

# Phoenixville Area School District Understanding by Design (UbD) Science Template

**Grade Level: 6**

**Unit Name: Ecosystems and Organisms**

**Author: L. Freeman**

## Stage 1 Desired Results

<p><b>Overarching NGSS &amp; PA Standards:</b></p> <p><b>3.1.6-8.A</b> Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.</p> <p><b>3.1.6-8.B</b> Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.</p> <p><b>3.1.6-8.F</b> Construct a scientific explanation based on</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center; background-color: #e0e0e0;"><b>Transfer</b></td> </tr> <tr> <td colspan="2" style="padding: 5px;"><i>Students will be able to independently use their learning to...</i></td> </tr> <tr> <td colspan="2" style="padding: 5px;"> <ol style="list-style-type: none"> <li>1. Ask questions and/or define problems</li> <li>2. Develop and/or use models</li> <li>3. Plan and/or carry out investigations</li> <li>4. Analyze and interpret data using computational thinking</li> <li>5. Obtain, evaluate, and communicate information (supported by evidence)</li> <li>6. Construct explanations and design solutions</li> </ol> </td> </tr> <tr> <td colspan="2" style="text-align: center; background-color: #e0e0e0;"><b>Meaning-Making</b></td> </tr> <tr> <td style="width: 70%; padding: 5px;"><i>Students will understand that...</i></td> <td style="width: 30%; padding: 5px; vertical-align: top;"> <p><b>ESSENTIAL QUESTIONS</b> <i>Students will keep considering...</i></p> <ul style="list-style-type: none"> <li>• What is life?</li> <li>• How does energy flow through an ecosystem?</li> <li>• How do organisms depend on one another for survival?</li> <li>• What role do the nonliving parts of an ecosystem have on the living organisms within that ecosystem?</li> <li>• How does the form and function of an organism affect its ability to adapt and survive?</li> </ul> </td> </tr> <tr> <td colspan="2" style="text-align: center; background-color: #e0e0e0;"><b>Knowledge and Skills Acquisition</b></td> </tr> </table>	<b>Transfer</b>		<i>Students will be able to independently use their learning to...</i>		<ol style="list-style-type: none"> <li>1. Ask questions and/or define problems</li> <li>2. Develop and/or use models</li> <li>3. Plan and/or carry out investigations</li> <li>4. Analyze and interpret data using computational thinking</li> <li>5. Obtain, evaluate, and communicate information (supported by evidence)</li> <li>6. Construct explanations and design solutions</li> </ol>		<b>Meaning-Making</b>		<i>Students will understand that...</i>	<p><b>ESSENTIAL QUESTIONS</b> <i>Students will keep considering...</i></p> <ul style="list-style-type: none"> <li>• What is life?</li> <li>• How does energy flow through an ecosystem?</li> <li>• How do organisms depend on one another for survival?</li> <li>• What role do the nonliving parts of an ecosystem have on the living organisms within that ecosystem?</li> <li>• How does the form and function of an organism affect its ability to adapt and survive?</li> </ul>	<b>Knowledge and Skills Acquisition</b>	
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**UNDERSTANDINGS**

evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

**3.1.6-8.I**  
Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

**3.1.6-8.J**  
Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

**3.1.6-8.K**  
Develop a model to describe the cycling of matter and flow of energy among living

*Students will know...*

- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.
- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.
- Animals depend on matter from plants for growth and survival.
- The cause-and-effect relationships between resources and individual organisms can vary based upon periods of abundant and scarce resources.
- Transfers of matter into and out of the physical environment occur at every level.
- The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.
- Growth of organisms and population increases are limited by access to resources.
- All living things are made of smaller units called cells.
- Due to the small-scale size of cellular composition of living organism’s magnification devices need to be used.
- Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem.
- Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to release energy.
- Plants, algae, and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen.
- Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments.
- Predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival.
- Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.
- Predatory interactions may reduce the number of organisms or eliminate whole populations of organisms.
- Adaptations within species are developed over long periods of time for the future of that species.

*Students will be skilled at...*

- Describe and compare structural and functional similarities and differences that characterize living things.
- Constructing a model of nonliving parts of an ecosystem (e.g., water, minerals, air) that can provide matter to living organisms or receive matter from living organisms.
- Recognizing and identifying parts of a cell (nucleus, chloroplasts, cell wall, mitochondria, cell membrane)
- Using a microscope as a to magnify cells unable to be seen by the naked eye.
- Classifying organisms as a producer, consumer, or decomposer
- Creating a model of the interactions of producers, consumers, and decomposers within an ecosystem
- Explaining the importance of plants as producers within an ecosystem and how energy is passed on.
- Sequence organisms in a food web and explain how they are dependent on one another for survival.

<p>and nonliving parts of an ecosystem.</p> <p><b>Which branch(es) of science apply:</b></p> <p><b>LS</b></p>	<p style="text-align: center;"><b>KEY VOCABULARY</b></p> <ul style="list-style-type: none"> <li>• Biotic vs. Abiotic</li> <li>• Cell – (cell wall, chloroplasts, vacuoles, cell membrane, cytoplasm, nucleus, mitochondria)</li> <li>• Microscope – (total magnification, objective lens, eye piece, stage, diaphragm)</li> <li>• Ecosystem – Organism, Population, Community, Biome</li> <li>• Producer</li> <li>• Consumer</li> <li>• Primary Consumers/Secondary Consumers</li> <li>• Decomposer</li> <li>• Carbon Dioxide – Oxygen Cycle</li> <li>• Nitrogen Cycle</li> <li>• Food Chain/Food Web</li> <li>• Trophic Levels</li> <li>• Symbiotic Relationships – Mutualism, Parasitism, Commensalism</li> <li>• Ten Percent Rule</li> <li>• Behavior Adaptation</li> <li>• Structural Adaptation</li> </ul>	<ul style="list-style-type: none"> <li>• Classifying an animal by its diet and determining its part in the food chain.</li> <li>• Identifying and defining the reasons for the competitive relationships that occur within an ecosystem.</li> <li>• Differentiating between competitive, predatory, and mutually beneficial interactions between organisms within an ecosystem</li> <li>• Describe behavioral and physical adaptations of plants and animals and their impact on survival.</li> </ul>
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**Stage 2 – Evidence**

