

Big Idea	Essential Question	Concepts and Timeline	Competencies
Organisms share common characteristics of life.	How do we know if something is alive?	Nature of Science 2 cycles (Note: 1 cycle = 6 days)	Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms
			Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, observation
Life emerges due to the chemical organization of matter into cells.	How does life result from chemical structure and function?	Inorganic Chemistry 2 cycles	Describe the unique properties of water and how these properties support life on Earth (<i>e.g. freezing point, high specific heat, cohesion</i>)
			Describe how biological macromolecules form from monomers
		Organic Chemistry 3 cycles	Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction
			Compare the structure and function of carbohydrates, lipids, proteins and nucleic acids in organisms
			Explain how carbon is uniquely suited to form biological macromolecules
			Explain how factors such as pH, temperature, and concentration levels can affect enzyme function
Cells have organized structures and systems necessary to support chemical reactions needed to maintain the living condition.	How does life result from cellular structure and function?	Cells 1 cycle	Describe how membrane-bound cellular organelles (<i>e.g. endoplasmic reticulum, Golgi apparatus</i>) facilitate the transport of materials within a cell
			Compare cellular structures and their functions in prokaryotic and eukaryotic cells
Structure is related to function at all biological levels of organization.	How is structure related to function at all biological levels of organization?		Describe and interpret relationships between structure and function at various levels of biological organization (<i>i.e. organelles, cells, tissues, organs, organ systems and multicellular organisms</i>)
Through a variety of mechanisms organisms seek to maintain a biological balance between their internal and external environments.	How do organisms maintain a biological balance between their internal and external environments?	Cell Transport 1.7 cycles	Describe how the structure of the plasma membrane allows it to function as a regulatory structure and/or protective barrier for a cell
			Compare the mechanisms that transport materials across the plasma membrane (<i>i.e. passive transport - diffusion, osmosis, facilitated diffusion; and active transport – pumps, endocytosis, exocytosis</i>)
			Explain how organisms maintain homeostasis (<i>e.g. thermoregulation, water regulation, oxygen regulation</i>)

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Eukaryotic cells can differentiate and organize making it possible for multicellularity.	What are the advantages of multicellularity?	Photosynthesis 2 cycles	Describe the fundamental roles of plastids (<i>e.g. chloroplasts</i>) and mitochondria in energy transformation
Organisms obtain and use energy to carry out their life processes.	How do different organisms obtain and use energy to survive in their environment?	Cell Respiration 1 cycle	Compare the basic transformation of energy during photosynthesis and cellular respiration
			Describe the role of ATP in biochemical reactions
Hereditary information in genes is inherited and expressed.	How is the hereditary information in genes inherited and expressed?	DNA/Protein Synthesis 2 cycles	Describe how the process of DNA replication results in the transmission and/or conservation of genetic information
			Explain the functional, relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance
DNA segments contain information for the production of proteins necessary for growth and function of cells.	How does DNA control growth and function of cells?		Describe how the processes of transcription and translation are similar in all organisms
			Describe the role of ribosomes, endoplasmic reticulum, Golgi apparatus, and the nucleus in the production of specific types of proteins
New cells arise from the division of pre-existing cells.	How do cells grow and reproduce?	Cell Division 1.5 cycles	Describe the events that occur during the cell cycle: interphase, nuclear division (<i>i.e. mitosis or meiosis</i>), cytokinesis
			Compare the processes and outcomes of mitotic and meiotic nuclear divisions
DNA segments contain information for the production of proteins necessary for growth and function of cells.	How does DNA control growth and function of cells?	Mendelian Genetics 1.3 cycles	Describe and/or predict observed patterns of inheritance (<i>i.e. dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles</i>)
		Human Genetics 1.7 cycles	Describe processes that can alter composition or number of chromosomes (<i>i.e. crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion</i>)
			Explain how genetic engineering has impacted the field of medicine, forensics, and agriculture (<i>e.g. selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy</i>)
			Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (<i>e.g. silent, nonsense, frame-shift</i>)

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<p>Evolution is the result of many random processes selecting for the survival and reproduction of a population.</p>	<p>How do we scientifically explain the evidence and mechanisms for biological evolution?</p>	<p>Evolution 3 cycles</p>	<p>Explain how natural selection can impact allele frequency of a population</p>
			<p>Describe the factors that can contribute to the development of new species (<i>e.g. isolating mechanisms, genetic drift, founder effect, migration</i>)</p>
			<p>Explain how genetic mutations may result in genotypic and phenotypic variations within a population</p>
			<p>Interpret evidence supporting the theory of evolution (<i>i.e. fossil, anatomical, physiological, embryological, biochemical, and universal genetic code</i>)</p>
<p>Organisms on Earth interact and depend in a variety of ways on other living and nonliving things in their environments.</p>	<p>How do organisms interact and depend on each other and their environment for survival?</p>	<p>Ecology 2 cycles</p>	<p>Describe the levels of ecological organization (<i>i.e. organisms, population, community, ecosystem, biome, and biosphere</i>)</p>
			<p>Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems</p>
			<p>Describe biotic interactions in an ecosystem (<i>e.g. competition, predation, symbiosis</i>)</p>
			<p>Describe how matter recycles through an ecosystem (<i>i.e. water cycle, carbon cycle, oxygen cycle, and nitrogen cycle</i>)</p>
			<p>Describe how ecosystems change in response to natural and human disturbances (<i>e.g. climate change, introduction of nonnative species, pollution, fires</i>)</p>
<p>Organisms obtain and use energy to carry out their life processes.</p>	<p>How do different organisms obtain and use energy to survive in their environment?</p>		<p>Describe how energy flows through an ecosystem (e.g. food chains, food webs, energy pyramids)</p>