
10th Grade Honors Biology K

Curriculum Guide

Scranton School District

Scranton, PA



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10th Grade Honors Biology K

Prerequisite:

- 9th Grade Honors General Science
- Be in compliance with the [SSD Honors and AP Criteria Policy](#)

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

Subject: 10th Grade Honors Biology K	Grade: 10	Date Completed: 8/8/15
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1st Quarter

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

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		CC.2.2 CC.2.4
Homeostasis and Transport	Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 4	BIO A.4.1.1 BIO.A.4.1.2 BIO.A.4.1.3 BIO.A.4.2.1 CC.1.2 CC.1.4 CC.1.5 CC.2.1 CC.2.2 CC.2.4

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2nd Quarter

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

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3rd Quarter

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

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4th Quarter

Topic	Resources	Assessment Anchors
Ecology	Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 8	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 CC.1.2 CC.1.4 CC.1.5 CC.2.1 CC.2.2 CC.2.4
Keystone Review	Approved text SAS resources Suggested: Keystone Finish Line Biology	
Survey of the Animal Kingdom (optional study)	Approved text SAS resources	
Final Exam Review	Approved text SAS resources Suggested: Keystone Finish Line Biology	

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

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		<ul style="list-style-type: none"> • stimuli • adapt • evolve • population • organelle • cell • tissue • organ • organ system • multicellular organism 			
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"> • Chemical structure of water • Polarity of Water/Hydrogen Bonding <ul style="list-style-type: none"> ○ Adhesion and Cohesion <ul style="list-style-type: none"> ▪ Surface Tension ▪ Capillary action ○ High Specific Heat ○ Universal Solvent ○ Density anomaly • Examples of how the properties of water support life <ul style="list-style-type: none"> ○ Temperature moderation ○ Solid water less dense than liquid water ○ Water cycle ○ Metabolism requires an aqueous environment ○ Transpiration ○ Buffering properties of water • Levels of biochemical organization (atoms, molecules, macromolecules) • Chemical properties of Carbon atoms <ul style="list-style-type: none"> ○ Form 4 covalent bonds • Structural shapes of carbon molecules (straight chains, branched chains, rings) 	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"> • Monomers vs. Polymers • Monomer that forms carbohydrates, proteins and nucleic acids (monosaccharide, amino acid, nucleotide) <ul style="list-style-type: none"> ○ Idea of no common monomer for lipids • Dehydration Synthesis (Condensation) and Hydrolysis reactions • Basic structure of the four major classes of biological macromolecules <ul style="list-style-type: none"> ○ Common Chemical Components ○ Examples of monomers from each class ○ Examples of polymers constructed of the monomers • Importance and use of each macromolecule for biological functions • Enzymes as proteins • Enzyme and substrate specificity/interactions <ul style="list-style-type: none"> ○ Lock and key model • Effect of enzymes on activation energy and reaction rates • Reusable nature of enzymes • Examples of enzyme controlled reactions in living things • Enzyme activity as a function of specific conditions <p>Effects of environmental factors (pH, temperature, concentration) on enzyme function</p> <p>Keystone Eligible vocabulary:</p> <ul style="list-style-type: none"> • polarity • hydrogen bond • adhesion • cohesion • surface tension • capillary action 			
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		<ul style="list-style-type: none"> • high specific heat • universal solvent • density anomaly • macromolecule • monomer • polymer • dehydration synthesis (condensation) • hydrolysis • monosaccharide • amino acid • nucleotide • carbohydrates • lipids • proteins • nucleic acids • enzyme • catalyst • substrate • activation energy • active site • reaction rates • pH • concentration 			
Bioenergetics	BIO.A.3.1.1. BIO.A.3.2.1 BIO.A.3.2.2	<ul style="list-style-type: none"> • Double membrane structure of mitochondria • Double membrane structure of chloroplasts • Roles of mitochondria and chloroplasts in energy transformations • catabolic vs. anabolic chemical reactions • Overall (summary) chemical equations for photosynthesis and cellular respiration 	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"> • Basic energy transformations during photosynthesis and cellular respiration • Relationship between photosynthesis and cellular respiration • Molecular structure of ATP • ATP-ADP Cycle <p>Importance of ATP as the energy currency (fuel) for cell processes</p> <p>Keystone Eligible vocabulary:</p> <ul style="list-style-type: none"> • mitochondria • plastids • chloroplasts • photosynthesis • cellular respiration • metabolism • anabolic reaction • catabolic reaction • chemical energy • adenosine triphosphate (ATP) • adenosine diphosphate (ADP) 	Cellular Respiration Webquest (zunal.com)	Rubric	
Homeostasis and Transport	BIO.A.4.1.1 BIO.A.4.1.2 BIO.A.4.1.3 BIO.A.4.2.1	<ul style="list-style-type: none"> • Chemical structure of the plasma membrane (Phospholipid Bilayer) • Fluid mosaic model • Functions of the plasma membrane • Passive transport mechanisms <ul style="list-style-type: none"> ○ Diffusion ○ Osmosis ○ Facilitated Diffusion * Active transport mechanisms <ul style="list-style-type: none"> ○ Pumps ○ Endocytosis 	Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 4 Labs: Diffusion/Osmosis-- Potato Lab Dialysis bags		15 days

