

Curriculum Map: Accelerated Biology (2020 -2021)

Course: ACC BIOLOG Sub-topic: Uncategorized

Grade(s): None specified

Course Description: Biology is the study of life and its surroundings. Biological terminology, organismal structures, and functions, and life processes are presented to the students through a varied approval. This procedure requires that students apply rote memorization, analysis, and synthesis to their thought process. Topics covered are Biological Principles, Cells, Genetics, Evolution, Ecology, Microorganisms, Plants, Vertebrates, and Human Biology. This course of study is for students who elect an accelerated educational program. Students are homogeneously grouped, and the course is geared toward the above average achiever. The content covered is the same as General Biology but at an accelerated pace and more in depth and descriptive. Students enrolled in this course will take the Keystone Exam near the end of course

Course Textbooks, Workbooks, Materials Citations: Biology. Miller and Levine. 2010 (Hard Cover or Digital)

Unit: Unit #1 - Basic Biological Principles

Timeline: Week 1 to 3

Unit Description: This unit describe science, explains the relationship between science and society introduces the study of life.

Unit Essential Questions: Explain the characteristics common to all organisms.
Describe the relationships between structure &function at biological levels of organization

Unit Big Ideas: All organisms on earth share common characteristics of life.
Structure is related to function at all biological levels of organization.

Unit Materials: Chromebook
Smart Notebook
Bubble Lab Materials (Soap, rulers, cups, straws, tongue depressers)
Obsertainer Lab Materials (Black dishes, essential oils)
Google Forms
Google Docs
Websites used:
Screencastify
Quizlet
HHMI BioInteractive

Unit Assignments: Chapter 1 Vocabulary Practice (Quizlet)
Obsertainer Lab
Answering Scientific Questions (HHMI BioInteractive)
Controlled Experiment Handout #1

Controlled Experiment Handout #2
Controlled Experiment Handout #3
Identifying Controls and Variables (Simpsons)
Identifying Variables Handout (Spongebob)
Variable Worksheet #1
Analyzing Data Handout #1
Bubble Lab
Chapter 1 Vocabulary Quiz
Chapter 1 Test

**Unit Key
Terminology &
Definitions :**

- prokaryotic cell
- eukaryotic cell
- stimuli
- adapt
- evolve
- population
- organelle
- cell
- tissue
- organ
- organ System
- multicellular organism
- scientific method
- observation
- hypothesis
- record and analyze
- conclusion
- controlled experiment
- independent variable
- dependent variable
- control group
- experimental group
- quantitative data
- qualitative data
- peer review

STANDARDS: STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.1 \(Advanced\)](#) Basic Biological Principles

[BIO.A.1.1 \(Advanced\)](#) Explain the characteristics common to all organisms.

[BIO.A.1.1.1 \(Advanced\)](#) Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.

[BIO.B.3.3.1 \(Advanced\)](#) Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation.

(* standards consolidated from Topic level)

Topic: 1.1 What is Science

Minutes for Topic: 44

Core Lesson Goals of Science

Description: Reviewing the Scientific Method

Core Lesson Student Learning Objectives: Students will be able to do the following:
 Explain what science is and what science is not.
 List, explain and analyze the steps of the scientific method.
 Be able to analyze and experiment and identify and explain all the parts of the scientific method within that experiment.
 Construct their own scientific experiment given certain parameters.

Core Lesson Essential Questions: What is Science?

Core Lesson Big Ideas:

- All organisms on earth share common characteristics of life.
- Structure is related to function at all biological levels of organization.

Core Lesson Materials:

- Chromebook
- Smart Notebook
- Google Forms
- Google Docs
- Websites used:
- Screencastify
- Quizlet
- HHMI BioInteractive

Core Lesson Key Terminology & Definitions:

- scientific method
- observation
- hypothesis
- record and analyze
- conclusion
- controlled experiment
- independent variable
- dependent variable
- control group
- experimental group
- quantitative data
- qualitative data
- peer review

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.1 \(Advanced\)](#) Basic Biological Principles

[BIO.B.3.3.1 \(Advanced\)](#) Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation.

Topic: 1.2 Science in Context

Core Lesson Student Learning Objectives:

- Select and use appropriate tools and techniques when designing and conducting experiments related to the biological sciences and then communicate an analysis of the findings using various types of media
- Provide examples for when it is correct to use the terms scientific principles, scientific theory, scientific law, fact and belief

Core Lesson Essential Questions:

- What scientific attitudes help generate new ideas?
- Why is peer review important?
- What is a scientific theory?
- What is the relationship between science and society?

Core Lesson Big Ideas: Understanding how scientists discover new ideas and support or refute previously discovered concepts

Core Lesson Materials:

- Chromebook
- Smart Notebook
- Google Forms

- Google Docs
- Websites used:
- Screencastify
- Quizlet
- HHMI BioInteractive

- Core Lesson Key Terminology & Definitions:**
- theory
 - bias
 - scientific laws

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.1 \(Advanced\)](#) Basic Biological Principles

[BIO.B.3.3.1 \(Advanced\)](#) Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation.

Topic: 1.3 Studying Life

Minutes for Topic: 88

- Core Lesson Student Learning Objectives:**
- List the Characteristics of living things.
 - Identify the central themes in biology
 - Explain how life can be studied at different levels

Core Lesson Essential Questions: what characteristics do all living things share?

What are the central themes of biology?

How do the different fields of biology differ in their approach to studying life?

Core Lesson Big Ideas: Big Idea #1: Organisms share a common characteristics of Life

Big Idea #3: Cells have organized membranes and organelles to organize and carry out chemical reactions

Core Lesson Materials:

- Chromebook
- Smart Notebook
- Google Forms
- Google Docs
- Websites used:
- Screencastify
- Quizlet
- HHMI BioInteractive

- Core Lesson Key Terminology & Definitions:**
- biology
 - DNA
 - stimulus
 - sexual reproduction
 - asexual reproduction
 - homeostasis
 - metabolism
 - biosphere

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.1 \(Advanced\)](#) Basic Biological Principles

[BIO.A.1.1 \(Advanced\)](#) Explain the characteristics common to all organisms.

[BIO.A.1.1.1 \(Advanced\)](#) Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.

