

BIOLOGY GOALS

1. Assume and practice responsible lab safety behaviors.
2. Read and interpret science passages.
3. Read and interpret data tables and graphs.
4. Learn all the material listed in the following units below and be able to apply the material conceptually as related to practical applications of everyday science.

UNIT ONE: Scientific Method and Macromolecules

1. Explain and provide examples of the seven characteristics of life.
2. Determine a relationship between metabolism, homeostasis, and biological chemical reactions.
3. List and explain the five steps of the scientific method.
4. Interpret data expressed graphically.
5. Construct an appropriate graph based on dependent and independent variables.
6. Explain the relationship between elements, compounds, and bonds.
7. Distinguish between acids, bases, and neutral substances using a pH scale.
8. Identify and compare the structure and function of the four macromolecules.
9. Explain the “Lock and Key” model for how enzymes catalyze biological reactions.
10. Explain the effects of temperature, pH, surface area, and amount of enzyme, amount of substrate on enzyme reaction rate.

UNIT TWO: Energy and Cells

1. Identify and explain the parts of a compound light microscope.
2. Properly use the compound light microscope to view specimens.
3. Explain the Cell Theory.
4. Compare and contrast eukaryotic cells and prokaryotic cells.
5. Identify and explain the function of the following cell parts: cell membrane, cytoplasm, nucleus, mitochondria, ribosomes, endoplasmic reticulum, lysosomes, golgi bodies, vacuole, centrioles, cell wall, and chloroplasts.
6. Compare and contrast animal cells and plant cells.
7. Explain how semi-permeable membranes work with respect to active and passive transport.
8. Describe the process of diffusion in terms of concentration gradients.
9. Explain how hypertonic, isotonic, and hypotonic solutions affect cells.
10. Explain the relationship between ATP and chemical bonds.
11. Explain the purpose of photosynthesis and its reactants and products.
12. Explain the purpose of cellular respiration and its reactants and products.
13. Describe a relationship between photosynthesis and cellular respiration.
14. Compare the processes of aerobic respiration and anaerobic respiration.

UNIT THREE: Evolution and Classification

1. Explain how early Earth conditions differed from present day Earth.
2. Explain the significance of Miller and Urey’s experiment to the origin of the first cells.
3. Explain the significance of how plate tectonics has shaped the face of the Earth and led to evolution.
4. Explain how the Law of Superposition is used to determine the relative age of fossils.
5. Distinguish between adaptation and variation.
6. Compare and contrast Darwin’s and Lamarck’s views about how evolution occurs.

7. Describe the following evidence for evolution: fossils, homologous structures, analogous structures, vestigial structures, embryology, biochemistry, and DNA.
8. Compare the different modes of speciation including divergent evolution and adaptive radiation.
9. Construct graphs that show stabilizing selection, directional selection, disruptive selection.
10. Describe the system for classifying organisms.
11. Distinguish between organisms classified in each of the five kingdoms.
12. Explain how living things are organized.

UNIT FOUR: DNA, RNA, Protein Synthesis

1. Describe the experiments by Griffith, and Hershey and Chase, that led to the discovery of DNA as the genetic material in cells.
2. Describe the structure of DNA.
3. Explain the process of DNA replication.
4. Describe the extraction of DNA from plant cells.
5. Describe the processes of transcription and translation as they relate to protein synthesis.
6. Compare the differences between DNA and the three types of RNA.
- *7. Explain how mutations can affect proteins and protein synthesis.
- *8. Summarize the role of oncogenes in the development of cancer.
- *9. Identify environmental causes of mutations.

Note:

* items are NOT in the book.

