Pequea Valley School District
Middle School Science

Unit: Biomes of the World **Course: Life Science** **Grade: 7**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s):

Unit EQ: How do we classify the world's biomes, based on their characteristics?

Lesson EQ's: What is a biome and what characteristics distinguish each biome?
Why do we have different biomes?
How do organisms interact with their biome habitats?

Keystone Eligible Content/PA Core Standard

S8.B.3.1.2 Identify major biomes and describe abiotic and biotic components (e.g, abiotic;different soil types, air, water, sunlight; biotic: soil microbes, decomposers).

Pacing: Approximate number of class sessions per unit
2-3 weeks

Tier 3 Vocabulary (Content specific vocabulary)
Adaptation
Soil
Climate
Biome
Forests
Deserts
Grasslands
Polar Region
Mountain
Aquatic

Know - What do learners need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***
-Know the definition of biome.
-Know what causes climate, soil types to differ in areas of the world.

-Know that organisms need to have adaptations to survive in their biome.
-Know the characteristics that are used to distinguish one biome from another.
-Know the major distinguishing characteristics between the categories of biomes (deserts, forests, grasslands, aquatic).

Understand - What do learners need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***
-Learners need to understand that biomes are different due to their location on the Earth, and that the climate and soil types determine the types of organisms that live there.

Learning Outcome - What do learners need to be able to **accomplish** by the unit's end? ***List skills and competencies, NOT learning activities.***
Learners will be able to share their knowledge of a few chosen biomes, applying what they know about the distinguishing characteristics between biomes in the world in which we live. Learners will create a means of communicating information about the biomes they researched in depth, to teach others their knowledge.

Literature: Life Science Daybook, ScienceSaurus, resources for research from the PVIS library and Life Science Classroom.

Software/Resources: eScience, Planet Earth Video Series

Pequea Valley School District
Department

Unit: Classification of Living Things **Course: Life Science** **Grade: 7**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)

Unit EQ: What are the characteristics of the living things in our world and how do we classify them?

Lesson EQ's:

What is the main classification system used to organize living things?
What are some important categories of living things?
How are living things identified?
What challenges face scientists as they try to classify living things?

Keystone Eligible Content/PA Core Standard

S8.B.1.1.1 Describe the structures of living things that help them function effectively in specific ways (e.g., adaptations, characteristics).

S8.B.1.1.2 Compare similarities and differences in internal structures of organisms (e.g., invertebrate/vertebrate, vascular/nonvascular, single-celled/ multi-celled) and external structures (e.g., appendages, body segments, type of covering, size, shape).

S8.B.1.1.3 Apply knowledge of characteristic structures to identify or categorize organisms (i.e., plants, animals, fungi, bacteria, and protista).

Pacing: Approximate number of class sessions per unit
4-5 weeks

Tier 3 Vocabulary (Content specific vocabulary)
Classification
Kingdom
Phylum
Class
Order
Family
Genus
Species
Protists
Fungus

Archaebacteria
Eubacteria
Vascular
Nonvascular
Dichotomous key

Know - What do learners need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***
-Know the classification system used by scientists to organize living things.
-Know the characteristics of each of the six kingdoms of life.
-Know how to use characteristics of organisms to identify and classify.

Understand - What do learners need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***
-Learners need to understand that organisms are classified by their characteristics, but that this sometimes provides a challenge for scientists.

Learning Outcome - What do learners need to be able to **accomplish** by the unit's end? ***List skills and competencies, NOT learning activities.***
-Learners will be able to use argumentative skills to support their position on the classification of a particular organism, to show knowledge of how the organisms around us are classified and to show understanding that this is not always an easy task.

Literature: Life Science Daybook, ScienceSaurus, articles on the organism used for the argumentative assignment.

