CP Biology

Huntingdon Area School District

UNITS (11/11 SELECTED)	SUGGESTED DURATION
Unit 1: Module 1: The Study of Life	*9 lessons*
Unit 2: Module 6: Chemistry in Biology	*15 lessons*
Unit 2: Module 7: Cellular Structure and Function	*14 lessons*
Unit 2: Module 8: Cellular Energy	*12 lessons*
Unit 2: Module 9: Cellular and Sexual Reproduction	*17 lessons*
Unit 3: Module 10: Introduction to Genetics and Patterns of Inheritance	*18 lessons*
Unit 3: Module 11: Molecular Genetics	*15 lessons*
Unit 3: Module 12: Biotechnology	*17 lessons*
Unit 4: Module 13: The History of Life	*9 lessons*
Unit 4: Module 14: Evolution	*12 lessons*
Unit 4: Module 16: Organizing Life's Diversity	*25 lessons*

Unit 1: Module 1: The Study of Life

CP Biology

UNIT OVERVIEW

Students will study what biology is, the characteristics of life, and the scientific method.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.B 3.1.9-12.C

BIG IDEAS

Big Ideas

- The Science of Life
- The Nature of Science

ESSENTIAL QUESTIONS

Essential Questions

- Are sea spiders different than spiders in your backyard?
- What are the characteristics of living things?
- What are the characteristics of scientific inquiry?

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
the eight characteristics of life.	determine whether something is living or nonliving based on the characteristics of life.
the scientific method.	any experiment using the steps within the scientific method.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	**Description**
The Science of Life SmartBook	Formative	Lesson check-in
The Nature of Science SmartBook	Formative	Lesson check-in
The Study of Life Test	Summative	Assess student knowledge, understanding, application of module concepts

Unit 2: Module 6: Chemistry in Biology

CP Biology

UNIT OVERVIEW

Students will study how chemistry impacts the biological reactions within a cell.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.F

BIG IDEAS

Big Ideas

- Matter
- Chemical Reactions
- Water and its Solutions
- The Building Blocks of Life

ESSENTIAL QUESTIONS

Essential Questions

- What makes up everything around us?
- How do enzymes facilitate life?
- Why do things dissolve in water?
- Why is carbon essential to life?

Unit 2: Module 6: Chemistry in Biology

CP Biology

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
what makes up matter.	simple lab testing to determine if a substance is an element or compound.
how chemical reactions are carried out efficiently in cells.	lab experiments to support the law of conservation of mass.
the different properties of water.	a short essay to explain how the properties of water allow life to exist as we know it on Earth.
the characteristics of the four macromolecules.	an activity to show how the structure of the macromolecules relates to their functions.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	Description
Matter SmartBook	Formative	Lesson check-in
Chemical Reactions SmartBook	Formative	Lesson check-in
Water and Its Solutions SmartBook	Formative	Lesson check-in
The Building Blocks of Life SmartBook	Formative	Lesson check-in
Chemistry in Biology Test	Summative	Assess students knowledge, understanding, and application of module concepts.

Unit 2: Module 7: Cellular Structure and Function

CP Biology

UNIT OVERVIEW

Students will study how the structure of the cell allows it to maintain homeostasis.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.C

BIG IDEAS

Big Ideas

- Cell Discovery and Theory
- The Plasma Membrane
- Cellular Transport
- Structures and Organelles

ESSENTIAL QUESTIONS

Essential Questions

- How did the invention of the microscope lead to the discovery of cells?
- Why is the plasma membrane an important structure of the cell?
- What processes enable substances to move into or out of a cell?
- What are the structures and their functions in prokaryotic and eukaryotic cells?

Unit 2: Module 7: Cellular Structure and Function

CP Biology

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
the parts of the cell theory.	a comparison of early and modern microscopes and how they impacted the discovery of the cell.
the structure of the plasma membrane.	an analogy to compare the structure and function of the cell membrane to a castle wall.
how cells give particles into and out of the cell.	simple experiments to show that particle and water movement have large impacts on the size and shape of cells.
the structures and functions of the organelles.	an analogy between cell organelles and parts of a school.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	Description
Cell Discovery and Theory SmartBook	Formative	Lesson check-in
The Plasma Membrane SmartBook	Formative	Lesson check-in
Cellular Transport SmartBook	Formative	Lesson check-in
Structures and Organelles SmartBook	Formative	Lesson check-in
Cellular Structure and Function Test	Summative	Assess student knowledge, understanding, and application of module concepts.

Unit 2: Module 8: Cellular Energy

CP Biology

UNIT OVERVIEW

Students will study how energy is transformed in cells through ATP use, photosynthesis, and respiration.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.E | 3.1.9-12.G | 3.1.9-12.J | 3.1.9-12.K

BIG IDEAS

Big Ideas

- How Organisms Obtain Energy
- Photosynthesis
- Cellular Respiration

ESSENTIAL QUESTIONS

Essential Questions

- Lettuce plants can't eat, so how do they obtain energy?
- What do lettuce plants need to survive?
- How does your body get energy from eating lettuce?

