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# 9<sup>th</sup> Grade Honors Biology K

Curriculum Guide

Scranton School District

Scranton, PA



**9<sup>th</sup> Grade Honors Biology K**

**Prerequisite:**

- 8<sup>th</sup> Grade Physical Science
- Teacher recommendation

This is an honors level Biology Keystone course designed to prepare students for proficient and advanced scoring on the Keystone Biology Exam.

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Year-at-a-glance

<b>Subject: 9<sup>th</sup> Grade Honors Biology K</b>	<b>Grade: 9</b>	<b>Date Completed: 8/8/15</b>
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**1<sup>st</sup> Quarter**

Topic	Resources	Assessment Anchors
<b>Introduction to Biology</b>	<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone Finish Line Biology Unit 1</b>	<b>BIO.A.1.1.1</b> <b>BIO.A.1.2.1</b> <b>BIO.A.1.2.2</b> <b>CC.1.2</b> <b>CC.1.4</b> <b>CC.1.5</b> <b>CC.2.1</b> <b>CC.2.2</b> <b>CC.2.4</b>
<b>Chemical Basis for Life</b>	<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone Finish Line Biology Unit 2</b>	<b>BIO.A.2.1.1</b> <b>BIO.A.2.2.1</b> <b>BIO.A.2.2.2</b> <b>BIO.A.2.2.3</b> <b>BIO.A.2.3.1</b> <b>BIO.A.2.3.2</b> <b>CC.1.2</b> <b>CC.1.4</b> <b>CC.1.5</b> <b>CC.2.1</b> <b>CC.2.2</b> <b>CC.2.4</b>
<b>Bioenergetics</b>	<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone Finish Line Biology Unit 3</b>	<b>BIO.A.3.1.1.</b> <b>BIO.A.3.2.1</b> <b>BIO.A.3.2.2</b> <b>CC.1.2</b> <b>CC.1.4</b> <b>CC.1.5</b> <b>CC.2.1</b> <b>CC.2.2</b> <b>CC.2.4</b>

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<b>Homeostasis and Transport</b>	<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone Finish Line Biology Unit 4</b>	<b>BIO A.4.1.1</b> <b>BIO.A.4.1.2</b> <b>BIO.A.4.1.3</b> <b>BIO.A.4.2.1</b> <b>CC.1.2</b> <b>CC.1.4</b> <b>CC.1.5</b> <b>CC.2.1</b> <b>CC.2.2</b> <b>CC.2.4</b>
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**2<sup>nd</sup> Quarter**

Topic	Resources	Assessment Anchors
<b>Cell Growth and Reproduction</b>	<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone Finish Line Biology Unit 5</b>	<b>BIO.B.1.1.1</b> <b>BIO.B.1.1.2</b> <b>BIO.B.1.2.1</b> <b>BIO.B.1.2.2</b> <b>BIO.B.2.2.1</b> <b>BIO.B.2.2.2</b> <b>CC.1.2</b> <b>CC.1.4</b> <b>CC.1.5</b> <b>CC.2.1</b> <b>CC.2.2</b> <b>CC.2.4</b>
<b>Genetics</b>	<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone Finish Line Biology Unit 6</b>	<b>BIO.B.1.2.2</b> <b>BIO.B.2.1.1</b> <b>BIO.B.2.1.2</b> <b>BIO.B.2.3.1</b> <b>BIO.B.3.1.3</b> <b>BIO.B.2.4.1</b> <b>CC.1.2</b> <b>CC.1.4</b> <b>CC.1.5</b> <b>CC.2.1</b> <b>CC.2.2</b> <b>CC.2.4</b>

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**3<sup>rd</sup> Quarter**

Topic	Resources	Assessment Anchors
<b>Genetics (continued)</b>		
Evolution	<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone Finish Line Biology Unit 7</b>	<b>BIO.B.3.1.1</b> <b>BIO.B.3.1.2</b> <b>BIO.B.3.1.3</b> <b>BIO.B.3.2.1</b> <b>BIO.B.3.3.1</b> <b>CC.1.2</b> <b>CC.1.4</b> <b>CC.1.5</b> <b>CC.2.1</b> <b>CC.2.2</b> <b>CC.2.4</b>

