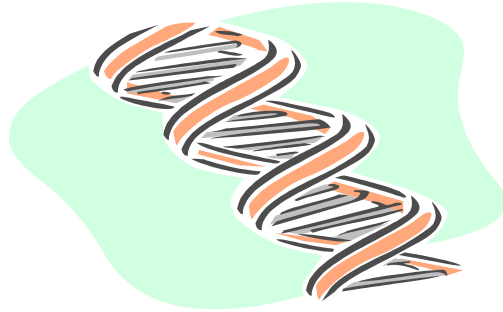


BAHAMAS ACADEMY
of
SEVENTH-DAY ADVENTISTS



BIOLOGY | *COURSE OUTLINE*



GRADE 10

SCHOOL YEAR 2006/2007

Teacher: Mr. Gary E. Jones A. Sc., B. Sc., Dip. Ed.

Introduction

Biology is the study of life and living things as well as the interaction of living things with each other and with their environment.

This is the first of a three-year course of study which will culminate with the sitting of the Bahamas General Certificate of Secondary Education (BGCSE) examination. This examination offers students success through performance within their own ability range.

Through written and practical mode, students may demonstrate their competency at the core level or the core and extended level of the examination.

The format of the examination is as follows:

Paper 1: 50 Multiple Choice Questions (*1 hour 15 mins*)

Paper 2: 8 Structured / Short Answer Questions (*1 hour 30 mins*)

Paper 3: Extended Paper (*1 hour 30 mins*)

Section A: 4 Structured/Short Answer Questions

Section B: 3 Free Response/Essay Questions (to answer 2)

Paper 4: Coursework

Course Objectives

At the end of the year the students should be able to:

1. Describe the scope of Biology and the importance of its study.
2. State and describe the factors that characterize living things.
3. Describe the methods and importance of classifying living things.
4. Discuss the relationships of organisms with one another and with their environment.
5. Outline practices in agriculture and fishing that are beneficial to the Bahamian economy.
6. Discuss the need for protecting the environment, conserving of species, their habitats and of natural resources.
7. Describe the levels of organization in living things.
8. Describe the methods of movement of materials in and out of cells.

Assessment

Assignments/Classwork	10%
Quizzes	10%
Practical Work/Projects	10%
Tests/Unit Tests	20%
Final Examinations	<u>50%</u>
	100%

Course Content

NOTE: Items in *italics* are additional materials for students preparing for the extended paper. (Biology - Paper 3)

Term 1

1. Introduction to Biology
 - (a) Definition of Biology
 - (b) The branches of Biology
 - (c) The importance and applications of Biology.
2. The characteristics of living organisms
 - (a) The meaning of characteristics of living things.
 - (b) Naming and defining the characteristics of living things.
 - (c) Comparing the characteristics of living things in plants and animals.
3. Classification and the binomial system of naming species
 - (a) The meaning of classification and its importance.
 - (b) Classification of living things.
 - (c) Levels of classification.
 - (d) Define the binomial system.
 - (e) Describe and use the binomial system to name species.
4. Animal classification and diversity
 - (a) Identifying the five main classes of vertebrates using visible external features.
 - (b) *The internal features of birds (air sacs, light bones) and mammals (two sets of teeth, diaphragm, viviparity – young born alive, not hatching) which distinguishes them from other vertebrates.***
 - (c) *Study of the arthropods (insects, crustaceans, and arachnids).***
 - (d) *Study of the molluscs.***
5. Plant classification and diversity
 - (a) Identifying the four main groups of plants (simple plants, mosses and liverworts, ferns and seed-bearing plants)
 - (b) *The main features used in the classification of flowering plants.***
 - (c) Structure and function of a typical flowering plant e.g. pigeon peas (Cajanus), Shepherd's needle (Bidens)
 - (d) *Distinction between monocotyledons and dicotyledons.***
 - (e) *The main features used in the classification of bacteria, fungi***
6. Energy flow, food chains and food webs
 - (a) Identify the principal source of energy input to biological systems.
 - (b) Describe the non-cyclical flow of energy in nature.
 - (c) Define food chain.

