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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Science

Quarter 1
Lesson
5

Lesson Exemplar for Science Grade 8
Quarter 1: Lesson 5 of 5 (for Week 8)
SY 2025-2026

Development Team

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SCIENCE /QUARTER 1 / GRADE 8

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners learn that photosynthesis and respiration are processes that show how living things obtain energy and nutrients from the environment.
B. Performance Standards	By the end of the Quarter, learners describe the processes of respiration and photosynthesis and plan and record a scientific investigation to verify the raw materials needed. They use flow charts and diagrams to explain cycles in nature. Learners will explain that the classification of living things shows the diversity and unity of living things.
C. Learning Competencies and Objectives	***Learning Competency*** 1. The student will explain the role of plants and animals in the cycles of nature, such as the carbon, oxygen, and water cycles using flow charts and labeled diagrams. 2. The student will describe the process of photosynthesis and respiration, and identify the raw materials needed and products. 3. The student will identify the different parts of the cell where photosynthesis and respiration occur using information from secondary sources. 4. The students will plan a scientific investigation to verify the raw materials needed for photosynthesis. ***Learning Objectives:*** Students should be able to: 1. Identify the factors affecting photosynthesis and respiration 2. Identify and categorize the steps involved in the process of photosynthesis. 3. Understand the resultant product of each consecutive stage in the process of photosynthesis. 4. Understand the role of carbon dioxide in photosynthesis and respiration, and how it is produced and utilized by living organisms. 5. Understand the process of cellular respiration by engaging in an activity that involves labeling a diagram. 6. Explain the key components and processes involved in this essential biological process.
D. Content	Topic: Cycles in Nature - Photosynthesis

E. Integration	**SDG 13- Climate Action -** Photosynthesis plays a crucial role in carbon sequestration, removing carbon dioxide from the atmosphere and mitigating climate change by promoting the conservation and restoration of forest and natural ecosystems. **SDG 15- Life on Land -** Photosynthesis is the foundation of terrestrial ecosystems providing food and habitat for a diverse array of ecosystem

II. LEARNING RESOURCES

Admin. (2023, January 23). Photosynthesis - definition, process, and diagrams. BYJUS. Retrieved from: https://byjus.com/biology/photosynthesis/#:~:text=Photosynthesis%20is%20a%20process%20by,from%20water%20and%20carbon%20dioxide.

Photosynthesis. Education. (n.d.). Retrieved from: https://education.nationalgeographic.org/resource/photosynthesis/

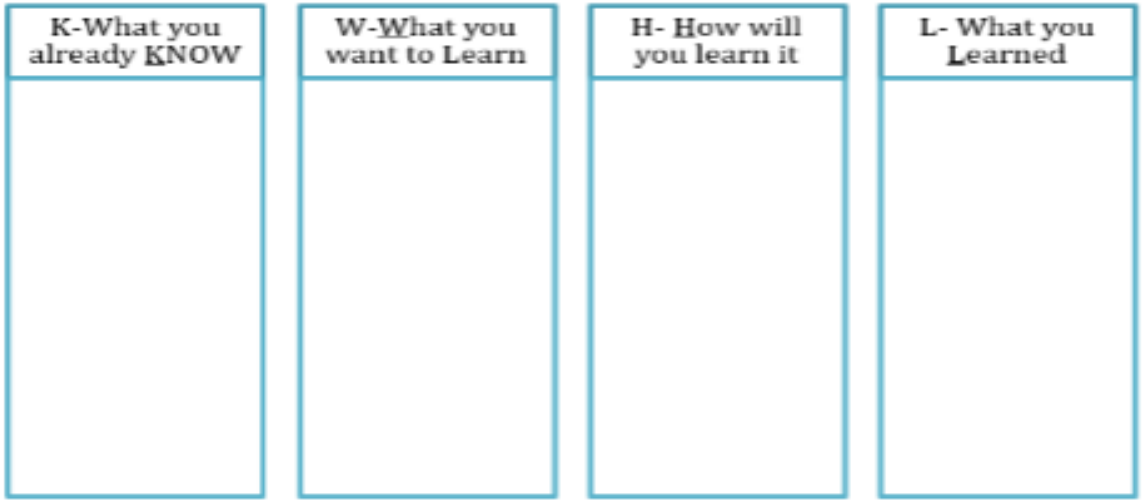
Osmosis - cellular respiration: What is it, its purpose, and more. (n.d.-b). Retrieved from: https://www.osmosis.org/answers/cellular-respiration

Khan Academy. (n.d.). Steps of Cellular Respiration. Khan Academy. Retrieved May 25, 2024. Retrieved from: https://www.khanacademy.org/science/ap-biology/cellular-energetics/cellular-respiration-ap/a/steps-of-cellular-respiration

Practical Science 8. (2018). 4/F SEDCCO 1 Bldg. 120 Thailand corner Legazpi Streets: DIWA Learning Systems INC.