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		<ul style="list-style-type: none"> ○ Exocytosis ● Endoplasmic Reticulum <ul style="list-style-type: none"> ○ Rough ER <ul style="list-style-type: none"> ▪ Synthesis/transport of proteins ○ Smooth ER <ul style="list-style-type: none"> ▪ Synthesis/transport of lipids ▪ Synthesis/transport of carbohydrates ● Golgi Apparatus ● Processes and packages for intra and extra-cellular transport ● Examples of Mechanisms <ul style="list-style-type: none"> ○ Thermoregulation ○ Water regulation ○ Oxygen regulation ○ Chemical regulation <ul style="list-style-type: none"> ▪ pH/Buffers ▪ Hormone ▪ Electrolyte ▪ <p>Keystone Eligible vocabulary:</p> <ul style="list-style-type: none"> ● phospholipids bilayer ● fluid mosaic model ● selectively permeable ● passive transport ● diffusion ● osmosis ● facilitated diffusion ● active transport ● pumps ● endocytosis ● exocytosis ● homeostasis ● intracellular transport 			
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		<ul style="list-style-type: none"> • endoplasmic reticulum • Golgi apparatus • vesicles • buffers • electrolyte • thermoregulation 			
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"> • Stages of the cell cycle <ul style="list-style-type: none"> ○ Interphase <ul style="list-style-type: none"> ▪ G1 ▪ S ▪ G2 ○ Nuclear Division <ul style="list-style-type: none"> ▪ Mitosis ▪ Meiosis ○ Cytokinesis <ul style="list-style-type: none"> ▪ Plant vs. Animal Cell • Phases of Mitosis • Phases of Meiosis • Importance of Mitosis and Meiosis • Outcomes of Mitosis and Meiosis • Importance of chromosome composition and number controlling phenotype <p>Chromosomal Mutations during Mitosis and Meiosis</p> <p>Keystone Eligible vocabulary:</p> <ul style="list-style-type: none"> • cell cycle • interphase • mitosis • meiosis • cytokinesis • cell plate • cleavage furrows 	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"> • prophase • metaphase • anaphase • telophase • haploid • diploid • chromosome • chromatid • homologous chromosomes • tetrad • crossing over • spindle (fiber) • somatic cells • germ cells • gametes • independent assortment • chromosomal mutation • nondisjunction • duplication • translocation • deletion • insertion • inversion 			
Genetics: Gene to protein and Nucleic Acids	BIO.B.1.2.2 BIO.B.2.1.1	<ul style="list-style-type: none"> • Structure of DNA <ul style="list-style-type: none"> ○ Components of a Nucleotide ○ Base-pair rule (Chargaff's Rule) • Semi-conservative/DNA Replication Process • Structure of eukaryotic chromosomes • Similarities and differences between DNA and RNA 	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"> • Types of RNA • Transcription uses DNA to make RNA • Translation uses RNA to make a protein • Location of transcription in eukaryotic cells (nucleus) • Location of translation (ribosomes) • Role of ribosomes, endoplasmic reticulum and Golgi apparatus in assembling, transporting, packaging and modifying different proteins • Phenotype as a function of gene expression (DNA to protein to phenotype) • Mutations may or may not affect phenotype • Different types of gene mutations • Common Patterns of Inheritance • Tools for predicting patterns of inheritance <ul style="list-style-type: none"> ○ Punnett square ○ Pedigree ○ Mathematics of probability • Relationship between genotype and phenotype • Tools of genetic engineering • Examples of genetic engineering <ul style="list-style-type: none"> ○ Genetically modified organisms in medicine and agriculture ○ Use of biotechnology in forensics, medicine, and agriculture ○ Cloning ○ Selective Breeding ○ Gene splicing ○ Gene Therapy 		<p>Pedigree Project and Rubric Dragon Genetics and Rubric Webquest-genetic engineering, zunal.com "What in the World?"</p>	<p style="text-align: center;">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"> • deoxyribonucleic acid (DNA) • DNA Replication 			<p style="text-align: center;">5 days</p>

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

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		<ul style="list-style-type: none"> • variation • directional selection • stabilizing selection • diversifying/ disruptive selection • speciation • isolating mechanisms • genetic drift • founder effect • migration • genotype • phenotype • mutation • variation • evolution • fossil • fossil record • anatomical • physiological • embryological • biochemical • universal genetic code • homologous structures • analogous structures • vestigial structures • convergent evolution • divergent evolution • hypothesis • prediction • inference • observation • principle • theory • law 		<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"> • fact • opinion 			
Ecology	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	<ul style="list-style-type: none"> • The levels of ecological organization <ul style="list-style-type: none"> ○ Organism ○ Population ○ Community ○ Ecosystem ○ Biome ○ Biosphere • Abiotic components of an ecosystem • Biotic components of an ecosystem • Characteristic abiotic and biotic components of earth's aquatic and terrestrial ecosystems. • The ultimate energy source is the sun. <ul style="list-style-type: none"> ○ Other initial sources of energy <ul style="list-style-type: none"> ▪ Chemicals ▪ Heat • Photosynthesis and Cellular Respiration • Structure and components of a food chain or food web. • Implications of the 10% rule/law (energy pyramids) • Habitat and niche (fundamental and realized) • Symbiotic interactions within an ecosystem • Symbiotic interactions within an ecosystem ▪ Biogeochemical cycles <ul style="list-style-type: none"> ○ Water cycle ○ Carbon cycle ○ Oxygen cycle ○ Nitrogen cycle • Examples of Natural Disturbances Affecting Ecosystems <ul style="list-style-type: none"> ○ Ecological Succession ○ Natural Disasters • Examples of Human Disturbances Affecting Ecosystems <ul style="list-style-type: none"> ○ Human overpopulation 	Approved text SAS resources Suggested: Keystone Finish Line Biology Unit 8		15 days

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