

Biology Keystone – Module Anchors & Vocabulary Guide

Module 1

Anchor – Basic Biological Principles

- BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms
- BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
- BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).

Vocabulary

Homeostasis, Evolution, Asexual reproduction, Eukaryote, Nucleus, Sexual reproduction, Cell membrane, DNA, Membrane-bound organelles, Cell, Prokaryote, Cell specialization

Anchor – Chemical Basis for Life

- BIO.A.2.1.1 Describe the unique properties of water and how these properties support life on Earth (e.g. freezing point, high specific heat, cohesion.)
- BIO.A.2.2.1 Explain how carbon is uniquely suited to form biological macromolecules.
- BIO.A.2.2.2 Describe how biological macromolecules form from monomers.
- BIO.A.2.2.3 Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.
- BIO.A.2.3.1 Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction.
- BIO.A.2.3.2 Explain how factors such as pH, temperature, and concentration levels can affect enzyme function.

Vocabulary

Hydrogen bond, solution, pH scale, cohesion, Adhesion, polarity, freezing point, monomer, Heat of vaporization, polymer, nucleic acid, nucleotide, Carbohydrate, monosaccharide, polysaccharide, lipid, Triglyceride, phospholipid, steroid, wax, Fatty acid, protein, amino acid, primary structure, Secondary structure, tertiary structure, quaternary structure, chemical reaction, Enzyme, catalyst, activation energy, active site, Substrate, product, reactant

Anchor – Bioenergetics

- BIO.A.3.1.1 Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations.
- BIO.A.3.2.1 Compare the basic transformation of energy during photosynthesis and cellular respiration.
- BIO.A.3.2.2 Describe the role of ATP in biochemical reactions.

Vocabulary

ATP, ADP, autotroph, heterotroph, Photosynthesis, pigment chlorophyll, chloroplast, Thylakoid, stroma, NADP+/NADPH, calorie, Cellular respiration, aerobic, anaerobic, fermentation, Glucose

Anchor – Homeostasis & Transport

- BIO.A.4.1.1 Describe how the structure of the plasma membrane allows it to function as a regulatory structure and/or protective barrier for a cell.
- BIO.A.4.1.2 Compare the mechanisms that transport materials across the plasma membrane (i.e., passive Transport — diffusion, osmosis, facilitated diffusion; and active transport—pumps, endocytosis, exocytosis).
- BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation.)

Vocabulary

Buffer, homeostasis, diffusion, isotonic, Hypertonic, hypotonic, facilitated diffusion, osmosis, Endocytosis, exocytosis, Concentration gradient, feedback mechanism, Plasma membrane, channel proteins, feedback inhibition, solute, Fluid mosaic model, equilibrium, multicellular, unicellular, Endoplasmic reticulum, Golgi apparatus, vesicle, vacuole

Module 2

Anchor – Cell Growth & Reproduction

- BIO.B.1.1.1 Describe the events that occur during the cell cycle: interphase, nuclear division (i.e. mitosis or meiosis), cytokinesis.
- BIO.B.1.1.2 Compare the processes and outcomes of mitotic and meiotic nuclear divisions.
- BIO.B.1.2.1 Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.
- BIO.B.1.2.2 Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance.

Vocabulary

Cell division, asexual reproduction, sexual reproduction, Chromosome, chromatin, cell cycle, Interphase, mitosis, cytokinesis, Prophase, centromere, chromatid, Centriole, metaphase, anaphase, Telophase, growth factor, Cancer, tumor, apoptosis, Homologous, tetrad, crossing-over, Haploid, diploid, meiosis

Anchor – Genetics

- BIO.B.2.1.1 Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, codominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).
- BIO.B.2.1.2 Describe processes that can alter composition or number of chromosomes (i.e., crossing over, nondisjunction, duplication, translocation, deletion, insertion, and inversion.)
- BIO.B.2.2.1 Describe how the processes of transcription and translation are similar in all organisms.
- BIO.B.2.2.2 Describe the role of ribosomes, endoplasmic reticulum, Golgi apparatus, and the nucleus in the production of specific types of proteins.
- BIO.B.2.3.1 Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g., silent, nonsense, frame shift).
- BIO.B.2.4.1 Explain how genetic engineering has impacted the fields of medicine, forensics, and agriculture (e.g., selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy).

Vocabulary

Genetics, fertilization, allele, principle of dominance, Trait, segregation, hybrid, gene, Gamete, probability, genotype, phenotype, Homozygous, heterozygous, codominance, independent assortment, Multiple allele, polygenic trait, base pairing, Incomplete dominance, Replication, DNA polymerase, nucleotides, nucleic acid, RNA, messenger RNA, ribosomal RNA, RNA polymerase, Transfer RNA, transcription, polypeptide, genetic code, Codon, anticodon, translation, gene expression, Biotechnology, PCR, genetic marker, transgenic, Recombinant DNA, clone, plasmid, gene therapy, DNA fingerprinting, genome, autosome, sex-linked gene, Sex chromosome, nondisjunction

Anchor – Theory of Evolution

- BIO.B.3.1.1 Explain how natural selection can impact allele frequencies of a population.
- BIO.B.3.1.2 Describe the factors that can contribute to the development of new species (e.g. isolating mechanisms, genetic drift, founder effect, migration).
- BIO.B.3.1.3 Explain how genetic mutations may result in genotypic and phenotypic variations within a population.
- BIO.B.3.2.1 Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical, and universal genetic code)
- BIO.B.3.3.1 Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation.

Vocabulary

Evolution, natural selection, variation, adaptation, mutation, diversity, fitness, common ancestor, gene pool, founder effect, bottleneck effect, genetic drift, equilibrium, gene flow, allele frequency, isolation (behavioral, reproductive, geographic, and mechanical), speciation, vestigial, homologous, analogous, fossil, embryology, molecular biology

Anchor – Ecology

- BIO.B.4.1.1 Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, and biosphere).
- BIO.B.4.1.2 Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.
- BIO.B.4.2.1 Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).
- BIO.B.4.2.2 Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).
- BIO.B.4.2.3 Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, and nitrogen cycle).
- BIO.B.4.2.4 Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).
- BIO.B.4.2.5 Describe the effects of limiting factors on population dynamics and potential species extinction.

Vocabulary

Biosphere, population, community, ecology, Ecosystem, biome, biotic factor, abiotic factor, Autotroph, primary producer, photosynthesis, heterotroph, Consumer, carnivore, herbivore, scavenger, Omnivore, decomposer, detritivore, food chain, Food web, trophic level, ecological pyramid, biomass, Nutrient, limiting factor, weather, Biogeochemical cycle, Climate, microclimate, tolerance, greenhouse effect, Habitat, niche, resource, predation, Herbivory, keystone species, competitive exclusion principle, Symbiosis, mutualism, parasitism, commensalism, Succession, pioneer species, primary succession, secondary succession, Wetland, estuary, population density, Immigration, emigration, exponential growth, logistic growth, Carrying capacity, limiting factor, global warming, ecological hot spot, Demography, monoculture, Renewable resource, desertification, Ecological footprint, deforestation, acid rain, nonrenewable resource, Pollutant, smog, habitat fragmentation, sustainable development, Biodiversity, genetic diversity, ozone layer, biological magnification, Ecosystem diversity, species diversity, density-dependent limiting factor, Extinction, Chemosynthesis, density-independent limiting factor