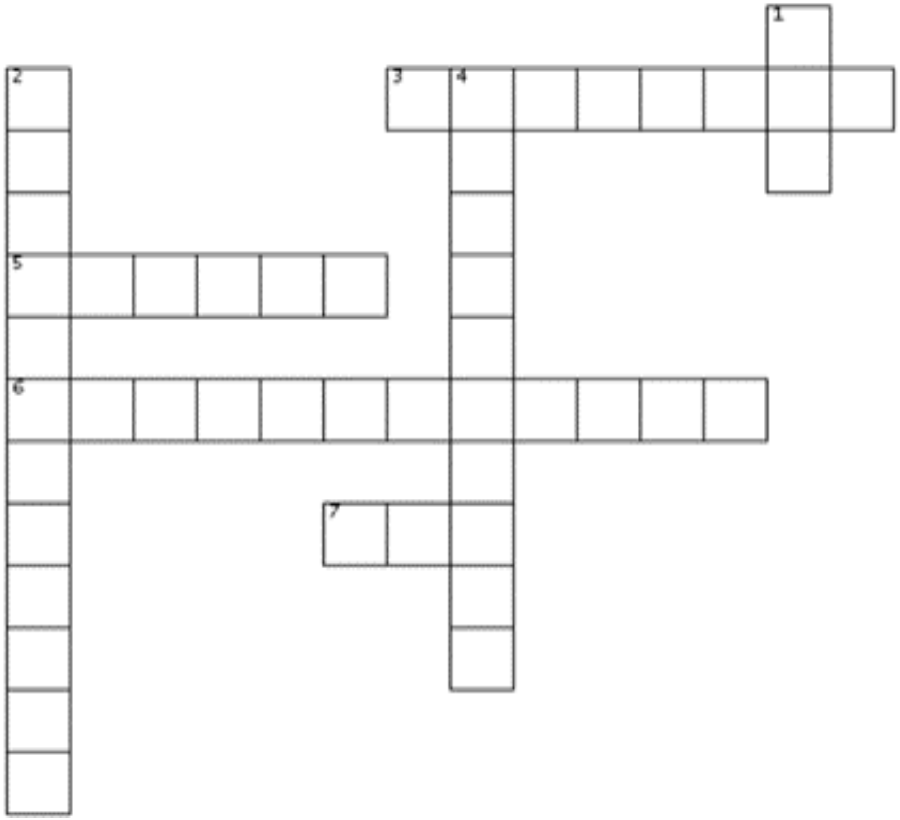
Practical Science 9. (2018). 4/F SEDCCO 1 Bldg. 120 Thailand corner Legazpi Street: DIWA Learning System.

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	**Day 1)** **1. Short Review** **Activity 1.** Ask the students to answer the K, W and H portions of the chart.	Let the student answer the KWHL chart. See Learning Activity Sheet: *Activity #1: KWHL Chart* Before proceeding to the new lesson, please complete the KWH portion of the chart. After

	CELLULAR RESPIRATION  K-What you already KNOW W-What you want to Learn H- How will you learn it L- What you Learned **2. Feedback (Optional)**	the discussion, the teacher will distribute it for completion of the L section.
B. Establishing Lesson Purpose	**1. Lesson Purpose** **Activity 2.** Carbon dioxide is one of the end products of cellular respiration. This gas will allow the balloon to be blown up with the help of baker's yeast (Saccharomyces cerevisiae) *Guide Questions:* 1.What do you observe from the activity? 2.What is the role of baker's yeast to the inflation of the balloon? 3. What kind of gas does yeast produce as a byproduct? 4. How will you relate this activity to cellular respiration?	See Learning Activity Sheet: *Activity #2: Inflating Insights: Blowing Balloons with CO2 Magic*

2. Unlocking Content Area Vocabulary
Activity 3.

Ask the students to complete the word puzzle using the words in the box.



