BIOLOGY

Syllabus by Objectives

Objective 1 (Day 1)

1. List and describe the steps in the scientific method.
2. Define and give examples of Control, Dependent Variable, and Independent Variable as they pertain to experiments.
3. Create a time-line of major discoveries which brought biology from its beginnings up to the science it is today.
4. List and describe the characteristics of living things.
5. Make a list of Safe Laboratory Procedures when handling chemicals, Bunsen burners, laboratory glassware and microscopes.
6. Create a chart showing international units of measure for length, volume, and mass.
7. AP Only – Explain how scientific research can impact the decision for the government could have to propose a law requiring the wearing of seatbelts in all moving vehicles.
8. Complete Quizstar Lab Scenarios Test.

Objective 2 (Days 2 & 3)

1. Describe cell processes necessary for achieving homeostasis, including active and passive transport, osmosis, diffusion, exocytosis, and endocytosis.
2. Briefly explain what carbohydrates, lipids, proteins, and nucleic acids are and what the basic function of each is.
3. Compare the reaction of plant and animal cells in isotonic, hypotonic, and hypertonic solutions.
4. Explain how surface area, cell size, temperature, light, and pH affect cellular activities.
5. Apply the concept of fluid pressure to biological systems such as blood pressure, turgor pressure, bends, and strokes.
6. AP Only – Complete an experiment explaining how temperature affects the rate of an enzyme-catalyzed reaction (pg. 54 of Prentice Hall Biology textbook).
7. Complete Quizstar Biology Obj 1-2 Test.

Objective 3 (Days 3 & 4)

1. Describe the process of photosynthesis, including the reactants and products.
2. Explain the light-dependent and light-independent reactions of photosynthesis.
3. Describe the process of cellular respiration, including the reactants and products.
4. Explain how lactic acid fermentation and alcoholic fermentation are similar and different.
5. Create a chart comparing photosynthesis and cellular respiration.
6. AP Only – Write a paragraph to explain cellular respiration using the analogy of bank deposits and withdrawals of money.
7. Complete Quizstar Biology Obj 1-3 Test.

Objective 4 (Day 5)

1. Explain the components of the cell theory.
2. Create a time-line of the history of the development of the cell theory and the scientists who contributed to it.

3. Distinguish between prokaryotic and eukaryotic cells.
4. Draw and label a diagram of a plant cell and an animal cell.
5. List each organelle in plant and animal cells and briefly explain each organelles function.
6. AP Only – Imagine that you are Lynn Margulis and write a persuasive letter to the editor of a magazine explaining your idea. Be sure to make your explanation clear to people who do not have a background in biology.
7. Complete Quizstar Biology Obj 1-4 Test.

Objective 5 (Days 6, 7, & 8)

1. List and describe each level of organization from cells up through organisms.
2. List, draw, and explain each of the eleven systems of the human body.
3. Explain how specialized cells in each system make us function properly.
4. Explain in detail how a nerve impulse is transmitted from the time you touch a really warm (but not burning hot) stove until you move your hand. Compare that to touching a hot stove.
5. Draw and label the major bones of the skeletal system.
6. What are the types of muscle tissue, where are they found, and how do they differ?
7. Explain how the circulatory, blood and lymphatic, and respiratory systems are connected.
8. AP Only – Describe an imaginary journey in a microscopic vessel which you are piloting from a specialized cell in an organism working your way outward through tissues and organs until you leave the organism. Then continue to venture out through the organism's community and ecosystem.
9. Complete Quizstar Biology Obj 1-5 Test.

Objective 6 (Days 9 & 10)

1. Explain the various reasons why a cell must divide.
2. Draw, label, and explain the steps to mitosis.
3. Draw, label, and explain the steps to meiosis.
4. Compare sperm and egg formation in terms of ploidy (haploid and diploid).
5. Compare/Contrast sexual and asexual reproduction. Explain each type and give examples.
6. AP Only – Explain the significance of mitosis to cancer and its treatment options.
7. Complete Quizstar Biology Obj 1-6 Test.

Objective 7 (Days 11 & 12)

1. Define: genetics, fertilization, trait, hybrid, gene, allele, homozygous, heterozygous, principle of dominance, segregation, gamete, probability, phenotype, genotype, independent assortment
2. Write a summary of who Gregor Mendel was and why his work is important to biology.
3. Complete Quizstar Biology Objective 1-7 Test.
4. AP Only – Complete a Punnett Square genotype/phenotype possibilities chart for a mom and dad with 15 different homozygous/heterozygous traits.