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**4<sup>th</sup> Quarter**

Topic	Resources	Assessment Anchors
<b>Ecology</b>	<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone Finish Line Biology Unit 8</b>	<b>BIO.B.4.1.1</b> <b>BIO.B.4.1.2</b> <b>BIO.B.4.2.1</b> <b>BIO.B.4.2.2</b> <b>BIO.B.4.2.3</b> <b>BIO.B.4.2.4</b> <b>BIO.B.4.2.5</b> <b>CC.1.2</b> <b>CC.1.4</b> <b>CC.1.5</b> <b>CC.2.1</b> <b>CC.2.2</b> <b>CC.2.4</b>
<b>Keystone Review</b>	<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone Finish Line Biology</b>	
<b>Survey of the Animal Kingdom (optional study)</b>	<b>Approved text</b> <b>SAS resources</b>	
<b>Final Exam Review</b>	<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone Finish Line Biology</b>	

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General Topic	Academic Standard(s)	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time
Introduction to Biology	BIO.A.1.1.1 BIO.A.1.2.1 BIO.A.1.2.2	<ul style="list-style-type: none"> <li>• Review scientific processes and methods</li> <li>• Common characteristics of life:               <ul style="list-style-type: none"> <li>○ composed of one or more units called cells</li> <li>○ obtain and use matter and energy to carry out their life processes</li> <li>○ reproduce and pass their genetic material on to the next generation</li> <li>○ seek to maintain a biological balance between their internal and external environments</li> <li>○ grow, develop and eventually die</li> <li>○ detect and respond to stimuli</li> <li>○ adapt and evolve at the population level</li> </ul> </li> <li>• Similarities and differences in structure between prokaryotic and eukaryotic cells</li> <li>• Relationship between form and function</li> <li>• Common features/functions of cell structures in both prokaryotic and eukaryotic cells</li> <li>• Levels of biological organization from organelle to multicellular organism               <ul style="list-style-type: none"> <li>○ Organelle</li> <li>○ Cell</li> <li>○ Tissue</li> <li>○ Organ</li> <li>○ Organ System</li> <li>○ Multicellular Organism</li> </ul> </li> </ul> <p>Relationship between form and function</p> <p>Keystone Eligible vocabulary:</p> <ul style="list-style-type: none"> <li>• prokaryotic cell</li> <li>• eukaryotic cell</li> </ul>	<p>Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 1</p> <p>Labs:</p> <ul style="list-style-type: none"> <li>• Microscope/Lab skills Review</li> <li>• Prokaryotic/Eukaryotic</li> <li>• Cheek Cells</li> <li>• Cell Organelle Project</li> <li>• Cell City Analogy Essay</li> </ul>	<p>Teacher prepared tests, quizzes, etc. Lab Write-up Rubric Cell Organelle Project Rubric Cell City Analogy Essay Rubric Scientific Article Abstract activity, rubric</p>	5 days