Mitochondria	Heterotrophs	Oxygen
Autotrophs	Bacteria	
ATP	Six	

See Learning Activity Sheet:
Activity #3: Word Puzzle

C. Developing and Deepening Understanding	**Day 2** **1. Explicitation** Let the student watch video about cellular respiration using the link below. Cellular Respiration: How Do Cell Get Energy? https://www.youtube.com/watch?v=JagPP3MX5ks *Guide Questions:* 1. What is cellular respiration? 2. What are the two types of respiration? 3. What are the stages of cellular respiration? 4. What are the roles of glucose and oxygen in cellular respiration, and how they are broken down and utilized to produce ATP? 5. What is the importance of ATP as an energy source for cellular activities, including muscle contraction, active transport and biosynthesis? 6. What is the significance of cellular respiration in human health and disease, including its role in metabolism, aging and conditions such as diabetes and cancer? *Big Idea:* Cellular respiration is the process by which cells break down organic molecules, such as glucose, to produce ATP (adenosine triphosphate), the primary energy currency of cells. It primarily occurs within mitochondria of eukaryotic cells. There are two types of respiration: Aerobic respiration happens in the presence of oxygen whereas anaerobic respiration happens in the absence of oxygen. During cellular respiration, glucose and oxygen are utilized to generate ATP through a series of biochemical reactions. The process occurs in multiple stages including glycolysis, the citric acid cycle (Krebs cycle) and oxidative phosphorylation (electron transport chain). Through cellular respiration, cells extract energy stored in glucose molecules and convert it into a form that can be readily used to power various cellular activities. Additionally, carbon dioxide and water are produced as a byproduct of cellular respiration.	

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + ATP$$

Present to the class this diagram and instruct them to complete the blanks provided below. See attached worksheet entitled Cellular Respiration – Gap Fill Exercise.

You may check this online: https://www.sciencegeek.net/Biology/

2. Worked Example

Glycolysis literally means "*sugar*-splitting." In glycolysis, the *six*-carbon sugar glucose is split into *two* molecules of pyruvate, also called *pyruvic acid*. This process produces a net gain of *two* ATP molecules. The resulting molecules of pyruvate each have *three* carbon atoms. Glycolysis takes place in the cell's *cytoplasm*. The remainder of cellular respiration takes place in organelles called *mitochondria*.

The Krebs Cycle takes place in the fluid-filled area inside the inner membrane of the mitochondria known as the matrix. Some *ATP* and other energy-carrying molecules are produced here. The gas *carbon dioxide* is a byproduct of this process.

The Electron Transport Chain. Most of the *ATP* is produced in this last step of cellular respiration. Electron transport takes place in the infoldings of the inner membrane of the mitochondria. These infoldings are called *cristae*. At the end of electron transport, *oxygen* combines with hydrogen ions and *electrons* (e^-) to form *water*.

$$\frac{1}{2}O_2 + 2H^+ + 2e^- \rightarrow H_2O$$

Overall Process
glucose + oxygen → carbon dioxide + water + 38 *ATP*

Fermentation. In the absence of oxygen, the cell resorts to anaerobic metabolism. In animal cells, pyruvate is converted to lactic acid. In yeast and bacteria, the pyruvate is often converted to alcohol. In both cases, no

new ATP is produced, so the net production of the energy-carrying molecule is only the two molecules of ATP produced in glycolysis.

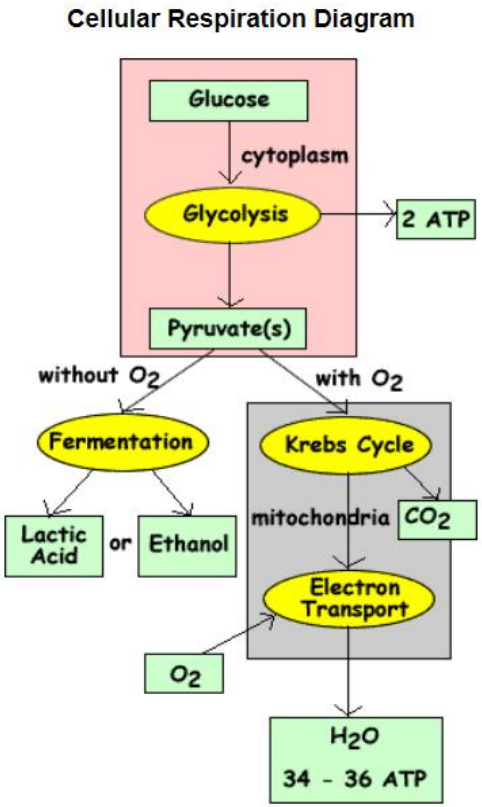


Image Source: sciencegeek.net

Day 3
3. Lesson Activity
Activity 4.

