control. - Notice that a raise in the carotid pressure contributes in lowering the arterial pressure by stimulating the cardio-moderator medullary center and by inhibiting the cardio-accelerator and vaso-motor center. - Notice that a drop in the carotid pressure contributes in raising the arterial pressure by reducing the activity of the cardiomodulator center and by increasing the inhibition of the cardioaccelerator and vaso-motor centers. 	<ul style="list-style-type: none"> - Methodical analysis of experiments proving the organization of a regulating system. - Analysis of results and interpretation of recordings of nervous messages traversing the extracardiac innervation. 	<ul style="list-style-type: none"> - Receptors: baroreceptors of the carotid sinus and of the aortic arch. - System of communication: sympathetic and parasympathetic nerves. - Integration centers: spinal and medullary centers of the parasympathetic and the sympathetic systems. - Effectors: heart and blood vessels.

Content	Learning objectives (Skills...)	Activities	Remarks
<p>5- Evolution of living things.</p> <p>5.1 Parental relationships between living things.</p> <p>5.1.1 Time framework of evolution of life.</p>	<ul style="list-style-type: none"> - Know the geologic time and its subdivisions into eras, periods... - Specify the criteria that define the unity of the living world.. - Notice the diversity of the actual living world. - Recall the definition of species and its importance in the classification of the living world. - Notice that the living things are divided into prokaryotes and eukaryotes according to recent biological given. - Notice the succession of species during the geologic times. - Notice that the evolution is the only scientific explanation that considers the unity and the diversity of the living world in addition to the changes occurring during the geologic times. 	<ul style="list-style-type: none"> - Analysis of documents and of tables of given relative to geologic time. - Analysis of documents, of tables of given and of graphs. - Getting information from a text. - Analysis of sequences in a film. - Searching in CDI. - Analysis of documents and of tables of given relative to the: <ul style="list-style-type: none"> • appearance of vertebrates during geologic times. (study of fossils permitting to establish a chronological order). • phylogenetic links between the different vertebrates. 	<p>All the unit is suspended</p> <ul style="list-style-type: none"> - Mention: genetic code, proteosynthesis, ATP, meiosis, fertilization, chemical communication, the same nitrogenous bases. - Eukaryotes: DNA constituents of cells organized in chromosomes present in a nucleus and the presence of other cellular organelles. - Prokaryotes: absence of differentiated cellular organelles, DNA strand free in the cytoplasm.

Content	Learning objectives (Skills...)	Activities	Remarks
<p>- Creation of new genes.</p> <p>- Creation of new genotypes.</p> <p>5.2.2 Conservation of the genetic innovation.</p>	<ul style="list-style-type: none"> - Notice that the non-oriented, spontaneous, little frequent mutations can affect numerous genes and increase in number under the influence of certain environmental factors, thus playing a fundamental role in the genetic innovation. - Differentiate between a mutation of "natural selection" and a mutation of "architected genes". - Relate the mutations of "architected genes" to the important consequences on the phenotypes, therefore, on evolution. - Know that genic duplications can interfere in a divergent evolution of the produced duplicates that can explain the appearance of new genes; which in turn explains the appearance of more and more complex beings. - Notice that the new genes issued from the same ancestral gene form a multigenic family. These genes code for the proteins of neighbouring functions. - Notice the intervention of the sexual reproduction in the production of descendants of original genotypes accentuating the diversity. - Know that natural selection has its part in the conservation of the genetic innovation. - Infer that the natural selection privileges the conservation of alleles or allelic associations favorable in the ecological conditions of the moment. - Know that the birth of new species from a mother gene or speciation implies a reproductive isolation. 	<ul style="list-style-type: none"> - Analysis of documents and of tables of given. - Getting information from a text. - Searching in CDI. - Probing a given on the: <ul style="list-style-type: none"> • structure and sequence of various genes. • mechanism of creation of new genes from an ancestral gene: duplication, transposition, mutation... - Analysis of the multigenic family of globins. - Probing documents relative to the examples of: predation, adaptation, conquer and competition. - Analysis of documents and of tables of given. 	<ul style="list-style-type: none"> - The creation of new genes from the duplication and the re-association of fragments of preexisting genes is not to be studied. - Deal with speciation in a very brief way.

