Pond Oxygen Puzzle

Use oxygen data to trace how living things get energy.

L.7.3.2 "Analyze and interpret data to explain how the processes of photosynthesis, and cellular respiration (aerobic and anaerobic) work together to meet the needs of plants and animals."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline sentences that connect photosynthesis or respiration to oxygen, then circle two table values that support one underlined sentence.

What Changed in the Jars?

1. A class prepared three jars of pond water with pond plants, snails, or both. The three pond jars began with the same amount of dissolved oxygen. After four hours, students measured the oxygen again. The table shows their results. Dissolved oxygen is oxygen mixed into water, which plant and snail cells can use for respiration.

DISSOLVED OXYGEN BEFORE AND AFTER FOUR HOURS

Container	Start (mg/L)	After 4 hours (mg/L)
Plant and snail, light	8	10
Plant and snail, dark	8	5
Snail only, light	8	6
Yeast and sugar, no oxygen	0	0

2. In light, a plant uses sunlight to turn carbon dioxide and water into sugar and oxygen through photosynthesis. Plants and snails use sugar and oxygen in aerobic cellular respiration, releasing energy for their cells. Snails get sugar from food. In darkness, photosynthesis stops, but respiration continues. That difference helps explain the changing oxygen levels in the pond jars.

3. Another container held yeast and sugar water with no oxygen. The yeast released carbon dioxide gas while oxygen stayed at zero. Yeast can release some energy from sugar without oxygen through anaerobic respiration, but this yields less energy per sugar molecule than aerobic respiration. Animal muscle cells can also use an anaerobic process briefly when oxygen cannot meet their needs.

2 ANSWER WITH EVIDENCE

Use the passage

1. Compare the two jars with a plant and a snail. How do photosynthesis and respiration explain their different oxygen changes?

2. Both light jars held a snail. What does their oxygen data suggest about the plant's effect in light?

3. The yeast released carbon dioxide gas while its container stayed at zero oxygen. What does this show about anaerobic respiration, and how does its energy yield compare with aerobic respiration?

4. The dark jar lost oxygen. Use this result and the passage to explain why both the plant and the snail still need cellular respiration in darkness.

3 YOUR TURN

Your own words

Design a two-jar test of whether light helps a pond plant supply oxygen to a snail. Describe what you would keep the same, predict how oxygen would change in each jar, and explain how a snail might get energy briefly if oxygen became scarce.

ANSWER KEY

Pond Oxygen Puzzle

GRADE 7 · L.7.3.2

PART 1 · READ AND MARK

Underline sentences that connect photosynthesis or respiration to oxygen, then circle two table values that support one underlined sentence. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Compare the two jars with a plant and a snail. How do photosynthesis and respiration explain their different oxygen changes?	**In light, oxygen rose from 8 to 10 mg/L because photosynthesis added more oxygen than respiration used. In darkness, oxygen fell from 8 to 5 mg/L because photosynthesis stopped while respiration continued.**
2	Both light jars held a snail. What does their oxygen data suggest about the plant's effect in light?	**Oxygen rose from 8 to 10 mg/L with the plant but fell from 8 to 6 mg/L without it. The plant's photosynthesis added oxygen in light.**
3	The yeast released carbon dioxide gas while its container stayed at zero oxygen. What does this show about anaerobic respiration, and how does its energy yield compare with aerobic respiration?	**Yeast can release energy from sugar without oxygen through anaerobic respiration. It gets less energy per sugar molecule than it would through aerobic respiration.**
4	The dark jar lost oxygen. Use this result and the passage to explain why both the plant and the snail still need cellular respiration in darkness.	**Photosynthesis stops in darkness, but both organisms still need energy. Their cells continue aerobic respiration, which uses oxygen and helps explain the drop from 8 to 5 mg/L.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would put the same kind of plant and one snail in each jar, with equal amounts of water and the same starting oxygen level. I would keep one jar in light and one in darkness, then measure oxygen after four hours. I predict oxygen would rise in the light jar and fall in the dark jar because photosynthesis adds oxygen only in light, while respiration continues in both. If oxygen became scarce, the snail could use an anaerobic process briefly, but it would provide less energy per sugar molecule.

Accept predictions based on oxygen increasing in light and decreasing in darkness, even if students do not predict exact values. The test should change light while keeping the other starting conditions the same.