

Phoenixville Area School District Understanding by Design (UbD) Science

Grade Level 2

Unit Name: Plants and Insects

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Stage 1 Desired Results		
	<i>Transfer</i>	
<p>Overarching NGSS & PA Standards: Life Science:</p> <p>3.1.2.A Plan and conduct an investigation to determine if plants need sunlight and water to grow.</p> <p>3.1.2.B Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.</p> <p>3.1.2.C Make observations of plants and animals to compare the diversity of life</p>	<p><i>Students will be able to independently use their learning to...</i></p> <ol style="list-style-type: none"> 1. Ask questions and/or define problems 2. Develop and/or use models 3. Plan and/or carry out investigations 4. Obtain, evaluate, and communicate information (supported by evidence) 5. Construct explanations and design solutions 	
	<i>Meaning-Making</i>	
	<p><i>Students will understand that...</i></p> <ul style="list-style-type: none"> • Plants depend on water and light to grow. • Plants depend on animals for pollination or to move their seeds around. • There are many different kinds of living things in any area, and they exist in different places on land and in water. • Reproduction is essential to the continued existence of every kind of organism. • Plants and animals have unique and diverse life cycles. 	<p>ESSENTIAL QUESTIONS <i>Students will keep considering...</i></p> <p>The natural history of plants and animals, for example:</p> <ul style="list-style-type: none"> • a beetle • a flowering plant • a milkweed bug <p>How does the natural history of some insects compare to the uniqueness of the:</p> <ul style="list-style-type: none"> • butterfly • moth <p>How can we compare the animals that live in different habitats?</p> <p>How might insects pollinate flowers?</p>

<p>in different habitats.</p> <p>3.1.3.A Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. (From Grade 3)</p>	Knowledge and Skills Acquisition		
	<p>UNDERSTANDINGS</p> <p><i>Students will know that...</i></p> <p>Insects:</p> <ul style="list-style-type: none"> • Insects need air, food, water, and space. • The life cycle of some insects is egg, nymph stages, and adult, which produces eggs. • The life cycle of some insects involves complete metamorphosis—egg, larva, pupa, and adult, which produces eggs. • Insects have characteristic structures and behaviors. • Adult insects have a head, thorax, and abdomen. • Variations exist within a group of related organisms. • As insects grow, they molt their exoskeleton. • Insects have predictable characteristics at different stages of development. • There are many different kinds of living things and they live in different places on land and in water. <p>Plants:</p> <ul style="list-style-type: none"> • Plants need water, air, nutrients, light, and space. • As plants grow, they develop roots, stems, leaves, buds, flowers, and seeds in a sequence called a life cycle. • Seeds develop into new plants that look like the parent plant. • Animals disperse seeds, moving them from one location to another where they grow. • Bees and other insects help some plants by moving pollen from flower to flower. • Some kinds of plants provide habitats for a greater diversity of insects and other small animals. 		<p><i>Students will be skilled at...</i></p> <p>Planning and conducting an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.</p> <p>Analyzing data from tests of an object or tool to determine if it works as intended.</p> <p>Constructing explanations and designing solutions</p> <p>Making observations to construct an evidence-based account for natural phenomena</p>
	<p>KEY VOCABULARY (in bold print)</p>		
<p><i>Mealworms:</i></p> <p>abdomen egg exoskeleton habitat head Insect larva life cycle molt pupa</p>	<p><i>Brassica Seeds:</i></p> <p>flower fruit germinate nutrient reproduction</p> <p><i>Silkworms:</i></p> <p>cocoon metamorphosis pupa</p>		

	thorax <i>Milkweed Bugs:</i> nymph pollen	<i>Butterflies:</i> caterpillar chrysalis	
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Stage 2 – Evidence