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		<ul style="list-style-type: none"> <li>• stimuli</li> <li>• adapt</li> <li>• evolve</li> <li>• population</li> <li>• organelle</li> <li>• cell</li> <li>• tissue</li> <li>• organ</li> <li>• organ system</li> <li>• multicellular organism</li> </ul>			
Chemical Basis for Life	BIO.A.2.1.1 BIO.A.2.2.1 BIO.A.2.2.2 BIO.A.2.2.3 BIO.A.2.3.1 BIO.A.2.3.2	<ul style="list-style-type: none"> <li>• Chemical structure of water</li> <li>• Polarity of Water/Hydrogen Bonding               <ul style="list-style-type: none"> <li>○ Adhesion and Cohesion                   <ul style="list-style-type: none"> <li>▪ Surface Tension</li> <li>▪ Capillary action</li> </ul> </li> <li>○ High Specific Heat</li> <li>○ Universal Solvent</li> <li>○ Density anomaly</li> </ul> </li> <li>• Examples of how the properties of water support life               <ul style="list-style-type: none"> <li>○ Temperature moderation</li> <li>○ Solid water less dense than liquid water</li> <li>○ Water cycle</li> <li>○ Metabolism requires an aqueous environment</li> <li>○ Transpiration</li> <li>○ Buffering properties of water</li> </ul> </li> <li>• Levels of biochemical organization (atoms, molecules, macromolecules)</li> <li>• Chemical properties of Carbon atoms               <ul style="list-style-type: none"> <li>○ Form 4 covalent bonds</li> </ul> </li> <li>• Structural shapes of carbon molecules (straight chains, branched chains, rings)</li> </ul>	Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 2  Labs: Cohesion/Adhesion Acids/Bases Enzymes—Speed it Up! Acids and Bases Labs Cohesion and Adhesion lab		15 days

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	<ul style="list-style-type: none"> <li>• <b>Monomers vs. Polymers</b></li> <li>• <b>Monomer that forms carbohydrates, proteins and nucleic acids (monosaccharide, amino acid, nucleotide)</b> <ul style="list-style-type: none"> <li>○ Idea of no common monomer for lipids</li> </ul> </li> <li>• <b>Dehydration Synthesis (Condensation) and Hydrolysis reactions</b></li> <li>• <b>Basic structure of the four major classes of biological macromolecules</b> <ul style="list-style-type: none"> <li>○ <b>Common Chemical Components</b></li> <li>○ <b>Examples of monomers from each class</b></li> <li>○ <b>Examples of polymers constructed of the monomers</b></li> </ul> </li> <li>• <b>Importance and use of each macromolecule for biological functions</b></li> <li>• <b>Enzymes as proteins</b></li> <li>• <b>Enzyme and substrate specificity/interactions</b> <ul style="list-style-type: none"> <li>○ <b>Lock and key model</b></li> </ul> </li> <li>• <b>Effect of enzymes on activation energy and reaction rates</b></li> <li>• <b>Reusable nature of enzymes</b></li> <li>• <b>Examples of enzyme controlled reactions in living things</b></li> <li>• <b>Enzyme activity as a function of specific conditions</b></li> </ul> <p><b>Effects of environmental factors (pH, temperature, concentration) on enzyme function</b></p> <p><b>Keystone Eligible vocabulary:</b></p> <ul style="list-style-type: none"> <li>• <b>polarity</b></li> <li>• <b>hydrogen bond</b></li> <li>• <b>adhesion</b></li> <li>• <b>cohesion</b></li> <li>• <b>surface tension</b></li> <li>• <b>capillary action</b></li> </ul>			
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		<ul style="list-style-type: none"> <li>• high specific heat</li> <li>• universal solvent</li> <li>• density anomaly</li> <li>• macromolecule</li> <li>• monomer</li> <li>• polymer</li> <li>• dehydration synthesis (condensation)</li> <li>• hydrolysis</li> <li>• monosaccharide</li> <li>• amino acid</li> <li>• nucleotide</li> <li>• carbohydrates</li> <li>• lipids</li> <li>• proteins</li> <li>• nucleic acids</li> <li>• enzyme</li> <li>• catalyst</li> <li>• substrate</li> <li>• activation energy</li> <li>• active site</li> <li>• reaction rates</li> <li>• pH</li> <li>• concentration</li> </ul>			
Bioenergetics	BIO.A.3.1.1 . BIO.A.3.2.1 BIO.A.3.2.2	<ul style="list-style-type: none"> <li>• Double membrane structure of mitochondria</li> <li>• Double membrane structure of chloroplasts</li> <li>• Roles of mitochondria and chloroplasts in energy transformations</li> <li>• catabolic vs. anabolic chemical reactions</li> <li>• Overall (summary) chemical equations for photosynthesis and cellular respiration</li> </ul>	Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 3  How Cells Work Project	Cell Processes— How Cells Work Rubric Cellular Respiration Webquest	10 days

