Model Rubric

Part I

A. Record your final model to show how cycles matter to develop from a small seedling into a large tree.

B. Add a brief description of your model and how your model shows how a tree gets mass to develop into a large tree.

	EMERGING	APPROACHING	MEETING	ADVANCED
Description of the Model	States that photosynthesis is the cause of the tree growth but does not include a clear statement about what matter is involved or statement contains inaccuracies, such as mass is obtained from water or soil.	States that photosynthesis is the cause of tree growth. Includes a clear statement that matter is cycling [states that plant gathers matter from the air and/or water and converts that matter to add mass] but response lacks specifics about how the matter is conserved [CO_2 is taken from the air and with water is reorganized into sugar and oxygen] OR does not describe the role of energy in the cycling of matter [does not specify that solar energy is needed to reorganize CO_2 and water].	States that photosynthesis is the cause of the cycling of matter and specifies that CO_2 from the air and water is converted into sugar and oxygen AND describes the role of light energy in the rearrangement of CO_2 and water into sugar and oxygen for growth and energy for the tree.	States that photosynthesis is the cause of the cycling of matter and specifies that CO_2 from the air and water is converted into sugar and oxygen AND describes the role of light energy in the rearrangement of CO_2 and water into sugar and oxygen for growth and energy for the tree AND describes specific pathways for carbon [converted to sugar for immediate energy or cellulose for growth].
Developing a Model	Constructs a model (drawing, words, symbols) that is relevant, but the model is lacking major conceptual components (sunlight, CO_2), has major errors, or is composed of irrelevant details.	Constructs a model to represent the process of photosynthesis but minor errors or omissions are present. For example, the cycling of carbon is incomplete AND information about how energy was used to change matter into new tree mass is missing.	Constructs an accurate model but the model has some vague information about how matter was converted to form new tree mass. For example, only the conversion of CO_2 to glucose is discussed but fails to address the role of water or resulting O_2 in the process. [model is missing some necessary variables in the photosynthesis process]. OR The model does not show how the transfer of energy drives the cycling of matter [develop a model to describe unobservable mechanisms]	Constructs an accurate and complete model that includes the necessary components of photosynthesis (sunlight, CO_2, water, sugar) and indicates how matter from the air (CO_2) and water is rearranged to form oxygen and new tree mass and energy for the tree (sugar and cellulose) [develop a model to show the relationships among variables, including those that are not observable but predict observable phenomena]. AND The model shows how the transfer of energy drives the cycling of matter [develop a model to describe unobservable mechanisms].

Model Rubric (continued)

Part II

C. Use your model to predict what would happen to the tree growth if a large store was built next to the tree, blocking the sunlight for a major portion of the day. How is your model accurate and useful in predicting the outcome?

	EMERGING	APPROACHING	MEETING	ADVANCED
Prediction of Model: Strengths and Limitations	Prediction is inaccurate AND The model's ability to provide an accurate prediction is not discussed.	Makes an accurate prediction (tree growth will likely be slowed since energy from the Sun is needed to rearrange the matter) BUT the prediction is not consistent with the model AND does not evaluate the accuracy of the system or process.	Makes an accurate prediction (tree growth will likely be slowed since energy from the Sun is needed to rearrange the matter) AND prediction is consistent with the model. BUT does not evaluate the accuracy of the system or process.	Makes an accurate prediction (tree growth will likely be slowed since energy from the Sun is needed to rearrange the matter) AND is consistent with the model AND evaluates the accuracy AND limitations of the system or process.