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Content	Learning objectives (Skills...)	Activities	Remarks
<p>5.3 Human evolution. 5.3.1 Criteria of human evolution.</p> <p>5.3.2 Phylogenetic relationships between Man and primates.</p>	<ul style="list-style-type: none"> - Notice that the most evident cause of a reproductive isolation is the geographical isolation. - Know that the human evolution is the progressive acquisition of morphological and cultural characteristics of the human lineage, and also of language. - Compare the morphological, anatomical and cultural characteristics that distinguish the principal types of hominids. - Know the main evolutionary stages of hominids. - Notice the criteria of human evolution: bipedal walking, increase in the cerebral volume, appearance of language, acquisition of techniques and development of cultural activity. - Notice the phylogenetic relations between modern Man and that of primates by a comparative study of karyotypes and homologous proteins. - Notice that a modification of certain genes of regulation, related to environmental changes, can be at the origin of the human lineage. 	<ul style="list-style-type: none"> - Getting information from a text. - Analysis of documents relative to the comparative study of moldings or reconstituted anatomical elements of the human species lineage; tools testifying their culture. - Analysis of documents relative to the main evolutionary stages of humans since the appearance of hominoids 4 to 1.4 MYA passing by the appearance of the genus Homo until the birth of the modern Man: Homo sapiens. - Analysis of documents relative to the comparative study of karyotypes, of homologous proteins of Man and of apes (anthropomorphs). 	<ul style="list-style-type: none"> - Mention certain Australopithecus, Homo habilis, Homo erectus, Homo sapiens.

REDUCTION OF THE LIFE SCIENCE CURRICULUM

3rd Year Secondary – Literature and Humanities Series

Content	Learning objectives (skills...)	Activities	Remarks
<p>1. Nutrition and health. 1.1 Diversity of food habits.</p>	<ul style="list-style-type: none"> - Recognise that food habits are diverse. - Identify the causes of variation of food habits. - Notice that the consumption of principal foods has evolved since the beginning of the XIX century. - Demonstrate that human feeding varies according to the region. 	<ul style="list-style-type: none"> - Getting information from text. - Search in a CDI. - Analysis of statistical data concerning an industrial country and results of surveys. - Observation and analysis of documents, tables or graphs. 	<ul style="list-style-type: none"> - Recall that consumed food is a mixture of mineral and organic substances. - Recall briefly the role of foods as source of matter and energy. It is not required to do a practical study of food. - Mention the existence of quantitative inequality of food between overnourished people and people that die of famine. - Recall the energetic values of the different foods.

Content	Learning objectives (skills...)	Activities	Remarks
<p>2. Neurobiology, human behaviour and health.</p> <p>2.1. Social communication.</p> <p>– Aggressiveness.</p> <p>– Dominance.</p> <p>– Emotional and stress reactions.</p>	<p>–Recognise that social life involves interindividual relations of diverse nature, and based on communication that may be expressed as aggressiveness, dominance and emotional reactions.</p> <p>–Understand that aggressiveness is a natural tendency to attack, which exists in the majority of species.</p> <p>–Take into account that aggressive behaviour is linked to rivalry, innate disposition, and may result from frustration induced by an obstacle.</p> <p>–Point out that dominance is an individual tendency to control others' behaviour and establish and maintain a social structure based on a hierarchy.</p> <p>–Recognise that an individual is permanently subject to disturbances of various origins called stress, which constitute aggression towards his own organism.</p> <p>–Point out that too many situations may underlie stress.</p>	<p>–Analysis of documents.</p> <p>– Observation of documents</p> <p>– Drawing information from text</p> <p>– Analysis of sequence in a film</p>	<p>– Draw attention to the fact that communication is achieved by exchange of signals (speaking, signs...) received by sensory receptors.</p>

