**Photosynthesis Review Questions/Practice**

Questions 1–4 refer to the following answer choices—use each answer only once. The remaining questions choose the BEST possible!

A. Transpiration
B. Calvin cycle
C. CAM photosynthesis
D. Cyclic photophosphorylation-PSII
E. Noncyclic photophosphorylation-PSI

1. Plants use this process so that they can open their stomata at night and close their stomata during the day to avoid water loss during the hot days, without depleting the plant's CO2 reserves.
2. Uses NADPH, ATP, and CO2 as the inputs to its reactions.
3. Photosynthetic process that has ATP and oxygen as its products.
4. The process by which plants lose water via evaporation through their leaves.

5. The photosynthetic process performed by some plants in an effort to survive the hot and dry conditions of climates such as the desert is called
   - A. Carbon fixation.
   - B. C₃ photosynthesis.
   - C. C₄ photosynthesis.
   - D. CAM.

6. Which of the following is the photosynthetic stage that produces oxygen?
   - A. The light-dependent reactions
   - B. Chemiosmosis
   - C. The Calvin cycle
   - D. Carbon fixation
   - E. Photorespiration

7. Which of the following reactions occur in both cellular respiration and photosynthesis?
   - A. Carbon fixation
   - B. Fermentation
   - C. Reduction of NADP⁺
   - D. Substrate level phosphorylation
   - E. Formation of NADH

8. Which of the following is *not* a product of the light-dependent reactions of photosynthesis?
   - A. O₂
   - B. ATP
   - C. NADPH
   - D. Sugar

9. Which of the following is an advantage held by a C₄ plant?
   - A. More efficient light absorption
   - B. More efficient photolysis
   - C. More efficient carbon fixation
   - D. More efficient uptake of carbon dioxide into the stomata
10. Carbon dioxide enters the plant through the
   A. Stomata
   B. Stroma
   C. Thylakoid membrane
   D. Bundle sheath cell

11. Which of the following is the source of the oxygen released during photosynthesis?
   A. CO₂
   B. H₂O
   C. Rubisco
   D. Pyruvate

12. Which of the following is an *incorrect* statement about the Calvin-Benson reactions of photosynthesis?
   A. The main inputs to the reactions are NADPH, ATP, and CO₂.
   B. The main outputs of the reactions are NADP+, ADP, and sugar.
   C. Carbon fixation is the first step of the process.
   D. The reactions occur in the stoma of the chloroplast.

13. Which of the following is the source of the carbon in sugar produced during photosynthesis?
   A. CO₂  B. H₂O  C. Rubisco  D. PEP carboxylase  E. Pyruvate

14. The light-dependent reactions of photosynthesis occur in the
   A. stroma.
   B. mitochondrial matrix.
   C. thylakoid membrane.
   D. cytoplasm
15. To elucidate the cycle of reactions that allow carbon fixation, Melvin Calvin exposed suspensions of the green alga *Chlorella* to $^{14}$CO$_2$ for a period of time. He then killed the cells and denatured the enzymes by submerging them in a beaker of boiling alcohol. The $^{14}$C-labeled compounds were then separated from one another at the beginning of the Calvin cycle using paper chromatography and were found in__________.
A. Glucose
B. RuBP
C. PGAL
D. None of these

16. How many revolutions of the Calvin cycle are required to produce the sugar glucose?
A. 2
B. 3
C. 4
D. 5

17. In which part of the chloroplasts are the Calvin cycle enzymes located?
A. stroma
B. thylakoids
C. grana
D. cristae

18. What products of light reactions of photosynthesis are used in the Calvin cycle?
A. oxygen and protons
B. carbon dioxide and water
C. ATP and NADPH
D. ADP and NADP
E. glucose and oxygen

19. The loss of carbon fixing activity of the enzyme RuBP carboxylase is directly proportional to
A. high temperatures and high light intensities.
B. low temperature and low light intensities.
C. completely dark conditions.
D. lack of carbon dioxide.
E. lack of oxygen.

20. A method devised by succulent desert plants to reduce the problem of photorespiration is
A. the C$_3$ pathway.
B. the CAM metabolism.
C. the Calvin cycle.
D. light reactions.
E. nitrogen fixation.
21. Most of the atmospheric oxygen occurs as a result of photosynthesis. From which of the following molecules is the oxygen derived?
A. water
B. carbon dioxide
C. glucose
D. chlorophyll

22. A scientist is hoping to synthesize a new herbicide that will kill certain weeds. She has found that one weed species in particular has thylakoids that have rather large pores. The herbicide will open the pores of these thylakoids, causing them to leak
A. stromal enzymes.
B. chlorophyll and other pigments.
C. ATP and ADP.
D. glucose.
E. NADPH.

23. Van Niel used sulfur bacteria in his research on photosynthesis. His equation involved carbon dioxide and hydrogen sulfide which were converted into organic sugars at very deep sea depths. The bacteria used the sulfur. They would be examples of….
A. anaerobic chemoheterotrophs
B. anaerobic photochemoautotrophs
C. aerobic photoautotrophs
D. aerobic chemoheterotrophs

24. Carotenoids are important to many plants because these pigments are able to
A. remove carbon dioxide from the air.
B. absorb wavelengths of light that neither chlorophyll a nor b can absorb.
C. absorb water so that hydrolysis can be carried out in the chloroplasts.
D. capture UV radiation that is harmful to the DNA in the nucleus of plant cells.
E. store electrons for use during the "dark" reaction of photosynthesis.

25. Fall leaf color on deciduous trees is a result of
A. the production of more accessory pigments because of the cooler temperatures.
B. the reduction in the production of accessory pigments because of the cooler temperatures.
C. cessation of chlorophyll production, which allows the accessory pigments to be revealed.
D. the increased angle of the sun during the fall, which reflects more of the accessory pigments causing the human eye to see the red, yellow, and orange colors that were masked by the green chlorophyll.
26. In the plants that utilize the CAM pathway, what happens to the stomata?
   A. The stomata open in the afternoon but close as soon as the sun sets.
   B. The stomata open in the morning but close in the afternoon.
   C. The stomata open in the evening but close in the morning.
   D. The stomata open only when the sun is shining and close at night.

27. Which of the following is not part of the light-dependent reactions?
   A. use of NADPH
   B. catabolizing water
   C. O2 production
   D. electron transport

28. The Calvin cycle requires all of the following except
   A. carbon dioxide.
   B. oxygen.
   C. ATP.
   D. NADPH.