Marietta City Schools

2025–2026 District Unit Planner

Grade & Course: Biology & Honors Biology	**Topic:** Cell Respiration Photosynthesis: Energy Transfer through Cells	**Duration:** 2.5 weeks
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Georgia Standards of Excellence

SB1. Obtain, evaluate, and communicate information to analyze the nature of the relationships between structures and functions in living cells.

e. Ask questions to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell (e.g., single-celled alga).(*Clarification statement:* Instruction should focus on understanding the inputs, outputs, and functions of photosynthesis and respiration and the functions of the major sub-processes of each including glycolysis, Krebs cycle, electron transport chain, light reactions, and Calvin cycle.)

SB5. Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment.

b. Develop and use models to analyze the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration.

Narrative / Background Information

Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)

7th Grade Foundational GSE:

S7L2. Obtain, evaluate, and communicate information to describe how cell structures, cells, tissues, organs, and organ systems interact to maintain the basic needs of organisms.

a. Develop a model and construct an explanation of how cell structures (specifically the nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, and mitochondria) contribute to the function of the cell as a system in obtaining nutrients in order to grow, reproduce, make needed materials, and process waste.

S7L4. Obtain, evaluate, and communicate information to examine the interdependence of organisms with one another and their environments.

b. Develop a model to describe the cycling of matter and the flow of energy among biotic and abiotic components of an ecosystem.

S8P1. Obtain, evaluate, and communicate information about the structure and properties of matter.

f. Construct an explanation based on evidence to describe conservation of matter in a chemical reaction including the resulting differences between products and reactants.

5th Grade Foundational GSE:

S5L3. Obtain, evaluate, and communicate information to compare and contrast the parts of plant and animal cells.

b. Develop a model to identify and label parts of a plant cell (membrane, wall, cytoplasm, nucleus, chloroplasts) and of an animal cell (membrane, cytoplasm, and nucleus).

c. Construct an explanation that differentiates between the structure of plant and animal cells.

4th Grade Foundational GSE:

S4L1. Obtain, evaluate, and communicate information about the roles of organisms and the flow of energy within an ecosystem.

b. Develop simple models to illustrate the flow of energy through a food web/food chain beginning with sunlight and including producers, consumers, and decomposers.

1st Grade Foundational GSE:

S1L1. Obtain, evaluate, and communicate information about the basic needs of plants and animals.

a. Develop models to identify the parts of a plant—root, stem, leaf, and flower.

b. Ask questions to compare and contrast the basic needs of plants (air, water, light, and nutrients) and animals (air, water, food, and shelter).

c. Design a solution to ensure that a plant or animal has all of its needs met.

Year-Long Anchoring Phenomena: (LEARNING PROCESS)
Sickle cell is a heritable genetic mutation that evolved in response to interactions in ecosystems.

Unit Phenomena (LEARNING PROCESS)
BTB - why is one blue and the other yellow?
Aquarium plants and animals -Slug Power
Mitochondrial Diseases

MYP Inquiry Statement:
The systems of life are supported by biochemical reactions and the **transformations** of **energy** that occur within cells.

MYP Global Context:
Identities and Relationships

Approaches to Learning Skills:
Critical Thinking Skills
Communication Skills

Science & Engineering Practices
Constructing explanations
Asking Questions
Develop and Use Models

Disciplinary Core Ideas: (KNOWLEDGE & SKILLS)

- ATP/ADP Cycle
- Aerobic Respiration (glycolysis, Krebs, electron transport chain)
- Anaerobic Respiration
- Photosynthesis light reactions
- Photosynthesis dark reactions

Crosscutting Concepts: (KNOWLEDGE & SKILLS)
Energy and Matter
Structure and Function
Systems and System Models

MYP Key and Related Concepts:
Key Concept: Systems
Related Concepts: Transformations; Energy

GADOE Achievement Level Descriptors for Biology

Disciplinary Core Content: cell energy
Focus Science & Engineering Practices: constructing explanations, asking questions, developing and using models
Focus Crosscutting Concepts: structure and function

SB1a: Construct an explanation of how cell **structures** and organelles (including ~~nucleus, cytoplasm, cell membrane, cell wall,~~ chloroplasts~~, lysosome, Golgi, endoplasmic reticulum, vacuoles, ribosomes,~~ and mitochondria) interact as a system to maintain homeostasis.

SB1e: Ask questions to investigate and provide **explanations** about the roles of photosynthesis and respiration in the cycling of **matter and flow of energy** within the cell (e.g., single-celled alga). (*Clarification statement:* Instruction should focus on understanding the inputs, outputs, and functions of photosynthesis and respiration and the functions of the major sub-processes of each including glycolysis, Krebs cycle, electron transport chain, light reactions, and Calvin cycle.)

SB5b. Develop and use models to analyze the cycling of **matter** and flow of **energy** within ecosystems through the processes of photosynthesis and respiration.

