Lehighton Area School District
Curriculum Framework

Course Title:	Biology
Content Area:	Science
Grade Level(s):	10
Course Overview:	This course will explain the principles of life: cells, essential compounds, energy relationships, genetics, and evolution. These concepts will be explored through the use of scientific literacy, investigations, critical thinking, analogies and real-world examples. While learning these concepts, students will appreciate the tenacity of life and the complexities of living systems. Biology is a full year course with students taking the Keystone Biology exam towards the end of the spring semester.
PA Core Standards:	PA Standards
Key Course Text and Materials:	McDougal Littel Biology
Key Assessments/Projects:	Quizzes, Tests, Laboratory Investigations, Activity Sheets

Big Idea/Unit: Basic Biological Principles – Common Characteristics of Life, Levels of Biological Organization, Homeostasis and Biodiversity
Pacing: 3 weeks

Standards	Objective/Skill	Vocabulary	Additional Resources	Assessment/Project
3.1.9-12 B, C, S	List and describe the characteristics that all living things share. Use evidence to support that living things are made of cells. Use a model to illustrate hierarchy of interacting systems within multicellular life. Relate the structures of living things to its function. Understand the importance of homeostasis for maintatining constant conditions for cells to thrive. Recognize the importance of biodiversity. Describe how evolution explains the unity and diversity of life.	species adaptation stimuli homeostasis metabolism DNA proteins unicellular multicellular evolution biodiversity	Canvas powerpoints/slide shows Textbook study guide reinforcements interactive readers Progress Learning CK12 Pearson Mastering Biology (Honors) Animations Videos: Bozeman, Beverly Biology, Amoeba Sisters, Khan Academy, Crash Course Biology Class discussions Daily bellringers	Classwork / Homework (ranging from practice sheets to application of knowledge to solve problems) Quiz (Multiple Choice and Some Fill in the Blank) Exam (teacher made, multiple choice, modified true and false, fill in the blank, short answer and essay all in one test) Progress Learning Mastering Biology (honors) Fall CDT

Big Idea/Unit: Chemistry of Life- Basic Chemistry, Properties of water, Carbon-based molecules, Chemical Reactions, Enzyme Function
Pacing: 4 weeks

Standards	Objective/Skill	Vocabulary	Additional Resources	Assessment/Project
3.1.9-12 F	Compare and Contrast ionic, covalent and hydrogen bonding. Model how hydrogen bonds give unique characteristics to water. Understand why water is important for living things. Construct models to show how C,H,O, N and P combine to form the building blocks of carbohydrates, proteins, nucleic acids and lipids. Explain the importance of carbon-based molecules. Model the breaking and reforming of bonds during a chemical reaction. Understand how anergy is involved in the progression of chemical reactions. Describe enzymes as catalysts and understand their importance in living things.	Compound Ion Polar molecule Hydrogen bond Catalyst Activation energy Bond energy Enzyme Macromolecule Monomers Polymer dehydration reaction hydrolysis reaction amino acids proteins nucleotides nucleic acids monosaccharides carbohydrates fatty acids lipid	Canvas powerpoints/slide shows Textbook study guides, reinforcements, and interactive readers Progress Learning CK12 Pearson Mastering Biology (Honors) Animations Videos: Bozeman, Beverly Biology, Amoeba Sisters, Khan Academy, Crash Course Biology Class discussions Daily bellringers	Classwork/Homework (ranging from practice sheets to application of knowledge to solve problems) Quiz (Multiple Choice and Some Fill in the Blank) Exam (teacher made, multiple choice, modified true and false, fill in the blank, short answer and essay all in one test) Progress Learning Mastering Biology (honors) Enzyme Lab

Big Idea/Unit: Cell Basics: Cell Theory, Cell Anatomy & Physiology, Movement across the cell membrane, Interaction of organelles to produce proteins and maintain homeostasis of the cell
Pacing: 4 weeks

Standards	Objective/Skill	Vocabulary	Additional Resources	Assessment/Project
	Describe the major aspects of the Cell Theory.	organelles		

3.1.9-12 C	Differnetiate between prokaryotic and eukaryotic cells. Model the how parts of cells contribute to its overall function. Describe the structure of the cell membrane and how it relates to its function. Differentiate between active and passive cell transport. Predict the net movement of water into or out of the cell using osmosis. Describe exocytosis and endocytosis.	nucleus ER Golgi vesicles chloroplast mitochondria ribosomes cell wall cell membrane Passive and Active transport Osmosis Diffusion exocytosis endocytosis Cell Theory Prokaryotic cell Eukaryotic cell Facitated diffusion	Canvas powerpoints/slide shows Textbook study guides, reinforcements, and interactive readers Progress Learning CK12 Pearson Mastering Biology (Honors) Animations Videos: Bozeman, Beverly Biology, Amoeba Sisters, Khan Academy, Crash Course Biology Class discussions Daily bellringers	Classwork / Homework (ranging from practice sheets to application of knowledge to solve problems) Quiz (Multiple Choice and Some Fill in the Blank) Exam (teacher made, multiple choice, modified true and false, fill in the blank, short answer and essay all in one test) Progress Learning Mastering Biology (honors) Lab on diffusion, osmosis and active transport