- (d) Define trophic level and name the three trophic levels in a typical food chain.
- (e) Define food web.
- (f) Define and use the terms – *producers, consumers, decomposers, herbivore, carnivore, omnivore, population, community, ecosystem.*
- (g) Trophic levels and energy losses / Advantages of short food chains.
- (h) *Pyramids of biomass and energy***
- (i) *Efficiency in supplying green plants as human food.***
- (j) *Inefficiency of feeding crop plants to animals.***

Term 2

1. Nutrient cycles
 - (a) The water cycle
 - (b) The carbon cycle
 - (c) *The effects of combustion of fossil fuels and the cutting down of forests (deforestation) on the balance between O₂ and CO₂.***
 - (d) *Renewable and non-renewable energy sources.***
 - (e) The nitrogen cycle
2. Pollution and its effects
 - (a) Water pollution by sewage, inorganic wastes, pesticides, herbicides and oil
 - (b) Land pollution – biodegradable and non-biodegradable materials
3. Conservation
 - (a) Importance of conservation of species, habitats and natural resources
 - (b) Identification of species, habitats and natural resources that need to be conserved.
 - (c) *Detailed study of the following Bahamian ecosystems:***
 - (i) *Coral reefs*** **(ii) *Mangrove swamps*** **(iii) *Sandy beaches*** **(iv) *Rocky shores***
 - (d) *Explanation of the economic importance to The Bahamas of the above ecosystems.***
4. Fishing methods in the Bahamas
 - (a) Fishing methods and gears – ***their advantages and disadvantages***
 - (b) The relative number of fish in Bahamian waters compared to other large commercial fishing areas.
 - (c) The effects of over-fishing: ***short term (economic gains) and long-term effects (possible extinction)***
 - (d) The use of illegal methods for the capture of fish, conch and lobster
5. The Conch
 - (a) Life cycle
 - (b) Economic importance to The Bahamas.

Term 3

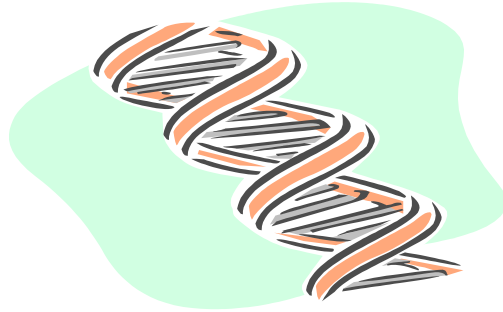
1. Agricultural practices in the Bahamas
 - (a) Local subsistence farming
 - (b) The value of modern technology for food production (powerful vehicles, pesticides, herbicides)
 - (c) The undesirable effects of deforestation, over-use of fertilizers (decreased crop production from lack of active transport),herbicides and pesticides.

2. Study of the maize plant
 - (a) Life cycle
 - (b) Economic importance

3. Levels of organization in living things.
 - (a) List the levels of organisation in living things.
 - (b) Define the term cell.
 - (c) Describe the structure of plant and animal cells.
 - (d) Identify similarities and differences between plant and animal cells.
 - (e) Describe the parts of plant and animal cells.
 - (f) Identify types of cells and their functions.
 - (g) Define the term tissue.
 - (h) Identify types of tissues and their functions.
 - (i) Name some major organs and their functions.
 - (j) Identify the main organ systems and their functions.

4. Movement in and out of cells.
 - (a) Explain the importance of movement of materials in and out of cells.
 - (b) Describe diffusion and its importance.
 - (c) Describe osmosis and its effects – turgor, plasmolysis and wilting
 - (d) Describe active transport and its importance.

BAHAMAS ACADEMY
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SEVENTH-DAY ADVENTISTS



BIOLOGY | *COURSE OUTLINE*



GRADE 11

SCHOOL YEAR 2006/2007

Teacher: Mr. Gary E. Jones A. Sc., B. Sc., Dip. Ed.

Introduction

Biology is the study of life and living things as well as the interaction of living things with each other and with their environment.

This is the second of a three-year course of study which will culminate with the sitting of the Bahamas General Certificate of Secondary Education (BGCSE) examination. This examination offers students success through performance within their own ability range.

Through written and practical mode, students may demonstrate their competency at the core level or the core and extended level of the examination.

