IAA Curriculum

Content Area	Science	**Grade**	9
Course Name	Biology		

Unit 1/ Concepts	Unit 1: Basic Principles of Life
Big Ideas	<u>Common Characteristics of life:</u> ● All living things are made up of one or more units called cells ● Cells occur in two basic forms: prokaryotic and eukaryotic ● Obtain and use matter and energy to carry out their life processes ● Reproduce and pass out their genetic material to the next generation ● 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 on both Prokaryotic and eukaryotic cells ● Levels of biological organization from organelle to multicellular organism o Organelle o Cell o Tissue o Organ o Organ System o Multicellular Organism ● Cell surface area to volume ratio controls cell size. ● All organisms on earth share common characteristics of life. ● Structure is related to function at all biological levels of the organization.
Key learning objectives and skills	● Identify systems ● Label parts of systems ● Collect data ● Interpret data ● Show cause and effect ● Develop a scientific model ● Apply scientific concepts of life ● Apply mathematical equation to cell surface ratios
Essential Questions	● How do we know if something is alive? ● How is structure related to function at the various levels of cellular organization? ● What are the common characteristics of all living things? ● How are prokaryotic and eukaryotic cells different? How are they the same? ● How do cell structures relate to their functions in eukaryotes and prokaryotes?

Dates	Smart Objectives	Instructional Strategies and Activities	PA CC Standards	Keystone Anchors	Keystone Eligible Content	Vocabulary
3 weeks	***Characteristics of Life*** • Cite evidence on how the scientific method is applied. • List the 7 characteristics of life • Apply concepts to how organisms achieve homeostasis • Explain two examples of each characteristic of life • Differentiate the levels of biological organization • Apply safety guidelines in laboratory work according to a judged rubric ***Prokaryotes vs. Eukaryotes*** • Compare and contrast prokaryotic and eukaryotic cells	***Characteristics of Life*** • Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations showing how the scientific method is applied • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations • Make observations about the natural world • Use pneumonic device to memorize the 7 characteristics of life ***Prokaryotes vs. Eukaryotes*** • Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and Graphs • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations • Make a venn diagram of prokaryotes and eukaryotes	3.1.B.A1 3.1.B.A5 3.1.B.A6 3.1.B.A9 3.1.B.C2 3.2.B.A8 4.1.3.A 4.1.4.A	BIO.A.1.1 BIO.A.1.2	BIO.A.1.1.1 BIO.A.1.2.1 BIO.A.1.2.2	Scientific Method Hypothesis Inference Variable Control group Experimental group Control variable Experimental variable Independent variable Dependent variable Prokaryotic cell Eukaryotic cell Stimuli Adapt Evolve Population Organelle Cell Tissue Organ Organ System Multicellular Organism
Resources	*(Materials, texts, videos, internet sites, software, human to support instruction)* • Lab Aids SEPUP Science and Global Issues Biology Textbook • Test Prep/Keystone Exam: Biology Assessment Anchors and Eligible Content (with sample questions and glossary) • Powerpoint slides • Lab Aids lab materials • Virtual labs • microscopes • Internet materials such as Amoeba Sisters, Teacher's Pet, Edpuzzle, Nearpod, Kahoot, National Geographic					

Formative Assessments	• Bell Ringers • Exit tickets • Lab reports • Models • Quizzes • Discussion • Stations • Oral questioning • Independent practice
Summative Assessments	• Unit Test • Project
Strategies for ELL and IEP Support	*What tools, strategies, and resources will be used to provide accommodations and modifications to support students with IEPs and who are ELLs?* • Productive pacing • Incorporate native languages • Use visuals • Small group teaching • Provide different levels of materials • Simplify language • Repetition • Provide content in multiple forms
Acceleration Strategies	*What tools, strategies, and resources will be used to help advance students closer to grade-level expectations* • Scaffolding of material • Collaboration with others • Grouping of students • Concrete examples • Visuals • Integrate technology • Goal setting

IAA Curriculum

Content Area	Science	Grade	9
Course Name	Biology		

Unit 2/ concepts	Unit 2: Chemical Basis for Life (Biochemistry)
Big Ideas	● Organic vs. Inorganic Matter ○ matter is anything that occupies space and has mass ○ Living things are made up of molecules ● Chemical structure of water ● Polarity of water/hydrogen bonding and related properties ● Examples of how the properties of water support life. ● Chemical properties of carbon atoms. (Form 4 covalent Bonds) ● Structural Shapes of carbon molecules(straight chains, branch chains, rings) ● Monomers vs. Polymers ● Monomer that forms carbohydrates, protein and nucleic acids and Hydration reactions. ● Basic structure of the 4 major classes of biological macromolecules ● Importance and use of each macromolecule for biological function ● Enzymes as proteins ● Enzymes as Substrate ● 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. ● Effects of environmental factors (pH, temperature, concentration) on enzyme function
Key learning objectives and skills	● Identify systems ● Label parts of systems ● Collect data ● Interpret data ● Show cause and effect ● Develop a scientific model ● Apply scientific concepts of life ● Apply chemical concepts to water reactions ● Make visual representation of the properties of water
Essential Questions	● How is life a product of the organization and interaction of matter? ● What are the unique properties of water? ● How do the unique properties of water support life on earth? ● Why are organic molecules carbon containing? ● What makes carbon so reactive? ● What are the monomers of all carbohydrates/proteins/lipids/nucleic acids? ● How do proteins speed up chemical reactions?

