

RAVEN CHAPTER 8 GUIDED NOTES: PHOTOSYNTHESIS

Raven 9th edition

1. What is the role of photosynthesis in the ecosystem?

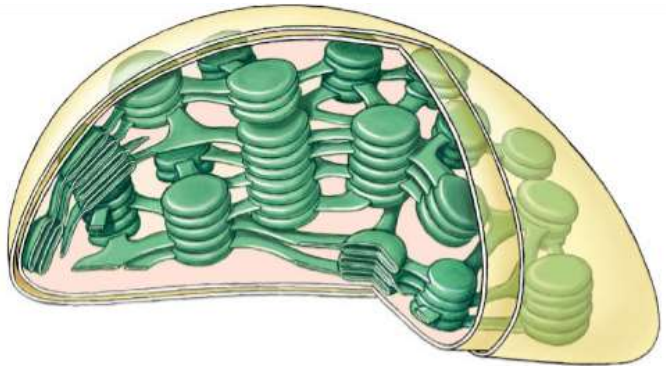
2. The textbook divides the reactions of photosynthesis into 3 stages. List and briefly describe their functions:

Light-dependent reactions

Light-independent reactions (Calvin cycle)

3. Write the summary equation for photosynthesis:

4. Label the structures of the chloroplast



Indicate the role of each structure within the leaf:

a. mesophyll cells _____

b. thylakoid _____

c. thylakoid membranes _____

- d. grana _____
- e. stroma _____
- f. photosystem _____
- g. stomates _____

8. What is the source of oxygen released from photosynthesis?

9. Light is a form of _____ energy and is divided into packets of energy called _____

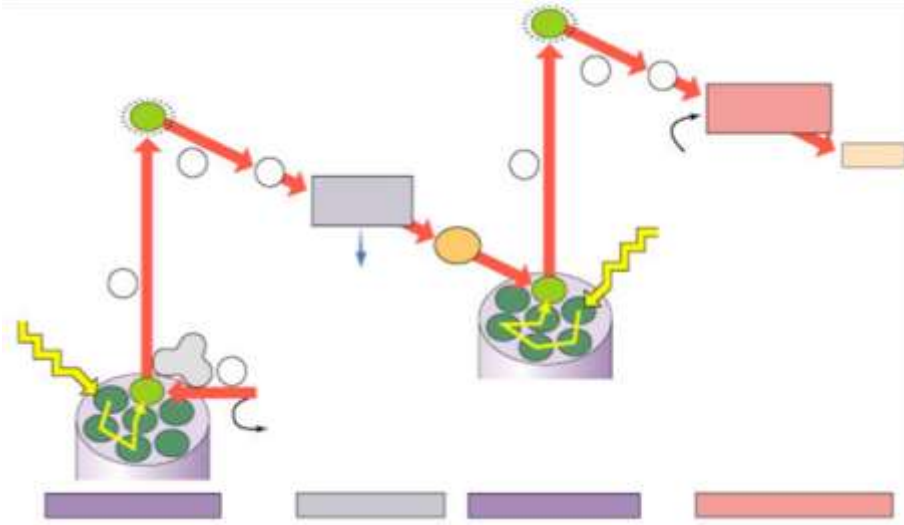
10. What other pigments exist in green leaves and what is their function?

11. The porphyrin ring of chlorophyll contains the element _____ and the role of the ring is to

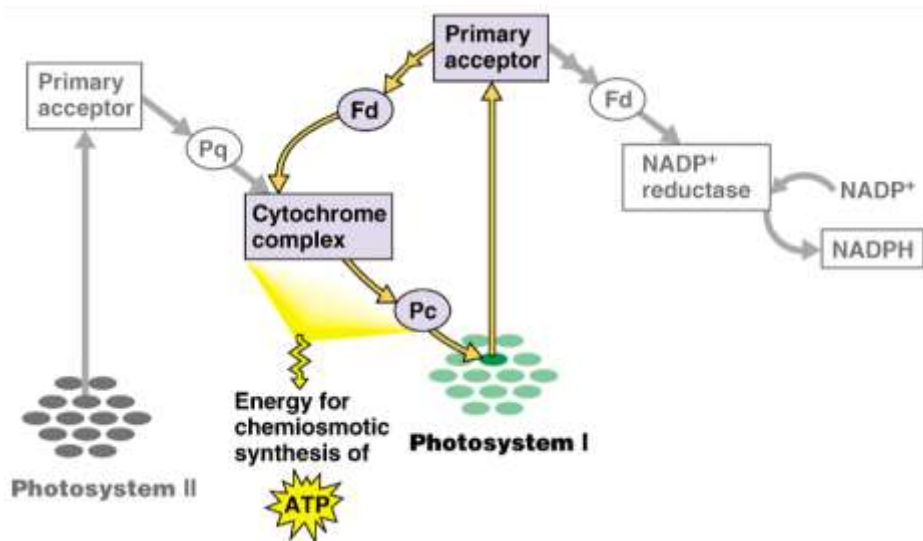
12. What does chlorophyll do when excited by photons?

13. What is a photosystem?

14. Label the diagram and explain the difference between Photosystem I and Photosystem II.



15. With 2 different colored pencils, follow the energy paths of both **cyclic** and **noncyclic** electron flow. (the diagram is not from your text, but it better illustrates the concept)



Explain how cyclic photophosphorylation differs from noncyclic photophosphorylation.

17. What is the function of the electron transport chain of Photosystem II?

18. How is ATP synthesis coupled with the reactions of Photosystem II?

19. Within the thylakoid membrane and stroma, indicate what happens to each of the following:

a. water _____

b. high energy electrons _____

c. H^+ _____

d. oxygen _____

e. $NADP^+$ _____

f. ADP _____

20. Where in the chloroplast is the H^+ concentration highest?

21. Explain what happens during carbon fixation.

23. The products of the Calvin cycle are

24. For each of the materials the plant uses during the photosynthesis list which stage they are used in, their source, their role, and what their fate is.

a. water _____

b. CO₂ _____

c. NADP+ _____

d. ADP _____

e. H+ _____

25. Why is Rubisco sometimes called the most important enzyme in the world?

26. Why is the Calvin cycle also called “carbon fixation”?

27. What environmental and internal challenges have forced both C4 and CAM plants to evolve alternatives to the photosynthesis system used by other plants?

28. Why do high oxygen levels inhibit photosynthesis?

29. What happens during photorespiration and why is it considered bad for plants?

30. What evolutionary adaptations to the Calvin cycle are seen in **C4 plants** like sugar cane?

31. Draw a diagram to show the anatomical adaptations seen in C4 plants to accommodate their variation on the Calvin cycle.

32. What evolutionary adaptation to the Calvin cycle is seen in **CAM plants** like cacti?
