

Name: _____

Per: _____

Date: _____

B.P.O.T.W. - Photosynthesis

1. Explain why almost all organisms depend upon photosynthesis to satisfy their energy needs.
2. Which organisms are responsible for carrying out the most photosynthesis on the earth?
3. Photosynthesis can be thought of as a process that converts energy. What are the three energy conversions?
4. Summarize the events of the light reactions.
5. Explain how the products of the light reaction are used to reduce CO_2 in the Calvin cycle to form PGAL and describe the fate of this PGAL.
6. Where *exactly* would you find chlorophyll and the ETC?
7. What molecule is analogous to the NADH used in cellular respiration?
8. What is the function of the Calvin cycle?
9. Identify where each of the reactants in photosynthesis comes from and where the products are produced.
10. What is the purpose of the electron transport chain in photosynthesis?
11. How do the electrons accepted by the ETC become high energy?
12. How is it that photosystem II and photosystem I do not "run out" of electrons?
13. Why can the plant cell not use the ATP produced in the chloroplasts?
14. Why does the primary electron acceptor have to be so close to the reaction center chlorophyll?
15. When plants photosynthesize, they always make more glucose than they require for energy. Explain.
16. What is the relationship of the processes of photosynthesis and cellular respiration?
17. What is the immediate energy source for the Calvin cycle?
18. If you could catch all the PGAL (G3P) a green plant produces and remove it, what would happen to photosynthesis?
19. If you illuminate a solution of chlorophyll, carbon dioxide, and water in a glass vessel, will the mixture produce sugar? Explain.
20. Both the light reactions and the Calvin Cycle stop when there is no light. Which specific reaction stops first? Which stops next? Continue answering the question "Which stops next?" until you have explained why both pathways have stopped.

Answers

Photosynthesis Concept Questions

1. Explain why almost all organisms depend upon photosynthesis to satisfy their energy needs. (P/S produces glucose which is used by most cells as energy)
2. Which organisms are responsible for carrying out the most photosynthesis on the earth? (blue-green algae)
3. Photosynthesis can be thought of as a process that converts energy. What are the three energy conversions? (solar to e-; e- to ATP; ATP to glucose)
4. Summarize the events of the light reactions.
5. Explain how the products of the light reaction are used to reduce CO₂ in the Calvin cycle to form PGAL and describe the fate of this PGAL. (ATP provides energy; NADPH provides electrons; PGAL is used to make glucose, from which the plant can make polysaccharides and other molecules)
6. Where *exactly* would you find chlorophyll and the ETC? (thylakoid membrane)
7. What molecule is analogous to the NADH used in cellular respiration? (NADPH)
8. What is the function of the Calvin cycle? (convert carbon dioxide into organic carbon (PGAL))
9. Identify where each of the reactants in photosynthesis comes from and where the products are produced.
10. What is the purpose of the electron transport chain in photosynthesis? (make ATP)
11. How do the electrons accepted by the ETC become high energy? (absorb photon)
12. How is it that photosystem II and photosystem I do not “run out” of electrons? (PS II gets replacements from water while PS I gets them from PS II via the ETC)
13. Why can the plant cell not use the ATP produced in the chloroplasts? (it is inside the chloroplasts and used in the Calvin cycle)
14. Why does the primary electron acceptor have to be so close to the reaction center chlorophyll? (transfer electrons before they lose their energy)
15. When plants photosynthesize, they always make more glucose than they require for energy. Explain. (some is needed for growth and to store for when light is unavailable)
16. What is the relationship of the processes of photosynthesis and cellular respiration? (they are the of one another reverse)
17. What is the immediate energy source for the Calvin cycle? (ATP from light reactions)
18. If you could catch all the PGAL (G3P) a green plant produces and remove it, what would happen to the cell? (plant would be unable to produce energy for cell work or make cellulose)
19. If you illuminate a solution of chlorophyll, carbon dioxide, and water in a beaker, will the mixture produce sugar? Explain. (no - requires enzymes of Calvin cycle to produce sugar)
20. Both the light reactions and the Calvin Cycle stop when there is no light. Which specific reaction stops first? Which stops next? Continue answering the question “Which stops next?”

until you have explained why both pathways have stopped. (no light - no electrons down ETC - no ATP - no electrons move through PSI - no NADPH - no Calvin cycle - no PGAL)