	● What are the environmental factors that affect enzyme productivity?					
Dates (estimates only)	**Smart Objectives**	**Instructional Strategies and Activities**	**PA CC Standards**	**Keystone Anchors**	**Keystone Eligible Content**	**Vocabulary**
3 weeks	● Write up a lab report following industry standards ***Water Supporting Life on Earth*** ● List the unique properties of water ● Relate how the properties of water support life on Earth ***Basic Chemistry*** ● Summarize how carbon is a very reactive element ● Compare and contrast the different types of chemical bonds ***Macromolecules*** ● Analyze life relationships between structure & function at levels of biochemical organization ● Demonstrate using models how Carbon has the unique ability to form four bonds & is suitable to form life's macromolecules. ● Compare and contrast the structure & function of carbohydrates, lipids, proteins, & nucleic acids in organisms ***Enzymes*** ● Define substrate, active site, catalyst ● Categorize the role of enzymes in our bodies. ● Construct the general structure of enzymes ● Analyze a graph of data about enzyme productivity ● List the importance of enzymes as catalysts in cell reactions.	***Water Supporting Life on Earth*** ● Direct Instruction ● Guided notes ● Question/Answer ● Visual Aids ● Lab or Visual Demonstrations ● Using Tables and Graphs ● Ed Puzzles ● Graphic Organizers ● Lab inquiry activities ***Basic Chemistry*** ● Direct Instruction ● Guided notes ● Question/Answer ● Visual Aids ● Visual Demonstrations ● Using Tables and Graphs ● Using Models ● Ed Puzzles ● Graphic Organizers ● Lab inquiry activities ● Computer simulations ***Macromolecules*** ● Direct Instruction ● Guided notes ● Question/Answer ● Visual Aids ● Lab or Visual Demonstrations ● Using Tables and Graphs ● Using Models ● Ed Puzzles ● Graphic Organizers ● Lab inquiry activities ● Computer simulations ***Enzymes*** ● Direct Instruction ● Guided notes	3.1.B.A5 3.1.B.A7 3.1.B.A8 3.1.B.A8 3.1.B.A2 3.1.C.A7 3.2.C.A2 4.2.5.C	BIO.A.2.1 BIO.A.2.2	BIO.A.2.1.1 BIO.A.2.2.1 BIO.A.2.2.2 BIO.A.2.2.3	Organic matter Inorganic matter Mass Atoms Elements Molecules Macromolecules Compounds Polarity Hydrogen Bond Adhesion Cohesion Surface tension Capillary action 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

	• Show how factors such as pH, temperature, & concentration levels can affect enzyme function.	• Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and Graphs • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations				

Resources	• Lab Aids SEPUP Science and Global Issues Biology Textbook • Test Prep/Keystone Exam: Biology Assessment Anchors and Eligible Content (with sample questions and glossary) • Powerpoint slides • Lab Aids lab materials • Virtual labs • Atom models • Internet materials such as Amoeba Sisters, Teacher's Pet, Edpuzzle, Nearpod, Kahoot, National Geographic
Formative Assessments	• Bell Ringers • Exit tickets • Lab reports • Models • Quizzes • Discussion • Stations • Oral questioning • Independent practice
Summative Assessments	• Unit Test • Project
Strategies for ELL and IEP Support	What tools, strategies, and resources will be used to provide accommodations and modifications to support students with IEPs and who are ELLs? • Productive pacing • Incorporate native languages • Use visuals • Small group teaching • Provide different levels of materials • Simplify language • Repetition • Provide content in multiple forms
Acceleration Strategies	• Scaffolding of material • Collaboration with others • Grouping of students • Concrete examples

	• Visuals • Integrate technology • Goal setting

IAA Curriculum

Content Area	Science	Grade	9
Course Name	Biology		

Unit 3/concepts	Unit 3: Cell Structures & Functions
Big Ideas	• Apply scientific concepts of life • Similarities and differences in structure between prokaryotic and eukaryotic cells. • Common features/ functions of cell structures on both Prokaryotic and eukaryotic cells through a variety of mechanisms, organisms maintain homeostasis.
Key learning objectives and skills	• Identify systems • Label parts of systems • Collect data • Interpret data • Show cause and effect • Develop a scientific model • Explain how organisms stay the same by changing • Create a venn diagram supporting the cell theory
Essential Questions	• How do organisms maintain biological balance between their internal and external environments? • How does the structure relate to the function at the organelle, cell tissue, organ, organ system and multicellular organism level of organization?

Dates	Smart Objectives	Instructional Strategies and Activities	PA CC Standards	Keystone Anchors	Keystone Eligible Content	Vocabulary
2 weeks	**Characteristics of cells** • Examine the characteristics of the different types of cell. • Compare and contrast prokaryotic and eukaryotic cells. • Identify and describe the different functions of cell organelles • Compare and contrast the different cell organelles • Compare and contrast animal and plant cells **Prokaryotic and eukaryotic** • Explain that some structures in eukaryotic cells developed from early prokaryotic cells • Reconstruct a cell using clay as the medium	• Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and Graphs • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations	3.1.B.A2 3.1.B.A5 3.1.B.A4 3.1.B.A7 3.2.C.A1 3.2.C.A6	BIO.A.1 BIO.A.4.2	BIO.A.1.1.1 BIO.A.1.2.1 BIO.A.1.2.2 BIO.A.4.2.1	Prokaryotic cells Eukaryotic Cells Organelle Plasma membrane Cytoplasm DNA Ribosomes

Resources	● Lab Aids SEPUP Science and Global Issues Biology Textbook ● Test Prep/Keystone Exam: Biology Assessment Anchors and Eligible Content (with sample questions and glossary) ● Powerpoint slides ● Lab Aids lab materials ● Virtual labs ● Microscopes ● Clay for model building ● Internet materials such as Amoeba Sisters, Teacher's Pet, Edpuzzle, Nearpod, Kahoot, National Geographic
Formative Assessments	● Bell Ringers ● Exit tickets ● Lab reports ● Models ● Quizzes ● Discussion ● Stations ● Oral questioning ● Independent practice
Summative Assessments	● Test ● Project
Strategies for ELL and IEP Support	What tools, strategies, and resources will be used to provide accommodations and modifications to support students with IEPs and who are ELLs? ● Productive pacing ● Incorporate native languages ● Use visuals ● Small group teaching ● Provide different levels of materials ● Simplify language ● Repetition ● Provide content in multiple forms
Acceleration Strategies	● Scaffolding of material ● Collaboration with others ● Grouping of students ● Concrete examples ● Visuals ● Integrate technology ● Goal setting

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Content Area	Science	Grade	9
Course Name	Biology		

