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

Grade Level 4   **Unit Name: Environments**   **Authors: L. Freeman (PAMS)**

	Stage 1 Desired Results

Overarching NGSS & PA Standards:	*Transfer*
3.1.4.A Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	*Students will be able to independently use their learning to…* 1. Ask questions and/or define problems 2. Develop and/or use models 3. Plan and/or carry out investigations 4. Analyze and interpret data using computational thinking 5. Obtain, evaluate, and communicate information (supported by evidence) 6. Construct explanations and design solutions

	Meaning-Making	

| **3.1.4.B** Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. | *Students will understand that…*

 • An environment is everything that surrounds and influences an organism
 • An ecosystem is a community of living and non-living things
 • Organisms have ranges of tolerance for environmental factors; there are optimum conditions that produce maximum growth
 • Organisms structure and behavior have a direct correspondence on how well the organisms grow and survive in the environment
 • Every organism has a set of preferred environmental conditions and a range of tolerance for these conditions | ESSENTIAL QUESTIONS
 Students will keep considering...

 1. How do the structures of an organism function to support the survival of the organisms in that environment?

 2. How do organisms sense and interact with their environment?

 3. How is optimum environment related to organism and population survival?

 4. What environmental conditions result in the best growth and survival of different plants? |

Which branch(es) of science apply: LS		
	Knowledge and Skills Acquisition	
	UNDERSTANDINGS _Students will know…_ - Animals have structures and behaviors that function to support survival, growth, and reproduction. - Every organism has a set of preferred environmental conditions - How structures function to meet the needs of organisms in different environments - Organisms have structures that allow them to interact in feeding relationships in ecosystems (food chains and food webs). - The role of producers, consumers, and decomposers in food chains and food webs in different environments - Organisms may compete for resources in their environment - The ways animals use their sense of hearing to interact in their environment - Human activities impact environments - Adaptations are structures and behaviors of an organism that help it survive and reproduce.	_Students will be skilled at…_ - Observing and describing the living and nonliving components (biotic and abiotic factors) in different environments - Organizing information gathered about organisms through first-hand investigations - Comparing the structures of land and water organisms and the ways structures function to meet the organisms' needs - Gathering and comparing information on how different animals obtain one basic need—oxygen. - Conducting controlled experiments and use data to draw conclusions - Using the data to make a recommendation about managing the environment
	KEY VOCABULARY	
	Environment Structure Behavior Food Chain Internal Surroundings External Survival Function Producer Reception Consumer Reproduction Decomposer	

Stage 2 – Evidence		
Evaluative Criteria	**_Assessment Evidence_**	
What criteria will be used in each assessment	PERFORMANCE TASK(S): Investigations:	Differentiation Considerations: For labs, some students may wish to:

to evaluate attainment of the desired results? Rubrics related to each will be developed.	I. **Task(s):** Students observe terrestrial organisms as a phenomenon—mealworms and isopods in the classroom and leaf-litter critters on the schoolyard. They set up a mealworm environment at two temperatures and observe the life cycle over time. Students investigate how isopods respond to environmental factors such as water and light, and design an isopod environment. Students investigate small animals that live in leaf litter and study their structures. Students observe and describe the living and nonliving components (biotic and abiotic factors) in terrestrial environments and are introduced to the diverse environments of deserts and rain forests. Students organize information they gather about organisms through first-hand investigations, readings, and videos to understand how structures function to meet the needs of organisms in terrestrial environments. **Assessment**: Investigation 1 I-Check II. **Task(s):** Students investigate the phenomenon of life in water and how organisms' needs are the same and different from life on land. Students set up a freshwater aquarium with different kinds of fish, plants, and other organisms. They monitor the environmental factors in the system and look for feeding interactions among the populations. They learn about the role of producers, consumers, and decomposers in food chains and food webs in terrestrial and aquatic systems. Through an outdoor simulation, students learn about how food affects a population's home range. Students compare the structures of land and water organisms and the ways structures function to meet the organisms' needs. Students gather and compare information on how different animals obtain one basic need—oxygen. Students explore how animals receive information from their environment through their sensory system and use the information to guide their actions. Through simulations and research, students model how animals use their sense of hearing. **Assessment**: Investigation 2 I-Check III. **Task(s):** Students are presented with an ecological problem related to water level fluctuations in an important migratory bird environment—Mono Lake. Brine shrimp are a critical factor in the food web of the lake ecosystem and the salinity of the lake may change due to human activities. Students conduct a controlled experiment to determine which of four salt concentrations allow brine shrimp eggs to hatch. Students determine range of tolerance and optimum conditions for brine shrimp hatching. They use the data to make a recommendation about managing the environment. Students, through an outdoor simulation, look at variation in a	• Explain verbally instead of in a written format • Draw their responses • Write in their first language If challenges arise with the complexity of the task(s), some students may need: • Additional incremental steps • An alternative activity Other considerations: • When grouping students' various skills sets and strengths will be considered • When asking students to describe a model, opportunities to draw or write it, as well. • Teacher can scribe written responses for students

	population, and consider how variation among individuals contributes to survival of a population. **Assessment**: Investigation 3 I-Check IV. Students return to the desert and rain forest environments they studied in Investigation 1 and engage with the phenomenon that different plants survive in each environment. Students set up and monitor controlled experiments to determine the range of tolerance of water for germination of four kinds of seeds: corn, pea, barley, and radish. In a second experiment, students test the effect of salinity on these seeds. Students study local plants by mapping schoolyard plants and relate plant distribution to environmental factors. Students look at plant adaptations that allow the organisms to thrive in dry desert environments and wet tropical environments. **Assessment**: Investigation 4 I-Check	
What criteria will be used in each assessment to evaluate attainment of the desired results? Rubrics related to each will be developed.	OTHER EVIDENCE: • Checklists of collaborative behaviors in labs and activities • Checklists of collaborative behaviors in class discussions • Daily journal entries • Self-Assessment Rubrics for all performance tasks • Science Notebook • TO CONSIDER FOR LATER: UNIT TEST(S)	Differentiation Considerations: For journal entries, consider that some students may wish to: • draw instead of write entries • write in their first language • record verbally instead of in a written format