The format of the examination is as follows:

Paper 1: 50 Multiple Choice Questions (*1 hour 15 mins*)

Paper 2: 8 Structured / Short Answer Questions (*1 hour 30 mins*)

Paper 3: Extended Paper (*1 hour 30 mins*)

Section A: 4 Structured/Short Answer Questions

Section B: 3 Free Response/Essay Questions (to answer 2)

Paper 4: Coursework

Course Objectives

At the end of the year the students should be able to:

1. Describe the effects of osmosis in terms of turgor, flaccidity, plasmolysis and wilting.
2. Describe the properties of enzymes.
3. Discuss the factors and processes involved in nutrition in living things.
4. Describe methods of transport of materials in living things.
5. Describe the respiratory processes in living things.

Assessment

Assignments/Classwork	10%
Quizzes	10%
Practical Work/Projects	10%
Tests/Unit Tests	20%
Final Examinations	<u>50%</u>
	100%

Course Content

NOTE: Items in *italics* are additional materials for students preparing for the extended paper. (Biology - Paper 3)

Term 1

1. The effects of osmosis.
 - (a) Review of the methods of movement of materials in and out of cells.
 - (b) Review of the concepts relating to osmosis.
 - (c) Describe the effects of osmosis on plant and animal cells.
 - (d) Use and apply the following terms- *turgor, flaccidity, plasmolysis and wilting*

2. Enzymes
 - (a) Definition of enzymes.
 - (b) Importance of enzymes.
 - (c) Properties of enzymes.
 - (d) *Enzymes and germination.*

3. Nutrition and nutrients.
 - (a) Definition of nutrition and nutrients.
 - (b) Types of nutrients – carbohydrates, proteins, fats, vitamins, minerals, water and roughage.
 - (c) The chemical elements which make up carbohydrates, proteins and fats.
 - (d) Synthesis of carbohydrates, proteins and fats from simple units.
 - (e) The importance and principal sources of carbohydrates, proteins, fats, vitamins - A, B, B₆, C & D; mineral salts- calcium, iron iodine & phosphorous; water and roughage (dietary fibre).
 - (f) The deficiency symptoms for the above vitamins and mineral salts.
 - (g) Food tests (iodine test – starch, Benedict’s test / Fehlings test – reducing sugars, Biuret test – proteins, ethanol/translucence test – fats).
 - (h) Explanation of the positive test for a reducing sugar.
 - (i) *The role of micro-organisms in food production (yoghurt and bread making)*
 - (j) *The health problems and potential health hazards associated with food additives – preservatives, colourings and flavourings.*

4. Animal nutrition
 - (a) Stages of animal nutrition
 - (b) Definition of diet.
 - (c) Food intake and energy – calculating the energy content of foods.
 - (b) Balanced diet and its relation ship to the age, sex and activity of an individual.
 - (e) The effects of malnutrition – starvation, heart disease, constipation, obesity.
 - (f) *The problems of world food supplies.*
 - (g) *The problems which contribute to famine – unequal distribution of food, drought, flooding, population increase.*

-4-

 - (h) *Mariculture and aquaculture as means of increased food production.*
 - (i) The effects of alcohol and the dangers of its misuse.

5. The human alimentary canal.
 - (a) Gross structure of the alimentary canal and associated organs.
 - (b) The functions of the various parts of the alimentary canal in relation to ingestion, digestion, absorption, assimilation and egestion of food.

Term 2

1. Plant nutrition and photosynthesis
 - (a) Definition of photosynthesis
 - (b) Equation for photosynthesis in words.
 - (c) Equation for photosynthesis in symbols.**
 - (d) Conditions required for photosynthesis (carbon dioxide, water, chlorophyll, sunlight).
 - (e) Description of the process of photosynthesis.
 - (f) Limiting factors of photosynthesis (temperature, light intensity, carbon dioxide concentration, availability of water)**
 - (g) Factors affecting the rate of photosynthesis
2. Leaf structure
 - (a) The cellular and tissues structure of a dicotyledonous leaf in cross section.
 - (b) The significance of the cellular and tissue structures in terms of functions: (distribution of chloroplasts – photosynthesis, stomata and mesophyll cells – gaseous exchange, vascular bundles- transport)
3. Plant mineral nutrition
 - (a) Identify the mineral nutrients required by plants.
 - (b) Describe the importance of nitrogen-containing ions (protein synthesis).
 - (c) Describe the importance of magnesium ions (chlorophyll synthesis), phosphorous (growth of roots and ATP formation), potassium (correct salt balance in cells).**
4. Teeth structure and function
 - (a) The importance of teeth in digestion.
 - (b) The types of teeth and their functions.
 - (c) The advantages and disadvantages of fluoride in public water supplies.**
 - (d) Description of the processes of chewing and peristalsis.
5. Digestion of food
 - (a) The significance of producing small soluble molecules.
 - (b) Extra-cellular digestion in the alimentary canal – starch, fats, proteins.
 - (c) The functions of a typical amylase, protease and lipase, listing the substrate and end products.
6. Absorption of food
 - (a) Identify the region of the alimentary canal for absorption of food.