Unit 4/concepts	Unit 4: Cellular Transport & Homeostasis

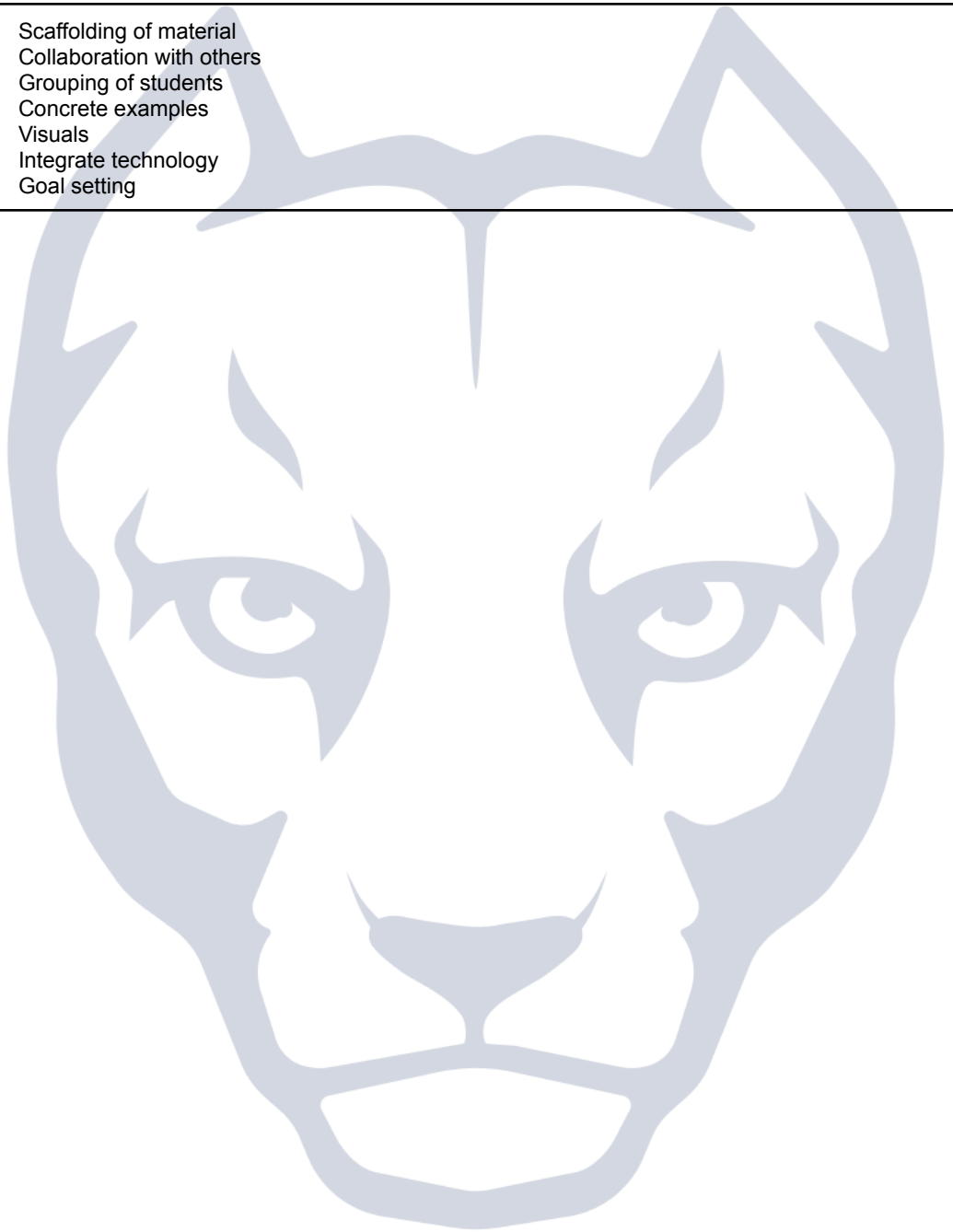
Big Ideas	• Chemical structure of the plasma membrane
	• Fluid mosaic model
	• Functions of the plasma membrane Passive transport mechanisms
	  ○ Diffusion
	  ○ Osmosis
	• Active transport mechanisms
	• Endoplasmic Reticulum
	  ○ Rough ER - Smooth ER
	• Golgi Apparatus
	• Examples of mechanisms

Key learning objectives and skills	• Identify systems • Label parts of systems • Collect data • Interpret data • Show cause and effect • Develop a scientific model
Essential Questions	• How do organisms maintain biological balance between their internal and external environments? • How does the structure of a plasma membrane allow it to function as a regulatory structure and/or protective barrier for a cell? • How is active vs. passive transport different? • How do membrane- bound cellular organelles facilitate intracellular transport of materials? • What are the mechanisms organisms use to maintain homeostasis?

Dates (estimates only)	Smart Objectives	Instructional Strategies and Activities	PA CC Standards	Keystone Anchors	Keystone Eligible Content	Vocabulary
2 weeks	• List different types of movement in plasma membrane • List and describe each type of passive transport • Compare and contrast the three types of passive transport	• Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and	3.1.B.A.2 3.1.B.A.4 3.1.B.A.5 3.1.B.A.7 3.2.C.A.5 3.2.P.B.6	BIO.A.4.1 BIO.A.4.2	BIO.A.4.1.1 BIO.A.4.1.2 BIO.A.4.1.3 BIO.A.4.2.1	Phospholipids bilayer Fluid mosaic model Selectively permeable Passive transport Diffusion Osmosis