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	<ul style="list-style-type: none"> - Notice that the organism reacts to stress by visible, immediate, involuntary and adapted responses. - Take into account that the organism's reactions towards stress are defence reactions which favour fight or flight. - Recognise that certain reactions towards stress concern the functioning of internal organs while others affect behaviour. - Notice the existence of discreet responses in many situations of stress such as hormonal fluctuation. - Note that an organism reacts sometimes in an unfavourable manner when it is under intense stress. - Point out that regulatory and adapting reactions to stress involve intervention of sensory receptors, integrating nervous centers and effectors. - Notice that the nervous system and the hormonal one function together to face stress. - Point out that the hypothalamus plays an integrating role for the nervous and hormonal mechanisms. 	<ul style="list-style-type: none"> - Getting information from text - Analysis of graphs - Evidence from every day life. - Analysis of a diagram showing the nervous mechanism acting during reaction to stress (cold...) - Analysis of diagrammatic figure showing the different nervous and hormonal pathways. - Drawing information from a text or a table. 	<ul style="list-style-type: none"> - Mention that certain aggressions due to stress are greatly perceived (death, divorce...) and they provoke marked emotional reactions while others, such as the daily stress (traffic...) are not perceptible except when they are added. - Recall briefly in the form of a general diagram the possible sense of nervous messages between receptors, nervous centers and effectors.
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<ul style="list-style-type: none"> • Voluntary action 	<ul style="list-style-type: none"> - Recognise that all voluntary actions are commanded by the motor area of the cerebral cortex. - Locate the motor area in the cerebral cortex. - Note that every part of the body is represented in the motor area as a function of its functional importance. - Specify the direct voluntary motor pathways and indirect ones (pyramidal and extra-pyramidal). - Indicate that the nervous motor pathways intersect and that every motor area commands the opposite half of the body. - Recognise that the psychomotor area allows co-ordination of voluntary movements. - Point out that voluntary movements are controlled by different levels of the central nervous system and that sensory information is received at every level (sensory-motor relation). - Recognise that reflexes are automatic and involuntary responses to excitation. 	<ul style="list-style-type: none"> - Analysis of clinical observations - Analysis of a negative plate obtained by scintillography made throughout a movement - Observation and analysis of a diagrammatic section of the motor area (homonculus) - Analysis of a document showing the two great motor tracts. - Analysis of a document showing the multiple nervous mechanisms intervening in a voluntary movement - Recall in the form of a diagram the anatomical elements of the pathway of the Nervous message during a simple reflex. 	<ul style="list-style-type: none"> - Draw attention to the fact that paralysis of the right half of the body may be induced by destruction of the left motor area.
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<ul style="list-style-type: none"> • Simple reflexes. • Conditional reflexes 	<ul style="list-style-type: none"> - Recognise that reflex reactions are two types: innate and acquired. - Point out that certain activities necessitate learning or conditioning before becoming reflexes. - Cite the characteristics of conditioned reflexes. - Indicate the importance of conditioned reflexes in an animal (training) and in Man (learning). - Deduce that the development of conditioned reflexes requires the presence of cerebral hemispheres. - Compare the path of the nervous impulse throughout the innate reflex action of salivation to that throughout conditioned salivation. - Note that the important factor in conditioning is establishment of new nervous links between the nervous centers. -Recognise that inside an organism, different groups of cells communicate among one another by hormonal messages. 	<ul style="list-style-type: none"> -Analysis of a text about pavlov's experiment -Drawing information from text -Drawing information from text -Drawing information from text -Analysis of documents -Analysis of documents 	<ul style="list-style-type: none"> - Mention that spinal reflexes or bulbar ones are innate
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<p>2.3 Hormonal communication.</p> <p>- Characteristics of the hormonal message</p> <p>• Elaboration and transportation of hormonal messages.</p>	<ul style="list-style-type: none"> - Understand that a hormone is a chemical compound produced by an endocrine gland and then liberated in small amount into the internal medium acting as a means of transport. - Note that endocrine glands manufacture and secrete hormones under the effect of nervous, hormonal or mixed stimulations. - Point out that production of hormones is carried out in steps: taking raw materials from the blood, synthesis and later secretion. - Note that hormones act on target cells and modify their activity. - Point out that responding of target cells to hormonal messages requires temporary binding between the hormone molecules and receptors located on the membrane or inside the target cell. - Recognise that certain activities the body involve some complementarity between nervous and hormonal mechanisms. 	<ul style="list-style-type: none"> - Observation of a microscopic section of an endocrine gland - Analysis of documents - Analysis of documents - Analysis of documents and graphs - Analysis of documents 	<p>- Limited to only one endocrine gland (the thyroid pancreas...)</p>
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<ul style="list-style-type: none"> - Neuro-hormonal integration. • Complementary of the nervous and hormonal systems. • Role of the hypothalamus. <p>2.5 Biological rhythms.</p>	<ul style="list-style-type: none"> - Take into account the integrating role of the hypothalamus in neuro-hormonal correlation. - Recognise that biological rhythms are periodic variation of the functions of the body. - Point out the existence of biological rhythms at all levels of the organism. - Note that the well known biological rhythms are the circadian ones or those with medium frequency. - Notice that sleep is a phenomenon that passes in many phases. - Notice that the awakening-sleep rhythm changes and progressively through out life. - Note that the troubles of sleep are very frequent , and that anxiety is often the cause, and that proper hygiene may prevent those troubles. - Point out that biological rhythms have an endogenous origin but they are synchronised by environmental factors. 	<ul style="list-style-type: none"> - Probing documents which show the relation between the hypothalamus, hypophysis, glands and target cells. - Analysis of a table of data - Analysis of documents - Analysis of a hypnogram - Analysis of sequence in a film - Analysis of documents - Drawing information from text - Getting information from text which provides experimental results. - Getting information from text 	<ul style="list-style-type: none"> - Draw attention to the existence of circannual rhythms... - The mechanism of sleep is not required. - Chronobiology: study of biological rhythms. - Pharmacology: science of drugs, i.e. natural or synthetic chemical substances capable of inducing a biological response. - Give as an example the work by shifts.
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<ul style="list-style-type: none"> - Synchronisation of endogenic rhythms. - Applications of chronobiology 	<ul style="list-style-type: none"> - Point out that in the human kind, the principal synchronisation is the rhythm imposed by the social context: the schedule of activity and rest. - Notice that the body presents a periodic variation in its susceptibility to administered chemical substances. - Deduce that the conditions of life and work may disturb the biological rhythms. 	<ul style="list-style-type: none"> - Analysis of graphs which represent the interference between the biological rhythm and the time of administration of medicines. - Drawing information from a text or a document. 	<ul style="list-style-type: none"> - Chronopharmacology: study of the effects of medicines according to the time of their administration.
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Contents	Learning objectives / skills	Activities	Remarks
<ul style="list-style-type: none"> • Needs of amino acids. • Needs of fatty acids. • Needs of mineral substances. 	<ul style="list-style-type: none"> - Notice that total absence or insufficient amount of vitamins induces deficiency diseases or avitaminosis. - Deduce the importance of certain amino acids which must be found in food. - Recognise that certain fatty acids are not synthesised by the body and that they must be supplied by food (particular vegetable oils). - Notice that a great deficiency in certain fatty acids leads into more or less serious troubles. - Note that certain mineral elements such as iodine and fluorine are essential in a very small dose for the proper functioning of the organism, and that their total lack induces very serious troubles. - Point out the existence of rules to be respected and practical advices for a balanced diet. 	<ul style="list-style-type: none"> - Use of a software relevant to avitaminoses. - Observation and analysis of documents or graphs. - Search in a CDI for avitaminoses such as scurvy, rickets, berberi, xerophthalmia. - Probing experimental results: experiments conducted on animals (Magendie, Osborne and Mendel). - Drawing information from text or analysis of experimental results - Observation and analysis of documents or graphs. - Drawing information from text or a document. 	<ul style="list-style-type: none"> - Draw attention to the existence of eight essential amino acids for man which can't be synthesised by his own body. - Recall the importance of water, iron and calcium. - Insist on the necessity of fluoridation of water as an antidecay measure for teeth. - Emphasise the importance of fibers present in cereals, vegetables and fruits (role in transport inside the intestine).