- (b) Name the features of the villi, which make them suitable for absorption.
- (c) The significance of the villi in increasing the internal surface area.
- (d) Describe the structure of the villus including the role of the capillaries and the lacteals.**

7. Assimilation of food

- (a) Description of the processes of assimilation.
- (b) List and describe the functions of the liver.

Term 3

1. Uptake in plants

- (a) Water and mineral salts uptake.
- (b) Structure and function of a root hair cell.
- (c) The passage of water through root, stem and leaf.

2. Transpiration

- (a) Definition of transpiration.
- (b) How water vapor loss is related to cell surfaces, air spaces and stomata.
- (c) The mechanism of water uptake (transpiration pull and root pressure).**
- (d) The effects of variation of temperature, humidity and light intensity on transpiration rate.
- (e) Using the potometer to measure transpiration rate.
- (f) How wilting occurs.
- (g) Adaptations of leaf, stem and root to different environments with emphasis on local examples.**

3. Translocation in plants

- (a) Definition of translocation.
- (b) Translocation of applied chemicals and systemic pesticides.**

4. Transport in Humans

- (a) General plan of the human circulatory system.
- (b) The double circulatory system.
- (c) Structure and function of the human heart
- (d) Effects of exercise on heart beat
- (e) Heart attack - causes (diet, smoking, stress) and preventative measures.
- (f) Blood vessels – arteries, veins and capillaries.
- (g) Blood - composition, structure and function.
- (h) The transfer of materials between capillaries and tissue fluid.
- (i) The immune system – antibody production, tissue rejection, phagocytosis.
- (j) The function of the lymphatic system in circulation of body fluids and the production of lymphocytes.

5. Respiration

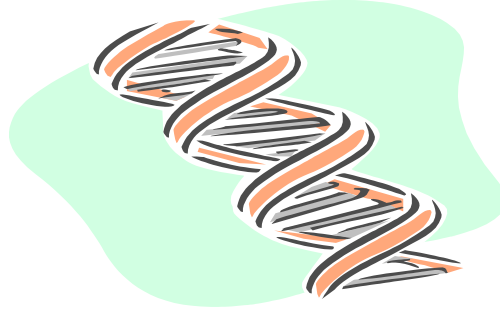
- (a) Definition and types of respiration – aerobic and anaerobic.

- (b) Equation in words and *symbols* for aerobic respiration
 - (c) ***The importance of ADP and ATP / Advantages of ATP.***
 - (d) ***Uses of energy in the body of humans.***
 - (e) Anaerobic respiration – equation in words and *symbols*.
 - (f) Anaerobic respiration in the brewing process and in lactic acid production in muscles
6. Breathing and gaseous exchange
- (a) Definitions of breathing and gaseous exchange.
 - (b) Features of gaseous exchange surfaces.
 - (c) Comparison of inspired air with expired air.
 - (d) ***The role of the ribs, intercostal muscles and diaphragm in lung ventilation.***
 - (e) The effects of physical activity on the rate and depth of breathing.
 - (f) The effects of cigarette smoke and air pollution on gaseous exchange structures.

Prepared by: Gary E. Jones
July 2005
Reviewed: July 2006

BAHAMAS ACADEMY

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BIOLOGY | *COURSE OUTLINE*



GRADE 12

SCHOOL YEAR 2006/2007

Teacher: Mr. Gary E. Jones A. Sc., B. Sc., Dip. Ed.

-2-

Introduction

Biology is the study of life and living things as well as the interaction of living things

with each other and with their environment.

This is the final of a three-year course of study which will culminate with the sitting of the Bahamas General Certificate of Secondary Education (BGCSE) examination. This examination offers students success through performance within their own ability range.