	• List and differentiate the three types of active cellular transport • Compare and contrast the different types of active transport: molecular pumps, endocytosis, exocytosis • Show by giving a step by step synopsis on how the Covid-19 virus enters our cells.	Graphs • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations • Construct models				Facilitated Diffusion Active transport Molecular Pumps Endocytosis Exocytosis Homeostasis Intracellular transport Endoplasmic reticulum (ER) Golgi apparatus vesicles Buffers Electrolyte Thermoregulation
Resources	• Lab Aids SEPUP Science and Global Issues Biology Textbook • Test Prep/Keystone Exam: Biology Assessment Anchors and Eligible Content (with sample questions and glossary) • Powerpoint slides • Lab Aids lab materials • Virtual labs • microscopes • Internet materials such as Amoeba Sisters, Teacher's Pet, Edpuzzle, Nearpod, Kahoot, National Geographic					
Formative Assessments	• Bell Ringers • Exit tickets • Lab reports • Models • Quizzes • Discussion • Stations • Oral questioning • Independent practice					
Summative Assessments	• Test • Project					
Strategies for ELL and IEP Support	What tools, strategies, and resources will be used to provide accommodations and modifications to support students with IEPs and who are ELLs? • Productive pacing • Incorporate native languages • Use visuals • Small group teaching • Provide different levels of materials • Simplify language • Repetition • Provide content in multiple forms					

Acceleration Strategies	• Scaffolding of material • Collaboration with others • Grouping of students • Concrete examples • Visuals • Integrate technology • Goal setting



IAA Curriculum

Content Area	Science	Grade	9
Course Name	Biology		

Unit 5/concept	Unit 5: Energy Transformations (Bioenergetics)
Big Ideas	• Roles of mitochondria and chloroplasts in energy transformations • Catabolic vs. Anabolic chemical reactions related to metabolism • Basic energy transformations during photosynthesis and cellular respiration • Relationship between photosynthesis and cellular respiration • Molecular structure of ATP • ATP-ADP cycle • Importance of ATP as the energy currency (fuel) for cell process • Organisms obtain and use energy to carry out their life processes.

Key learning objectives and skills	• Identify systems
	• Label parts of systems
	• Collect data
	• Interpret data
	• Show cause and effect
	• Develop a scientific model
	• Venn diagrams
	  ○ Chloroplast/mitochondria
	  ○ Aerobic/anaerobic
	  ○ Photosynthesis/cellular respiration

Essential Questions	• How do organisms obtain and use energy to carry out their life's processes? • What is the structure and function of mitochondria and chloroplasts in eukaryotic cells? • What are the fundamental roles of plastids (e.g.,chloroplasts) and mitochondria in energy transformations?

Dates (estimates only)	Smart Objectives	Instructional Strategies and Activities	PA CC Standards	Keystone Anchors	Keystone Eligible Content	Vocabulary
2 weeks	***Energy Transfer*** • Compare and contrast cell processes in terms of chemical reactions and energy changes. • Explain the important role of ATP in cell metabolism • Describe the relationship between photosynthesis and cellular respiration in	***Energy Transfer*** • Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and Graphs • Using Models • Ed Puzzles	3.1.B.A2 3.1.B.A5 3.1.C.A1 3.1.C.A2	BIO.A.3.1 BIO.A.3.2	BIO.A.3.1.1 BIO.A.3.2.1 BIO.A.3.2.2	Mitochondria Plastids Chloroplasts Photosynthesis Cellular respiration Metabolism Anabolic reaction Catabolic reaction Chemical energy

	photosynthetic organisms.	• Graphic Organizers • Lab inquiry activities • Computer simulations				Adenosine triphosphate (ATP) Adenosine diphosphate (ADP)

Resources	• Lab Aids SEPUP Science and Global Issues Biology Textbook • Test Prep/Keystone Exam: Biology Assessment Anchors and Eligible Content (with sample questions and glossary) • Powerpoint slides • Lab Aids lab materials • Virtual labs • microscopes • Internet materials such as Amoeba Sisters, Teacher's Pet, Edpuzzle, Nearpod, Kahoot, National Geographic
Formative Assessments	• Bell Ringers • Exit tickets • Lab reports • Models • Quizzes • Discussion • Stations • Oral questioning • Independent practice
Summative Assessments	• Test • Project
Strategies for ELL and IEP Support	• Productive pacing • Incorporate native languages • Use visuals • Small group teaching • Provide different levels of materials • Simplify language • Repetition • Provide content in multiple forms
Acceleration Strategies	• Scaffolding of material • Collaboration with others • Grouping of students • Concrete examples • Visuals • Integrate technology • Goal setting

