Southmoreland School District
Curriculum Framework

Course	Biology
Unit	Unit 1:Introduction to Biology

Standards

- 3.1.A1 - Describe the characteristics and needs of living organisms.
- 3.1.B1 - Explain the role of biology in understanding the natural world

Essential Questions	**Skills/Competencies**
• What are the core principles of biology that apply to all living organisms? • How do biological systems interact to maintain life processes?	• Understanding fundamental biological concepts. • Observing, describing, and categorizing living organisms. • Applying the scientific method to biological questions.
Key Vocabulary	**Related Misconceptions**
• Biology • Living Organisms • Scientific Method • Homeostasis • Cell Theory	• Misconception: Biology focuses only on plants and animals. (Reality: Biology encompasses all forms of life, including microorganisms.) • Misconception: All living organisms function the same way. (Reality: Living organisms exhibit diverse functions and structures.)

Southmoreland School District
Curriculum Framework

Course	Biology
Unit	Unit 2:Biochemistry

Standards

- 3.1.B2 - Investigate the roles of biological molecules.
- 3.3.B2 - Analyze the functions of different biological molecules and their reactions.

Essential Questions	**Skills/Competencies**
• What are the major types of biochemical molecules, and what roles do they play in living organisms? • How do biochemical reactions contribute to the overall function of cells?	• Identifying the structure and function of biomolecules (carbohydrates, proteins, lipids, nucleic acids). • Understanding and explaining biochemical reactions, such as enzymatic activity and metabolism. • Applying knowledge of biochemistry to biological processes.
Key Vocabulary	**Related Misconceptions**
• Biochemistry • Enzymes • Carbohydrates • Proteins • Nucleic Acids	• Misconception: Biochemistry is only about chemical reactions. (Reality: It also involves understanding the role of these reactions in living organisms.) • Misconception: All proteins and enzymes have the same function. (Reality: Proteins and enzymes have diverse functions based on their structures.)

Southmoreland School District
Curriculum Framework

Course	Biology
Unit	Unit 3:Cells and Cell Processes

Standards

- 3.1.A2 - Describe cell structures and their functions.
- 3.1.B3 - Investigate cellular processes and their roles in maintaining homeostasis.

Essential Questions	**Skills/Competencies**
• What are the key components of a cell, and how do they contribute to cellular function? • How do cellular processes such as respiration, photosynthesis, and cell division support the organism?	• Identifying cell organelles and their functions. • Understanding and describing processes like cellular respiration, photosynthesis, and cell division (mitosis and meiosis). • Analyzing how cells interact with their environment to maintain homeostasis.
Key Vocabulary	**Related Misconceptions**
• Cell Membrane • Organelles • Cellular Respiration • Photosynthesis • Mitosis/Meiosis	• Misconception: All cells are the same. (Reality: Cells vary in function and structure depending on their type.) • Misconception: Cellular respiration and breathing are the same. (Reality: Cellular respiration occurs within cells, while breathing involves gas exchange.)

Southmoreland School District
Curriculum Framework

Course	Biology
Unit	Unit 4: Heredity

Standards

- 3.3.A1 - Analyze patterns of inheritance.
- 3.3.B1 - Explore genetic variation and the impact of genetic principles.

Essential Questions	**Skills/Competencies**
• How are traits inherited through generations, and what patterns can be observed? • What is the role of genes in the expression of traits and the variability among individuals?	• Understanding Mendelian genetics and inheritance patterns. • Using Punnett squares and pedigrees to predict and analyze genetic traits. • Exploring genetic variation and its implications for populations.
Key Vocabulary	**Related Misconceptions**
• Heredity • Genes • Alleles • Genotype/Phenotype • Punnett Square	• Misconception: Traits are solely determined by genes. (Reality: Traits result from interactions between genes and environmental factors.) • Misconception: Recessive traits are less important. (Reality: Recessive traits can be significant, especially in genetic disorders.)

Southmoreland School District
Curriculum Framework

Course	Biology
Unit	Unit 5: Molecular Genetics and Technology

Standards

- 3.3.C2 - Investigate technologies used in genetic research.
- 3.4.A1 - Analyze the impact of biotechnology on genetics and medicine.

Essential Questions	Skills/Competencies
• What are the major technologies used in molecular genetics, and how do they work? • How have advancements in genetic technologies influenced scientific research and medical practices?	• Understanding techniques such as PCR, gel electrophoresis, and DNA sequencing. • Exploring the applications of molecular genetics in medicine, agriculture, and research. • Evaluating the ethical and social implications of genetic technologies.

Key Vocabulary	Related Misconceptions
• Molecular Genetics • DNA Sequencing • PCR (Polymerase Chain Reaction) • Genetic Engineering • Biotechnology	• Misconception: Genetic modification is inherently unsafe. (Reality: Genetic modification has many applications and potential benefits when used responsibly.) • Misconception: Molecular genetics is too complex to understand. (Reality: Fundamental concepts and technologies can be grasped with appropriate instruction.)

Southmoreland School District
Curriculum Framework

Course	Biology
Unit	Unit 6: Evolution

Standards

- 3.1.C2 - Evaluate evidence supporting the theory of evolution.
- 3.2.A1 - Analyze evolutionary processes and their impact on species.

Essential Questions	**Skills/Competencies**
• What evidence supports the theory of evolution, and how is it interpreted? • How do evolutionary processes like natural selection and genetic drift drive changes in species over time?	• Understanding and evaluating different types of evidence for evolution, such as fossil records and comparative anatomy. • Analyzing evolutionary mechanisms and their effects on species adaptation and diversity. • Exploring the role of evolutionary theory in understanding biological processes and biodiversity.
Key Vocabulary	**Related Misconceptions**
• Evolution • Natural Selection • Genetic Drift • Adaptation • Phylogenetics	• Misconception: Evolution is just a theory without substantial evidence. (Reality: Evolution is supported by extensive and diverse evidence from multiple scientific disciplines.) • Misconception: Evolution always leads to more complex organisms. (Reality: Evolution can lead to various changes, including simplifications or new adaptations.

Southmoreland School District
Curriculum Framework

Course	Biology
Unit	Unit 7: Ecology

Standards

- 4.2.A1 - Describe interactions between organisms and their environments.
- 4.1.B2 - Investigate ecosystems, biodiversity, and human impacts.

Essential Questions	**Skills/Competencies**
• How do organisms interact within ecosystems, and what roles do they play in their environments? • What are the impacts of human activities on ecosystems, and how can we mitigate these effects?	• Understanding ecological concepts such as food webs, energy flow, and nutrient cycling. • Analyzing the effects of human activities on ecosystems and developing conservation strategies. • Exploring relationships among organisms and their environments at various ecological levels.
Key Vocabulary	**Related Misconceptions**
• Ecosystem • Food Web • Biodiversity • Trophic Levels • Environmental Impact	• Misconception: Ecosystems are static and unchanging. (Reality: Ecosystems are dynamic and constantly affected by both natural and anthropogenic factors.) • Misconception: All human impacts on the environment are negative. (Reality: Some human activities, like conservation and sustainable practices, can have positive effects.