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		<ul style="list-style-type: none"> <li>• Basic energy transformations during photosynthesis and cellular respiration</li> <li>• Relationship between photosynthesis and cellular respiration</li> <li>• Molecular structure of ATP</li> <li>• ATP-ADP Cycle</li> </ul> <p>Importance of ATP as the energy currency (fuel) for cell processes</p> <p>Keystone Eligible vocabulary:</p> <ul style="list-style-type: none"> <li>• mitochondria</li> <li>• plastids</li> <li>• chloroplasts</li> <li>• photosynthesis</li> <li>• cellular respiration</li> <li>• metabolism</li> <li>• anabolic reaction</li> <li>• catabolic reaction</li> <li>• chemical energy</li> <li>• adenosine triphosphate (ATP)</li> <li>• adenosine diphosphate (ADP)</li> </ul>	Cellular Respiration Webquest (zunal.com)	Rubric	
Homeostasis and Transport	<p>BIO.A.4.1.1</p> <p>BIO.A.4.1.2</p> <p>BIO.A.4.1.3</p> <p>BIO.A.4.2.1</p>	<ul style="list-style-type: none"> <li>• Chemical structure of the plasma membrane (Phospholipid Bilayer)</li> <li>• Fluid mosaic model</li> <li>• Functions of the plasma membrane</li> <li>• Passive transport mechanisms               <ul style="list-style-type: none"> <li>○ Diffusion</li> <li>○ Osmosis</li> <li>○ Facilitated Diffusion</li> </ul> </li> <li>* Active transport mechanisms               <ul style="list-style-type: none"> <li>○ Pumps</li> <li>○ Endocytosis</li> </ul> </li> </ul>	<p>Approved text</p> <p>SAS resources</p> <p>Suggested: Keystone Finish Line Biology Unit 4</p> <p>Labs:</p> <p>Diffusion/Osmosis--</p> <p>Potato Lab</p> <p>Dialysis bags</p>		15 days

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		<ul style="list-style-type: none"> <li>○ Exocytosis</li> <li>● Endoplasmic Reticulum <ul style="list-style-type: none"> <li>○ Rough ER <ul style="list-style-type: none"> <li>▪ Synthesis/transport of proteins</li> </ul> </li> <li>○ Smooth ER <ul style="list-style-type: none"> <li>▪ Synthesis/transport of lipids</li> <li>▪ Synthesis/transport of carbohydrates</li> </ul> </li> </ul> </li> <li>● Golgi Apparatus</li> <li>● Processes and packages for intra and extra-cellular transport</li> <li>● Examples of Mechanisms <ul style="list-style-type: none"> <li>○ Thermoregulation</li> <li>○ Water regulation</li> <li>○ Oxygen regulation</li> <li>○ Chemical regulation <ul style="list-style-type: none"> <li>▪ pH/Buffers</li> <li>▪ Hormone</li> <li>▪ Electrolyte</li> <li>▪</li> </ul> </li> </ul> </li> </ul> <p><b>Keystone Eligible vocabulary:</b></p> <ul style="list-style-type: none"> <li>● phospholipids bilayer</li> <li>● fluid mosaic model</li> <li>● selectively permeable</li> <li>● passive transport</li> <li>● diffusion</li> <li>● osmosis</li> <li>● facilitated diffusion</li> <li>● active transport</li> <li>● pumps</li> <li>● endocytosis</li> <li>● exocytosis</li> <li>● homeostasis</li> <li>● intracellular transport</li> </ul>			
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		<ul style="list-style-type: none"> <li>• endoplasmic reticulum</li> <li>• Golgi apparatus</li> <li>• vesicles</li> <li>• buffers</li> <li>• electrolyte</li> <li>• thermoregulation</li> </ul>			
Cell Growth and Reproduction	BIO.B.1.1.1 BIO.B.1.1.2 BIO.B.1.2.1 BIO.B.1.2.2 BIO.B.2.2.1 BIO.B.2.2.2	<ul style="list-style-type: none"> <li>• Stages of the cell cycle               <ul style="list-style-type: none"> <li>○ Interphase                   <ul style="list-style-type: none"> <li>▪ G1</li> <li>▪ S</li> <li>▪ G2</li> </ul> </li> <li>○ Nuclear Division                   <ul style="list-style-type: none"> <li>▪ Mitosis</li> <li>▪ Meiosis</li> </ul> </li> <li>○ Cytokinesis                   <ul style="list-style-type: none"> <li>▪ Plant vs. Animal Cell</li> </ul> </li> </ul> </li> <li>• Phases of Mitosis</li> <li>• Phases of Meiosis</li> <li>• Importance of Mitosis and Meiosis</li> <li>• Outcomes of Mitosis and Meiosis</li> <li>• Importance of chromosome composition and number controlling phenotype</li> </ul> <p>Chromosomal Mutations during Mitosis and Meiosis</p> <p>Keystone Eligible vocabulary:</p> <ul style="list-style-type: none"> <li>• cell cycle</li> <li>• interphase</li> <li>• mitosis</li> <li>• meiosis</li> <li>• cytokinesis</li> <li>• cell plate</li> <li>• cleavage furrows</li> </ul>	Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 5	Mitosis/Meiosis Lab Activities and Lab Practicals	15 days