Objective 8 (Days 13 & 14)

1. Define: transformation, bacteriophage, copying information, storing information, transmitting information, deoxyribonucleic acid, nucleotides, nitrogenous base, Chargaff's rule, double helix, anti-parallel strands, base pairing, replication, unzipping, DNA polymerase, telomeres, telomerase, nucleosomes, prokaryotic DNA replication, eukaryotic DNA replication, single-stranded binding

protein, leading strand, lagging strand, Okazaki fragments, Alfred Hershey and Marsha Chase, Oswald Avery, Frederick Griffith, Rosalind Franklin, Watson and Crick, Erwin Chargaff, purines, pyrimidines
2. Create a timeline for the discovery and role of DNA.
3. Briefly explain the similarities and differences between DNA replication and transcription.
4. Using three examples of each, explain how mutations in DNA can be positive AND negative.
5. Complete Quizstar Biology Objective 1-8 Test.
6. AP Only – Write a 500-word persuasive essay on why Genetically Modified Organisms are either good or bad. Take a position.

Objective 9 (Days 15 & 16)

1. Explain Charles Darwin's findings and contributions to the theory of evolution.
2. Make a timeline for the theory of evolution including scientists and their contributions.
3. Briefly explain EACH piece of evidence supporting the theory of evolution.
4. Describe speciation and factors that contribute towards it.
5. Make a chart to describe plant and animal life for each era from Pre-Cambrian to present day.
6. Briefly explain the Origin of Earth's first molecules leading to life.
7. Using examples, explain the purpose of assigning scientific names for plant and animal classifications.
8. Create a chart to demonstrate Linnaeus's hierarchical system of classification.
9. Using examples, explain why classification Kingdoms changed from a 5-Kingdom system to a 6-Kingdom system in the 1990's.
10. Create a chart to demonstrate how living organisms are classified into 3 Domains.
11. Complete Quizstar Biology Objective 1-9 Test.
12. AP Only – Write a short essay justifying the grouping of viruses in a category separate from living things.

Objective 10 (Day 17)

1. Describe what a plant is, its life cycle, and what it needs to survive.
2. Describe each major member of the group of Bryophytes.
3. Draw a chart comparing monocots and dicots.
4. Draw, label, and explain the vascular system of plants.
5. Describe the histology of roots, stems, leaves, and flowers.
6. Including at least three examples, explain some chemical and physical adaptations of plants and why they have them.
7. Complete Quizstar Biology Objectives 1-10 Test.
8. AP Only – Using local plants, prepare a poster project with gathered specimens of plant parts to show bryophytes, monocots, dicots, roots, stems, leaves, and flowers (if possible as time of year plays a role).

Objective 11 (Day 18)

1. Describe and list examples of each of the following animal classifications:
    a. Invertebrates (sponges, cnidarians, worms, mollusks, arthropods, echinoderms)
    b. Vertebrates (fishes, amphibians, reptiles, birds, mammals)
2. What are the major trends in invertebrate evolution?
3. Create a chart comparing invertebrates.
4. What are major trends in the evolution of chordates?

5. How is the control of body temperature an important aspect of vertebrate life?
6. Complete the Quizstar Biology Objectives 1-11 Test.
7. AP Only – Create an analysis comparing and contrasting invertebrates to vertebrates.

Objective 12 (Day 19)

1. Describe protective adaptations of animals. Be sure to include examples of animals who use mimicry, camouflage, migration, and hibernation to survive.
2. Explain how the various beak types in birds aid in their survival.
3. Identify ways in which the theory of evolution explains the nature and diversity of organisms.
4. Describe natural selection, survival of the fittest, geographic isolation, and the fossil record.
5. Complete the Quizstar Biology Objectives 1-12 Test.
6. AP Only – Choose a wild animal and describe its habitat and identify the adaptations that enable the animal to survive in its environment. Include adaptations that allow the animal to find prey and/or avoid predators.

Objectives 13-16 (Day 20)

1. Draw and explain the example of a food web, food chain, and energy pyramid.
2. Explain why decomposers are important.
3. Trace biogeochemical cycles through the environment for each of the following: water, carbon, oxygen, and nitrogen.
4. Describe the process of ecological succession.
5. Using examples of environment, plant and animal species, describe each of Earth's biomes.
6. Identify and explain density-dependent and density-independent limiting factors that affect populations in an ecosystem.
7. Complete the Quizstar Biology Final Exam.
8. AP Only – Create a persuasive research based essay taking a side in the debate between creationism and big bang/evolution. There are at least three sides to this debate.