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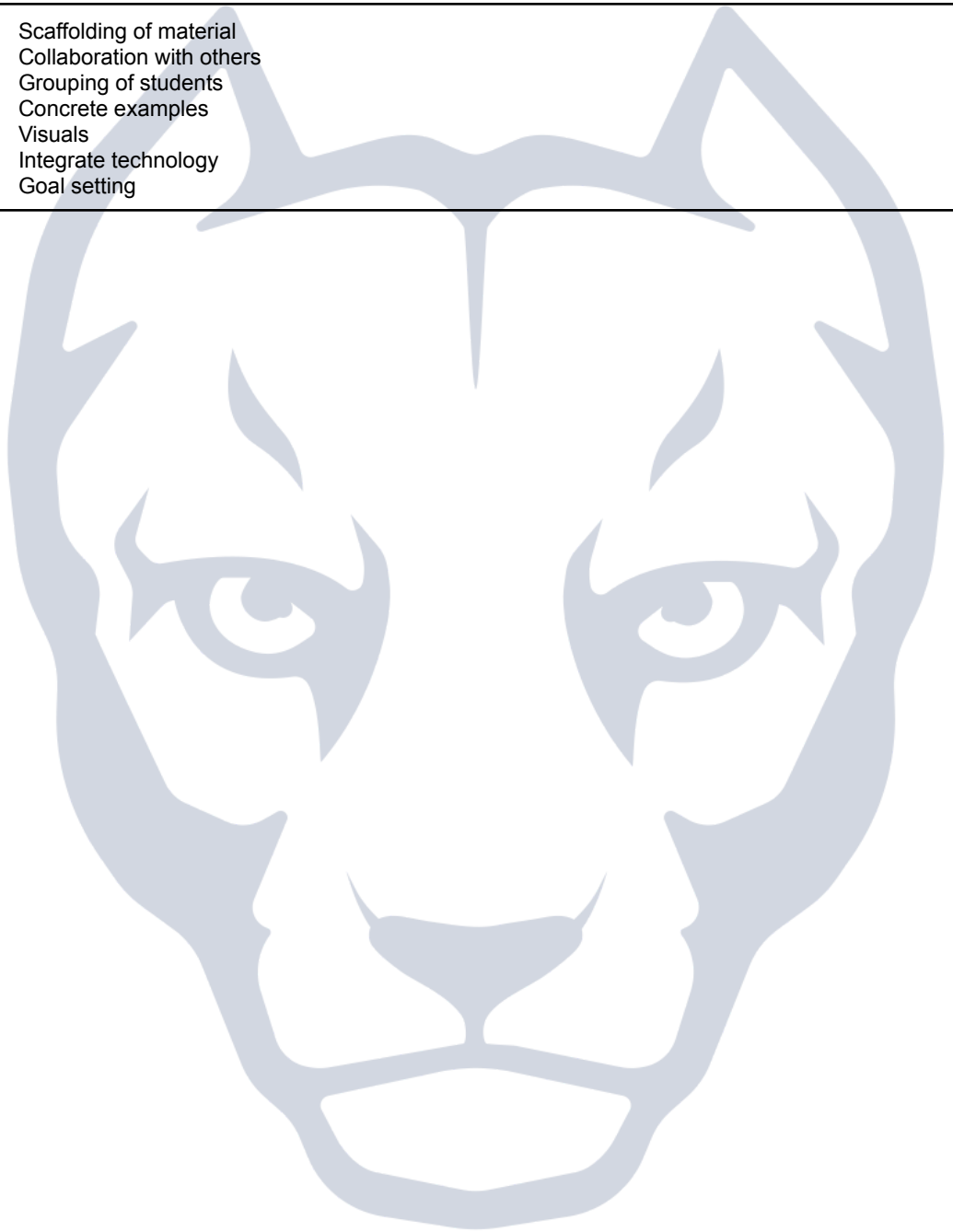
Content Area	Science	Grade	9
Course Name	Biology		

Unit 6/concept	Unit 6: Cell Growth & Reproduction
Big Ideas	• In nature, new cells arise from the division of pre-existing cells. • Cell cycle in a non- reproductive, eukaryotic cell: Interphase (G1,S,G2) Nuclear Division (Mitosis and Meiosis) Cytokinesis (plant vs. animal) • Phases of mitosis: prophase, metaphase, anaphase, telophase • Phases of meiosis in diploid, germ-line stem cells • Importance of Mitosis and Meiosis • Outcomes of Mitosis and Meiosis • Chromosomal Mutations during Mitosis and Meiosis
Key learning objectives and skills	• Identify systems • Label parts of systems • Collect data • Interpret data • Show cause and effect • Develop a scientific model • Create a flip book showing the stages of mitosis and meiosis • Create a Venn diagram comparing mitosis and meiosis
Essential Questions	• How do cells grow and reproduce? • What are the events that occur during the cell cycle? • How are the processes and outcomes of mitotic and meiotic nuclear divisions different and/or similar? • What processes alter composition or number of chromosomes (chromosomal mutations) and how?

Dates (estimates only)	Smart Objectives	Instructional Strategies and Activities	PA CC Standards	Keystone Anchors	Keystone Eligible Content	Vocabulary
3 weeks	***Cell reproduction*** • Critique how all organisms begin their life cycles as a single cell and that in multicellular organisms, successive generations of embryonic cells form by cell division • List the cell cycle and the process and significance of mitosis	***Cell reproduction*** • Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and Graphs • Using Models • Ed Puzzles • Graphic Organizers	3.1.B.A4 3.1.B.A5 3.1.B.B2 3.1.B.B3 3.1.B.B5 3.1.B.C2 3.1.C.B2	BIO.B.1.1	BIO.B.1.1.1 BIO.B.1.1.2	Cell cycle Interphase Mitosis Meiosis Cytokinesis Cell plate Cleavage furrows Prophase Metaphase Anaphase Telophase

	• Draw the process of meiosis resulting in the formation of gametes • Compare and contrast mitosis and meiosis	• Lab inquiry activities • Computer simulations				Haploid Diploid Chromosome Chromatid Homologous chromosomes Tetrad Crossing over spindle (fiber) Somatic Cells Gametes Chromosomal mutation Nondisjunction Duplication Translocation Deletion Insertion Inversion
Resources	• Lab Aids SEPUP Science and Global Issues Biology Textbook • Test Prep/Keystone Exam: Biology Assessment Anchors and Eligible Content (with sample questions and glossary) • Powerpoint slides • Lab Aids lab materials • Virtual labs • microscopes • Internet materials such as Amoeba Sisters, Teacher's Pet, Edpuzzle, Nearpod, Kahoot, National Geographic					
Formative Assessments	• Bell Ringers • Exit tickets • Lab reports • Models • Quizzes • Discussion • Stations • Oral questioning • Independent practice					
Summative Assessments	• Test • Project					
Strategies for ELL and IEP Support	• Productive pacing • Incorporate native languages • Use visuals • Small group teaching • Provide different levels of materials • Simplify language • Repetition • Provide content in multiple forms					

Acceleration Strategies	• Scaffolding of material • Collaboration with others • Grouping of students • Concrete examples • Visuals • Integrate technology • Goal setting