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		<ul style="list-style-type: none"> <li>• prophase</li> <li>• metaphase</li> <li>• anaphase</li> <li>• telophase</li> <li>• haploid</li> <li>• diploid</li> <li>• chromosome</li> <li>• chromatid</li> <li>• homologous chromosomes</li> <li>• tetrad</li> <li>• crossing over</li> <li>• spindle (fiber)</li> <li>• somatic cells</li> <li>• germ cells</li> <li>• gametes</li> <li>• independent assortment</li> <li>• chromosomal mutation</li> <li>• nondisjunction</li> <li>• duplication</li> <li>• translocation</li> <li>• deletion</li> <li>• insertion</li> <li>• inversion</li> </ul>			
Genetics: Gene to protein and Nucleic Acids	BIO.B.1.2.2 BIO.B.2.1.1	<ul style="list-style-type: none"> <li>• Structure of DNA               <ul style="list-style-type: none"> <li>○ Components of a Nucleotide</li> <li>○ Base-pair rule (Chargaff's Rule)</li> </ul> </li> <li>• Semi-conservative/DNA Replication Process</li> <li>• Structure of eukaryotic chromosomes</li> <li>• Similarities and differences between DNA and RNA</li> </ul>	Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 6	Race for the Double Helix- movie, worksheets and study guide with Rubric	15 days

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<p>Genetics: Patterns of Inheritance</p>	<p>BIO.B.2.1.2 BIO.B.2.3.1 BIO.B.3.1.3</p>	<ul style="list-style-type: none"> <li>• Types of RNA</li> <li>• Transcription uses DNA to make RNA</li> <li>• Translation uses RNA to make a protein</li> <li>• Location of transcription in eukaryotic cells (nucleus)</li> <li>• Location of translation (ribosomes)</li> <li>• Role of ribosomes, endoplasmic reticulum and Golgi apparatus in assembling, transporting, packaging and modifying different proteins</li>   <li>• Phenotype as a function of gene expression (DNA to protein to phenotype)</li> <li>• Mutations may or may not affect phenotype</li> <li>• Different types of gene mutations</li> <li>• Common Patterns of Inheritance</li> <li>• Tools for predicting patterns of inheritance             <ul style="list-style-type: none"> <li>○ Punnett square</li> <li>○ Pedigree</li> <li>○ Mathematics of probability</li> </ul> </li> <li>• Relationship between genotype and phenotype</li>   <li>• Tools of genetic engineering</li> <li>• Examples of genetic engineering             <ul style="list-style-type: none"> <li>○ Genetically modified organisms in medicine and agriculture</li> <li>○ Use of biotechnology in forensics, medicine, and agriculture</li> <li>○ Cloning</li> <li>○ Selective Breeding</li> <li>○ Gene splicing</li> <li>○ Gene Therapy</li> </ul> </li> </ul>		<p>Pedigree Project and Rubric Dragon Genetics and Rubric Webquest- genetic engineering, zunal.com “What in the World?”</p>	<p>20 days</p>
<p>Genetics: Biotechnology</p>	<p>BIO.B.2.4.1</p>	<p>Keystone Eligible vocabulary:</p> <ul style="list-style-type: none"> <li>• deoxyribonucleic acid (DNA)</li> <li>• DNA Replication</li> </ul>			<p>5 days</p>