<b>Evaluative Criteria</b>	<b>Assessment Evidence</b>	
<p>3D Cell Project Rubric</p>	<p style="text-align: center;">PERFORMANCE TASK(S):</p> <p>1. Design a 3D Model of a Plant or Animal Cell, Label Organelles, and Explain function in a cell</p> <p>Part 1: Create a 3D Model of a Plant of Animal Cell – labeling 10 Organelles either directly on model or using a key</p> <p>Part 2: Complete graphic organizer with cell part, function, and explanation of object used to represent.</p> <p>Common Summative - 3D Cell Project</p>	<p>Differentiation Considerations:</p> <p>Use of notes and resources</p> <p>Choice</p> <p>Chunked Assignments/check lists</p>

<p>Diorama and Food Web Rubric (see attachment below)</p>	<p>Graphic Organizer - 3D Cell Project</p> <p>2. Create Model of Ecosystem</p> <p>Part 1: Create Diorama of Ecosystem – must include:</p> <ul style="list-style-type: none"> <li>• 3 populations of producers</li> <li>• 2 populations of consumers</li> <li>• 2 populations of decomposers</li> <li>• 3 Abiotic factors</li> </ul> <p>Part 2: Create a Food Web based on your diorama</p> <p>Part 3: Biotic and Abiotic Factors within an Ecosystem - explanation</p> <p>Common Summative - Ecosystems and Energy Dynamics</p>	
<p>Content Criteria/ Observation</p> <p>Content Criteria/ Observation</p> <p>Self Matched Checklist</p>	<p style="text-align: center;">OTHER EVIDENCE:</p> <p>1. Differentiate between Abiotic and Biotic Sort</p> <ul style="list-style-type: none"> <li>• group organisms into categories Abiotic/Biotic/Undecided</li> <li>• MR GREENN Foldable</li> <li>• Develop and defend arguments to support sort</li> </ul> <p>2. Characteristics of Life Quiz (TS)</p> <p>3. Cell Parts and Functions</p> <ul style="list-style-type: none"> <li>• Investigate Cell Parts and Functions - Organelles and Functions</li> <li>• Differentiate between plant and animal cells</li> <li>• Make connections between Cells and the Classroom - Cell Classroom Connections</li> </ul> <p>4. Organelles and Functions Quiz (TS)</p> <p>5. Cells Under the Microscope – Onion Cells, Elodea Leaf, Cheek Cells Labs</p>	<p>Differentiation Considerations:</p> <p>Pictures to support vocabulary</p> <p>Videos to support concepts</p> <p>Adapted Quizzes/Assessments</p> <p>Guided/Cloze Notes</p> <p>Homogeneously grouped labs to allow for teacher support</p>

<p>Graded Quizzes</p> <p>Content Criteria/</p> <p>Observation</p>	<ul style="list-style-type: none"> <li>• Proper Use and Safety Procedures when Using a Microscope</li> <li>• Scientific Drawings of Plant and Animal Cells</li> </ul> <p>Using a Microscope</p> <p>Microscope – Hands on Practice Packet</p> <p>Scientific Drawing Rubric</p> <p>Microscope Quiz (TS)</p>	<p>Notes/Resources available for more exposure</p>
<p>Graded Quizzes</p> <p>Pre-Squid Lab Notes and Content Criteria</p>	<p>6. Food Chains to Food Webs</p> <ul style="list-style-type: none"> <li>• Classify Organisms according to relationships within an ecosystem</li> <li>• Use cards to sort passing of energy within living organisms</li> <li>• Students model how energy passes from one organism to the next within an ecosystem</li> </ul> <p>Food Chain Sort</p> <p>Food Chains and Food Webs</p> <p>Energy Pyramid Model</p>	<p>Product modification in place of writing:</p> <ul style="list-style-type: none"> <li>-Drawing</li> <li>-Verbal explanation</li> </ul>
<p>Content Criteria</p>	<p>7. Photosynthesis</p> <p>Photosynthesis Model</p> <p>Photosynthesis Sort</p>	
<p>Observation</p>	<p>7. Producer, Consumer, Decomposer Quiz (TS)</p> <p>8. Adaptations of Survival – Squid Dissection</p> <ul style="list-style-type: none"> <li>• Conduct a hands-on investigate of a once living organisms to determine adaptations of survival</li> <li>• Determine Taxonomy</li> <li>• Identify squid anatomy</li> <li>• Use precise measurements to conduct scientific drawings</li> </ul> <p>Pre-Lab Squid Notes</p> <p>Squid Book – Student Copy</p> <p>Squid Worksheet During Dissection</p> <p>8. Science Notebook Entries</p> <ul style="list-style-type: none"> <li>• Concept maps</li> <li>• Vocabulary/Glossary entries</li> <li>• Guided Research</li> </ul>	

	<p>9. Class Participation Volunteering Note-taking Participation in Labs</p>	
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