Software/Resources: eScience

Pequea Valley School District
Department

Unit: Ecology **Course: Life Science** **Grade: 7**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)
Unit EQ: In what ways do living things interact with each other and their environment?
Lesson EQ's:
What is ecology?
What is an ecosystem and what is it made up of?
What are some ways living things interact with each other?
How is energy transferred in an ecosystem?

Keystone Eligible Content/PA Core Standard
S8.A.3.1.3 Distinguish among system inputs, system processes, system outputs, and feedback (e.g., physical, ecological, biological, informational).
S8.A.3.1.4 Distinguish between open loop (e.g., energy flow, food web) and closed loop (e.g., materials in the nitrogen and carbon cycles, closed-switch) systems.
S8.B.3.1.1 Explain the flow of energy through an ecosystem (e.g. food chains, food webs.)
S8.B.3.1.3 Explain relationships among organisms (eg producers/consumers, predator/prey) in an ecosystem.

Pacing: Approximate number of class sessions per unit
3-4 weeks

Tier 3 Vocabulary (Content specific vocabulary)

ecology	organism	species	population
ecosystem	community	habitat	biotic
abiotic	energy	food chain	food web
producer	consumer	primary	herbivore
secondary	carnivore	omnivore	tertiary
scavenger	decomposer	trophic level	energy pyramid
niche	symbiosis	competition	predation

commensalism mutualism parasitism

Know - What do learners need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***
-Know the level that organize an ecosystem.
-Know the interactions that organisms frequently have within their ecosystems.
-Know how energy is transferred through an ecosystem.

Understand - What do learners need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***
-Learners need to understand that ecosystems are made up of living and non-living components that interact.

Learning Outcome - What do learners need to be able to **accomplish** by the unit's end? ***List skills and competencies, NOT learning activities.***
-Learners will be able to describe the interactions that take place in an ecosystem to keep it running.
-Learners will be able to show how humans fit into the scheme of an ecosystem.

Literature: Life Science Daybook, ScienceSaurus

Software/Resources: eScience, Explorelearning

Pequea Valley School District
Department

Unit: Nature of Science **Course: Life Science** **Grade: 7**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)
How can we apply science process skills to be successful scientists and explore the world around us?

Keystone Eligible Content/PA Core Standard
S8.A.1.1.2 Explain how certain questions can be answered through scientific inquiry and/or technological design.
S8.A.1.1.3 Use evidence, such as observations or experimental results, to support inferences about a relationship.
S8.A.1.1.4 Use evidence, observations, or a variety of scales (e.g., mass, distance, volume, temperature) to describe relationships.
S8.A.1.1.4 Develop descriptions, explanations, predictions, and models using evidence.
S8.A.2.1.2 Use space/time relationships, define concepts operationally, raise testable questions, or formulate hypotheses.
S8.A.2.1.3 Design a controlled experiment by specifying how the independent variables will be manipulated, how the dependent variable will be measured, and which variables will be held constant.
S8.A.2.1.4 I Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions
S8.A.2.1.5 Use evidence from investigations to clearly communicate and support conclusions.
S8.A.2.2.1 Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.
S8.A.2.2.2 Apply appropriate measurement systems (e.g., time, mass, distance, volume, temperature) to record and interpret observations under varying conditions.
S8.A.3.2.1 .Describe how scientists use models to explore relationships in natural systems (e.g., an ecosystem, river system, the solar system)

Pacing: Approximate number of class sessions per unit
4 weeks (and spread throughout the semester)

Tier 3 Vocabulary (Content specific vocabulary)
Observation
Inference
Classify
Predict
Hypothesis

Testable Question
Measure
Data
Interpret
Graph
Variable (Independent, Dependent, Constant)
Control

Know - What do learners need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***
-Know how to collect information about an object or situation.
-Know how to design an experiment, using variables, testable question and hypothesis.
-Know how to analyze data (look for patterns, draw conclusions, organize data and communicate it to others).

Understand - What do learners need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***
-Learners need to understand how to conduct experimentation in an effort to answer questions about the world around them.