Evaluative Criteria	Assessment Evidence
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<p>What criteria will be used in each assessment to evaluate attainment of the desired results?.</p> <p style="text-align: center;">Teacher observations notes and rubrics</p>	<p style="text-align: center;">PERFORMANCE TASK(S):</p> <p>I. Investigations:</p> <ol style="list-style-type: none"> 1. Performance Task(s): Students study biodiversity by focusing on insects and plants and their interactions. They begin by investigating firsthand the phenomenon of mealworms to observe their structures and behaviors. Over 10 weeks, students observe the larvae grow, molt, pupate, and turn into beetles (adults), which mate, lay eggs, and die. Students read about and use media to gather information about the diversity of plants and animals that live in different habitats. Assessment: Investigation 1 I-Check 2. Performance Task(s): Students engage with biodiversity of plants by studying the natural history of a flowering plant and in the process uncover the phenomenon of a flower. Each student plants a seed, grows it under continuous light and develops it for a month. Students analyze the experimental results of growing seeds in different conditions and design an experiment to test the effects of water and light on mature plants. Students observe the process of pollination through video and by cross-pollinating their plants. Students observe and record the complete life cycle from seed to seed. They search for seeds outdoors and learn about ways that animals disperse seeds to new locations. Assessment: Investigation 2 I-Check 3. Performance Task(s): Students observe an insect (different from the one in Activity #1) through its stages of life and compare the phenomena of complete and simple metamorphosis. Groups of students receive vials of insect eggs. Each group prepares a habitat for the bugs, providing air, food, water, and space, including shelter. They observe structure, pattern, and behavior as the insects advance through simple metamorphosis. Students gather information using media about garden and backyard insects and other animals. Students go outdoors to search for insects living naturally 	<p>Differentiation Considerations:</p> <ul style="list-style-type: none"> • Read tasks and all questions aloud. • Provide embedded notes when possible (via FOSS) • Accept verbal responses in lieu of written responses. • When grouping students consider matching different skills sets • When asking students to describe a model, give them the opportunity to draw or write it, as well. • Teacher can scribe written responses for students <p>For labs, consider that some students may wish to:</p> <ul style="list-style-type: none"> • explain verbally instead of in a written format • draw their responses • write in their first language <p>If challenges arise with complexity of the task(s):</p>
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on the ground and on plants and design an insect habitat. They continue to explore biodiversity of animals by investigating schoolyard habitats to observe insects and other small animals and design an insect habitat.

Assessment: Investigation 3 I-Check

4. **Performance Task(s):** Students observe the life history of successful insects (I.e., silkworm) and discover that this insect is responsible for an interesting phenomenon, the production of silk. They start with eggs and observe the growth and changes to larvae, pupae, and adults, which produce eggs. They search the schoolyard for evidence of plants being eaten by insects. Through a video, they observe a team of students in an urban school plan and conduct a biodiversity study in a natural area to answer the question will a native willow tree habitat have the same animals as a nonnative palm tree habitat?

Assessment: Investigation 4 I-Check

5. **Performance Task(s):** Students conclude their study of animal biodiversity by nurturing and studying another insect (a butterfly). The class observes the larvae grow, pupate, and emerge as adults. Students observe the stages of complete metamorphosis and compare the natural history of moths and butterflies. Students study pollination through video and outdoor flowering plant observations, and construct, test, and share models of pollinators. Through video and firsthand investigations in the schoolyard, students explore the phenomena of pollination and the important role insects play in the life cycle of flowering plants. Students construct, test, and share models of pollinators.

Assessment: Investigation 5 I-Check

II. Other Unit Activity: Invent an Insect

Description: Students explore physical structures and adaptations of insects to discover a wide range of insect diversity within habitats. Then students use what they have learned to create an insect with physical structures and capabilities to survive in a specified habitat.

Task: Invent an insect. Draw a diagram of an original insect.

Assessment: Label your insect's body parts. Include: head, legs, thorax, abdomen, antennae. On the insect fact sheet describe your insect's habitat, what foods it eats, how it moves, its predators, and any other special skills.

- smaller steps and/or
- alternative activities will be provided.

Challenge:

- Create a 3D model of an insect.
- Create an insect with additional adaptations or skills.

Rubric	<p style="text-align: center;">OTHER EVIDENCE:</p> <ul style="list-style-type: none">• Checklists of collaborative behaviors in labs and activities• Checklists of collaborative behaviors in class discussions• Journal entries	<p>For journal entries, consider that some students may wish to:</p> <ul style="list-style-type: none">• draw instead of write entries• write in their first language <p>If challenges arise with complexity of the task(s):</p> <ul style="list-style-type: none">• smaller steps and/or• alternative activities will be provided.
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