Big Idea/Unit:	Cells and Energy: ATP, Photosynthesis, Cellular Respiration, Metabolism and the role of energy in living things.			
Pacing:	4 weeks			
Standards	**Objective/Skill**	**Vocabulary**	**Additional Resources**	**Assessment/Project**
3.1.9-12 E, G, J, K	Explain how plant and animal cells acquire energy. Explain how cells release energy from food. Describe how ATP carries energy in the cell. Write the chemical equation for photosynthesis. Write the chemical equation for cellular respiration. Describe the purpose of fermentation. Use model to illustrate how photosynthesis transforms light energy into stored chemical energy. Construct how C,H,O combine to form sugars during cellular respiration. Model bonds being broken in cellular respiration and reforming bonds in ATP. Contrast flow of energy and cycling of matter under both aerobic and anaerobic conditions.	ATP Cellular Respiration Metabolism Photosynthesis Pigment Fermentation Chlorophyll ATP / ADP Calvin Cycle Electron Transport Chain Kerbs Cycle glycolysis aerobic anaerobic	Canvas powerpoints/slide shows Textbook study guides, reinforcements, and interactive readers Progress Learning CK12 Pearson Mastering Biology (Honors) Animations Videos: Bozeman, Beverly Biology, Amoeba Sisters, Khan Academy, Crash Course Biology Class discussions Daily bellringers	Classwork / Homework (ranging from practice sheets to application of knowledge to solve problems) Quiz (Multiple Choice and Some Fill in the Blank) Exam (teacher made, multiple choice, modified true and false, fill in the blank, short answer and essay all in one test) Progress Learning Mastering Biology (honors) Photosynthesis / Cellular Respiration Lab

Big Idea/Unit:	The Cell Cycle and Cell Division: The Cell Cycle, Regulation of the Cell Cycle, Mitosis, Asexual and Sexual Reproduction, Organization of Cell in Multicellular Organisms			
Pacing:	4 weeks			
Standards	**Objective/Skill**	**Vocabulary**	**Additional Resources**	**Assessment/Project**
	Use a model to illustrate the cell cycle. Describe the result of unregulated cell divsion.	Cell Cycle Mitosis cytokinesis	Canvas powerpoints/slide shows	

3.1.9-12 B, D, Q, T	Use a model to illustrate mitosis. Understand the purpose of mitosis. Differentiate between asexual and sexual reproduction. Describe binary fission as a method of reproduction in prokaryotes. Describe mitosis as a method of reproduction in eukaryotic organisms. Model the organization of multicellular organisms from the cellular level to the organism level. Describe the purpose of fermentation.	prophase anaphase metaphase telophase identical chromosome sister chromatid centrioles spindle fibers apoptosis binary fission asexual reproduction tissue/organ/organ system	Canvas powerpoints/slide shows Textbook study guides, reinforcements, and interactive readers Progress Learning CK12 Pearson Mastering Biology (Honors) Animations Videos: Bozeman, Beverly Biology, Amoeba Sisters, Khan Academy, Crash Course Biology Class discussions Daily bellringers	Classwork / Homework (ranging from practice sheets to application of knowledge to solve problems) Quiz (Multiple Choice and Some Fill in the Blank) Exam (teacher made, multiple choice, modified true and false, fill in the blank, short answer and essay all in one test) Progress Learning Mastering Biology (honors) Mitosis Onion Cell Lab

Big Idea/Unit: Meiosis and Genetic Variation : Meiosis and and the production of sex cells, Genetic variation from meiosis and sexual reproduction

Pacing: 4 weeks

Standards	Objective/Skill	Vocabulary	Additional Resources	Assessment/Project
3.1.9-12 D, P, Q, T	Differentiate between haploid gametes and diploid somatic cells. Explain how hologogous chromosomes are the result of sexual reproduction. Compare and contrast Mitosis and Meiosis. Use a model to illustrate the process of meiosis. Explain why meiosis results in genetic variation. Describe crossing over and explain how it results in genetic variation.	meiosis gamete/ somatic cell haploid / diploid sexual reproduction homologous chromosomes fertilization sperm / egg crossing over genetic variation	Canvas powerpoints/slide shows Textbook study guides, reinforcements, and interactive readers Progress Learning CK12 Pearson Mastering Biology (Honors) Animations Videos: Bozeman, Beverly Biology, Amoeba Sisters, Khan Academy, Crash Course Biology Class discussions Daily bellringers	Classwork / Homework (ranging from practice sheets to application of knowledge to solve problems) Quiz (Multiple Choice and Some Fill in the Blank) Exam (teacher made, multiple choice, modified true and false, fill in the blank, short answer and essay all in one test) Progress Learning Mastering Biology (honors)