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Section A: 4 Structured/Short Answer Questions

Section B: 3 Free Response/Essay Questions (to answer 2)

Paper 4: Coursework

Course Objectives

At the end of the year the students should be able to:

1. Describe methods of transport of materials in humans.
2. Describe the respiratory processes in living things.
3. Discuss the concepts of excretion and homeostasis.
4. Describe the concepts involved in co-ordination and response in living things.
5. Describe the development of living things through the processes of reproduction.
6. Describe the transmission of genetic information from generation to generation.
7. Discuss the concepts of variation and selection as they relate to the theory of evolution.

Assessment

Assignments/Classwork	10%
Quizzes	10%
Practical Work/Projects	10%
Tests/Unit Tests	20%
Final Examinations	<u>50%</u>
	100%

Course Content

NOTE: Items in *italics* are additional materials for students preparing for the extended

Term 1

1. Transport in Humans

- (a) General plan of the human circulatory system.
- (b) The double circulatory system.
- (c) Structure and function of the human heart
- (d) Effects of exercise on heart beat
- (e) Heart attack - causes (diet, smoking, stress) and preventative measures.
- (f) Blood vessels – arteries, veins and capillaries.
- (g) Blood - composition, structure and function.
- (h) The transfer of materials between capillaries and tissue fluid.
- (i) The immune system – antibody production, tissue rejection, phagocytosis.
- (j) The function of the lymphatic system in circulation of body fluids and the production of lymphocytes.

2. Respiration

- (a) Definition and types of respiration – aerobic and anaerobic.
- (b) Equation in words and *symbols* for aerobic respiration
- (c) *The importance of ADP and ATP / Advantages of ATP.***
- (d) *Uses of energy in the body of humans.***
- (e) Anaerobic respiration – equation in words and *symbols*.
- (f) Anaerobic respiration in the brewing process and in lactic acid production in muscles

3. Breathing and gaseous exchange

- (a) Definitions of breathing and gaseous exchange.
- (b) Structure and function of the human breathing system.
- (c) Structure and function of the alveoli.
- (d) Features of gaseous exchange surfaces.
- (e) The effects of cigarette smoke and air pollution on gaseous exchange surfaces.
- (f) Comparison of inspired air with expired air.
- (g) *The role of the ribs, intercostal muscles and diaphragm in lung ventilation.***
- (h) The effects of physical activity on the rate and depth of breathing.

4. Excretion

- (a) Definition and importance of excretion.
- (b) Structure and function of the kidneys and nephron.
- (c) The role of the bladder and the urethra.
- (d) *Dialysis and its applications in kidney machines.***

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5. Homeostasis

- (a) Definition of homeostasis.

- (b) Temperature regulation – sweating, vasodilation, and vasoconstriction
- (c) Sugar control by the liver and pancreas
- (e) Homeostasis and negative feedback.**

6. Tropic and Taxic Responses

- (a) Definition of response.
- (b) Tropic and taxic responses.
- (c) Geotropism and phototropism in terms of auxins regulating differential growth.
- (d) Simple behaviour in terms of the taxic responses of invertebrates e.g. woodlice, termites etc.

7. Hormones and chemical co-ordination in animals and plants

- (a) Definition and characteristics of hormones.
- (b) The chemical control of metabolic activity by insulin and adrenaline.
- (c) Comparison of nervous and hormonal control systems.**
- (d) The chemical control of plant growth by auxins.
- (e) The effects of synthetic plant hormones used as weed killers.

8. Nervous control in humans

- (a) Divisions of the human nervous system – CNS and PNS.
- (b) The role of the Central (CNS) and Peripheral (PNS) Nervous Systems.
- (c) Structure and function of the brain.
- (d) Nerve cells – types, structure and functions.
- (e) Differences between voluntary and involuntary actions.**
- (f) Reflex action and the simple reflex arc.

9. Receptors

- (a) Definition of receptors.
- (b) Description of the sense organs.
- (c) Structure and function of the eye.
- (d) Description of the pupil reflex.
- (e) Description of accommodation.**
- (f) The function of the rods and the cones.**
- (g) Structure and function of the ear (hearing and balance).
- (h) Detailed functions of the cochlea, semi-circular canals, sacculus and utriculus.**

10. Effectors

- (a) Definition of effectors.
- (b) Structure of the elbow joint
- (c) The action of antagonistic muscles in the movement of the elbow joint.
- (d) Functions of tendons, ligaments, cartilage and synovial fluid.