IAA Curriculum

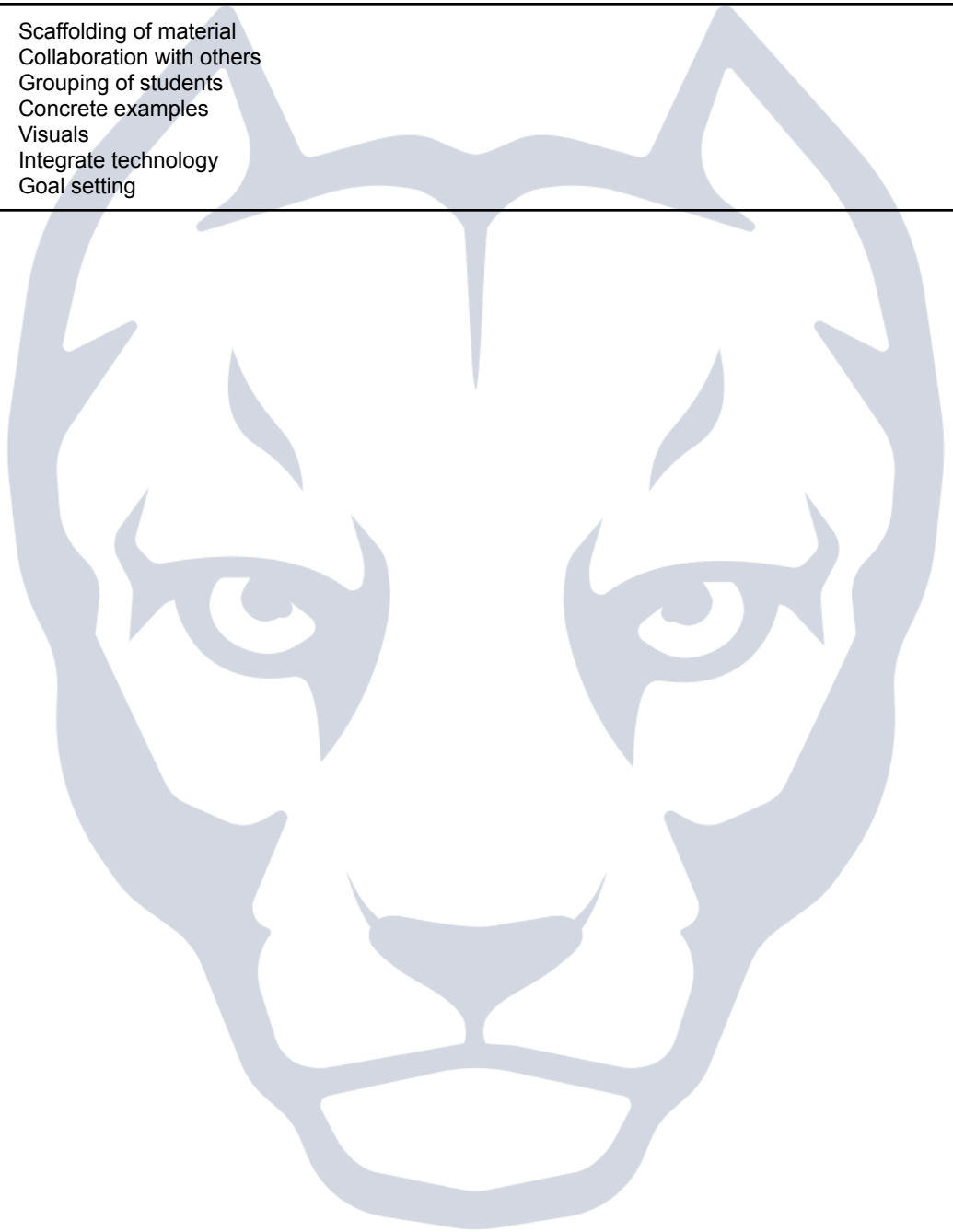
Content Area	Science	Grade	9
Course Name	Biology		

Unit 7 /concept	Unit 7: Inheritance Patterns
Big Ideas	• Common Inheritance patterns • Tools for predicting patterns of inheritance: Punnett Square Pedigree Mathematics and Probability • Genetic Disorders • Genes are expressed in a variety of predictable patterns of inheritances
Key learning objectives and skills	• Identify systems • Label parts of systems • Collect data • Interpret data • Show cause and effect • Develop a scientific model • Create Punnett Squares • Create a family tree • Make “beaker babies”
Essential Questions	• How do organisms pass their inheritance onto their offspring? • How do scientists predict observed patterns of inheritance? • What are the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance? • What are the processes that can alter composition or number of chromosomes?

Dates (estimates only)	Smart Objectives	Instructional Strategies and Activities	PA CC Standards	Keystone Anchors	Keystone Eligible Content	Vocabulary
3 weeks	***Common Inheritance patterns*** • Analyze how Mendel’s laws of segregation and independent assortment can be observed through patterns of inheritance. • Summarize how genetic information is inherited and expressed. ***Punnett Square*** • Identity patterns how the information passed from parents to offspring is transmitted by means of genes which are coded in DNA molecules.	***Common Inheritance patterns*** • Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and Graphs • Case studies • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations	3.1.B.B1 3.1.B.B2 3.1.B.B.3 3.1.B.B5 3.1.B.C2 3.1.C.C2	BIO.B.1.2 BIO.B.2.1	BIO.B.1.2.1 BIO.B.2.1.1 BIO.B.2.1.1 BIO.B.2.1.2	Dominant Recessive Incomplete Dominance Codominance Punnett square Pedigree Autosomal Dominant Autosomal recessive Sex-linked DNA Alleles Chromosomes Genes Genotype

	• Critique how someone can have a different blood type than their parents • Differentiate between heterozygous and homozygous • Create Punnett Squares to predict the phenotype and genotype of two parents' offspring.and calculate ratios • Compare & Contrast Non-Mendelian heredity	***Punnett Square*** • Direct Instruction • Guided notes • Creating Punnett Squares • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and Graphs • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations				Heterozygous/hybrid Homozygous/pure Multiple alleles Phenotype Polygenetic Testcross
Resources	• Lab Aids SEPUP Science and Global Issues Biology Textbook • Test Prep/Keystone Exam: Biology Assessment Anchors and Eligible Content (with sample questions and glossary) • Powerpoint slides • Lab Aids lab materials • Virtual labs • microscopes • Internet materials such as Amoeba Sisters, Teacher's Pet, Edpuzzle, Nearpod, Kahoot, National Geographic					
Formative Assessments	• Bell Ringers • Exit tickets • Lab reports • Models • Quizzes • Discussion • Stations • Oral questioning • Independent practice					
Summative Assessments	• Test • Project					
Strategies for ELL and IEP Support	What tools, strategies, and resources will be used to provide accommodations and modifications to support students with IEPs and who are ELLs? • Productive pacing • Incorporate native languages • Use visuals • Small group teaching • Provide different levels of materials • Simplify language • Repetition • Provide content in multiple forms					

