Name _____ **Period** _____

AP Biology **Date** _____

RAVEN CHAPTER 10 GUIDED NOTES: PHOTOSYNTHESIS

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

   a. _____

   b. _____

   Light-independent reactions (Calvin cycle)

   c. _____

3. Explain why the light-dependent reactions are called as such:

   _____

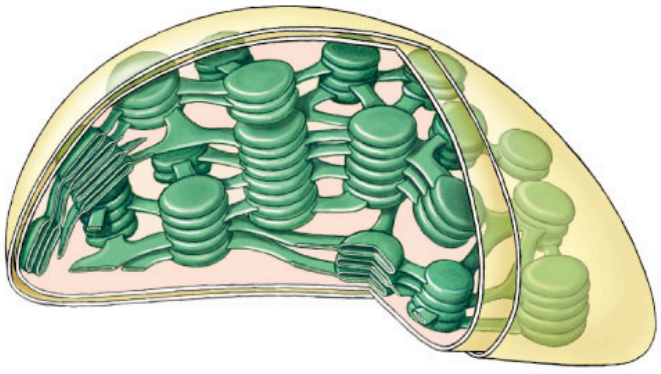
4. Explain why the light-independent reactions are called as such:

   _____

5. Write the summary equation for photosynthesis:

   _____

6. Label the structure of the chloroplast



7. 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. Visible light has a wavelength range of _____ . Chlorophyll a absorbs _____ light at wavelength of _____ and chlorophyll b absorbs _____ light at wavelength of _____ whereas they reflect _____ light.

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

    _____

    _____

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

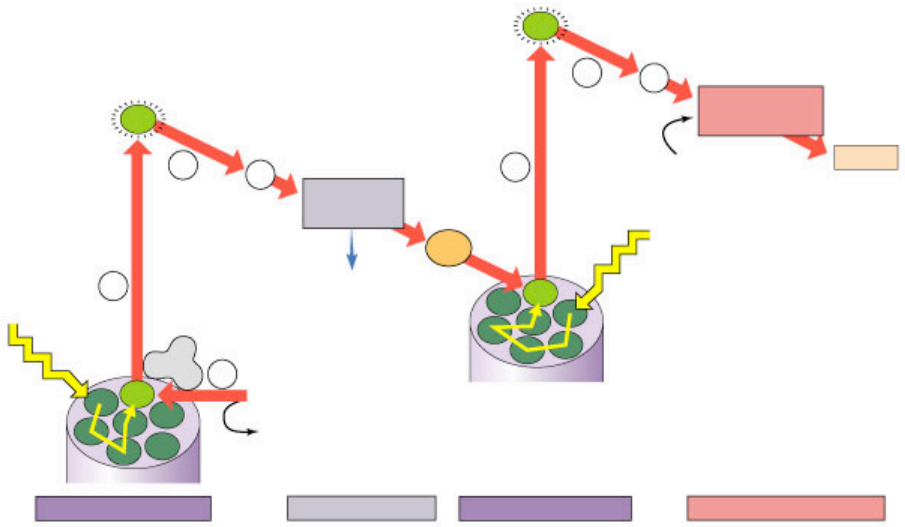
13. What does chlorophyll do when excited by photons? _____

    _____

14. What is a photosystem? _____

_____

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

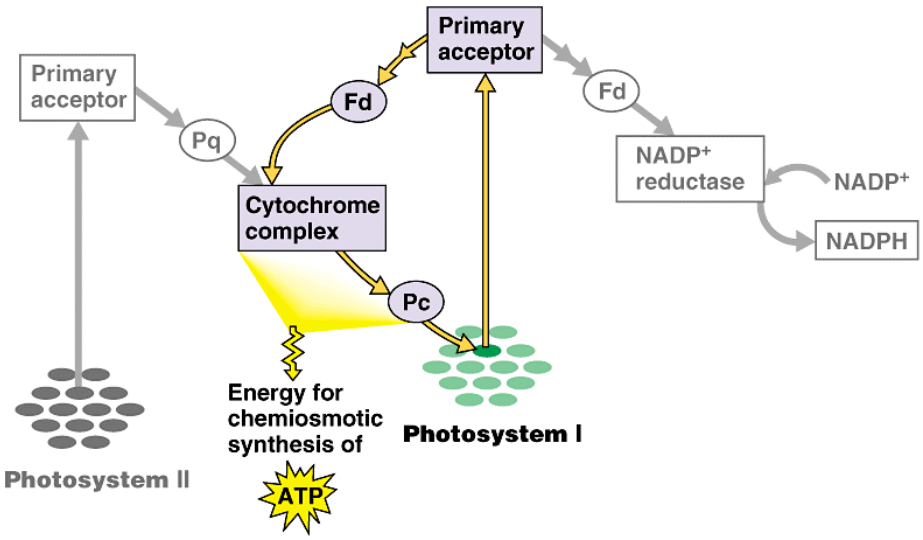


_____

_____

_____

16. 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



17. Explain how cyclic photophosphorylation differs from noncyclic photophosphorylation.

_____

_____

_____

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

_____

_____

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

_____

_____

_____

20. 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 _____

21. Where in the chloroplast is the H+ concentration highest? _____

_____

22. 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. CO_2 _____

    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?

_____

_____

_____

_____