

Name \_\_\_\_\_

1. Which of the following statements is false about C4 plants?

- a. Adaptations in C4 plants allow them to minimize photorespiration.
- b. Corn, sugar cane, and crabgrass are all C4 plants.
- c. C4 plants grow faster than C3 plants in tropical regions.
- d. The leaves of C4 plants have less prominent bundle-sheath cells than the leaves of C3 plants.
- e. In C4 plants, the Calvin-Benson cycle takes place in the bundle-sheath cells.

2. \_\_\_\_\_ is the addition of carbon dioxide to organic molecules.

- a. Oxygen regeneration
- b. Carbon assimilation
- c. Carbon regeneration
- d. Oxygen assimilation
- e. Carbon oxidation

3. Which of the following statements are true?

- I. During photorespiration, nitrogen competes with carbon dioxide as a substrate for rubisco.
- II. Photorespiration wastes energy.
- III. In photorespiration, ribulose-1,5-bisphosphate is converted to one molecule of 3-phosphoglycerate and one molecule of 2-phosphoglycolate.
- IV. Photorespiration may not have had a large impact on plants when atmospheric oxygen levels were lower.

- a. I, II, and III only
- b. I, II, and IV only
- c. II, III, and IV only
- d. I, III, and IV only
- e. I, II, III, and IV

4. Why is it advantageous for the Calvin-Benson cycle to occur in bundle-sheath cells in C4 plants?

- a. Because bundle-sheath cells are grouped around leaf veins
- b. Because malate is transported to the bundle-sheath cells
- c. Because these cells lie deep within the leaf, and the amount of nitrogen that competes with carbon dioxide for rubisco is reduced
- d. Because malate is broken down into pyruvate and carbon dioxide in bundle-sheath cells
- e. Because oxygen cannot diffuse easily into bundle-sheath cells.

5. How many molecules of ATP is (are) consumed in one round of the Calvin-Benson cycle?

- a. One
- b. Two
- c. Three
- d. Four
- e. None

6. Which of the following is not a stage in the Calvin-Benson cycle?

- a. Regeneration
- b. Photorespiration
- c. Fixation
- d. Reduction
- e. All of the above are stages in the Calvin-Benson cycle

7. In a C<sub>4</sub> plant, what is the first molecule that carbon dioxide reacts with?

- a. Pyruvate
- b. Rubisco
- c. Malate
- d. Phosphoenolpyruvate
- e. Oxaloacetate

8. In photorespiration, ribulose-1,5-bisphosphate is converted to one molecule of \_\_\_\_\_ and one molecule of \_\_\_\_\_.

- a. glyceraldehyde-3-phosphate, 2-phosphoglycolate
- b. phosphoenolpyruvate, 3-phosphoglycerate
- c. 3-phosphoglycerate, 2-phosphoglycolate
- d. 2-phosphoglycolate, phosphoenolpyruvate
- e. 3-phosphoglycerate, glyceraldehyde-3-phosphate

9. Which of the following statements is false?

- a. The activity of rubisco in carbon dioxide assimilation is regulated by light-dependent factors.
- b. The rubisco reaction occurs in the stroma.
- c. High pH activates rubisco.
- d. Rubisco catalyzes the carbon fixation reaction in the first stage of the Calvin-Benson cycle.
- e. Rubisco works best at a pH of 7.

10. One possible selective advantage of photorespiration could be that it allows plants to release absorbed light energy in the absence of \_\_\_\_\_.

- a. carbon dioxide
- b. oxygen
- c. water
- d. nitrogen
- e. rubisco