Contents	Learning objectives / skills	Activities	Remarks
<p>1.3 Nutritionally caused diseases: characteristics, causes, and prevention.</p> <p>- Diseases caused by nutritional excess: cardiovascular disease, obesity..</p> <p>• Cardiovascular disease.</p>	<p>- Recognise that the health problems related to nutrition are numerous.</p> <p>- Notice that in rich countries, the evolution of food habits is expressed notably as excessive consumption of animal fat, meat and sugar.</p> <p>- Understand that there is a tight relation between consumption of food and the risk of appearance of certain diseases: cardiovascular diseases, obesity...</p> <p>- Point out that a cardiovascular disease is essentially due to slowing of blood flow in an artery and that the cause of this slowing is atherosclerosis.</p> <p>- Point out that atherosclerosis is a lesion of arteries, the coronary arteries of the heart often.</p> <p>- Notice that a great correlation exists between the concentration of cholesterol in the blood and mortality by cardiovascular diseases.</p>	<p>- Analysis of documents about the evolution of the consumption of lipid, meat, sugar...</p> <p>- An inquiry which permits the students to locate themselves in the frame of that evolution.</p> <p>- Observation and analysis of documents.</p> <p>- Getting information from text.</p> <p>- Analysis of graphical data.</p> <p>- Analysis of epidemiological data.</p>	<p>- Mention that nutritionists provide the scientific basis for balanced diets and that they offer suggestions which one can adopt according to physiological situation at the moment and according to his food habits.</p> <p>- Cholesterol is an organic compound which exists in the fats and oils of animal origin.</p> <p>- Draw attention to the presence of HDL (good cholesterol) and LDL (bad cholesterol) in the blood.</p>