Topic: Bubble Lab

Minutes for Topic: 88

Topic: Identifying Controls and Variables

Minutes for Topic: 44

Topic: Observantainer Lab

Unit: Unit #2 - The Chemical Basis of Life

Timeline: Week 4 to 8

Unit Description: This unit introduces the molecular basis of life, and thereby advances students' comprehension of the Enduring Understanding: The process of science helps biologists investigate how nature works at all levels, from molecules in cells to the biosphere.

Unit Essential Questions: Describe how the unique properties of water support life on Earth.

Describe and interpret relationships between structure and function at various levels of biochemical organization (i.e., atoms, molecules and macromolecules).

Explain how enzymes regulate biochemical reactions within a cell.

Unit Big Ideas: Life is a product of the organization and interaction of matter.

- Unit Materials:**
- Chromebook
 - Smart Notebook
 - Google Forms
 - Google Docs
 - Macromolecular Model Kits
 - String and Beakers
 - lab quests
 - salinity probes
 - enzymes
 - Websites used:
 - Screencastify
 - Newslea
 - Quizlet

- Unit Assignments:**
- Quizizz (Macromolecules Review)
 - Why do apple slices turn brown after being cut? (Newslea)
 - Factors affecting enzyme activity (Newslea)
 - Building Carbon Skeletons (Molecular Model Kits)
 - Building Water (Molecular Model Kits)
 - Demonstration of Bonds (Molecular Model Kits)
 - Properties of Water (Handout)
 - Keystone Exam Practice (Carbon Compounds)
 - Macromolecule Puzzle game
 - 2.1 Concept Review (Google Forms)
 - 2.2 Concept Review (Google Forms)
 - Intro to 2.3 Homework (Google Forms)
 - Macromolecules (Google Forms)

Keystone Exam Practice (Composition of Matter)

[Molecular Structure of Fat](#) (HHMI BioInteractive)

[How The Body Uses Fat](#) (HHMI BioInteractive)

Water Challenge

Enzyme Lab

Chapter 2 Vocabulary Quiz (Google Forms)

Chapter 2 Test

**Unit Key
Terminology
& Definitions :**

- 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

STANDARDS: STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.1.2 \(Advanced\)](#) Describe relationships between structure and function at biological levels of organization.

[BIO.A.1.2.2 \(Advanced\)](#) Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).

[BIO.A.2 \(Advanced\)](#) The Chemical Basis for Life

[BIO.A.2.1 \(Advanced\)](#) Describe how the unique properties of water support life on Earth.

[BIO.A.2.1.1 \(Advanced\)](#) Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion).

[BIO.A.2.2 \(Advanced\)](#) Describe and interpret relationships between structure and function at various levels of biochemical organization (i.e., atoms, molecules, and macromolecules).

[BIO.A.2.2.1 \(Advanced\)](#) Explain how carbon is uniquely suited to form biological macromolecules.

[BIO.A.2.2.2 \(Advanced\)](#) Describe how biological macromolecules form from monomers.

[BIO.A.2.2.3 \(Advanced\)](#) Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.

[BIO.A.2.3 \(Advanced\)](#) Explain how enzymes regulate biochemical reactions within a cell.

BIO.A.2.3.1 (Advanced)	Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction.
BIO.A.2.3.2 (Advanced)	Explain how factors such as pH, temperature, and concentration levels can affect enzyme function.

(* standards consolidated from Topic level)

Topic: 2.1 The Nature of Matter

Minutes for Topic: 88

STANDARDS

STATE: [Pennsylvania SAS Keystone Anchors \(2010-2014\)](#)

BIO.A.2 (Advanced)	The Chemical Basis for Life
BIO.A.2.2 (Advanced)	Describe and interpret relationships between structure and function at various levels of biochemical organization (i.e., atoms, molecules, and macromolecules).

Topic: 2.2 Properties of Water

Minutes for Topic: 132

STANDARDS

STATE: [Pennsylvania SAS Keystone Anchors \(2010-2014\)](#)

BIO.A.2.1 (Advanced)	Describe how the unique properties of water support life on Earth.
BIO.A.2.1.1 (Advanced)	Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion).

Topic: Water Challenge

Minutes for Topic: 44

STANDARDS

STATE: [Pennsylvania SAS Keystone Anchors \(2010-2014\)](#)

BIO.A.2.1 (Advanced)	Describe how the unique properties of water support life on Earth.
BIO.A.2.1.1 (Advanced)	Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion).

Topic: 2.3 Carbon Compounds

STANDARDS

STATE: [Pennsylvania SAS Keystone Anchors \(2010-2014\)](#)

BIO.A.2 (Advanced)	The Chemical Basis for Life
BIO.A.2.2 (Advanced)	Describe and interpret relationships between structure and function at various levels of biochemical organization (i.e., atoms, molecules, and macromolecules).
BIO.A.2.2.1 (Advanced)	Explain how carbon is uniquely suited to form biological macromolecules.
BIO.A.2.2.2 (Advanced)	Describe how biological macromolecules form from monomers.
BIO.A.2.2.3 (Advanced)	Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.

Topic: Macromolecule Matching Game

Minutes for Topic: 44

STANDARDS

STATE: [Pennsylvania SAS Keystone Anchors \(2010-2014\)](#)

BIO.A.2.2 (Advanced)	Describe and interpret relationships between structure and function at various levels of biochemical organization (i.e., atoms, molecules, and macromolecules).
BIO.A.2.2.1 (Advanced)	Explain how carbon is uniquely suited to form biological macromolecules.
BIO.A.2.2.2 (Advanced)	Describe how biological macromolecules form from monomers.
BIO.A.2.2.3 (Advanced)	Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.

Topic: Molecular Models

Minutes for Topic: 66

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.2.2.1 \(Advanced\)](#) Explain how carbon is uniquely suited to form biological macromolecules.

[BIO.A.2.2.2 \(Advanced\)](#) Describe how biological macromolecules form from monomers.

Topic: 2.4 Chemical Reactions and Enzymes

Minutes for Topic: 132

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.1.2 \(Advanced\)](#) Describe relationships between structure and function at biological levels of organization.

[BIO.A.1.2.2 \(Advanced\)](#) Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).

[BIO.A.2.2 \(Advanced\)](#) Describe and interpret relationships between structure and function at various levels of biochemical organization (i.e., atoms, molecules, and macromolecules).

[BIO.A.2.3 \(Advanced\)](#) Explain how enzymes regulate biochemical reactions within a cell.