Acceleration Strategies	• Scaffolding of material • Collaboration with others • Grouping of students • Concrete examples • Visuals • Integrate technology • Goal setting



IAA Curriculum

Content Area	Science	Grade	9
Course Name	Biology		

Unit 8/ concepts	Unit 8: DNA & Protein Synthesis
Big Ideas	• DNA, RNA, and protein synthesis are the blueprints of organisms • Structures of DNA • Semi-conservative/DNA replication process • Similarities and Differences between DNA and RNA • Transcriptions between DNA and RNA • Translation uses RNA to make protein • Environmental influences on phenotype
Key learning objectives and skills	• Identify systems • Label parts of systems • Collect data • Interpret data • Show cause and effect • Develop a scientific model • Create a venn diagram • Compare and contrast
Essential Questions	• How do organisms use DNA and RNA to make proteins? • What factors affect gene expression? • How does DNA replication result in the transmission and/or conservation of genetic information? • What are the structural relationships between DNA, genes, and chromosomes? • How is protein synthesis a unified process? • What is the role of the nucleus, ribosomes, ER, and golgi apparatus in the production and processing of proteins. • How do genetic mutations alter the DNA sequence and how can they affect phenotype?

Dates (estimates only)	Smart Objectives	Instructional Strategies and Activities	PA CC Standards	Keystone Anchors	Keystone Eligible Content	Vocabulary
3 weeks	***DNA and RNA*** • Record the basic process of DNA replication and how the process results in the transmission and conservation of the genetic code • Compare and contrast the basic	• Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and	3.1.B.A5 3.1.B.A8 3.1.B.B1 3.1.B.B3 3.1.B.B5 3.1.B.B6 3.1.B.B4	BIO.B.1.2 BIO.B.2.2 BIO.B.2.3 BIO.B.2.4	BIO.B.1.2.1 BIO.B.1.2.2 BIO.B.2.2.1 BIO.B.2.2.2 BIO.B.2.3.1 BIO.B.2.4.1	Adenine Amino acids Anticodon Chargaff's Rule Chromosomes Codon Complementary strand

	processes of transcription and translation and how these processes result in gene expression • Differentiate among the end products of replication, transcription, and translation • Analyze how crossing over, jumping genes, and deletion and duplication of genes results in genetic variation • Record how mutations can alter genetic information. • Create a presentation demonstrating knowledge of a topic in genetic engineering. • Analyze how the effort to completely map and sequence the human genome will advance human knowledge and technological advances. • Research and record the process used by engineers to modify the genome of bacteria.	Graphs • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations	4.4.7.A 4.4.10.A 4.4.12.A 4.4.7.B 4.4.10.B 4.4.12.B			Cytosine, Deletion, Deoxyribonucleic Acid (DNA) Deoxyribose DNA replication Double helix Endoplasmic reticulum Enzymes Frameshift mutation Gene mutation Genes Golgi apparatus Guanine Hydrogen bond Insertion Missense Nonsense Nucleotide Nucleus, Parent strand Phenotype Phosphate group Point mutation Polypeptides proteins Ribonucleic Acid (RNA) Ribosomes Semi-conservative model Silent Thymine Transcription Translation Triplet Uracil Biotechnology Cloning DNA fingerprinting DNA sequencing Electrophoresis Gene splicing Gene therapy Genetic engineering Genetically modified organisms (GMO) Plasmids Polymerase chain reactions (PCR) Recombinant DNA Restricted enzymes

						Selective breeding Stem cell Transgenic organisms

Resources	• Lab Aids SEPUP Science and Global Issues Biology Textbook • Test Prep/Keystone Exam: Biology Assessment Anchors and Eligible Content (with sample questions and glossary) • Powerpoint slides • Lab Aids lab materials • Virtual labs • microscopes • Internet materials such as Amoeba Sisters, Teacher's Pet, Edpuzzle, Nearpod, Kahoot, National Geographic
Formative Assessments	• Bell Ringers • Exit tickets • Lab reports • Models • Quizzes • Discussion • Stations • Oral questioning • Independent practice
Summative Assessments	• Test • Project
Strategies for ELL and IEP Support	What tools, strategies, and resources will be used to provide accommodations and modifications to support students with IEPs and who are ELLs? • Productive pacing • Incorporate native languages • Use visuals • Small group teaching • Provide different levels of materials • Simplify language • Repetition • Provide content in multiple forms
Acceleration Strategies	• Scaffolding of material • Collaboration with others • Grouping of students • Concrete examples • Visuals • Integrate technology • Goal setting

IAA Curriculum

Content Area	Science	Grade	9
Course Name	Biology		

Unit 9/concepts	Unit 9: Theory of Evolution
Big Ideas	• The theory of evolution • Principles of inheritance as they relate to evolution • Fundamental principles of natural selection • Types of natural selection • Factors that contribute to speciation • Examples of variations in population • Evidence of evolution
Key learning objectives and skills	• Identify systems • Label parts of systems • Collect data • Interpret data • Show cause and effect • Develop a scientific model • Make a prehistoric man to *Homo sapien* cladogram
Essential Questions	• How do natural processes as described by the theory of evolution effect change in population over time? • How does natural selection impact allele frequencies of a population? • What are the factors that can contribute to the development of the new species? • How do genetic mutations result in genotypic and phenotypic variations within the population? • How have scientists Interpreted evidence supporting the theory of evolution? • What are the differences among hypothesis, scientific theory, and scientific law?