Unit 2: Module 8: Cellular Energy

CP Biology

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
the structure and function of ATP.	diagrams to show how photosynthesis and cellular respiration to show how matter and energy flow in an ecosystem.
the steps of photosynthesis.	experiments to show the reactants and products of photosynthesis.
the steps of cellular respiration and fermentation.	experiments to track the amount of respiration done by organisms based on carbon dioxide levels.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	Description
How Organisms Obtain Energy SmartBook	Formative	Lesson check-in
Photosynthesis SmartBook	Formative	Lesson check-in
Cellular Respiration SmartBook	Formative	Lesson check-in
Cellular Energy Test	Summative	Assesses student knowledge, understanding, and application of module concepts.

Unit 2: Module 9: Cellular and Sexual Reproduction

CP Biology

UNIT OVERVIEW

Students will study how cell reproduce for the purpose of growth and repair and how cells reproduce for the purpose of sexual reproduction.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.D

3.1.9-12.Q

BIG IDEAS

Big Ideas

- Cellular Reproduction
- Meiosis and Sexual Reproduction

ESSENTIAL QUESTIONS

Essential Questions

- Why do some of these cells look so different from each other?
- What are the primary stages of the cell cycle?
- What are the stages of meiosis, and how does meiosis provide genetic variation?

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
the stages of the cell cycle and mitosis.	surface area to volume ratios to show why cells divide instead of just grow larger and larger.
how genetic variation occurs within meiosis.	meiosis diagrams to show how crossing over and independent assortment contribute to genetic variation.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	**Description**
Cellular Reproduction SmartBook	Formative	Lesson check-in
Meiosis and Sexual Reproduction SmartBook	Formative	Lesson check-in
Cellular and Sexual Reproduction Test	Summative	Assess student knowledge, understanding, and application of module concepts.
Unit STEM Project	Summative	Assesses students' ability to apply their understanding of chemistry and their ability to work as a team to solve a real-world problem.

Unit 3: Module 10: Introduction to Genetics and Patterns of Inheritance

CP Biology

UNIT OVERVIEW

Students will study how traits are passed down from parents to offspring.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.P 3.1.9-12.Q 3.1.9-12.R

BIG IDEAS

Big Ideas

- Mendelian Genetics
- Genetic Recombination and Gene Linkage
- Applied Genetics
- Basic Patterns of Human Inheritance
- Complex Patterns of Inheritance

ESSENTIAL QUESTIONS

Essential Questions

- Why are siblings not identical?
- What is the significance of Mendel's experiments to the study of genetics?
- How do genetics recombination and gene linkage compare?
- What are examples of selective breeding?
- Why is a pedigree helpful in analyzing the inheritance of traits through several generations?
- What are examples of complex inheritance?

Unit 3: Module 10: Introduction to Genetics and Patterns of Inheritance

CP Biology

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
how Mendel influenced genetics.	simple Punnett squares to indicate the likelihood of a trait being passed from parents to offspring.
how genetic recombination and gene linkage impact genetic variation.	chromosome mapping to determine the likelihood that genes stay linked.
how selective breeding works.	Punnett squares to show how offspring can help to determine the genotype of a parent with a dominant trait.
how to use a pedigree to track traits through generations.	karyotyping to detect whether an individual had a chromosome mutation.
how to deal with traits that are more than simply dominant and recessive.	Punnett squares for any type of trait.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	Description
Mendelian Genetics SmartBook	Formative	Lesson check-in
Genetic Recombination and Gene Linkage SmartBook	Formative	Lesson check-in
Applied Genetics SmartBook	Formative	Lesson check-in
Basic Patterns of Human Inheritance SmartBook	Formative	Lesson check-in
Complex Patterns of Inheritance SmartBook	Formative	Lesson check-in
Introduction to Genetics and Patterns of Inheritance Test	Summative	Assess student knowledge, understanding, and application of module content

Unit 3: Module 11: Molecular Genetics

CP Biology

UNIT OVERVIEW

Students will study how the structure and function of DNA impacts the structure and function of proteins.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.A | 3.1.9-12.P | 3.1.9-12.Q

BIG IDEAS

Big Ideas

- DNA: The Genetic Material
- DNA: Replication of DNA
- DNA, RNA, and Protein
- Gene Regulation and Mutation

ESSENTIAL QUESTIONS

Essential Questions

- Why do the rungs of the DNA ladder appear "broken"?
- Which experiments led to the discovery of DNA, and which led to the structure of DNA?
- How does DNA replicate?
- How is DNA and RNA involved in transcription and translation?
- How do prokaryotes and eukaryotes regulate their genes?