Learning Outcome - What do learners need to be able to **accomplish** by the unit's end? ***List skills and competencies, NOT learning activities.***
-Learners will be able to plan, conduct and analyze an experiment of their own design.
-Learners will be able to apply science skills to solve problems in their daily lives.

Literature: ScienceSaurus

Software/Resources: eScience, Explorelearning

Pequea Valley School District
Middle School Science

Unit: Genetics **Course: Life Science** **Grade: 8**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)

Unit EQ: How do organisms gain certain features?
Lesson EQ's:How do organisms get their appearance?
How did we learn about genes and traits?
How can we predict the traits that an organism will show?
How can changes occur in the heredity of organisms?
What are the ways that organisms reproduce, and what part do cells play in this process?

Keystone Eligible Content/PA Core Standard

S8.A.1.2.1 **Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).**
S8.A.1.2.3 **Describe fundamental scientific or technological concepts that could solve practical problems (e.g., Newton's laws of motion, Mendelian genetics).**
S8.A.1.3.1 **Use ratio to describe change (e.g., percents, parts per million, grams per cubic centimeter, mechanical advantage).**
S8.B.2.1.3 **Explain that mutations can alter a gene and are the original source of new variations.**
S8.B.2.1.4 **Describe how selective breeding or biotechnology can change the genetic makeup of organisms.**
S8.B.2.2.1 **Identify and explain differences between inherited and acquired traits.**
S8.B.2.2.2 **Identify and explain differences between inherited and acquired traits.**
S8.B.2.1.4 **Describe how selective breeding or biotechnology can change the genetic makeup of organisms.**
S8.B.1.1.4 Identify the levels of organization from cell to organism and describe how specific structures (parts), which underlie larger systems, enable the system to function as a whole.

Pacing: Approximate number of class sessions per unit
3-4 weeks

Tier 3 Vocabulary (Content specific vocabulary)

heredity
Asexual Reproduction
Sexual Reproduction
Budding
Pollination
Fertilization

Cell Division
Mitosis
Meiosis
Chromosomes
trait
gene
Genetics
Gregor Mendel
cross-pollinated
offspring
parent
inherit
allele
dominant
recessive
codominance
genotype
phenotype
probability
Punnett Square
mutations
selective breeding
hybridization
cloning
genetic engineering
Genetically Modified Organism
hybrid
homozygous
heterozygous
purebred

Know - What do students need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***

-Know the different types of reproduction, and cell division that leads to them.
-Know how genes are passed from parents to offspring to create traits.
-Know how to use a Punnett Square and probability to predict traits in offspring.
-Know some ways heredity can be changed.

Understand - What do students need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***

-Learners need to understand that traits seen in organisms are passed from parents to offspring through the reproductive process, and that these traits can be predicted.
Learning Outcome - What do students need to be able to **accomplish** by the unit's end? ***List skills and competencies, NOT learning activities.*** **-Learners will be able to follow the "rules" of heredity to predict traits in organisms, based on the genes of parent organisms.** **-Learners will apply this knowledge to common agricultural problems.**

Literature: Life Daybook, ScienceSaurus

Software/Resources: eScience, Explorelearning

Pequea Valley School District
Science

Unit: Investigating Cells **Course: Life Science** **Grade: 8**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)
Unit EQ: How does cell structure influence the processes that they carry out?
Lesson EQ's:
What are the parts of a cell that help them function?
What are the major processes carried out by cells to help organisms survive?

Keystone Eligible Content/PA Core Standard
S8.A.2.2.3 - Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes.
S8.A.3.2.3 - Given a model showing simple cause-and- effect relationships in a natural system, predict results that can be used to test the assumptions in the model (e.g., photosynthesis, water cycle, diffusion, infiltration).
S8.B.1.1.2 - Compare similarities and differences in internal structures of organisms (e.g., invertebrate/vertebrate, vascular/nonvascular, singlecelled/ multi-celled) and external structures (e.g., appendages, body segments, type of covering, size, shape).