The beginning learner can…	The developing learner can…	The proficient learner can…	The distinguished learner can…

• identify the structures and functions of cell parts (mitochondria and chloroplasts); • recognize the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell; • describe the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration	• explain that cell structures and organelles interact as a system to maintain homeostasis; • identify questions used to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell; • identify models that can be used to analyze the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration	• construct an explanation of how cell structures and organelles (mitochondria and chloroplasts) interact as a system to maintain homeostasis; • ask questions to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell (e.g., single celled alga); • develop and use models to analyze the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration	• refine explanations of how cell structures and organelles interact as a system to maintain homeostasis; • analyze complex questions used to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell; • refine models used to analyze the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration

Student Friendly Learning Targets

1. I can identify the products and reactants for cellular respiration.
2. I can identify the products and reactants for photosynthesis.
3. I can describe how the *general* structure of the mitochondria supports its function.
4. I can describe how the *general* structure of the chloroplast supports its function.
5. I can differentiate between aerobic and anaerobic respiration.
6. I can explain why ATP is considered a renewable energy source.
7. I can describe a model of the ATP cycle.
8. I can explain why the processes of photosynthesis and cellular respiration are interdependent.
9. I can generate questions to determine the role of cellular respiration in moving energy through cells.
10. I can explain where organisms get the inputs they need for cellular respiration and photosynthesis.
11. I can describe and model the inputs, outputs, and functions of glycolysis, the Krebs cycle, and the electron transport chain of cellular respiration (what does in, what comes out, where it occurs, and why the subprocess is important).
12. I can describe and model the inputs, outputs, and functions of the light reactions and Calvin cycle of photosynthesis (what does in, what comes out, where it occurs, and why the subprocess is important).
13. I can compare and contrast the processes of photosynthesis and cellular respiration (organelle, reactants, subprocesses, products, organisms that perform).
14. I can generate questions to determine the role of photosynthesis in moving energy through cells.
15. I can develop and use models to analyze how cellular respiration moves matter and energy through ecosystems.
16. I can develop and use models to analyze how photosynthesis moves matter and energy through ecosystems.

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)

Possible Misconceptions:

- Only animals carry out cellular respiration.
- Energy in terrestrial ecosystems originates from somewhere other than the sun.
- Energy is truly lost in many energy transformations.
- Things “use up” energy.
- Energy is associated only with movement.
- Plant cells only have a chloroplast.
- Plants get their energy from the soil through roots.

- Plants obtain their energy directly from the sun.

Possible Preconceptions:

- Students should have a basic understanding of the structure and function between the mitochondria and chloroplast.
- Students understand the components of the chemical equations for photosynthesis, however, they confuse reactants and products.
- Students may think plants only require sunlight and water.
- Students should understand the general idea of homeostasis.
- Students should have a basic understanding of the biogeochemical cycles to include P, H, N, C, and H.

Key Vocabulary: (KNOWLEDGE & SKILLS)

ADP, ATP, plant cell, animal cell, Calvin cycle, chloroplasts, chlorophyll, electron transport chain, energy, glycolysis, homeostasis, Krebs cycle, light reactions, matter, energy, mitochondria, producer, consumer, respiration, aerobic, anaerobic, autotroph, heterotroph, products, reactants, carbon/oxygen cycle, organic molecule, carbohydrate, polysaccharide

Inquiry Statements:

Factual:

- What are some chemical reactions which occur inside cells?
- What occurs in the process of cellular respiration?
- What occurs in the process of photosynthesis?
- What factors are needed for photosynthesis?

Conceptual:

- Why do some organisms need to feed themselves whereas others do not?
- Can the chemical reactions of life occur outside cells?

Debatable:

- Should chemical reactions be manipulated in order to meet our food and fuel needs?

MYP Objectives	Summative Assessment	
Reflecting on the impact of science **Applying Scientific language effectively**	Assessment Tasks: MYP Assessment: SB5b Common Summative Assessment	Relationship between summative assessment task(s) and statement of inquiry: The CFAs help to monitor and determine student progress as we move through the unit. This data informs the teacher of which students to accelerate, and which to remediate prior to the unit summative. The summative assessments serve to test students' mastery of the learning targets at the proficient and distinguished level of the Achievement Level Descriptors for Biology

Unit Objectives: *Energy can neither be created nor destroyed, but it can be transformed as it flows through organisms and ecosystems.*

- The structure of the mitochondria and chloroplasts support their function in photosynthesis and cellular respiration (SB1a).
- Photosynthesis and respiration are essential in the cycling of matter and energy within the cell. (SB1e, SB5b)
- It is important to understand the inputs, outputs, and functions of photosynthesis and respiration and their roles in the overall process of energy transfer through cells. (SB1e)

- It is important to have a conceptual understanding of the functions of the major sub processes of photosynthesis and respiration, including glycolysis, the Krebs cycle, the electron transport chain, the light reactions, and the Calvin cycle. (SB1e)

Learning Activities and Experiences	Obtain:	Evaluate:	Communicate:
Week 1: **Topic 1: Cell Respiration** • Aerobic Respiration • Anaerobic Respiration • Role in C / O cycles	Common Openers & Closers for Unit 7: Energy Transfer through Cells Cell Energy PPT (Honors) • Chemical Energy & ATP Interactive Notes • Cellular Respiration Interactive Notes Cell Energy PPT (On-Level)	ATP Modeling Activity Effect of Exercise on Cellular Respiration Lab Observing Cellular Respiration (BTB & Radish) Lab Yeast Cellular Respiration Lab	Common Formative Assignments and Common Closers
Week 2: **Topic 2: Photosynthesis** • Light Reactions • Calvin Cycle • Role in C / O cycles	Cell Energy PPT (Honors) • Photosynthesis Interactive Notes Cell Energy PPT (On-Level) • Photosynthesis Graphic Organizer	Asking Questions: Photosynthesis & Cellular Respiration Activity Compare & Contrast Cellular Respiration & Photosynthesis Photosynthesis & Cellular Respiration Simulation: Fish Tank Lab Photosynthesis Leaf Disk Lab Photosynthesis Spinach Lab Photosynthesis Virtual Lab 1 Photosynthesis Virtual Lab 2	MYP Writing Task
Week 2.5 • Common Summative Assessment & Remediation			Common Summative Assessment Remediation & Enrichment with Discovery Education

All unit resources available on the Biology Schoology Group page.