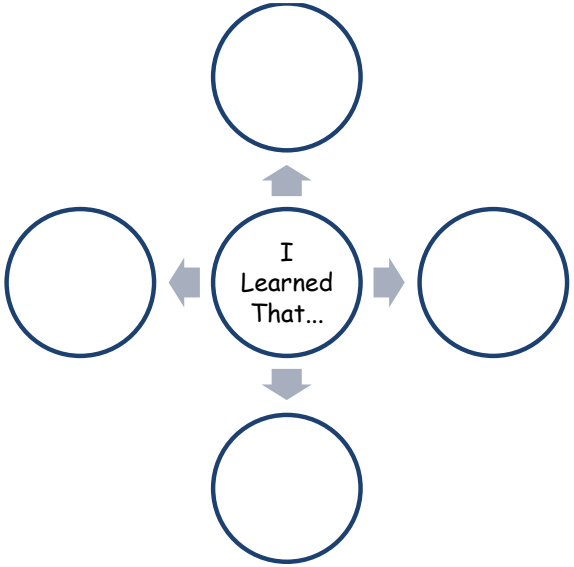
You are a member of a group of food technologists. As part of your outreach activity, the city mayor invited you to demonstrate the proper way of producing fermented products such as wine and vinegar. Your task is to lecture on the proper way of producing vinegar from coconut water and making wine from saging na saba using the fermentation process. Your lecture should show the proper sequence or steps on how the process do is

See Learning Activity Sheet: *Activity #4: Fizz, Froth and Fermentation: Secret Science of Bubbles*

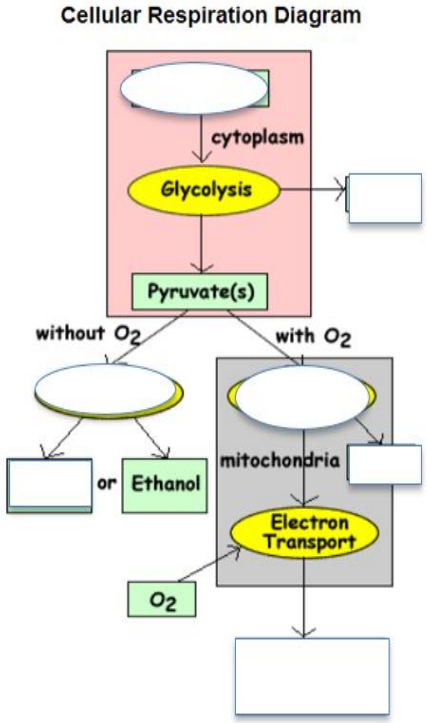
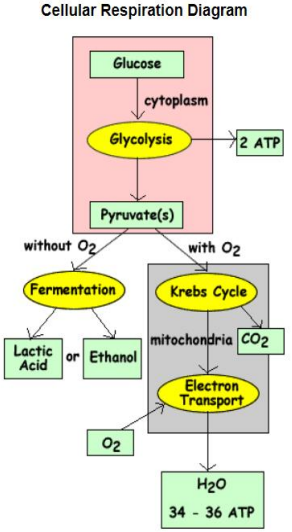
and what the science behind the process. You can use a powerpoint presentation which includes appropriate pictures and images in your lecture.

You have the option to organize the students into teams and present the activity along with the rubrics.

Criteria	4	3	2	1	Total
1.Content (Accuracy and Depth) 1.1 Provides a comprehensive overview of the fermentation process, including its definition, types (lactic acid fermentation, alcoholic fermentation) 1.2 Explains the biochemical reactions involved in fermentation, such as glycolysis and the conversion of pyruvate to fermentation products. 1.3 Describe the role of microorganisms (yeast and bacteria) in fermentation and their importance in the production of fermented foods and beverages. 1.4 Demonstrates an understanding of the factors influencing fermentation, such as temperature, pH and substrate concentration.					
2. Organization and Structure 2.1. Presentation is well structured with clear sections. 2.2 Content flows logically from one point to the next, facilitating understanding and retention. 2.3 Each slide has a clear title and contains concise, relevant information that supports the main point.					
3.Clarity and Presentation Skills 3.1 Slides are visually appealing with appropriate use of graphics, images and colors. 3.2 Font size and style are consistent and easy to read.					