Contents	Learning objectives / skills	Activities	Remarks
<ul style="list-style-type: none"> • Obesity. - Diseases caused by nutritional deficiency: marasmus, kwashiorkor. 	<ul style="list-style-type: none"> - Specify that cardiovascular diseases have multiple causes (hypertension, smoking...). - Note that prevention of cardiovascular diseases must begin at childhood and that it is not made only by reducing the consumption of lipids but also by a great modification of the way of life: avoiding sedentarity, stress and smoking, and carrying out physical exercises. - Point out that obesity is a multifactor symptom. - Cite the factors of development of obesity. - Establish that obesity is not a disease but an important risk factor which gives rise to or aggravates a certain number of diseases: cardiovascular diseases, diabetes, hypertension... - Note that prevention of obesity must be carried out as early as possible and that it is done by reduction of energy supply. - Recognise that diseases of food deficiency affect primarily the infants of developing countries. - Know that diseases of deficiency follow undernutrition and / or malnutrition. 	<ul style="list-style-type: none"> - Getting information from text. - Getting information from text or analysis of documents. - Analysis of graphs showing the link between obesity, and the risk of mortality by cardio-vascular diseases. 	<ul style="list-style-type: none"> - Undernutrition: quantitatively deficient nutrition. - Malnutrition: qualitatively imbalanced nutrition.

Contents	Learning objectives / skills	Activities	Remarks
1 4 Biological renewal:	<ul style="list-style-type: none"> - Point out that deficiency of essential amino acids due to a monotonous diet of a plant origin is serious throughout childhood. - Recognise that marasmus is due to global deficiency of food (Undernutrition). - Recognise that kwashiorkor is due to quantitative and qualitative deficiency of amino acids present in animal proteins. - Recognise that the stability of a living thing is not as it appears. - Point out that the majority of cells in a body are continuously replaced and that their characteristics are maintained in spite of this renewal. - Know that the constituting molecules of all cells are renewed without stop. 	<ul style="list-style-type: none"> - Analysis of documents about diseases of deficiency in the countries of the third world: marasmus, kwashiorkor. - Observation of skin sections in regeneration, smears of bone marrow. - Evidence from every day life. 	

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Contents	Learning objectives / skills	Activities	Remarks
<ul style="list-style-type: none"> - Food, digestion, and assimilation. - Synthesis of molecules. 	<ul style="list-style-type: none"> - Recognise that continuous renewal of molecules compensates for loss occurring due to continuous degradation of intracellular materials in a manner which lets the organism maintain a dynamic equilibrium. - Note that biological renewal might not happen except when the diet is balanced. - Know that the molecules necessary for biological renewal are derived from nutrients produced by food digestion. - Understand that nutrients are assimilated by the cells in order to construct their proper matter and insure biological renewal. - Know that proteins are macromolecules synthesised according to a plan which imposes its sequence of amino acids on their manufacture. 		<ul style="list-style-type: none"> - Draw attention to storage of food and its mobilisation according to need. - The steps of protein synthesis need not to be involved.

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Content	Learning objectives (skills)	Activities	Remarks
<p>2 Neurobiology, human behaviour and health.</p> <p>2.2. Nervous communication.</p> <ul style="list-style-type: none"> - Cerebral activity and conditioned reflex. • The cerebrum and conscious perception • voluntary action. 	<ul style="list-style-type: none"> - Specify the afferent sensory pathways and their synaptic relays. -Recognise that all voluntary actions are commanded by the motor area of the cerebral cortex. -Locate the motor area in the cerebral cortex. -Note that every part of the body is represented in the motor area as a function of its functional importance. -Specify the direct voluntary motor pathways and indirect ones (pyramidal and extra-pyramidal). -Indicate that the nervous motor pathways intersect and that every motor area commands the opposite half of the body. -Recognise that the psychomotor area allows co-ordination of voluntary movements. 	<ul style="list-style-type: none"> -Analysis of clinical observations -Analysis of a negative plate obtained by scintillography made throughout a movement -Observation and analysis of a diagrammatic section of the motor area (homonculus) -Analysis of a document showing the two great motor tracts. -Analysis of a document showing the multiple nervous mechanisms intervening in a voluntary movement 	<ul style="list-style-type: none"> - Draw attention to the fact that paralysis of the right half of the body may be induced by destruction of the left motor area.