Big Idea/Unit: Mendelian and Non-Mendelian Genetics: Genotype vs. Phenotype, Dominant and Recessive Genes, Mendelian Inheritance Patterns, Using Punnett Squares to determine the probability of genotypes and phenotypes, Codominance, Incomplete dominance, Sex-linked, and Epistatic Inheritance Patterns

Pacing: 4 weeks

Standards	Objective/Skill	Vocabulary	Additional Resources	Assessment/Project
3.1.9-12 D, P, Q, R	Understand the relationship between genotype and phenotype. Differentiate between Dominant and Recessive genes and inheritance patterns. Apply math to explain variation and distribution of traits in a population. Describe Mendel's law of segregation and law of independent assortment.	Alleles Dominant / recessive Phenotype / genotype Heterozygous / Homozygous Pedigree Karyotype Punnett Square genetic disorder Codominance Incomplete dominance Law of Segregation / Law of Independent Assortment trait gene carrier	Canvas powerpoints/slide shows Textbook study guides, reinforcements, and interactive readers Progress Learning CK12 Pearson Mastering Biology (Honors) Animations Videos: Bozeman, Beverly Biology, Amoeba Sisters, Khan Academy, Crash Course Biology Class discussions Daily bellringers	Classwork / Homework (ranging from practice sheets to application of knowledge to solve problems) Quiz (Multiple Choice and Some Fill in the Blank) Exam (teacher made, multiple choice, modified true and false, fill in the blank, short answer and essay all in one test) Progress Learning Mastering Biology (honors) Labs working with pedigrees and Punnett squares

	Use Punnett squares to predict the outcome of various crosses: monohybrid ,dihybrid, incomplete dominance, codominance, epistasis, and blood typing.	carrier sex-linked gene probability		

Big Idea/Unit:	DNA to Proteins: DNA structure, RNA structure, DNA Replication, Transcription, Translation, Types of Mutations			
Pacing:	4 weeks			
Standards	**Objective/Skill**	**Vocabulary**	**Additional Resources**	**Assessment/Project**
3.1.9-12 A, P, Q	Describe DNA structure. Compare and Contrast DNA and RNA. Describe the functions of different types of RNA. Discuss the relationship between DNA and chromosomes in coding for traits. Model DNA replication, transciption and translation. Use a model to describe why changes to genes may affect proteins and how that can affect an organism. Distinguish between different types of gene mutations. Understand why chromosomal mutations often cause more impact on an organism when compared to gene mutations.	DNA RNA (mRNA, tRNA, rRNA) codons anticodons replication transcription translation genetic code amino acids nucleotide bases DNA/RNA Polymerase ribosome template point mutation frameshift mutation chromosomal mutation	Canvas powerpoints/slide shows Textbook study guides, reinforcements, and interactive readers Progress Learning CK12 Pearson Mastering Biology (Honors) Animations Videos: Bozeman, Beverly Biology, Amoeba Sisters, Khan Academy, Crash Course Biology Class discussions Daily bellringers	Classwork / Homework (ranging from practice sheets to application of knowledge to solve problems) Quiz (Multiple Choice and Some Fill in the Blank) Exam (teacher made, multiple choice, modified true and false, fill in the blank, short answer and essay all in one test) Progress Learning Mastering Biology (honors) Labs working with pedigrees and Punnett squares Lab working with mutations

Big Idea/Unit:	Microevolution and Speciation: Darwin's theory of Natural Selection, Evidences of evolution, Genetic variation in poulations, Mechanisms of evolution, Development of new species through isolation			
Pacing:	4 weeks			
Standards	**Objective/Skill**	**Vocabulary**	**Additional Resources**	**Assessment/Project**
3.1.9-12 L, M, O, S, T, U, W, X	Model how natural selection leads to adaptation of populations. Evaluate evidence of behavior on survival of the fittest. Describe mechanisms of evolution such as natural selection, gene flow, genetic drift, founder effect and bottleneck effect. Evaluate evidences of evolution. Evaluate evidence that supports increasing populations, emergence of new species, and extinction. Explain how genetic variation can increase the chances of a population's survival.	Natural Selection adaptation gene flow genetic drift founder effect mutations reproductive isolation species extinction isolating mechanisms fitness evidences of evolution variation heritability allele frquency gene pool sexual selection bottleneck effect	Canvas powerpoints Textbook related study guide,reinforcements, interactive readers progress learning, Ck12 -pearson mastering biology (honors) Animations Videos: Bozeman, Beverly biology, amoeba sisters, khan academy, crash course biology Class discussions Daily bellringers	Classwork / Homework (ranging from practice sheets to application of knowledge to solve problems) Quiz (Multiple Choice and Some Fill in the Blank) Exam (teacher made, multiple choice, modified true and false, fill in the blank, short answer and essay all in one test) Progress learning Mastering biology (honors)

bottleneck effect
speciation

Describe various types of isolation that can lead to speciation.