	3.3 Speaker maintains eye contact, speaks clearly and engages the audience throughout the presentation.	
	4.Creativity and Originality 4.1 Demonstrate creativity in the design and delivery of the presentation, incorporating innovative elements that capture the audience's attention.	
	5.Time Management 5.1 Adheres to the allocated presentation time without rushing or exceeding the time limit.	
D. Making Generalizations	**1. Learners' Takeaways** Let the students supply this concept map to capture their takeaways.  	Allow the students to record their key insights within the provided diagram. The teacher may propose other activities for the learners to describe their understanding of a concept, idea, and skill covered in the previous topic. After sharing the overview of cellular respiration, please provide the KWHL chart to the students again, allowing them to record their insights in the L section.

	2. Reflection on Learning In their notebook, the students will write a journal entry consisting of 3-4 sentences, answering ANY of the following questions. *a. What did I learn about this lesson that I did not know before?* *b. Which topic was easy for me?* *c. Which topic was challenging to learn?* *d. Do I understand it now?*	The teacher should allow the learners to document their ways on how they think about their learning (metacognition).

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**
A. Evaluating Learning	**1. Formative Assessment** 1-7 Label the Diagram.  	Assessment will be given at the end of the lesson. Answer key: 1-7. 

	8-15. Choose the letter of the correct answer. 8.Where does most of the cellular respiration take place in eukaryotic cells? a.Mitochondria b.Nucleus c.Cytoplasm d.Endoplasmic reticulum 9.What is the primary purpose of cellular respiration? a.To produce oxygen for the cell b.To convert carbon dioxide into glucose c.To generate ATP for cellular energy d.To synthesize proteins 10. What molecule is typically used as the initial substrate for cellular respiration? a.Glucose b.Carbon dioxide c.Water d. Oxygen 11.Which stage of cellular respiration produces the most ATP? a.glycolysis b.Citric acid cycle c.Electron transport chain d.Fermentation 12.Which of the following is a key difference between photosynthesis and cellular respiration? a.Photosynthesis occurs in chloroplasts, while cellular respiration occurs in mitochondria. b.Photosynthesis produces glucose, while cellular respiration produces oxygen c.Photosynthesis requires oxygen, while cellular respiration requires carbon dioxide d.Photosynthesis releases energy while cellular respiration consumes energy.	8. A 9.C 10.A 11.C 12.A 13.C 14. A 15. C

	13.Which molecule is used as a raw material in photosynthesis but produced as a byproduct in cellular respiration? a.Glucose b.Oxygen c.Carbon Dioxide d.Water 14.Which statement accurately describes the relationship between photosynthesis and cellular respiration? a.Photosynthesis produces the oxygen needed for cellular respiration and cellular respiration produces the carbon dioxide needed for photosynthesis. b.Photosynthesis and cellular respiration are completely independent processes and do not influence each other? c. Photosynthesis and cellular respiration both occur simultaneously in the same organelle d.Photosynthesis and cellular respiration are identical processes with no differences. 15.Which stage of cellular respiration is like the light- dependent reactions of photosynthesis? a. Glycolysis b. Citric acid cycle c. Electron transport chain d.Fermentation **2. Homework (Optional)**			The teacher may give homework for extended deliberate practice.
A. Teacher's Remarks	*Note observations on any of the following areas:*	**Effective Practices**	**Problems Encountered**	This lesson design component prompts the teacher to record relevant observations and/or critical teaching events that
	strategies explored			

				he/she can reflect on to assess the achievement of objectives. The documenting of experiences is guided by possible areas for observation including teaching strategies employed, instructional materials used, learners' engagement in the tasks, and other notable instructional areas. Notes here can also be on tasks that will be continued the next day or additional activities needed.
	materials used			
	learner engagement/ interaction			
	Others			
B. Teacher's Reflection	*Reflection guide or prompt can be on:* ▪ *principles behind the teaching* *What principles and beliefs informed my lesson?* *Why did I teach the lesson the way I did?* ▪ *students* *What roles did my students play in my lesson?* *What did my students learn? How did they learn?* ▪ *ways forward* *What could I have done differently?* *What can I explore in the next lesson?*			This lesson design component guides the teacher in reflecting on and for practice. Entries on this component will serve as inputs for the LAC sessions, which can center on sharing the best practices discussing problems encountered and actions to be taken; and identifying anticipated challenges and intended solutions. Guide questions or prompts may be provided here.