[BIO.A.2.3.1 \(Advanced\)](#) Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction.

[BIO.A.2.3.2 \(Advanced\)](#) Explain how factors such as pH, temperature, and concentration levels can affect enzyme function.

Topic: Enzyme Lab

Minutes for Topic: 88

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.2.3 \(Advanced\)](#) Explain how enzymes regulate biochemical reactions within a cell.

[BIO.A.2.3.1 \(Advanced\)](#) Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction.

[BIO.A.2.3.2 \(Advanced\)](#) Explain how factors such as pH, temperature, and concentration levels can affect enzyme function.

Unit: Unit #3 - Bioenergetics

Timeline: Week 9 to 11

Unit

Description: The unit explores energy transformations. Students learn about the process of photosynthesis and cellular respiration and further connect that the processes occur at cellular levels provide the energy and basic structure of organisms need to survive.

Unit Essential Questions: Identify and describe the cell structures involved in processing energy.

Identify and describe how organisms obtain and transform energy for their life processes

Unit Big Ideas: Organisms obtain and use energy to carry out their life processes.

Unit Materials: Chromebook

Smart Notebook

Google Forms

Google Docs

oxygen sensors

carbon sensors

labquests

gas containers

Websites used:

Screencastify

Quizlet

Newslea

HHMI BioInteractive

**Unit
Assignments:**

Chapter 8 Book Assignment
8.1 Handout (Google Forms)
Light Reactions Identification Handout (PDF)
Dark Reactions Identification Handout (PDF)
Overall Photosynthesis Identification Handout (PDF)
Photosynthesis (HHMI BioInteractive)
Slug Power (HHMI BioInteractive)
Photosynthesis (HHMI BioInteractive)
All about cellular respiration (Newslea)
Photosynthesis Lab
8.1 Quiz (Google Forms)
8.2 Quiz (Google Forms)
8.1 & 8.2 Chloroplast Review (Google Forms)
Chapter 8 Vocabulary Quiz
Chapter 8 Review Sheet
Chapter 8 Test
Aerobic Respiration Identification Handout (PDF)
Glycolysis Identification Handout (PDF)
Electron Transport Chain Handout (PDF)
Fermentation Identification Handout (PDF)
Cellular Respiration Handout (Google Docs)
9.2 Questions (Google Docs)
Fermentation Review (Google Forms)
9.1 Quiz (Google Forms)
9.2 Quiz (Google Forms)
Chapter 9 Book Assignment
Chapter 9 Vocabulary Quiz
Chapter 9 Review Sheet
Chapter 9 Test

**Unit Key
Terminology &
Definitions :**

- mitochondria
- plastids
- chloroplasts
- photosynthesis
- cellular respiration
- metabolism
- anabolic reaction
- catabolic reaction
- chemical energy
- adenosine triphosphate (ATP)
- adenosine diphosphate (ADP)

STANDARDS: STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.3 \(Advanced\)](#) Bioenergetics

[BIO.A.3.1 \(Advanced\)](#) Identify and describe the cell structures involved in

	processing energy.
BIO.A.3.1.1 (Advanced)	Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations.
BIO.A.3.2 (Advanced)	Identify and describe how organisms obtain and transform energy for their life processes.
BIO.A.3.2.1 (Advanced)	Compare the basic transformation of energy during photosynthesis and cellular respiration.
BIO.A.3.2.2 (Advanced)	Describe the role of ATP in biochemical reactions.

Topic: 8.1 Energy and Life

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.3.1 \(Advanced\)](#) Identify and describe the cell structures involved in processing energy.

Topic: 8.2 Photosynthesis: An Overview

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.3.1 \(Advanced\)](#) Identify and describe the cell structures involved in processing energy.

[BIO.A.3.1.1 \(Advanced\)](#) Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations.

[BIO.A.3.2 \(Advanced\)](#) Identify and describe how organisms obtain and transform energy for their life processes.

[BIO.A.3.2.2 \(Advanced\)](#) Describe the role of ATP in biochemical reactions.

Topic: 8.3 The Process of Photosynthesis

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.3.1 \(Advanced\)](#) Identify and describe the cell structures involved in processing energy.

[BIO.A.3.2 \(Advanced\)](#) Identify and describe how organisms obtain and transform energy for their life processes.

[BIO.A.3.2.2 \(Advanced\)](#) Describe the role of ATP in biochemical reactions.

Topic: Photosynthesis Activity

Minutes for Topic: 44

Topic: 9.1 Cellular Respiration: An Overview

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.3.1 \(Advanced\)](#) Identify and describe the cell structures involved in processing energy.

[BIO.A.3.1.1 \(Advanced\)](#) Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations.

Topic: 9.2 The Process of Cellular Respiration

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.3.1 \(Advanced\)](#) Identify and describe the cell structures involved in processing energy.

[BIO.A.3.1.1 \(Advanced\)](#) Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations.

[BIO.A.3.2 \(Advanced\)](#) Identify and describe how organisms obtain and transform energy for their life processes.

[BIO.A.3.2.1 \(Advanced\)](#) Compare the basic transformation of energy during photosynthesis and cellular respiration.

[BIO.A.3.2.2 \(Advanced\)](#) Describe the role of ATP in biochemical reactions.

Topic: Cellular Respiration Activity

Minutes for Topic: 44

Topic: 9.3 Fermentation

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.3.2 \(Advanced\)](#) Identify and describe how organisms obtain and transform energy for their life processes.

[BIO.A.3.2.2 \(Advanced\)](#) Describe the role of ATP in biochemical reactions.

Unit: Unit #4 - Homeostasis and Transport

Timeline: Week 12 to 13

Unit Description: The unit explores that a cell is the basic unit of life; the process that occur at cellular levels provide the energy and basic structure of organisms need to survive. Students will learn about the cell theory and the structure and function of parts in prokaryotic and eukaryotic cells.

Unit Essential Questions: Identify and describe the cell structures involved in transport of materials into, out of, and throughout the cell.

Explain the mechanisms that permit organisms to maintain biological balance between their internal and external environments.

Unit Big Ideas: Through a variety of mechanisms organisms maintain homeostasis.