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	<ul style="list-style-type: none"><li>• double helix</li><li>• nucleotide</li><li>• deoxyribose</li><li>• adenine</li><li>• guanine</li><li>• cytosine</li><li>• thymine</li><li>• Chargaff's Rule</li><li>• parent strand</li><li>• complimentary strand</li><li>• semi-conservative model</li><li>• genes</li><li>• chromosomes</li><li>• transcription</li><li>• translation</li><li>• ribonucleic acid</li><li>• ribosomes</li><li>• nucleus</li><li>• amino acids</li><li>• polypeptides</li><li>• enzymes</li><li>• proteins</li><li>• triplet</li><li>• codon</li><li>• anticodon</li><li>• endoplasmic reticulum</li><li>• Golgi apparatus</li><li>• gene Mutation</li><li>• insertion</li><li>• deletion</li><li>• frameshift mutation</li><li>• point mutation</li><li>• silent</li></ul>			
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		<ul style="list-style-type: none"> <li>• missense</li> <li>• nonsense</li> <li>• dominant</li> <li>• recessive</li> <li>• codominance</li> <li>• incomplete dominance</li> <li>• sex-linked</li> <li>• polygenic</li> <li>• multiple alleles</li> <li>• genetics</li> <li>• Punnett square</li> <li>• pedigree</li> <li>• genotype</li> <li>• phenotype</li> <li>• probability</li> <li>• homozygous</li> <li>• heterozygous</li> <li>• genetic engineering</li> <li>• genetically modified organisms</li> <li>• biotechnology</li> <li>• cloning</li> <li>• selective breeding</li> <li>• gene splicing</li> <li>• gene therapy</li> </ul>			
<b>Midterm Review</b>			<p>Approved text SAS resources Suggested: Keystone Finish Line Biology Units 1-6</p>		<b>5 days</b>
<b>Evolution</b>	<p>BIO.B.3.1.1 BIO.B.3.1.2 BIO.B.3.1.3 BIO.B.3.2.1</p>	<ul style="list-style-type: none"> <li>• Principles of Inheritance</li> <li>• Fundamental Principles of Natural Selection</li> <li>• Types of Natural Selection               <ul style="list-style-type: none"> <li>○ Directional</li> </ul> </li> </ul>	<p>Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 7</p>	<p>Hardy-Weinberg, Bozeman Science</p>	<b>20 days</b>

