



**Dover Area School District Curriculum K-U-D
High School Biology**

Standards	Eligible Content	Know	Understand	Do
BIO.A.1.1 Explain the characteristics common to all organisms.	BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.	prokaryotic, eukaryotic, characteristics of life	Students will understand the unity and diversity of life.	Create a Venn diagram comparing and contrasting prokaryotes and eukaryotes. List, describe, and give an example of each characteristic of life.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.	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).	prokaryotic, eukaryotic, organelles, levels of organization,	Students will demonstrate that structure determines function at all levels.	Create a Venn diagram comparing and contrasting prokaryotes and eukaryotes. Identify the levels of biological organization and give examples of each. Describe how structure effects function.
BIO.A.2.1 Describe how the unique properties of water support life on Earth.	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).	Properties of water	Students will demonstrate that structure determines function at the molecular level.	Demonstrate how the properties of water affect life.
BIO.A.2.2 Describe and interpret relationships between structure and function at various levels of biochemical organization (i.e., atoms, molecules, and macromolecules).	BIO.A.2.2.1 Explain how carbon is uniquely suited to form biological macromolecules.	covalent bonds, carbon, macromolecules	Students will demonstrate that structure determines function at the molecular level.	Build macromolecules using kits. Draw carbon bonding to 4 different atoms.
	BIO.A.2.2.2 Describe how biological macromolecules form from monomers.	macromolecules, monomers, polymers, carbohydrates, lipids, proteins, nucleic acids		List the monomer of each macromolecule.
	BIO.A.2.2.3 Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.	carbohydrates, lipids, proteins, nucleic acids		Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.
BIO.A.2.3 Explain how enzymes regulate biochemical reactions within a cell.	BIO.A.2.3.1 Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction.	catalyst, enzymes, substrates, active site, activation energy	Students will demonstrate that structure determines function at the chemical level.	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.	ph, temperature, enzyme concentration, substrate concentration		Explain how factors such as pH, temperature, and concentration levels can affect enzyme function.
BIO.A.3.1 Identify and describe the cell structures involved in processing energy.	BIO.A.3.1.1 Describe the fundamental roles of plastids (e.g. chloroplasts) and mitochondria in energy transformations.	chloroplasts, mitochondria, photosynthesis, respiration, chemical energy, light energy	Students will understand that organisms use materials and energy.	Describe the fundamental roles of plastids (e.g. chloroplasts) and mitochondria in energy transformations.
BIO.A.3.2 Identify and describe how organisms obtain and transform energy for their life processes.	BIO.A.3.2.1 Compare the basic transformation of energy during photosynthesis and cellular respiration	chloroplasts, mitochondria, photosynthesis, respiration, chemical energy, light energy	Students will demonstrate that structure determines function at the cellular level.	Compare and contrast the transformations of energy that occur in photosynthesis and respiration.
	BIO.A.3.2.2 Describe the role of ATP in biochemical reactions.	ATP, respiration, phosphates, kinetic energy, potential energy		Describe the role of ATP in biochemical reactions.
BIO.A.4.1 Identify and describe the cell structures involved in transport of materials into, out of, and throughout a cell	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.	cell membrane, phospholipids, protein channels, hydrophilic, hydrophobic	Students will understand that organisms must maintain a stable internal environment. Students will understand that structure determines function at the cellular level. Students will understand that organisms use materials and energy.	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).	passive transport, diffusion, osmosis, facilitated diffusion, active transport, endocytosis, exocytosis, sodium-potassium pump		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.4.1.3 Describe how membrane-bound cellular organelles (e.g., endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials within a cell.	Golgi apparatus, endoplasmic reticulum, proteins, ribosomes, vesicles, cell membrane		Describe how membrane-bound cellular organelles (e.g., endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials within a cell.



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BIO.A.4.2 Explain mechanisms that permit organisms to maintain biological balance between their internal and external environments.	BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).	homeostasis, thermoregulation, water regulation, oxygen regulation	Students will understand that organisms must maintain a stable internal environment.	Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).
BIO.B.1.1 Describe the three stages of the cell cycle: interphase, nuclear division, cytokinesis.	BIO.B.1.1.1 Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis	mitosis, meiosis, cell cycle, interphase, cytokinesis, G1, S, G2	Students will understand that organisms reproduce at both the cellular and organismal levels.	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.	mitosis, meiosis, interphase, prophase, metaphase, anaphase, telophase, replicated chromosomes, single chromosomes,		Compare and contrast mitosis and meiosis.
BIO.B.1.2 Explain how genetic information is inherited.	BIO.B.1.2.1 Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.	DNA, replication, mitosis,	Students will understand that organisms are based on a universal genetic code.	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.	DNA, genes, alleles, chromosomes		Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance.
BIO.B.2.1 Compare Mendelian and non-Mendelian patterns of inheritance.	BIO.B.2.1.1 Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).	Mendel, dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles, heterozygous, homozygous dominant, homozygous recessive	Students will understand that organisms are based on a universal genetic code.	Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, 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).	crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion		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 Explain the process of protein synthesis (i.e., transcription, translation, and protein modification).	BIO.B.2.2.1 Describe how the processes of transcription and translation are similar in all organisms.	transcription, translation, RNA, mRNA, rRNA, tRNA, DNA, ribosomes, nucleus	Students will understand that organisms are based on a universal genetic code. Students will demonstrate that structure determines function at the cellular level.	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.	transcription, translation, RNA, mRNA, rRNA, tRNA, DNA, ribosomes, nucleus, endoplasmic reticulum, Golgi apparatus, nucleus, proteins		Describe the role of ribosomes, endoplasmic reticulum, Golgi apparatus, and the nucleus in the production of specific types of proteins.
BIO.B.2.3 Explain how genetic information is expressed.	BIO.B.2.3.1 Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g., silent, nonsense, frameshift).	Types of mutations, DNA, silent, nonsense, frameshift, missense, insertion, deletion	Students will understand that organisms are based on a universal genetic code.	Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g., silent, nonsense, frameshift).
BIO.B.2.4 Apply scientific thinking, processes, tools, and technologies in the study of genetics.	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).	selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy, genetic engineering	Students will understand that organisms are based on a universal genetic code that can be manipulated.	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).
BIO.B.3.1 Explain the mechanisms of evolution.	BIO.B.3.1.1 Explain how natural selection can impact allele frequencies of a population	natural selection, allele frequency, dominant, recessive	Students will understand that evolution explains the unity, continuity, and diversity of life.	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).	species, isolating mechanisms, genetic drift, founder effect, migration, emmigration		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.	Types of mutations, variation		Explain how genetic mutations may result in genotypic and phenotypic variations within a population.



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BIO.B.3.2 Analyze the sources of evidence for biological evolution.	BIO.B.3.2.1 Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical, and universal genetic code).	evidences of evolution, fossil, anatomical, vestigial structures, homologous structures, embryology, biochemical evidence, DNA	Students will understand that evolution explains the unity, continuity, and diversity of life.	Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical, and universal genetic code).
BIO.B.3.3 Apply scientific thinking, processes, tools, and technologies in the study of the theory of evolution.	BIO.B.3.3.1 Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation.	hypothesis, inference, law, theory, principle, fact, and observation.\	Students will understand that evolution explains the unity, continuity, and diversity of life.	Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation.