Gizmos

Name: _____ Date: _____

Student Exploration: Photosynthesis Lab

Directions: Follow the instructions to go through the simulation. Respond to the questions and prompts in the orange boxes.

Vocabulary: carbon dioxide, chlorophyll, glucose, limiting factor, nanometer, photosynthesis, wavelength

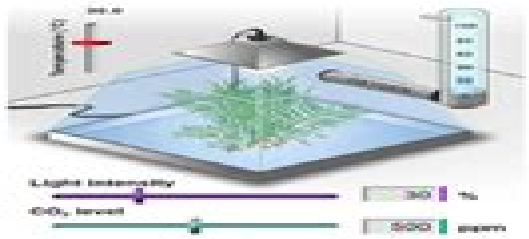
Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

To survive, what gas do we need to breathe in?	Oxygen
Where is this gas produced?	Plants

Gizmo Warm-up

During **photosynthesis**, plants use the energy of light to produce **glucose** ($C_6H_{12}O_6$) from **carbon dioxide** (CO_2), and water (H_2O). Glucose is a simple sugar that plants use for energy and as a building block for larger molecules.

A by-product of photosynthesis is oxygen. Plants use some of the oxygen they produce, but most of it is released. In the *Photosynthesis Lab* Gizmo, you can monitor the rate of photosynthesis by measuring oxygen production.



1. Observe the left pane closely. What do you think the bubbles are?

   Those Oxygen Bubbles

2. Select the BAR CHART tab. On the graph, notice the **Oxygen production** bar. Move the **Light intensity** slider back and forth. How does light intensity affect oxygen production?

   Oxygen production decreases with reduced light intensity.

3. Experiment with the vertical **Temperature** slider (upper left) and the **CO_2 level** slider.

A. How does temperature affect oxygen production?	When Temperature decreases, Oxygen production decreases.
B. How does CO_2 level affect oxygen production?	CO2 decreases Oxygen production decreases
C. How does oxygen production relate to the rate of photosynthesis?	Less Oxygen Production the rate of photosynthesis is slow.

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Answers For Student Exploration Photosynthesis Lab Gizmo

Jennifer Wilhelm,Ronald Wilhelm,Merryn Cole

Answers For Student Exploration Photosynthesis Lab Gizmo:

Creating Project-Based STEM Environments Jennifer Wilhelm,Ronald Wilhelm,Merryn Cole,2019-02-05 This book models project based environments that are intentionally designed around the United States Common Core State Standards CCSS 2010 for Mathematics the Next Generation Science Standards NGSS Lead States 2013 for Science and the National Educational Technology Standards ISTE 2008 The primary purpose of this book is to reveal how middle school STEM classrooms can be purposefully designed for 21st Century learners and provide evidence regarding how situated learning experiences will result in more advanced learning This Project Based Instruction PBI resource illustrates how to design and implement interdisciplinary project based units based on the REAL Realistic Explorations in Astronomical Learning Unit 1 and CREATES Chemical Reactions Engineered to Address Thermal Energy Situations Unit 2 The content of the book details these two PBI units with authentic student work explanations and research behind each lesson including misconceptions students might hold regarding STEM content pre post research results of unit implementation with over 40 teachers and thousands of students In addition to these two units there are chapters describing how to design one s own research based PBI units incorporating teacher commentaries regarding strategies obstacles overcome and successes as they designed and implemented their PBI units for the first time after learning how to create PBI STEM Environments the REAL way

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Table of Contents Answers For Student Exploration Photosynthesis Lab Gizmo

1. Understanding the eBook Answers For Student Exploration Photosynthesis Lab Gizmo
    - The Rise of Digital Reading Answers For Student Exploration Photosynthesis Lab Gizmo
    - Advantages of eBooks Over Traditional Books
2. Identifying Answers For Student Exploration Photosynthesis Lab Gizmo
    - Exploring Different Genres
    - Considering Fiction vs. Non-Fiction
    - Determining Your Reading Goals
3. Choosing the Right eBook Platform
    - Popular eBook Platforms
    - Features to Look for in an Answers For Student Exploration Photosynthesis Lab Gizmo
    - User-Friendly Interface
4. Exploring eBook Recommendations from Answers For Student Exploration Photosynthesis Lab Gizmo
    - Personalized Recommendations
    - Answers For Student Exploration Photosynthesis Lab Gizmo User Reviews and Ratings
    - Answers For Student Exploration Photosynthesis Lab Gizmo and Bestseller Lists
5. Accessing Answers For Student Exploration Photosynthesis Lab Gizmo Free and Paid eBooks
    - Answers For Student Exploration Photosynthesis Lab Gizmo Public Domain eBooks
    - Answers For Student Exploration Photosynthesis Lab Gizmo eBook Subscription Services
    - Answers For Student Exploration Photosynthesis Lab Gizmo Budget-Friendly Options

6. Navigating Answers For Student Exploration Photosynthesis Lab Gizmo eBook Formats
    - ePub, PDF, MOBI, and More
    - Answers For Student Exploration Photosynthesis Lab Gizmo Compatibility with Devices
    - Answers For Student Exploration Photosynthesis Lab Gizmo Enhanced eBook Features
7. Enhancing Your Reading Experience
    - Adjustable Fonts and Text Sizes of Answers For Student Exploration Photosynthesis Lab Gizmo
    - Highlighting and Note-Taking Answers For Student Exploration Photosynthesis Lab Gizmo
    - Interactive Elements Answers For Student Exploration Photosynthesis Lab Gizmo
8. Staying Engaged with Answers For Student Exploration Photosynthesis Lab Gizmo
    - Joining Online Reading Communities
    - Participating in Virtual Book Clubs
    - Following Authors and Publishers Answers For Student Exploration Photosynthesis Lab Gizmo
9. Balancing eBooks and Physical Books Answers For Student Exploration Photosynthesis Lab Gizmo
    - Benefits of a Digital Library
    - Creating a Diverse Reading Collection Answers For Student Exploration Photosynthesis Lab Gizmo
10. Overcoming Reading Challenges
    - Dealing with Digital Eye Strain
    - Minimizing Distractions
    - Managing Screen Time
11. Cultivating a Reading Routine Answers For Student Exploration Photosynthesis Lab Gizmo
    - Setting Reading Goals Answers For Student Exploration Photosynthesis Lab Gizmo
    - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Answers For Student Exploration Photosynthesis Lab Gizmo
    - Fact-Checking eBook Content of Answers For Student Exploration Photosynthesis Lab Gizmo
    - Distinguishing Credible Sources
13. Promoting Lifelong Learning
    - Utilizing eBooks for Skill Development
    - Exploring Educational eBooks
14. Embracing eBook Trends
    - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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the basic substructuring idea is to consider a substructure a part of the model separately and eliminate all but the degrees of freedom needed to connect this part to the rest of the model so that the substructure appears in the model as a substructure a collection of finite elements whose response is defined by the stiffness and mass o

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limitations of structural elements membrane elements cannot be used to overlay a substructure that consists of second order three dimensional brick elements of type c3d20 r h if the substructure will be used as a slave surface normally abaqus standard automatically converts c3d20 r h brick elements to elements with midface nodes c3d27 r h because this

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in abaqus standard the response within a substructure once it has been reduced to a substructure is considered to be a linear perturbation about the state of the substructure at the time it is made into a substructure

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set this parameter equal to yes default if the substructure eigenproblem needs to be solved during substructure generation in abaqus substructure eigenvectors can be used to define substructure modal damping for a given substructure abaqus standard will evaluate the stiffness associated with frequency dependent springs and dashpots at

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the purpose of this example is to provide basic demonstration and verification of the substructuring capabilities in abaqus problem description the example is a frame consisting of two columns connected by a beam figure 1 16 1 1 the columns and the beam are each modeled with 10 elements of type b21 once a substructure has been