- Unit Materials:**
- Chromebook
 - Smart Notebook
 - Google Forms
 - Google Docs
 - eggs
 - vinegar
 - corn syrup
 - Websites used:
 - Screencastify
 - Newslea
 - Quizlet
 - HHMI BioInteractive

- Unit Assignments:**
- 7.1 Concept Quiz (Google Forms)
 - 7.2 Concept Quiz (Google Forms)
 - 7.3 Concept Quiz (Google Forms)
 - Cell Labeling Activities (Google Docs)
 - Cell Labeling Quiz
 - Prokaryotes, Eukaryotes, and Cell Membrane (Google Forms)
 - Cells and the Versatile Functions of Their Parts (Newslea)
 - What is the Difference Between Osmosis and Diffusion (Newslea)
 - [Salt Stress Impacts Photosynthesis in Algae](#) (HHMI BioInteractive)
 - Egg Lab

Cell Organelle Worksheet (Google Docs)
Parting Look at Cell Transport (PDF)
Osmosis Worksheet (PDF)
Transport in Cells (PDF)
Chapter 7 Book Assignment
Chapter 7 Vocabulary Quiz
Chapter 7 Review Sheet
Chapter 7 Test

Unit Key Terminology & Definitions :

- phospholipids bilayer
- fluid mosaic model
- selectively permeable
- passive transport
- diffusion
- osmosis
- facilitated diffusion
- active transport
- pumps
- endocytosis
- exocytosis
- homeostasis
- intracellular transport
- endoplasmic reticulum
- Golgi apparatus
- vesicles

STANDARDS: STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.4 \(Advanced\)](#) Homeostasis and Transport

[BIO.A.4.1 \(Advanced\)](#) Identify and describe the cell structures involved in transport of materials into, out of, and throughout a cell.

[BIO.A.4.1.1 \(Advanced\)](#) Describe how the structure of the plasma membrane allows it to function as a regulatory structure and/or protective barrier for a cell.

[BIO.A.4.1.2 \(Advanced\)](#) Compare the mechanisms that transport materials across the plasma membrane (i.e., passive transport—diffusion, osmosis, facilitated diffusion; and active transport—pumps, endocytosis, exocytosis).

[BIO.A.4.1.3 \(Advanced\)](#) Describe how membrane-bound cellular organelles (e.g., endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials within a cell.

[BIO.A.4.2 \(Advanced\)](#) Explain mechanisms that permit organisms to maintain biological balance between their internal and external environments.

[BIO.A.4.2.1 \(Advanced\)](#) Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Topic: 7.1 Life is Cellular

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.A.1.1 \(Advanced\)](#) Explain the characteristics common to all organisms.

[BIO.A.1.1.1 \(Advanced\)](#) Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.

[BIO.A.1.2 \(Advanced\)](#) Describe relationships between structure and function at biological levels of organization.

Topic: 7.2 Cell Structure

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

BIO.A.1.1 (Advanced)	Explain the characteristics common to all organisms.
BIO.A.1.1.1 (Advanced)	Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2 (Advanced)	Describe relationships between structure and function at biological levels of organization.
BIO.A.1.2.1 (Advanced)	Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 (Advanced)	Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).

Topic: Cellular Organelle Activity

Minutes for Topic: 22

Topic: 7.3 Cellular Transport

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

BIO.A.4.1.2 (Advanced)	Compare the mechanisms that transport materials across the plasma membrane (i.e., passive transport—diffusion, osmosis, facilitated diffusion; and active transport—pumps, endocytosis, exocytosis).
BIO.A.4.1.3 (Advanced)	Describe how membrane-bound cellular organelles (e.g., endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials within a cell.
BIO.A.4.2 (Advanced)	Explain mechanisms that permit organisms to maintain biological balance between their internal and external environments.
BIO.A.4.2.1 (Advanced)	Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Topic: 7.4 Homeostasis and Cells

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

BIO.A.4.1.2 (Advanced)	Compare the mechanisms that transport materials across the plasma membrane (i.e., passive transport—diffusion, osmosis, facilitated diffusion; and active transport—pumps, endocytosis, exocytosis).
BIO.A.4.1.3 (Advanced)	Describe how membrane-bound cellular organelles (e.g., endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials within a cell.
BIO.A.4.2 (Advanced)	Explain mechanisms that permit organisms to maintain biological balance between their internal and external environments.
BIO.A.4.2.1 (Advanced)	Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Unit: Unit #5 - Cell Growth and Reproduction

Timeline: Week 14 to 16

Unit

Description: This unit will explore cell size, cell division, meiosis and the process of cell differentiation.

Unit Essential Questions: Describe the three stages of the cell cycle

Explain how genetic information is inherited.

Unit Big Ideas: In nature new cells arise from the division of a pre-existing cell.

Unit Materials: Chromebook

Smart Notebook

Google Forms

Google Docs

Chromosome bead kits

string

scissors

swim floatation device (noodle)

Websites used:

Screencastify

Newslea

Quizlet

HHMI BioInteractive

**Unit
Assignments:**

Chapter 10 Book Assignment (Google Docs)
Cell Cycle Identification Handout (Google Docs)
Mitosis and Meiosis Table (Google Docs)
Mitosis Lab (Google Docs)
Mitosis Matching Activity (Google Docs)
10.1 Cell Types and Chromosomes (Google Forms)
10.1 Cell Cycle (Google Forms)
Meiosis Homework (Google Forms)
Stages of Mitosis (Google Forms)
Mitosis Stages Practice (Quizizz)
Meiosis Stages Practice (Quizizz)
History of the Cell: Discovering the Cell (Newslea)
Meiosis (HHMI BioInteractive)
The Eukaryotic Cell Cycle and Cancer (HHMI BioInteractive)
[The Eukaryotic Cell Cycle and Cancer](#) (HHMI BioInteractive)
[Role of p53 in the Cell Cycle](#) (HHMI BioInteractive)
Mutations in Cancer (HHMI BioInteractive)
Mitosis and Meiosis Combined Practice (Quizizz)
Crossing-Over Activity
10.1 Concept Quiz (Google Forms)
10.2 Concept Quiz (Google Forms)
10.3 Concept Quiz (Google Forms)
Chapter 10 Vocabulary Quiz (Google Forms)
Chapter 10 Review Sheet (Google Docs)
Chapter 10 Test (Google Docs)

**Unit Key
Terminology &
Definitions :**

cell cycle
interphase
mitosis
meiosis
cytokinesis
cell plate
cleavage furrows
prophase
metaphase
anaphase
telophase
haploid
diploid
chromosome
chromatid
homologous chromosomes
tetrad
crossing over
spindle (fiber)
somatic cells
germ cells
gametes
chromosomal mutation
nondisjunction

duplication
translocation
deletion
insertion

STANDARDS: STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.1 \(Advanced\)](#) Cell Growth and Reproduction
- [BIO.B.1.1 \(Advanced\)](#) Describe the three stages of the cell cycle: interphase, nuclear division, cytokinesis.
- [BIO.B.1.1.1 \(Advanced\)](#) Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis.
- [BIO.B.1.1.2 \(Advanced\)](#) Compare the processes and outcomes of mitotic and meiotic nuclear divisions.
- [BIO.B.1.2 \(Advanced\)](#) Explain how genetic information is inherited.
- [BIO.B.1.2.1 \(Advanced\)](#) Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.
- [BIO.B.1.2.2 \(Advanced\)](#) Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance.

