Three Dimensional Learning Plan: **HS-LS2-5**

Grade Level: **High School**

Title	**Plants for Global Warming**	Phenomenon/Problem	**Is global warming beneficial to plant growth?**
Designed by	**Krista Peterson, Eileen Kelly-Gorman**	Course(s)	**Living Environment**
Brief Learning Description	**Students will go through a series of questioning and modeling to uncover the relationships between cell respiration, photosynthesis and the carbon cycle. Students will then relate plant growth to global warming and develop ways to reduce atmospheric carbon dioxide in the atmosphere.**		

Desired Results

Performance Expectation(s)

HS-LS2-5: Cycling of Carbon in Ecosystems
Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. (Systems and System Models)

Summative Assessment

HS-LS2-5 Assessment - Deforestation and Carbon Cycling Edited (NY)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
✓ Analyzing & Interpreting Data ✓ Asking Questions ❑ Constructing Explanations ❑ Defining Problems ❑ Designing Solutions ✓ **Developing & Using Models** ✓ Engaging in Argument from Evidence ✓ Mathematics & Computational Thinking ✓ Obtain, Evaluate, Communicate Information ❑ Planning & Carrying Out Investigations	✓ **PS3.D: Energy in Chemical Processes and Everyday Life** ✓ **LS2.B: Cycles of Matter and Energy Transfer in Ecosystems**	✓ Cause & Effect ✓ Energy & Matter ❑ Patterns ❑ Scale, Proportion & Quantity ❑ Stability & Change ❑ Structure & Function ✓ **Systems & System Models**

Activity 1			
Phenomenon or Problem	What will they do? The three dimensions woven together into a single learning performance.	Why is this important? How does this activity help build understanding of the anchoring phenomenon.	How will they do it? Graphic organizers, protocols, scaffolds, labs, mini-lesson, student discourse, etc.
Plant growth from seed to flower.	Students will ask questions to determine how matter and energy are transformed through the carbon cycle in the biosphere and atmosphere.	Students begin to think about what processes make a seed grow into a flower.	view Plant Time Lapse
Formative Assessment What information are you collecting to know that they met the target?		• Questions are classified according to CCC and added to the driving question board.	

Activity 2			
Phenomenon or Problem	What will they do? The three dimensions woven together into a single learning performance.	Why is this important? How does this activity help build understanding of the anchoring phenomenon.	How will they do it? Graphic organizers, protocols, scaffolds, labs, mini-lesson, student discourse, etc.
Plant growth from seed to flower.	Students will develop a model to explain how matter and energy are transformed through the carbon cycle in the biosphere and atmosphere.		-Individually develop a model of the process -Work in groups to develop a consensus model -Adjust model to incorporate key vocabulary terms and concepts: CO2, energy, mass
Formative Assessment What information are you collecting to know that they met the target?		• Model accounts for all noted vocabulary terms and concepts.	

Activity 3			
Phenomenon or Problem	What will they do? The three dimensions woven together into a single learning performance.	Why is this important? How does this activity help build understanding of the anchoring phenomenon.	How will they do it? Graphic organizers, protocols, scaffolds, labs, mini-lesson, student discourse, etc.
We Are What we Eat	Students will obtain, evaluate and communicate information defining cause and effect of photosynthesis and cellular	Students will demonstrate how carbon had an effect on both cell respiration and photosynthesis	-define the process that allows for energy and matter to be transformed in the system. -mini lesson on photosynthesis and

	respiration in the cycling of carbon among the biosphere and atmosphere.		respiration -Read If We Are What We Eat, Americans Are Corn and Soy
Formative Assessment What information are you collecting to know that they met the target?		• Students will create an individual model of the role carbon plays in photosynthesis and cell respiration	

Activity 4			
Phenomenon or Problem	What will they do? The three dimensions woven together into a single learning performance.	Why is this important? How does this activity help build understanding of the anchoring phenomenon.	How will they do it? Graphic organizers, protocols, scaffolds, labs, mini-lesson, student discourse, etc.
CO2 vs Plant Growth graph	Students will use mathematical representations to support claims that there exist cycles of Matter and Energy Transfer in Ecosystems.	Students will evaluate data to connect carbon dioxide levels in the atmosphere to carbon dioxide in the biosphere.	Photo caption: Interannual shifts in plant productivity (green line) fluctuated in step with shifts in atmospheric carbon dioxide (red line) between 2000 through 2009. Credit: Maosheng Zhao and Steven Running Read: Does Rising CO2 Benefit Plants?
Formative Assessment What information are you collecting to know that they met the target?		•	

Activity 5			
Phenomenon or Problem	What will they do? The three dimensions woven together into a single learning performance.	Why is this important? How does this activity help build understanding of the anchoring phenomenon.	How will they do it? Graphic organizers, protocols, scaffolds, labs, mini-lesson, student discourse, etc.
Formative Assessment What information are you collecting to know that they met the target?		•	

Summative Assessment What information are you collecting to know that they met the target?	•

Materials / Resources

Differentiation / Modifications