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<p>2.5. Biological rhythms</p> <ul style="list-style-type: none"> • Synchronisation of endogenic rhythms. • Applications of chronobiology 	<ul style="list-style-type: none"> - Point out that voluntary movements are controlled by different levels of the central nervous system and that sensory information is received at every level (sensory-motor relation). - Recognise that biological rhythms are periodic variation of the functions of the body. - Point out the existence of biological rhythms at all levels of the organism. - Note that the well known biological rhythms are the circadian ones or those with medium frequency. - Notice that sleep is a phenomenon that passes in many phases. - Notice that the awakening-sleep rhythm changes and progressively through out life. - Note that the troubles of sleep are very frequent , and that anxiety is often the cause, and that proper hygiene may prevent those troubles. - Point out that biological rhythms have an endogenous origin but they are synchronised by environmental factors. - Deduce that the conditions of life and work may disturb the biological rhythms. 	<ul style="list-style-type: none"> - Analysis of a table of data - Analysis of documents - Analysis of a hypnogram - Analysis of sequence in a film - Analysis of documents - Drawing information from text - Getting information from text which provides experimental results. - Getting information from text - Analysis of graphs which represent the interference between the biological rhythm and the time of administration of medicines. - Drawing information from a text or a document 	<ul style="list-style-type: none"> - The mechanism of sleep is not required. - Chronobiology: study of biological rhythms. - Pharmacology: science of drugs, i.e. natural or synthetic chemical substances capable of inducing a biological response. - Give as an example the work by shifts. - Chronopharmacology: study of the effects of medicines according to the time of their administration.
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Content	Learning objectives (skills...)	Activities	Remarks
<p>3.Theories of evolution</p> <p>3.1. the process of evolution through molecular biology and palaeontology</p> <p>3.2. From old theories to the synthetic theory</p>	<ul style="list-style-type: none"> - Recognise that evolution is modification of living structures in time. - Establish that the differences between homologous molecules (insulin, hemoglobin...) result in evolution from a common model. - Note that the comparison between the genes coding for homologous molecules allows to establish phylogenetic relationships. - Point out that the data of palaeontology confirm that the actually living things do not resemble their ancestors. - Note the principal points of the transformist theory of Lamarck. - Point out the principal points of Darwin's theory: evolution by natural selection. - Note the different points of the mutationist theory of Hugo de Vries: evolution occurs by mutation and the species are stable outside mutations. - Note that biologists admit currently a synthetic theory according to which evolution is transformation of populations and not single individuals by the action of natural selection. 	<ul style="list-style-type: none"> - Analysis of documents - Analysis of documents. - Analysis of documents (horse legs, human skull...). - Analysis of documents. - Analysis of a text by Lamarck. - Analysis of documents - Analysis of a text by Darwin. - Getting information from text. - Analysis of documents (the pepper moth, resistant bacteria to antibiotics, resistant insects to insecticides...) 	<ul style="list-style-type: none"> - Phylogeny: evolutionary history. - Palaeontology: the science which studies fossils. - Mention that fixism is a doctrine which affirms steadiness of species. - The synthetic theory is also called Neo-Darwinism. - Without detailed description of all forms, the great steps of hominids evolution would be treated starting from australopithecines.

Content	Learning objectives (skills...)	Activities	Remarks
<p>4- Science and Economy</p> <p>4.3 Industrial breeding and agricultural research:</p> <ul style="list-style-type: none"> - Selection de races productives et recherches de nouvelles sources alimentaires. <p>4.4 Biotechnology and the environment.</p>	<ul style="list-style-type: none"> - Point out that industrial breeding is the production of a great quantity of animals which a good quality to meet the consumers demands, and to insure great profit to the breeder. - Cite the conditions of breeding. - Know that agricultural research aims at satisfying the needs which leads to production of animals and improving their products. - Note the animal nutrition is rationalized to limit the cost and avoid the animals obesity. <ul style="list-style-type: none"> - Point out that growing agricultural and industrial production leads consequently to increase of atmospheric, fresh water and sea water pollution which forms a danger to the environment. - Know that the size of damage implies regulations for the protection of the environment on an international scale. - Point out that biotechnology contributes to improvement of the environment. 	<ul style="list-style-type: none"> - Observation and analysis of documents. - Getting information from text. - Analysis of documents. <ul style="list-style-type: none"> - Observation and analysis of documents, and inquiry on the use of nitrates, pesticides, and herbicides in agriculture. <ul style="list-style-type: none"> - Analysis of document on biodegradation of hydrocarbons by microorganisms... 	<ul style="list-style-type: none"> - Mention for information the methods of birth control in animals. - Draw attention to proteic seeds used as food for animals.