Dates (estimates only)	Smart Objectives	Instructional Strategies and Activities	PA CC Standards	Keystone Anchors	Keystone Eligible Content	Vocabulary
3 weeks	***The theory of evolution*** • List and compare the mechanisms of biological evolution and categorize the effects • Analyze the theory suggesting that life on Earth arose as a single, primitive prokaryotic cell about 4 billion years ago and that for the	***The theory of evolution*** • Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and Graphs • Using Models • Ed Puzzles • Graphic Organizers	3.1.B.B1 3.1.B.B3 3.1.B.B5 3.1.B.C1 3.1.B.C2 3.1.B.C3 3.1.B.C4 3.1.B.A9	BIO.B.3.1 BIO.B.3.2 BIO.B.3.3	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	Populations Natural selection Allele frequency Species Fitness Adaption Variation Directional selection Stabilizing selection Diversifying/disruptive

	next 2 billion years, a huge diversity of single-celled organisms evolved. ***Natural selection*** ● Analyze how evolution through natural selection can result in changes in biodiversity through the increase or decrease of genetic diversity within a population and compare and contrast the results ● Analyze how increasingly complex, multicellular organisms evolved once cells with nuclei developed. ● Identify and record the relationship between environmental changes and changes in the gene pool of a population. ● Compare and contrast various theories of evolution ***Scientific method*** ● Differentiate between hypothesis, scientific theory, and scientific law. ● Infer the outcome after observing scientific phenomena.	● Lab inquiry activities ● Computer simulations ***Natural selection*** ● Direct Instruction ● Guided notes ● Question/Answer ● Visual Aids ● Using Tables and Graphs ● Using Models ● Ed Puzzles ● Graphic Organizers ● Lab inquiry activities ● Computer simulations ***Scientific method*** ● Direct Instruction ● Guided notes ● Question/Answer ● Visual Aids ● Using Tables and Graphs ● Using Models ● Ed Puzzles ● Graphic Organizers ● Lab inquiry activities				selection Speciation Isolating Mechanisms Genetic drifts 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 Fact and Opinion
Resources	● Lab Aids SEPUP Science and Global Issues Biology Textbook ● Test Prep/Keystone Exam: Biology Assessment Anchors and Eligible Content (with sample questions and glossary) ● Powerpoint slides ● Lab Aids lab materials ● Virtual labs ● microscopes ● Internet materials such as Amoeba Sisters, Teacher's Pet, Edpuzzle, Nearpod, Kahoot, National Geographic					
Formative Assessments	● Bell Ringers ● Exit tickets ● Lab reports ● Models ● Quizzes ● Discussion ● Stations					

	• Oral questioning • Independent practice
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IAA Curriculum

Content Area	Science	Grade	9
Course Name	Biology		

Unit 10/ concepts	Unit 10: Ecology
Key learning objectives and skills	• Identify systems • Label parts of systems • Collect data • Interpret data • Show cause and effect • Develop a scientific model • Create a diorama
Big Ideas	• Ecology • The levels of ecological organization • The ultimate energy source is the sun • Structure and components of a food chain or food web • Symbiotic interactions within an ecosystem • Examples of natural disturbances affecting the ecosystem: Ecological succession Natural disasters • Examples of human and natural disturbances affecting the ecosystem • Biological cycles
Essential Questions	• How do organisms interact with and depend on each other in an ecosystem? • How are organisms impacted by the nonliving components of an ecosystem? • How are the levels of ecological organization different? • How does energy flow through an ecosystem? • What are the biotic interactions within an ecosystem? • What is the niche of an organism? • How does matter recycle through an ecosystem? • How do ecosystems change in response to natural and human disturbances?

Dates (estimates only)	Smart Objectives	Instructional Strategies and Activities	PA CC Standards	Keystone Anchors	Keystone Eligible Content	Vocabulary
3 weeks	***Photosynthesis and cellular respiration*** • Evaluate the efficiency of energy flow within a food web. ***Abiotic components of an ecosystem***	***Photosynthesis and cellular respiration*** • Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual	3.1.B.A2 3.1.B.C1 4.1.3.A 4.1.3.C 4.1.4.A 4.1.4.B 4.1.4.C	BIO.B.4.1 BIO.B.4.2	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	Organism Population Community Ecosystem Biome Biosphere Biotic

	• Examine the interactions between abiotic and biotic factors within an ecosystem and analyze their differences ***Effects of limiting factors on population dynamics*** • Analyze the relationship between habitat changes to plant and animal population fluctuations. • measure how limiting factors cause organisms to become extinct. • Analyze how humans influence the pattern of natural changes (e.g. primary/secondary succession and desertification) in ecosystems over time.	Demonstrations • Using Tables and Graphs • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations ***Abiotic components of an ecosystem*** • Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and Graphs • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations ***Effects of limiting factors on population dynamics*** • Direct Instruction • Guided notes • Question/Answer • Visual Aids • Lab or Visual Demonstrations • Using Tables and Graphs • Using Models • Ed Puzzles • Graphic Organizers • Lab inquiry activities • Computer simulations	4.1.4.E 4.1.5.A 4.1.5.C 4.1.7.A 4.1.7.B 4.1.7.C 4.1.7.E 4.1.10.A 4.1.10.B 4.1.10.D 4.1.10.E 4.1.12.A 4.1.12.C 4.2.5.A 4.2.7.A 4.2.8.A 4.2.10.A 4.2.10.B 4.2.10.C 4.2.12.A 4.2.12.B 4.2.12.C 4.3.12.A 4.3.4.C 4.3.4.D 4.4.3.C 4.4.5.C 4.4.6.A 4.4.6.B 4.5.3.D 4.5.4.C 4.5.5.D 4.5.6.D 4.5.7.B 4.5.7.C 4.5.8.C 4.5.10.B 4.5.10.D 4.5.12.B			Aquatic ecosystem Terrestrial ecosystem 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 Carrying capacity Limiting factors Density dependent Density independent Extinction Biotic potential Biodiversity
Resources	• Lab Aids SEPUP Science and Global Issues Biology Textbook • Test Prep/Keystone Exam: Biology Assessment Anchors and Eligible Content (with sample questions and glossary) • Powerpoint slides					

	• Lab Aids lab materials • Virtual labs • microscopes • Internet materials such as Amoeba Sisters, Teacher's Pet, Edpuzzle, Nearpod, Kahoot, National Geographic
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