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11. Drugs

- (a) Definition of drugs.
- (b) Types of drugs.

- (c) The effects of drug abuse – cocaine, marijuana, alcohol and nicotine.

Term 2

1. Asexual reproduction

- (a) Definition of asexual reproduction.
- (b) Types of asexual reproduction – natural and artificial methods.
- (c) *Asexual reproduction in bacteria – binary fission.***
- (d) *Spore production in fungi.***
- (e) Tuber formation in potatoes.
- (f) Artificial vegetative reproduction - marcotting and stem cuttings
- (g) *The advantages and disadvantages of asexual reproduction.***

2. Sexual reproduction in plants

- (a) Definition of sexual reproduction.
- (b) *The advantages and disadvantages of sexual reproduction.***
- (c) Structures and functions of a dicotyledonous flower.
- (d) Definition of pollination.
- (e) The differences between self-pollination and cross-pollination.
- (f) The agents of pollination and the ways in which they act.
- (g) *The different structural adaptations of insect and wind - pollinated flowers.***
- (h) The growth of the pollen tube and the process of fertilization.
- (i) Seed and fruit formation.
- (j) Structure of a leguminous seed.
- (k) Seed and fruit dispersal.

3. Sexual reproduction in humans

- (a) Structure and functions of the male reproductive system
- (b) Structure and function of the female reproductive system
- (c) The female menstrual cycle and factors affecting it. (emotional state, diet)
- (d) Gamete formation, sexual intercourse, fertilization and implantation
- (e) The development of the foetus.
- (f) *The effects of drug abuse by pregnant women.***
- (f) The functions of the amniotic sac and the amniotic fluid.
- (g) Birth of the foetus.
- (h) *The advantages of breast milk compared with bottle feeding.***

-6-

4. Sex hormones

- (a) The role of estrogen and progesterone in the menstrual cycle and in pregnancy.

- (b) The role of testosterone and oestrogen in the development and regulation of the secondary sexual characteristics.

5. Methods of birth control – natural, chemical, mechanical and surgical

- (a) The social and population aspects of birth control.
- (b) The social implications of artificial insemination.

6. Sexually transmitted diseases

- (a) The symptoms, signs, effects and treatment of gonorrhoea and syphilis.
- (b) The methods of transmission of the human immuno-deficiency virus (HIV).
- (c) The ways in which HIV can be prevented from spreading.

Term 3

1. Growth and development of plants

- (a) Definition of growth - in terms of dry mass and size
- (b) The environmental and internal conditions affecting germination
- (c) ***The germination of a named dicotyledonous seed.***

2. Inheritance

- (a) Definition of inheritance.
- (b) Chromosomes, genes and heredity – allele, haploid and diploid.
- (c) The inheritance of sex in humans (XX, XY)
- (d) Definitions of mitosis and meiosis.
- (e) ***Stages of mitosis.***
- (f) Description of monohybrid inheritance.
- (g) Use of the following terms – genotype, phenotype, homozygous, heterozygous, dominant, recessive.
- (h) The results of simple genetic crosses involving 1:1 and 3:1 ratios.
- (i) ***Co dominance and the inheritance of the ABO blood groups.***

3. Variation

- (a) Definition of variation.
- (b) Continuous and discontinuous variation.
- (c) Definition of mutation.
- (d) Mutation as a source of variation as shown by sickle cell anemia in relation to malaria.
- (e) ***The effects of radiation and chemicals on the rate of mutation.***
- (f) ***The effects of Down's Syndrome.***

4. Selection

- (a) Definition of selection.
- (b) Types of selection - natural and artificial.
- (c) The role of artificial selection in the production of varieties of animals and plants with increased economic importance.
- (d) Description of variation.***
- (e) Competition and its relationships to differential survival of and reproduction by those organisms best fitted to the environment.***
- (f) The importance of natural selection as a possible mechanism for evolution.***
- (g) The development of strains of antibiotic resistant bacteria as an example of natural selection.***

Prepared by: Gary E. Jones
July 2005
Reviewed: July 2006