Pacing: Approximate number of class sessions per unit
- 4 weeks

Tier 3 Vocabulary (Content specific vocabulary)
- cells
- membranes
- organelles
- Cell Membrane
- Cytoplasm
- Nucleus
- Nuclear Membrane
- Vacuoles
- Mitochondria
- Endoplasmic reticulum
- Ribosomes

- Golgi bodies
- Chromosomes
- Lysosome
- Cell Wall
- Chloroplasts
- Prokaryotes
- Eukaryotes
- Cellular respiration
- ATP
- glucose
- Photosynthesis
- Chlorophyll
- Proteins
- Enzymes
- Osmosis
- Diffusion
- Amino acids

Know - What do students need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***

- Know the parts of different types of cells and the function that they do.
- Know the processes carried out within cells that help organisms survive.

Understand - What do students need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***

- Learners need to understand that cells help organisms survive through the processes that take place within the cells.

Learning Outcome - What do students need to be able to **accomplish** by the unit's end? ***List skills and competencies, NOT learning activities.***

- Learners will be able to relate the parts of a cell to their functions, showing how the processes are linked to ensure survival of the organism.
- Learners will be able to relate how the functions of cells help them function as a living human.

Literature:

- Life Science Daybook, ScienceSaurus

Software/Resources:

- eScience, Explorelearning

Pequea Valley School District
Middle School Science

Unit: Natural Selection **Course: Life Science** **Grade: 8**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)

Unit EQ: How do organisms respond to the world around them?
Lesson EQ's: How do the traits that organisms inherit help them survive?
How are inherited adaptations different from an organism responding to an immediate change in its environment?
What occurs when a species cannot respond to a change?
How does a population grow?
What is carrying capacity and how does it affect a population?

Keystone Eligible Content/PA Core Standard

S8.A.1.3.2 **Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.**
S8.A.1.3.3 **Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.**
S8.A.1.3.4 **Given a scenario, explain how a dynamically changing environment provides for the sustainability of living systems.**
S8.B.1.1.1 Describe the structures of living things that help them function effectively in specific ways (e.g., adaptations, characteristics).
S8.B.1.1.2 **Compare similarities and differences in internal structures of organisms (e.g., invertebrate/vertebrate, vascular/nonvascular, single celled/ multi-celled) and external structures (e.g., appendages, body segments, type of covering, size, shape).**
S8.B.3.2.1 **Use evidence to explain factors that affect changes in populations (e.g., deforestation, disease, land use, natural disaster, invasive species).**
S8.B.3.2.2 **Use evidence to explain how diversity affects the ecological integrity of natural systems.**
S8.B.3.2.3 **Describe the response of organisms to environmental changes (e.g., changes in climate, hibernation, migration, coloration) and how those changes affect survival.**
S8.B.2.1.1 **Explain how inherited structures or behaviors help organisms survive and reproduce in different environments.**
S8.B.2.1.2 **Explain how different adaptations in individuals of the same species may affect survivability or reproduction success.**
S8.B.2.1.5 **Explain that adaptations are developed over long periods of time and are passed from one generation to another.**

Pacing: Approximate number of class sessions per unit
4 weeks

Tier 3 Vocabulary (Content specific vocabulary)
Adaptation
Physical
Behavioral
Theory

Survival of the Fittest
Natural Selection
Response to change
Threatened
Endangered
Extinct
Biodiversity
Population
Exponential
Birth Rate
Death Rate
Carrying Capacity
Homeostasis
Resources
Mutation

Know - What do students need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***
-Know that organisms are born with adaptations that help them survive, and the process that occurs to gain these adaptations over millions of years.
-Know why populations change in response to their environment.

Understand - What do students need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***
-Learners need to understand the difference between adaptations that organisms are born with, and behaviors that occur in response to changes in the environment.