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	<p><b>BIO.B.3.3.1</b></p>	<ul style="list-style-type: none"> <li>○ Stabilizing</li> <li>○ Diversifying/Disruptive</li> <li>● Factors that contribute to speciation             <ul style="list-style-type: none"> <li>○ Isolating mechanisms</li> <li>○ Genetic drift</li> <li>○ Founder effect</li> </ul> </li> <li>● Migration</li> <li>● Genotype and Phenotype</li> <li>● Types of Genetic Mutations</li> <li>● Examples of variation in populations</li> <li>● Evidences of Evolution             <ul style="list-style-type: none"> <li>○ Fossil</li> <li>○ Anatomical</li> <li>○ Physiological</li> <li>○ Embryological</li> <li>○ Biochemical</li> <li>○ Universal Genetic Code</li> </ul> </li> <li>● Scientific terms             <ul style="list-style-type: none"> <li>○ Hypothesis and Prediction</li> <li>○ Inference and Observation</li> <li>○ Principle</li> <li>○ Theory</li> <li>○ Law</li> <li>○ Fact and Opinion</li> </ul> </li> <li>● Classification             <ul style="list-style-type: none"> <li>○ Taxonomy and nomenclature</li> <li>○ Kingdoms</li> </ul> </li> </ul> <p>Keystone Eligible vocabulary:</p> <ul style="list-style-type: none"> <li>● populations</li> <li>● natural selection</li> <li>● allele frequency</li> <li>● species</li> <li>● fitness</li> <li>● adaptation</li> </ul>		<p>Hardy-Weinberg worksheets and Lab activities-Fishy Frequencies</p> <p>Geological Time Scale— “Cenozoic Time” and worksheets “Every day we’re shoveling”—fossil record and dating Shoe Classification and Candy Classification activities—scientific naming and writing Dichotomy Keys—leaf webquest to classify, Mystery Tree</p>	
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		<ul style="list-style-type: none"> <li>• variation</li> <li>• directional selection</li> <li>• stabilizing selection</li> <li>• diversifying/ disruptive selection</li> <li>• speciation</li> <li>• isolating mechanisms</li> <li>• genetic drift</li> <li>• founder effect</li> <li>• migration</li> <li>• genotype</li> <li>• phenotype</li> <li>• mutation</li> <li>• variation</li> <li>• evolution</li> <li>• fossil</li> <li>• fossil record</li> <li>• anatomical</li> <li>• physiological</li> <li>• embryological</li> <li>• biochemical</li> <li>• universal genetic code</li> <li>• homologous structures</li> <li>• analogous structures</li> <li>• vestigial structures</li> <li>• convergent evolution</li> <li>• divergent evolution</li> <li>• hypothesis</li> <li>• prediction</li> <li>• inference</li> <li>• observation</li> <li>• principle</li> <li>• theory</li> <li>• law</li> </ul>		<p>Challenge— Arbor Day Foundation Protist Kingdom – worksheets, preserved slide lab and live specimen lab, Lab Practical Fungi Kingdom— worksheets, webquest— Biology Junction, Bozeman Science Plant Kingdom— worksheets, webquest— Great Plant Escape</p>	
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		<ul style="list-style-type: none"> <li>• fact</li> <li>• opinion</li> </ul>			
Ecology	<p>BIO.B.4.1.1 BIO.B.4.1.2 BIO.B.4.2.1 BIO.B.4.2.2 BIO.B.4.2.3 BIO.B.4.2.4 BIO.B.4.2.5</p>	<ul style="list-style-type: none"> <li>• The levels of ecological organization               <ul style="list-style-type: none"> <li>○ Organism</li> <li>○ Population</li> <li>○ Community</li> <li>○ Ecosystem</li> <li>○ Biome</li> <li>○ Biosphere</li> </ul> </li> <li>• Abiotic components of an ecosystem</li> <li>• Biotic components of an ecosystem</li> <li>• Characteristic abiotic and biotic components of earth's aquatic and terrestrial ecosystems.</li> <li>• The ultimate energy source is the sun.               <ul style="list-style-type: none"> <li>○ Other initial sources of energy                   <ul style="list-style-type: none"> <li>▪ Chemicals</li> <li>▪ Heat</li> </ul> </li> </ul> </li> <li>• Photosynthesis and Cellular Respiration</li> <li>• Structure and components of a food chain or food web.</li> <li>• Implications of the 10% rule/law (energy pyramids)</li> <li>• Habitat and niche (fundamental and realized)</li> <li>• Symbiotic interactions within an ecosystem</li> <li>• Symbiotic interactions within an ecosystem</li> <li>▪ Biogeochemical cycles               <ul style="list-style-type: none"> <li>○ Water cycle</li> <li>○ Carbon cycle</li> <li>○ Oxygen cycle</li> <li>○ Nitrogen cycle</li> </ul> </li> <li>• Examples of Natural Disturbances Affecting Ecosystems               <ul style="list-style-type: none"> <li>○ Ecological Succession</li> <li>○ Natural Disasters</li> </ul> </li> <li>• Examples of Human Disturbances Affecting</li> </ul>	<p>Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 8</p>		15 days