Topic: 10.1 Cell growth, Division, and Reproduction

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.1 \(Advanced\)](#) Cell Growth and Reproduction
- [BIO.B.1.1 \(Advanced\)](#) Describe the three stages of the cell cycle: interphase, nuclear division, cytokinesis.
- [BIO.B.1.1.1 \(Advanced\)](#) Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis.

Topic: 10.2 The Process of Cell Division

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.1.1.1 \(Advanced\)](#) Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis.

Topic: 10.3 Regulating the Cell Cycle

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.1.1.1 \(Advanced\)](#) Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis.

Topic: 10.4 Cell Differentiation

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.1.1.1 \(Advanced\)](#) Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis.

Topic: 11.4 Meiosis

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.1.1.1 \(Advanced\)](#) Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis.
- [BIO.B.1.1.2 \(Advanced\)](#) Compare the processes and outcomes of mitotic and meiotic nuclear divisions.
- [BIO.B.1.2 \(Advanced\)](#) Explain how genetic information is inherited.

Unit: Unit #6 - Protein Synthesis

Timeline: Week 17 to 19

Unit Description: The unit will explore experiments that helped reveal the structure and function of DNA as well as how DNA replicates. It will also cover the structure and function of RNA as well as the processes of transcription and translation.

Unit Essential Questions: Explain the process of protein synthesis (i.e. transcription, translation and protein modification)

Explain how genetic information is expressed.

Unit Big Ideas: DNA sequences contain information for protein and nucleic acid synthesis.

Unit Materials: Chromebook

Smart Notebook

Google Forms

Google Docs

DNA Pop bead Kit

RNA Pop Bead Kit

Websites used:

Screencastify

Newslea

Quizlet

HHMI BioInteractive

Unit Assignments: Chapter 12 Book Assignment (Google Docs)
Chapter 13 Book Assignment (Google Docs)
DNA Structure Practice #1 (Google Forms)
DNA Structure Practice #2 (Google Forms)
RNA Structure Practice #1 (Google Forms)
RNA Structure Practice #2 (Google Forms)
DNA: An Overview (Newslea)
Nucleic Acids and Their Function (Newslea)
How Gene Mutations Work (Newslea)
DNA Transcription (HHMI BioInteractive)
Transcription Handout (Google Forms)
Translation Handout (Google Forms)
Transcription & Translation Handout (PDF)
Mutations (Google Docs)
Protein Synthesis (PDF)
DNA Replication (Google Forms)
DNA Replication Quiz (Google Forms)
12.2 Concept Quiz (Google Forms)
12.3 Concept Quiz (Google Forms)
13.1 Concept Quiz (Google Forms)
13.2 Concept Quiz (Google Forms)
13.3 Concept Quiz (Google Forms)
Chapter 12 Vocabulary Quiz (Google Forms)
Chapter 13 Vocabulary Quiz (Google Forms)
Chapter 12 & 13 Review Sheet (Google Docs)

Unit Key semi-conservative model
Terminology & Definitions : 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
missense
nonsense
deoxyribonucleic acid (DNA)
DNA Replication
double helix
nucleotide
deoxyribose
adenine
guanine
cytosine
thymine
Chargaff's Rule
parent strand
complimentary strand

STANDARDS: STANDARDS

STATE: Pennsylvania State Anchors (2010)

[S11.B.1 \(Advanced\)](#) Structure and Function of Organisms

[S11.B.1.1 \(Advanced\)](#) Explain structure and function at multiple levels of organization.

[S11.B.1.1.1 \(Advanced\)](#) Explain how structure determines function at multiple levels of organization (e.g., chemical, cellular, anatomical).

[S11.B.1.1.3 \(Advanced\)](#) Compare and contrast cellular processes (e.g., photosynthesis and respiration, meiosis and mitosis, protein synthesis and DNA replication).

[S11.B.2.2.1 \(Advanced\)](#) Describe how genetic information is expressed (i.e., DNA, genes, chromosomes, transcription, translation, and replication).

Topic: 12.2 The Structure of DNA

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.1.2.1 \(Advanced\)](#) Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.

[BIO.B.1.2.2 \(Advanced\)](#) Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance.

Topic: 12.3 DNA Replication

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.1.2.1 \(Advanced\)](#) Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.

Topic: 13.1 RNA

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.2.2 \(Advanced\)](#) Explain the process of protein synthesis (i.e., transcription, translation, and protein modification).

[BIO.B.2.2.1 \(Advanced\)](#) Describe how the processes of transcription and translation are similar in all organisms.

Topic: 13.2 Ribosomes and Protein Synthesis

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.2.2 \(Advanced\)](#) Explain the process of protein synthesis (i.e., transcription, translation, and protein modification).

[BIO.B.2.2.1 \(Advanced\)](#) Describe how the processes of transcription and translation are similar in all organisms.

[BIO.B.2.2.2 \(Advanced\)](#) Describe the role of ribosomes, endoplasmic reticulum, Golgi apparatus, and the nucleus in the production of specific types of proteins.

[BIO.B.2.3 \(Advanced\)](#) Explain how genetic information is expressed.

Topic: 13.3 Mutations

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.2.1.2 \(Advanced\)](#) Describe processes that can alter composition or number of chromosomes (i.e., crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion).

[BIO.B.2.3.1 \(Advanced\)](#) Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g., silent, nonsense, frame-shift).

