

<p>Grade, Subject/Course: High School Biology/Honors Biology</p>	
<p>Cell Organization</p>	<p><u> X </u> Essential <u> </u> Important <u> </u> Compact</p>
<p>Big Idea: Organisms have characteristic structures which enable functions and behaviors that allow them to grow, reproduce, and die.</p>	
<p>PA Core Content Standards/Anchors (or National Standards):</p> <ul style="list-style-type: none"> • 3.1.9-12.B; 3.1.9-12.F 	<p>Interdisciplinary Standards (if applicable):</p>
<p>Essential Questions:</p> <ul style="list-style-type: none"> • How do the structures of organisms enable life’s functions? • How do organisms obtain and use the matter and energy they need to live and grow? 	<p>Understandings (CCCs - Cross-cutting Concepts [themes]):</p> <ul style="list-style-type: none"> • Students will understand the content using... <ul style="list-style-type: none"> ○ Patterns ○ Cause and Effect ○ Scale, Proportion, and Quantity ○ Systems and System Models ○ Energy and Matter ○ Structure and Function ○ Stability and Change
<p>Knowledge (DCIs - Disciplinary Core Ideas [what they will know]):</p> <ul style="list-style-type: none"> • Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. • Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. 	<p>Do/Skills (SEPs - Science and Engineering Practices [what they do]):</p> <ul style="list-style-type: none"> • Students will be able to... <ul style="list-style-type: none"> ○ Asking Questions & Defining Problems ○ Developing & Using Models ○ Planning & Carrying Out Investigations ○ Using Mathematics & Computational Thinking ○ Constructing Explanations & Design Solutions ○ Engaging in Argument from Evidence ○ Obtaining Evaluating and Communicating Information
<p>Vocabulary:</p> <p>Macromolecule Polymer Monomer</p>	<p>Core Resources:</p> <p>Modern Biology Textbook</p>

<p>Carbohydrates Proteins Amino Acid Polypeptide Lipids Nucleic Acids DNA (Deoxyribonucleic Acid) RNA (Ribonucleic Acid) Nucleotide Triglycerides Phospholipid Enzyme Prokaryote Eukaryote Cytoplasm Plasma Membrane Phospholipid Bilayer Nucleus Ribosome Mitochondria Chloroplast Endoplasmic Reticulum (ER) Golgi Apparatus Cell Tissue Organ Organ System Organisms Unicellular Multicellular Specialized Cells Organelles</p>	
<p><u>Common Assessment(s):</u></p> <p>Tests</p>	<p><u>Supplemental Resources:</u></p>

Grade, Subject/Course: High School Biology/Honors Biology	
Bioenergetics	<u> X </u> Essential <u> </u> Important <u> </u> Compact
<p>Big Idea: The structures, functions, and behaviors of organisms allow them to obtain, use, transport, and remove the matter and energy needed to live.</p> <p>The structures, functions, and behaviors of organisms allow them to obtain, use, transport, and remove the matter and energy needed to live.</p>	
<p>PA Core Content Standards/Anchors (or National Standards):</p> <ul style="list-style-type: none"> 3.1.9-12.E; 3.1.9-12.G 	Interdisciplinary Standards (if applicable):
<p>Essential Questions:</p> <ul style="list-style-type: none"> How do organisms interact with the living and nonliving environments to obtain matter and energy? 	<p>Understandings (CCCs - Cross-cutting Concepts [themes]):</p> <ul style="list-style-type: none"> Students will understand the content using... <ul style="list-style-type: none"> Patterns Cause and Effect Scale, Proportion, and Quantity Systems and System Models Energy and Matter Structure and Function Stability and Change
<p>Knowledge (DCIs - Disciplinary Core Ideas [what they will know]):</p> <ul style="list-style-type: none"> Photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen. 	<p>Do/Skills (SEPs - Science and Engineering Practices [what they do]):</p> <ul style="list-style-type: none"> Students will be able to... <ul style="list-style-type: none"> Asking Questions & Defining Problems Developing & Using Models Planning & Carrying Out Investigations Using Mathematics & Computational Thinking Constructing Explanations & Design Solutions Engaging in Argument from Evidence Obtaining Evaluating and Communicating Information
<p>Vocabulary: Photosynthesis Glucose</p>	Core Resources:

Input Output Reactant Product Chemical Energy Light energy Mitochondria Cellular Respiration Reactants Products Chemical energy Stored energy Food molecule Net transfer ADP/ATP	Modern Biology Textbook
<u>Common Assessment(s):</u> Tests	<u>Supplemental Resources:</u>

<u>Grade, Subject/Course:</u> High School Biology/Honors Biology	
Cell Division & Transport	<u> X </u> Essential _____ Important _____ Compact
<u>Big Idea:</u> Organisms have characteristic structures which enable functions and behaviors that allow them to grow, reproduce, and die. The characteristic structures, functions and behaviors of organisms change in predictable ways as they progress through their life cycle.	
<u>PA Core Content Standards/Anchors (or National Standards):</u> <ul style="list-style-type: none"> 3.1.9-12.C; 3.1.9-12.D 	<u>Interdisciplinary Standards (if applicable):</u>
<u>Essential Questions:</u>	<u>Understandings (CCCs - Cross-cutting Concepts [themes]):</u>

<ul style="list-style-type: none"> • How do the structures of organisms enable life’s functions? • How do organisms grow and develop? 	<ul style="list-style-type: none"> • Students will understand the content using... <ul style="list-style-type: none"> ○ Patterns ○ Cause and Effect ○ Scale, Proportion, and Quantity ○ Systems and System Models ○ Energy and Matter ○ Structure and Function ○ Stability and Change
<p><u>Knowledge (DCIs - Disciplinary Core Ideas [what they will know]):</u></p> <ul style="list-style-type: none"> • Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. • Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. 	<p><u>Do/Skills (SEPs - Science and Engineering Practices [what they do]):</u></p> <ul style="list-style-type: none"> • Students will be able to... <ul style="list-style-type: none"> ○ Asking Questions & Defining Problems ○ Developing & Using Models ○ Planning & Carrying Out Investigations ○ Using Mathematics & Computational Thinking ○ Constructing Explanations & Design Solutions ○ Engaging in Argument from Evidence ○ Obtaining Evaluating and Communicating Information
<p><u>Vocabulary:</u></p> <p>Mitosis Chromosome Interphase Prophase Metaphase Anaphase Telophase Cytokinesis Cell Cycle Active Transport ATP (Adenosine Triphosphate) Ion Pumps Endocytosis Exocytosis Membrane Protein Cotransport Passive Transport Diffusion Facilitated Diffusion Osmosis Concentration Gradient</p>	<p><u>Core Resources:</u></p> <p>Modern Biology Textbook</p>

Equilibrium Selectively Permeable	
<u>Common Assessment(s):</u> Tests	<u>Supplemental Resources:</u>

<u>Grade, Subject/Course:</u> High School Biology/Honors Biology	
DNA	<u> X </u> Essential <u> </u> Important <u> </u> Compact
<u>Big Idea:</u> Organisms have characteristic structures which enable functions and behaviors that allow them to grow, reproduce, and die. Offspring resemble, but are not identical to, their parents due to traits being passed from one generation to the next via genes.	
<u>PA Core Content Standards/Anchors (or National Standards):</u> <ul style="list-style-type: none"> • 3.1.9-12.A; 3.1.9-12.P 	<u>Interdisciplinary Standards (if applicable):</u>
<u>Essential Questions:</u> <ul style="list-style-type: none"> • How are the characteristics of one generation related to the previous generation? • Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells • 	<u>Understandings (CCCs - Cross-cutting Concepts [themes]):</u> <ul style="list-style-type: none"> • Students will understand the content using... <ul style="list-style-type: none"> ○ Patterns ○ Cause and Effect ○ Scale, Proportion, and Quantity ○ Systems and System Models ○ Energy and Matter ○ Structure and Function ○ Stability and Change
<u>Knowledge (DCIs - Disciplinary Core Ideas [what they will know]):</u> <ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code 	<u>Do/Skills (SEPs - Science and Engineering Practices [what they do]):</u> <ul style="list-style-type: none"> • Students will be able to... <ul style="list-style-type: none"> ○ Asking Questions & Defining Problems ○ Developing & Using Models ○ Planning & Carrying Out Investigations ○ Using Mathematics & Computational Thinking ○ Constructing Explanations & Design Solutions

