Do Plants Respire?

A. Fill in the Blanks

Complete the sentences with the correct terms.

1. The energy released during respiration is stored in a molecule called _____.
2. Unlike photosynthesis, which only occurs in the presence of light, respiration occurs _____ the time.
3. The breakdown of _____ during respiration provides the energy for a plant's life activities.
4. Respiration in the roots, stems, and leaves ensures that all _____ cells of the plant get the energy they need.
5. The two main raw materials (reactants) for respiration are glucose and _____.

B. Match the Following;

Match the timekeeping device or concept in Column A with its correct description or principle in Column B.

Column A	Column B
1. Respiration	A. The organelle where photosynthesis occurs.
2. Photosynthesis	B. The process of breaking down glucose to release energy.
3. Stomata	C. The energy currency of the cell.
4. Mitochondria	D. The sugar/food made by plants.
5. Glucose	E. The process of using light energy to make food.
6. Chloroplast	F. Tiny pores on leaves for gas exchange.
7. ATP	G. The organelle where cellular respiration occurs.

C. Practice Problems

Use your knowledge to answer these more detailed questions.

1. Write the full word equation for cellular respiration in plants. _____ + _____ → _____ + _____ + _____

2. Explain why a plant needs the energy released from respiration. Give two examples of what it uses the energy for.
3. Where does a plant get the glucose (food) it needs for respiration?
4. How do the roots of a plant, which are underground, get the oxygen they need to respire?
5. What are the tiny pores on the surface of leaves that allow for gas exchange called?
6. In which specific part (organelle) of the plant cell does respiration take place?
7. List two major differences between the process of respiration and photosynthesis.
    - **Difference 1:** _____
    - **Difference 2:** _____
8. Why is it incorrect to say that plants "breathe"? What is a more accurate term?
9. What would likely happen to a plant if its roots were stuck in waterlogged (completely soaked) soil for a long time? Explain your answer in terms of respiration.
10. Is the amount of carbon dioxide released by a plant during respiration more or less than the amount it uses for photosynthesis during a sunny day?

D. Warm-up Questions

Answer these quick questions to get your brain warmed up!

1. What is the main purpose of respiration for any living organism?
2. What gas do plants take in from the atmosphere for respiration?
3. What gas do plants release as a waste product of respiration?
4. Do plants respire during the day, at night, or both?
5. Name one part of a plant where respiration occurs.

E. Challenge Questions

Think critically to solve these challenging problems.

1. Explain the concept of "net gas exchange" in a plant during a 24-hour period (covering both day and night).
2. If you seal a plant in a transparent, airtight box and place it in a dark room, what will happen to the concentration of oxygen and carbon dioxide inside the box over time? Explain why.
3. How is respiration in a germinating seed (that has not yet grown leaves) different from respiration in a mature, green plant? (Hint: Think about where the food comes from).

4. Some people believe you shouldn't keep many plants in your bedroom at night. Based on your knowledge of plant respiration, explain the scientific reason for this belief. Do you think it's a significant health risk?
5. A scientist is measuring the gas exchange from a single plant leaf. At noon on a sunny day, she measures a net release of oxygen. At midnight, she measures a net release of carbon dioxide. Why do her measurements differ?

F. Word Problems & Application

Apply your knowledge to real-world scenarios.

1. A farmer stores his freshly harvested apples in a refrigerated warehouse with low oxygen levels. How does this environment help the apples stay fresh for longer?
2. Maria buys a beautiful potted plant. The pot has no drainage holes at the bottom. After a week of regular watering, the plant starts to wilt and die, even though the soil is moist. What is the most likely reason related to respiration?
3. An experiment is set up with two bell jars. Jar A contains a plant in the sunlight. Jar B contains a plant in a dark cupboard. After 6 hours, a lit candle is placed in each jar. In which jar will the candle burn for a longer time? Why?
4. Lenticels are small pores on the woody stems of trees. What is their function, and why is it essential for the tree's survival?
5. If a plant were unable to produce mitochondria in its cells, what would be the immediate consequence for the plant, even if it could still photosynthesize?

G. True or False

1. Plants only respire at night when there is no light for photosynthesis. _____
2. The main purpose of respiration is to create food for the plant. _____
3. Only the leaves of a plant are capable of respiration. _____
4. Photosynthesis and respiration are opposite processes in terms of their overall equations. _____
5. Plants get all the oxygen they need as a byproduct of their own photosynthesis. _____