Unit: Unit #7 - Genetics

Timeline: Week 20 to 24

Unit Description: The unit explores how cellular information passes from one generation to another. It specifically looks at Mendel and his experiments on pea plants.

Unit Essential Questions: Compare Mendelian and non-Mendelian patterns of inheritance

Apply scientific thinking, processes tools and technologies in the study of genetics.

Unit Big Ideas: Genes are expressed in a variety of predictable patterns of inheritance.

Genetic engineering has transformed and continues to transform the fields of medicine, forensics, and agriculture.

Unit Materials: Chromebook

Smart Notebook

Google Forms

Google Docs

Pennies (Head/Face Lab)

Websites used:

Screencastify

Newslea

Quizlet

**Unit
Assignments:**

Chapter 11 Book Assignment (Google Docs)
An Overview of Mendelian Inheritance (Newslea)
Why are Some Genes Dominant and Some Genes Recessive? (Newslea)
Incomplete Dominance in Genetics (Newslea)
Types of non-Mendelian Genetics (Newslea) What is a Gene? (Newslea)
Cat Test Cross Handout (PDF)
Codominance Practice (PDF)
Spongebob Incomplete Dominance (PDF)
Mendelian Genetics, Probability, Pedigree, and Chi-Square Statistics (HHMI BioInteractive)
Monohybrid Cross Handout (PDF)
Monohybrid Cross Handout (Google Docs)
Dihybrid Cross Handout (PDF)
Bikinni Bottom Genetics Practice 1 (PDF)
Bikinni Bottom Genetics Practice 2 (PDF)
Head Face Lab (PDF)
11.1 Concept Quiz (Google Forms)
11.2 Concept Quiz (Google Forms)
11.3 Concept Quiz (Google Forms)
Chapter 11.1 - 11.3 Vocabulary Quiz (Google Forms)
Chapter 11 Review Sheet (Google Docs)
Chapter 11 Test (Google Docs)

**Unit Key
Terminology &
Definitions :**

- dominant
- recessive
- codominance
- incomplete dominance
- sex-linked
- polygenic
- multiple alleles
- genetics
- Punnett square
- pedigree
- genotype
- phenotype
- probability
- homozygous
- heterozygous
- independent assortment
- chromosomal mutation
- nondisjunction
- duplication
- translocation
- deletion
- insertion
- inversion
- genetic engineering
- genetically modified organisms
- biotechnology
- cloning
- selective breeding
- gene splicing
- gene therapy

STANDARDS: STANDARDS

STATE: Pennsylvania State Anchors (2010)

- [S11.B.1.1.1 \(Advanced\)](#) Explain how structure determines function at multiple levels of organization (e.g., chemical, cellular, anatomical).
- [S11.B.1.1.3 \(Advanced\)](#) Compare and contrast cellular processes (e.g., photosynthesis and respiration, meiosis and mitosis, protein synthesis and DNA replication).
- [S11.B.2.1.2 \(Advanced\)](#) Explain the role of mutations, differential reproduction, and gene recombination in changing the genetic makeup of a population.
- [S11.B.2.1.3 \(Advanced\)](#) Explain the role of selective breeding and biotechnology in changing the genetic makeup of a population.
- [S11.B.2.2 \(Advanced\)](#) Describe how genetic information is inherited and expressed.
- [S11.B.2.2.1 \(Advanced\)](#) Describe how genetic information is expressed (i.e., DNA, genes, chromosomes, transcription, translation, and replication).
- [S11.B.2.2.3 \(Advanced\)](#) Explain how different patterns of inheritance affect population variability (i.e., multiple alleles, codominance, dominance, recessiveness, sex-influenced traits, and sex-linked traits).

Topic: 11.1 The Work of Gregor Mendel**STANDARDS**

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.2.1 \(Advanced\)](#) Compare Mendelian and non-Mendelian patterns of inheritance.
- [BIO.B.2.1.1 \(Advanced\)](#) Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).

Topic: 11.2 Applying Mendel's Principles**STANDARDS**

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.2.1 \(Advanced\)](#) Compare Mendelian and non-Mendelian patterns of inheritance.
- [BIO.B.2.1.1 \(Advanced\)](#) Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).
- [BIO.B.2.3 \(Advanced\)](#) Explain how genetic information is expressed.
- [BIO.B.2.4 \(Advanced\)](#) Apply scientific thinking, processes, tools, and technologies in the study of genetics.

Topic: 11. Other Patterns of Inheritance**STANDARDS**

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.2.1.1 \(Advanced\)](#) Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).
- [BIO.B.2.3 \(Advanced\)](#) Explain how genetic information is expressed.

Topic: 14.1 Human Chromosomes**STANDARDS**

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.2.3 \(Advanced\)](#) Explain how genetic information is expressed.
- [BIO.B.2.3.1 \(Advanced\)](#) Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g., silent, nonsense, frame-shift).
- [BIO.B.2.4 \(Advanced\)](#) Apply scientific thinking, processes, tools, and technologies in the study of genetics.
- [BIO.B.2.4.1 \(Advanced\)](#) Explain how genetic engineering has impacted the fields of medicine, forensics, and agriculture (e.g., selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy).

Unit: Unit #8 - Theory of Evolution

Timeline: Week 23 to 25

Unit Description: The unit explores the diversity of life as the result of ongoing evolutionary change. Species alive today have evolved from ancient common ancestors.

Unit Essential Questions: Explain the mechanisms of evolution

Analyze the sources of evidence for biological evolution

Apply scientific thinking, processes, tools and technologies in the study of the theory of evolution

Unit Big Ideas: The theory of evolution describes the results of many natural processes that select for the survival and reproduction of a population.