UNIT FIVE: Mitosis, Meiosis, and Mendelian Genetics

1. Explain the role of cell division in growth, repair, and reproduction.
2. Explain the difference between haploid and diploid chromosome numbers.
3. Explain what a karyotype is and how it is used by genetic counselors to diagnose genetic disorders including monosomy and trisomy.
4. Compare and contrast meiosis and mitosis.
5. Relate genetic variation to cell division and evolution.
6. Analyze the results of Mendel's experiments with three generations of garden peas.
7. Distinguish between dominant traits and recessive traits.
8. Explain the relationship between genotype and phenotype using the terms homozygous and heterozygous.
9. Explain Mendel's three laws of inheritance.
10. Explain how probability is used in genetic predictions.
11. Construct and analyze Punnett squares for monohybrid and dihybrid crosses.
12. Perform a test cross to determine the genotype of an unknown individual.
13. Interpret pedigrees to determine the likelihood of an individual having a genetic disorder.
14. Perform crosses for dominant and recessive genetic disorders.
15. Explain and perform crosses involving codominance, incomplete dominance, multiple alleles, polygenic traits, and sex-linked alleles.
16. Explain how traits are influenced by the environment.

UNIT SIX: Biotechnology

1. Identify the advantages and disadvantages of selective breeding of various organisms.
2. Explain how recombinant DNA and restriction enzymes are related to genetic engineering.
- *3. Analyze and explain the process of gel electrophoresis and the results.
- *4. Relate biotechnology and genetic engineering to agriculture, medicine, and you!
- *5. Contrast the benefits and concerns associated with genetic engineering.
6. Do paper lab and electrophoresis labs to show the processes.

Note:* item is NOT in the book.

UNIT SEVEN: Reproduction and Development

1. Describe various reproductive characteristics for a variety of organisms.
2. State how hormones produced by the endocrine system cause body changes.
3. Diagram and explain positive and negative feedback loops as they relate to homeostasis.
4. Identify and explain functions of human male and female reproductive systems.
5. Explain the human female reproductive cycle.
6. Describe the steps of human development from zygote through fetus.
7. Explain disorders of the human reproductive systems including cancer, endometriosis, ectopic pregnancy and causes of infertility.

UNIT EIGHT: Circulation and Respiration

1. Distinguish between arteries, veins, and capillaries.
2. Identify the components of blood and how they are important to normal body functioning.
3. Label the parts of the human heart.
4. Explain how blood travels through the heart; identify chambers where the blood is oxygenated or deoxygenated.
5. Distinguish between pulmonary and systemic circulation.
6. State illnesses associated with the cardiovascular system.
7. Explain how to maintain the health of the cardiovascular system.
8. Describe the process of gas exchange in humans.
9. Identify parts of the human respiratory system and explain their functions.
10. Explain the mechanisms that control breathing.
11. State illnesses associated with the respiratory system.
12. Compare closed and open circulatory systems.

UNIT NINE: Nervous System

1. Identify the parts and explain the functions of the neuron.
2. Describe how a nerve impulse is transmitted along a neuron.
3. Describe how a nerve impulse is transmitted between neurons.
4. Identify the functions of the nervous system and how it maintains homeostasis.
5. Distinguish between the central and peripheral nervous systems.
6. Classify the three types of neurons.
7. Explain the parts of a reflex arc and how reflexes work.
8. Describe the organization of the peripheral nervous system.
9. Identify parts of the brain and their functions.
10. Identify and describe the parts of the eye and explain its relationship to the nervous system.
11. Identify and describe the parts of the ear and explain its relationship to the nervous system.

UNIT TEN: Plant Diversity

1. Describe evolution of modern plants from green algae and the adaptations that allowed plants to survive on land.
2. Compare and contrast the functions of xylem and phloem (vascular tissue) in plants.
3. Discuss the characteristics that are used to classify plants.
4. Identify the parts of a seed and distinguish between monocots and dicots.
5. Identify male, female, and sterile parts of the flower and their role in sexual reproduction.
6. Describe the process of plant fertilization.
7. Explain how plants reproduce asexually and provide examples.
8. Compare the functions of leaves, stems, roots, and flowers.
9. Relate leaf structures to the process of photosynthesis.
10. Explain how plants grow upward and outward using specialized growth tissues called meristems.
11. List characteristics required for seeds to germinate.
12. Provide examples of environmental stimuli and plant responses to these stimuli.
13. Name several plant hormones and describe the effect of each to a plant.