Learning Outcome - What do students need to be able to **accomplish** by the unit's end? ***List skills and competencies, NOT learning activities.***
-Learners will be able to analyze behaviors and physical features of organisms as adaptations or responses.
-Learners will be able to analyze adaptations of the living things around them.

Literature: Life Science Daybook, ScienceSaurus, treadbooks on adaptations and endangered species

Software/Resources: eScience, Explorelearning

Pequea Valley School District
Middle School Science

Unit: Pest Management **Course: Life Science** **Grade: 8**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)

Unit EQ: How can we protect our living world through proper pest management?

Keystone Eligible Content/PA Core Standard

S8.A.1.2.2 Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations).

Pacing: Approximate number of class sessions per unit

1-2 weeks

Tier 3 Vocabulary (Content specific vocabulary)

Cultural
Physical
Genetic
Biological
Chemical
Regulatory
Toxic
Pest Management
Pesticides

Know - What do students need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***

-Know what makes an organism a pest.
-Know the steps to controlling pests through Integrated Pest Management.

Understand - What do students need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***

-Students need to understand that pests are necessary parts of a balanced ecosystem, and need to be controlled with non-toxic means.

Learning Outcome - What do students need to be able to **accomplish** by the unit's end? ***List skills and competencies, NOT learning activities.***

-Students will be able to use the steps of IPM to solve pest problems.

Literature: ScienceSaurus, Life Science Daybook

Software/Resources: eScience

Pequea Valley School District
Science

Unit: Studying Life **Course: Life Science** **Grade: 7**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)
Unit EQ: How are cells studied?

Lesson EQ's:

What are the features used to know if something is alive?
How were cells discovered?
How are cells organized in a living thing?
Why do we use microscopes when studying cells?
What are some important parts of a cell?
What are the parts of a microscope and how are they used?

Keystone Eligible Content/PA Core Standard

S8.A.3.1.1 **Describe a system (e.g., watershed, circulatory system, heating system, agricultural system) as a group of related parts with specific roles that work together to achieve an observed result.**

S8.B.1.1.4 **Identify the levels of organization from cell to organism and describe how specific structures (parts), which underlie larger systems, enable the system to function as a whole.**

S8.A.3.1.5 Explain how components of natural and human-made systems play different roles in a working system.

S8.A.3.1.2 **Explain the concept of order in a system [e.g., (first to last: manufacturing steps, trophic levels); (simple to complex: cell, tissue, organ, organ system)].**

S8.B.1.1.2 Compare similarities and differences in internal structures of organisms (e.g., invertebrate/vertebrate, vascular/nonvascular, single-celled/ multi-celled) and external structures (e.g., appendages, body segments, type of covering, size, shape).

Pacing: Approximate number of class sessions per unit
3 weeks

Tier 3 Vocabulary (Content specific vocabulary)
Cells
Respond
Characteristics
Robert Hooke
Matthias Schleiden
Theodor Schwann

Rudolph Virchow
theory
Cell Theory
Microscope
Organelles
Tissue
Organ
System
Organism
Membrane
Nucleus
DNA
Anton Von Leeuwenhoek
Ocular
Arm
Coarse Adjustment
Fine Adjustment
Revolving Nosepiece
Objectives
Stage
Diaphragm
Light Source
Base

Know - What do learners need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***
-Know the characteristics that make up a living thing.
-Know the history and key points of the cell theory.
-Know the organization of living things from cell to organism.
-Know the basic cell parts (membranes, DNA, nucleus, organelles).
-Know that cells are small enough that we need a microscope to view them.

Understand - What do learners need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***
-Learners need to understand that cells are the basic units that make up all living things, and help them to function as a complete organism.

Learning Outcome - What do learners need to be able to **accomplish** by the unit's end? ***List skills and competencies, NOT learning activities.***

-Learners should be able to identify cells and their basic parts, appropriately using a microscope to do so.
-Learners will have explored the microscopic world around them.

Literature: Life Science Daybook, ScienceSaurus

Software/Resources: eScience, video resources from the internet