Unit Materials: Chromebook

Smart Notebook

Google Forms

Google Docs

Natural Selection Activity

Websites used:

Screencastify

Newslea

Quizlet

Who wants to live a million years? (Website Activity)

HHMI BioInteractive

Unit Assignments: Chapter 16 Book Assignment (Google Docs)
Chapter 17 Book Assignment (Google Docs)
Evolution HW (Google Forms)
Anatomical Evidence of Evolution (Newslea)
Raising Eyebrows: How Evolution Gave Us Expressive Faces (Newslea)
What is the Hardy-Weinberg principle? (Newslea)
Natural Selection and the Evolution of Darwin's Finches (HHMI BioInteractive)
Lizard Evolution Virtual Lab (HHMI BioInteractive)
Lactose Intolerance: Fact or Fiction (HHMI BioInteractive)
Chapter 16.1 SRHO (Google Docs)
Chapter 16.2 SRHO (Google Docs)
Chapter 16.3 SRHO (Google Docs)
Chapter 17.1 SRHO (Google Docs)
Chapter 17.2 SRHO (Google Docs)
Natural Selection Activity
Who wants to live a million years (Website)
Chapter 16.1 Vocabulary Quiz (Google Forms)
Chapter 16.2 Vocabulary Quiz (Google Forms)
Chapter 16.3 Vocabulary Quiz (Google Forms)
Chapter 17.1 Vocabulary Quiz (Google Forms)
Chapter 17.2 Vocabulary Quiz (Google Forms)
Chapter 16 & 17 Review Sheet (Google Docs)
Chapter 16 & 17 Test (Google Forms)

- Unit Key Terminology & Definitions :**
- populations
 - natural selection
 - allele frequency
 - species
 - fitness
 - adaptation
 - 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
 - fact
 - opinion

STANDARDS: STANDARDS

STATE: Pennsylvania State Anchors (2010)

- [S11.B.1.1 \(Advanced\)](#) Explain structure and function at multiple levels of organization.
- [S11.B.1.1.2 \(Advanced\)](#) Compare and contrast the structural and functional similarities and differences among living things (e.g., classify organisms into classification groups, compare systems).
- [S11.B.2 \(Advanced\)](#) Continuity of Life
- [S11.B.2.1 \(Advanced\)](#) Explain the mechanisms of the theory of evolution.
- [S11.B.2.1.1 \(Advanced\)](#) Explain the theory of evolution by interpreting data from fossil records, similarities in anatomy and physiology, or DNA studies that are relevant to the theory of evolution.
- [S11.B.2.1.2 \(Advanced\)](#) Explain the role of mutations, differential reproduction, and gene recombination in changing the genetic makeup of a population.
- [S11.B.2.1.3 \(Advanced\)](#) Explain the role of selective breeding and biotechnology in changing the genetic makeup of a population.
- [S11.B.2.1.4 \(Advanced\)](#) Explain why natural selection can act only on inherited traits.
- [S11.B.2.2 \(Advanced\)](#) Describe how genetic information is inherited and expressed.

Topic: 16.1 Darwin's Voyage of Discovery

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.3 \(Advanced\)](#) Theory of Evolution

Topic: 16.2 Ideas that Shaped Darwin's Thinking

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.3 \(Advanced\)](#) Theory of Evolution

Topic: 16.3 Darwin Presents His Case

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.3.1 \(Advanced\)](#) Explain the mechanisms of evolution.

[BIO.B.3.1.1 \(Advanced\)](#) Explain how natural selection can impact allele frequencies of a population.

Topic: 16.4 Evidence of Evolution

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.3.2 \(Advanced\)](#) Analyze the sources of evidence for biological evolution.

[BIO.B.3.2.1 \(Advanced\)](#) Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical, and universal genetic code).

[BIO.B.3.3 \(Advanced\)](#) Apply scientific thinking, processes, tools, and technologies in the study of the theory of evolution.

Topic: 17.1 Genes and Variation

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.3.1 \(Advanced\)](#) Explain the mechanisms of evolution.

[BIO.B.3.1.2 \(Advanced\)](#) Describe the factors that can contribute to the development of new species (e.g., isolating mechanisms, genetic drift, founder effect, migration).

[BIO.B.3.1.3 \(Advanced\)](#) Explain how genetic mutations may result in genotypic and phenotypic variations within a population.

[BIO.B.3.3 \(Advanced\)](#) Apply scientific thinking, processes, tools, and technologies in the study of the theory of evolution.

Topic: 17.2 Evolution as Genetic Change in Populations

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.3.1.3 \(Advanced\)](#) Explain how genetic mutations may result in genotypic and phenotypic variations within a population.

[BIO.B.3.2 \(Advanced\)](#) Analyze the sources of evidence for biological evolution.

[BIO.B.3.3 \(Advanced\)](#) Apply scientific thinking, processes, tools, and technologies in the study of the theory of evolution.

Unit: Unit #9 - Ecology

Timeline: Week 28 to 33

Unit

Description: This unit covers four major conceptual ideas. First, the biosphere and how its living and nonliving parts interact. It also explores the existence of life on Earth depends on interactions among organisms and between organisms and their environment. Unit 9 investigates ideas about populations and factors affecting population growth, in relation to the interdependence of nature. Finally, the unit requires students to examine the wise use of resources, importance of biodiversity, and the need to meet ecological challenges.

Unit Essential Describe ecological levels of organization in the biosphere.

Questions:

Describe interactions and relationships in an ecosystem.

Unit Big Ideas: Organisms interact with and are dependent on each other and the nonliving components in their environments.

Unit Materials: Chromebook

Smart Notebook

Google Forms

Google Docs

Fox and Mice Lab (Population Lab)

Food Web Activity

Websites used:

Screencastify

Newslea

Quizlet

HHMI BioInteractive

Unit Assignments:

Chapter 3 Book Assignment (Google Docs)

Chapter 4 Book Assignment (Google Docs)

Chapter 5 Book Assignment (Google Docs)

Chapter 6 Book Assignment (Google Docs)

Chapter 3 HW (Google Forms)

Otters Play a Vital Role in Ecology of Rivers (Newslea)

Energy Flow and the 10 Percent Rule (Newslea)

Niche Partitioning and Species Coexistence (HHMI BioInteractive)

The Wolves of Isle Royale (HHMI BioInteractive)

Mystery of the Buffalo Boom (HHMI BioInteractive)

Riverine Food Webs: How Flow Rates Affect Biomass (HHMI BioInteractive)

Introduction to Ecology (Keystone Practice; Google Docs)

Ecology Writing (Keystone Practice; Google Docs)

Community Ecology (Keystone Practice; Google Docs)

Populations (Keystone Practice; Google Docs)

Ecology Review Worksheet (Google Docs)

Ecological Succession (Google Docs)

Fox and Mice Lab (Google Docs)

Food Web Activity (Google Docs)

Name the Biome (Google Docs)

Human Impact on Biomes (Google Docs)

Chapter 3 Concept Quiz (Google Forms)

Chapter 4.1 & 4.2 Concept Quiz (Google Forms)