Unit 3: Module 11: Molecular Genetics

CP Biology

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
DNA is structured.	modeling to show the difference between the hydrogen and covalent bonds in DNA.
how DNA is replicated.	DNA replication diagrams to show how enzymes work together to make sure DNA is replicated correctly.
how transcription and translation read the DNA code to make proteins.	protein synthesis modeling by taking any strand of DNA and creating the amino acid sequence.
how mutations impact the function of proteins.	mutation analyses to determine how a mutation in DNA will impact a protein's function.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	Description
DNA: The Genetic Material SmartBook	Formative	Lesson check-in
DNA: Replication of DNA SmartBook	Formative	Lesson check-in
DNA, RNA, and Protein SmartBook	Formative	Lesson check-in
Gene Regulation and Mutation SmartBook	Formative	Lesson check-in
Molecular Genetics Test	Summative	Assesses student knowledge, understanding, application of module content

Unit 3: Module 12: Biotechnology

CP Biology

UNIT OVERVIEW

Students will study how the study of genetics and genomics allows humans to modify DNA artificially.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.A | 3.1.9-12.P | 3.1.9-12.Q | 3.1.9-12.X

BIG IDEAS

Big Ideas

- DNA Technology
- The Human Genome

ESSENTIAL QUESTIONS

Essential Questions

- What is this scientist putting into the tube?
- What is genetic engineering and why is it useful?
- Why does the Human Genome Project continue to be significant?

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
how genetic engineering works.	modeling to show how genetic engineering can benefit an organism.
how the Human Genome Project works.	simple genomics to show how protein genes are determined in the human genome.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	**Description**
DNA Technology SmartBook	Formative	Lesson check-in
The Human Genome SmartBook	Formative	Lesson check-in
Biotechnology Test	Summative	Assesses student knowledge, understanding, and application of module concepts
Unit STEM Project	Summative	Assesses students' ability to apply their understanding of chemistry and their ability to work as a team to solve a real-world problem.

Unit 4: Module 13: The History of Life

CP Biology

UNIT OVERVIEW

Students will study fossil evidence and how early life came to be.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.S 3.1.9-12.X

BIG IDEAS

Big Ideas

- Fossil Evidence of Change
- The Origin of Life

ESSENTIAL QUESTIONS

Essential Questions

- What do you think this organism looked like when it was alive?
- How can fossils provide evidence of past life?
- How does the theory of biogenesis relate to modern ideas of cellular life?

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
the fossil evidence that supports the theory of evolution.	fossil analyses to determine relative ages of fossils.
how it is thought that life came to exist.	modeling to show how eukaryotic cells evolved from prokaryotic cells.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	**Description**
Fossil Evidence of Change SmartBook	Formative	Lesson check-in
The Origin of Life SmartBook	Formative	Lesson check-in
The History of Life Test	Summative	Assesses student knowledge, understanding, and application of module concepts.

Unit 4: Module 14: Evolution

CP Biology

UNIT OVERVIEW

Students will study the evidence and mechanisms of evolution.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.M 3.1.9-12.O 3.1.9-12.R 3.1.9-12.S 3.1.9-12.T 3.1.9-12.U 3.1.9-12.W

3.1.9-12.X

BIG IDEAS

Big Ideas

- Darwin's Theory of Evolution by Natural Selection
- How does the fossil record, morphology, biochemistry, and adaptation provide evidence of evolution?
- Shaping Evolutionary Theory

ESSENTIAL QUESTIONS

Essential Questions

- Why would an animal try to look like a plant?
- What is the theory of evolution by natural selection?
- How does the fossil record, morphology, biochemistry, and adaptation provide evidence of evolution?
- What patterns can be observed in evolution?

Unit 4: Module 14: Evolution

CP Biology

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
the process of natural selection.	modeling to show how advantageous traits increase over generations.
the evidence for the theory of evolution.	embryological comparisons to show how organisms are related.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	Description
Darwin's Theory of Evolution by Natural Selection SmartBook	Formative	Lesson check-in
Evidence of Evolution SmartBook	Formative	Lesson check-in
Evolution Test	Summative	Assesses student knowledge, understanding, and application of module content.

Unit 4: Module 16: Organizing Life's Diversity

CP Biology

UNIT OVERVIEW

Students will study how life is classified.

STANDARDS/EXPECTATIONS

Pennsylvania - Grade 9-12 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.1.9-12.B

BIG IDEAS

Big Ideas

- The History of Classification
- Modern Classification

ESSENTIAL QUESTIONS

Essential Questions

- Why are these butterflies similar in structure but different in color?
- How and why do we classify animals?
- How is the evolutionary history of an organism determined?

LEARNING TARGETS: KNOWLEDGE & SKILLS

Knowledge	Skills
Students will know . . . . . (Acquired Knowledge)	**Students can do . . . . . (Acquired Skill)**
how to classify animals.	taxonomic modeling.
how the evolutionary history of an organism is determined.	dichotomous keys.

EVIDENCE OF LEARNING & ASSESSMENT

Name of Assessment	**Type** (formative, summative, project-based, diagnostic)	**Description**
The History of Classification SmartBook	Formative	Lesson check-in
Modern Classification SmartBook	Formative	Lesson check-in
Organizing Life's Diversity Test	Summative	Assesses student knowledge, understanding, and application of module concepts
Unit STEM Project	Summative	Assesses students' ability to apply their understanding of chemistry and their ability to work as a team to solve a real-world problem.