<p>for the formation of proteins, which carry out most of the work of cells.</p> <ul style="list-style-type: none"> • Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet-known function. 	<ul style="list-style-type: none"> ○ Engaging in Argument from Evidence ○ Obtaining Evaluating and Communicating Information
<p><u>Vocabulary:</u> DNA gene allele chromosome gene expression protein traits Inheritance DNA RNA Genes Protein Protein Synthesis DNA replication transcription translation</p>	<p><u>Core Resources:</u> Modern Biology Textbook</p>
<p><u>Common Assessment(s):</u> Tests</p>	<p><u>Supplemental Resources:</u></p>

<p><u>Grade, Subject/Course:</u> High School Biology/Honors Biology</p>	
<p>Genetics</p>	<p><u> X </u> Essential <u> </u> Important <u> </u> Compact</p>

<p><u>Big Idea:</u></p> <p>Variation among individuals of the same species can be explained by both genetic and environmental factors. Variation among individuals of the same species can be explained by both genetic and environmental factors.</p>	
<p><u>PA Core Content Standards/Anchors (or National Standards):</u></p> <ul style="list-style-type: none"> ● 3.1.9-12.Q; 3.1.9-12.R 	<p><u>Interdisciplinary Standards (if applicable):</u></p>
<p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> ● How does genetic variation among organisms affect survival and reproduction? 	<p><u>Understandings (CCCs - Cross-cutting Concepts [themes]):</u></p> <ul style="list-style-type: none"> ● Students will understand the content using... <ul style="list-style-type: none"> ○ Patterns ○ Cause and Effect ○ Scale, Proportion, and Quantity ○ Systems and System Models ○ Energy and Matter ○ Structure and Function ○ Stability and Change
<p><u>Knowledge (DCIs - Disciplinary Core Ideas [what they will know]):</u></p> <ul style="list-style-type: none"> ● In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. ● Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. 	<p><u>Do/Skills (SEPs - Science and Engineering Practices [what they do]):</u></p> <ul style="list-style-type: none"> ● Students will be able to... <ul style="list-style-type: none"> ○ Asking Questions & Defining Problems ○ Developing & Using Models ○ Planning & Carrying Out Investigations ○ Using Mathematics & Computational Thinking ○ Constructing Explanations & Design Solutions ○ Engaging in Argument from Evidence ○ Obtaining Evaluating and Communicating Information

<p><u>Vocabulary:</u> Meiosis Genetic mutation Genetic variation Genotype Phenotype Inheritance Traits Gene expression Population Dominant Recessive</p>	<p><u>Core Resources:</u> Modern Biology Textbook</p>
<p><u>Common Assessment(s):</u> Tests</p>	<p><u>Supplemental Resources:</u></p>

<p><u>Grade, Subject/Course:</u> High School Biology/Honors Biology</p>	
<p>Evolution</p>	<p><u> X </u> Essential _____ Important _____ Compact</p>
<p><u>Big Idea:</u></p>	
<p><u>PA Core Content Standards/Anchors (or National Standards):</u></p> <ul style="list-style-type: none"> ● 3.1.9-12.S; 3.1.9-12.T; 3.1.9-12.U; 3.1.9-12.W; 3.1.9-12.X 	<p><u>Interdisciplinary Standards (if applicable):</u></p>
<p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> ● 	<p><u>Understandings (CCCs - Cross-cutting Concepts [themes]):</u></p> <ul style="list-style-type: none"> ● Students will understand the content using... <ul style="list-style-type: none"> ○ Patterns ○ Cause and Effect ○ Scale, Proportion, and Quantity ○ Systems and System Models ○ Energy and Matter ○ Structure and Function ○ Stability and Change