Chapter 4.3 & 4.4 Concept Quiz (Google Forms)

5.1-5.3 Concept Quiz (Google Forms)

6.1-6.2 Concept Quiz (Google Forms)

Chapter 3 Vocabulary Quiz (Google Forms)

Chapter 4 Vocabulary Quiz (Google Forms)

Chapter 5 Vocabulary Quiz (Google Forms)

Chapter 6 Vocabulary Quiz (Google Forms)

Chapter 3,4,5 & 6 Review Sheet (Google Docs)

Chapter 3,4,5 & 6 Test (Google Forms)

**Unit Key
Terminology &
Definitions :**

- organism
- population
- community
- ecosystem
- biome
- biosphere
- biotic
- abiotic
- aquatic ecosystem
- terrestrial ecosystem
- 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
- energy
- autotroph
- heterotroph
- trophic level
- food chain
- food web
- producer
- consumer
- omnivore
- decomposer
- herbivore
- carnivore
- ecological pyramid
- 10% rule/law
- photosynthesis
- chemosynthesis
- competition
- predation

STANDARDS: STANDARDS

STATE: Pennsylvania State Anchors (2010)

[S11.B.1.1.2](#)
[\(Advanced\)](#)

Compare and contrast the structural and functional similarities and differences among living things (e.g., classify organisms into classification groups, compare systems).

[S11.B.3 \(Advanced\)](#)

Ecological Behavior and Systems

[S11.B.3.1 \(Advanced\)](#)

Use evidence or examples to explain the characteristics of and interactions within an ecosystem.

[S11.B.3.1.1](#)
[\(Advanced\)](#)

Explain the significance of diversity in ecosystems.

[S11.B.3.1.2](#)
[\(Advanced\)](#)

Explain the biotic (i.e., plant, animal, and microbial communities) and abiotic (i.e., soil, air, temperature, and water) components of an ecosystem and their interaction.

[S11.B.3.1.3](#)
[\(Advanced\)](#)

Describe how living organisms affect the survival of one another.

[S11.B.3.1.4](#)
[\(Advanced\)](#)

Compare the similarities and differences in the major biomes (e.g., desert, tropical rain forest, temperate forest, coniferous forest, tundra) and the communities that inhabit them.

[S11.B.3.1.5](#)
[\(Advanced\)](#)

Predict how limiting factors (e.g., physical, biological, chemical) can affect organisms.

- [S11.B.3.2 \(Advanced\)](#) Analyze patterns of change in natural or human-made systems over time.
- [S11.B.3.2.1 \(Advanced\)](#) Use evidence to explain how cyclical patterns in population dynamics affect natural systems.
- [S11.B.3.2.2 \(Advanced\)](#) Explain biological diversity as an indicator of a healthy environment.

Topic: 3.1 What is Energy

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.4 \(Advanced\)](#) Ecology
- [BIO.B.4.1 \(Advanced\)](#) Describe ecological levels of organization in the biosphere.

Topic: 3.2 Energy, Producers, and Consumers

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.4 \(Advanced\)](#) Ecology
- [BIO.B.4.1 \(Advanced\)](#) Describe ecological levels of organization in the biosphere.
- [BIO.B.4.2 \(Advanced\)](#) Describe interactions and relationships in an ecosystem.

Topic: 3.3 Energy Flow in Ecosystems

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.4.2 \(Advanced\)](#) Describe interactions and relationships in an ecosystem.
- [BIO.B.4.2.1 \(Advanced\)](#) Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

Topic: 3.4 Cycles of Matter

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.4.2.3 \(Advanced\)](#) Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, and nitrogen cycle).

Topic: 4.1 Climate

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.4 \(Advanced\)](#) Ecology
- [BIO.B.4.1.2 \(Advanced\)](#) Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.
- [BIO.B.4.2 \(Advanced\)](#) Describe interactions and relationships in an ecosystem.

Topic: 4.2 Niches and Community Interactions

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.4.2.2 \(Advanced\)](#) Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

Topic: 4.3 Succession

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.4.2 \(Advanced\)](#) Describe interactions and relationships in an ecosystem.

[BIO.B.4.2.4 \(Advanced\)](#) Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).

Topic: 4.4 Biomes

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.4.1 \(Advanced\)](#) Describe ecological levels of organization in the biosphere.

[BIO.B.4.1.2 \(Advanced\)](#) Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.

[BIO.B.4.2 \(Advanced\)](#) Describe interactions and relationships in an ecosystem.

[BIO.B.4.2.2 \(Advanced\)](#) Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

Topic: 4.5 Aquatic Ecosystems

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.4 \(Advanced\)](#) Ecology

[BIO.B.4.1.2 \(Advanced\)](#) Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.

[BIO.B.4.2 \(Advanced\)](#) Describe interactions and relationships in an ecosystem.

[BIO.B.4.2.1 \(Advanced\)](#) Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

[BIO.B.4.2.2 \(Advanced\)](#) Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

Topic: 5.1 How Populations Grow

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.4.1.2 \(Advanced\)](#) Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.

Topic: 5.2 Limits to Growth

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.4.2.5 \(Advanced\)](#) Describe the effects of limiting factors on population dynamics and potential species extinction.

Topic: 5.3 Human Population Growth

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.4.2.4 \(Advanced\)](#) Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).

Topic: 6.1 Changing Landscape

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

[BIO.B.4.2.4 \(Advanced\)](#) Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).

[BIO.B.4.2.5 \(Advanced\)](#) Describe the effects of limiting factors on population dynamics and potential species extinction.

Topic: 6.2 Using Resources Wisely

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.4.2.3 \(Advanced\)](#) Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, and nitrogen cycle).
- [BIO.B.4.2.4 \(Advanced\)](#) Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).

Topic: 6.3 Biodiversity

STANDARDS

STATE: Pennsylvania SAS Keystone Anchors (2010-2014)

- [BIO.B.4 \(Advanced\)](#) Ecology
- [BIO.B.4.1 \(Advanced\)](#) Describe ecological levels of organization in the biosphere.
- [BIO.B.4.1.2 \(Advanced\)](#) Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.
- [BIO.B.4.2 \(Advanced\)](#) Describe interactions and relationships in an ecosystem.
- [BIO.B.4.2.1 \(Advanced\)](#) Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).
- [BIO.B.4.2.2 \(Advanced\)](#) Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).