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		<p><b>Ecosystems</b></p> <ul style="list-style-type: none"> <li>○ Human overpopulation</li> <li>○ Climate changes</li> <li>○ Introduction of nonnative species</li> <li>○ Pollution</li> <li>○ Fires</li> </ul> <ul style="list-style-type: none"> <li>● <b>Effects of Human and Natural Disturbances on Ecosystems</b> <ul style="list-style-type: none"> <li>○ Loss of biodiversity</li> <li>○ Loss of habitat</li> <li>○ Increased rate of Extinction</li> <li>○ Disruption of natural biological cycles</li> </ul> </li> <li>● <b>Carrying Capacity</b></li> <li>● <b>Limiting Factors</b> <ul style="list-style-type: none"> <li>○ Density Dependent</li> <li>○ Density Independent</li> </ul> </li> <li>● <b>Effects of limiting factors on population dynamics</b> <ul style="list-style-type: none"> <li>○ Biotic Potential</li> <li>○ Environmental Resistance</li> <li>○ Increase/Decreased/ Stabilized Population Growth</li> <li>○ Extinction</li> <li>○ Increased/decreased/stabilized biodiversity</li> </ul> </li> </ul> <p><b>Keystone Eligible vocabulary:</b></p> <ul style="list-style-type: none"> <li>● organism</li> <li>● population</li> <li>● community</li> <li>● ecosystem</li> <li>● biome</li> <li>● biosphere</li> <li>● biotic</li> <li>● abiotic</li> </ul>			
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	<ul style="list-style-type: none"><li>• aquatic ecosystem</li><li>• terrestrial ecosystem</li><li>• energy</li><li>• autotroph</li><li>• heterotroph</li><li>• trophic level</li><li>• food chain</li><li>• food web</li><li>• producer</li><li>• consumer</li><li>• omnivore</li><li>• decomposer</li><li>• herbivore</li><li>• carnivore</li><li>• ecological pyramid</li><li>• 10% rule/law</li><li>• photosynthesis</li><li>• chemosynthesis</li><li>• competition</li><li>• predation</li><li>• symbiosis</li><li>• parasitism</li><li>• commensalism</li><li>• mutualism</li><li>• fundamental niche</li><li>• realized niche</li><li>• water cycle</li><li>• carbon cycle</li><li>• oxygen cycle</li><li>• nitrogen cycle</li><li>• succession</li><li>• extinction</li><li>• evolution</li></ul>			
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		<ul style="list-style-type: none"> <li>• biodiversity</li> <li>• nonnative species</li> <li>• carrying capacity</li> <li>• limiting factors</li> <li>• density dependent</li> <li>• density independent</li> <li>• extinction</li> <li>• biotic potential</li> <li>• biodiversity</li> </ul>			
<b>Keystone Review</b>			<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone</b> <b>Finish Line Biology</b>	<b>Review</b> <b>Foldables and</b> <b>Concept Maps</b> <b>for key topics</b>	<b>10 days</b>
<b>Survey of the Animal Kingdom (optional study)</b>			<b>Approved text</b> <b>SAS resources</b>	<b>Earthworm</b> <b>Dissection,</b> <b>Perch</b> <b>Dissection,</b> <b>Frog Dissection</b> <b>Owl Pellet</b> <b>activity and</b> <b>Rubric</b>	<b>15 days</b>
<b>Final Exam and Review</b>			<b>Approved text</b> <b>SAS resources</b> <b>Suggested: Keystone</b> <b>Finish Line Biology</b>		<b>15 days</b>