<p><u>Knowledge (DCIs - Disciplinary Core Ideas [what they will know]):</u></p> <ul style="list-style-type: none"> • Comparisons between species provides evidence that they evolved from common ancestors, explaining the similarities and differences between species. • In any environment, individuals with particular traits may be more likely than others to survive and produce offspring. • In any environment individuals with particular traits may be more likely than others to survive and produce offspring. • When the environment changes, some individuals in a population may have traits that provide a reproductive advantage which over many generations can change the make up of a population • When the environment changes, some individuals in a population may have traits that provide a reproductive advantage which over many generations can change the makeup of a population. 	<p><u>Do/Skills (SEPs - Science and Engineering Practices [what they do]):</u></p> <ul style="list-style-type: none"> • Students will be able to... <ul style="list-style-type: none"> ○ Asking Questions & Defining Problems ○ Developing & Using Models ○ Planning & Carrying Out Investigations ○ Using Mathematics & Computational Thinking ○ Constructing Explanations & Design Solutions ○ Engaging in Argument from Evidence ○ Obtaining Evaluating and Communicating Information
<p><u>Vocabulary:</u> Evolution Evolutionary evidence Natural selection Biological fitness Genetic variation Mutation Competition Biodiversity Species Speciation Extinction Divergent evolution Convergent evolution</p>	<p><u>Core Resources:</u> Modern Biology Textbook</p>
<p><u>Common Assessment(s):</u> Tests</p>	<p><u>Supplemental Resources:</u></p>

Grade, Subject/Course: High School Biology/Honors Biology	
Ecology	<u> X </u> Essential <u> </u> Important <u> </u> Compact
<p><u>Big Idea:</u></p> <p>Ecosystems are complex systems that include both living (biotic) and non-living (abiotic) components that interact with each other. The cycling of matter and the flow of energy within ecosystems occur through interactions among different organisms and between organisms and the physical environment. As the environment and populations of species change, there are resulting changes in ecosystems. Many species live in groups, increasing the chances of survival for individuals and their relatives.</p>	
<p><u>PA Core Content Standards/Anchors (or National Standards):</u></p> <ul style="list-style-type: none"> ● 3.1.9-12.H; 3.1.9-12.I; 3.1.9-12.J; 3.1.9-12.K; 3.1.9-12.L; 3.1.9-12.M; 3.1.9-12.N; 3.1.9-12.O 	<p><u>Interdisciplinary Standards (if applicable):</u></p>
<p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> ● How do organisms interact with the living and nonliving environments to obtain matter and energy? ● How do matter and energy move through an ecosystem? ● How do environmental changes impact ecosystems? ● How do organisms interact in groups so as to benefit individuals? 	<p><u>Understandings (CCCs - Cross-cutting Concepts [themes]):</u></p> <ul style="list-style-type: none"> ● Students will understand the content using... <ul style="list-style-type: none"> ○ Patterns ○ Cause and Effect ○ Scale, Proportion, and Quantity ○ Systems and System Models ○ Energy and Matter ○ Structure and Function ○ Stability and Change
<p><u>Knowledge (DCIs - Disciplinary Core Ideas [what they will know]):</u></p> <ul style="list-style-type: none"> ● Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical 	<p><u>Do/Skills (SEPs - Science and Engineering Practices [what they do]):</u></p> <ul style="list-style-type: none"> ● Students will be able to... <ul style="list-style-type: none"> ○ Asking Questions & Defining Problems ○ Developing & Using Models ○ Planning & Carrying Out Investigations ○ Using Mathematics & Computational Thinking ○ Constructing Explanations & Design Solutions ○ Engaging in Argument from Evidence ○ Obtaining Evaluating and Communicating Information

elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved.

- Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem.
- Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes.
- Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes.
- Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem.
- A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem.
- Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability.

- Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species.
- Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives.

Vocabulary:

group behaviors
 genetic
 relatedness
 species
 natural selection
 evolution
 cause and effect
 correlation
 Human disturbances
 ecosystem
 Biodiversity
 Ecological relationships
 niche
 succession
 carrying capacity
 limiting factors
 biotic
 abiotic
 population
 predation
 competition
 carbon cycle
 photosynthesis
 cellular
 respiration
 biosphere
 atmosphere
 hydrosphere
 geosphere
 Anaerobic respiration
 Aerobic respiration

Core Resources:

Modern Biology Textbook

energy transfer scale proportion conservation of energy food chains/webs trophic levels energy	
<u>Common Assessment(s):</u> Tests	<u>Supplemental Resources:</u>