

Learning targets for biology Chapter-4

When you are answering biology questions, please follow RARE response.

Restate the question
Answer the question with a
Reason and a piece of
Evidence

Photosynthesis

Please answer all questions on a separate piece of paper and explain all diagrams in your own words. Do not merely copy the caption or print the picture off the Internet.

1. How do organisms obtain energy from the environment?
2. Can animals survive without plants?
3. What are autotrophs?
4. What is the difference between photoautotrophs and chemoautotrophs? Give an example of each.
5. What kinds of organisms obtain energy from nonliving sources and how do they do it?
6. How does heterotroph gain energy?
7. All organisms need _____ and _____ to make sugars, amino acids, and other compounds necessary for life.
8. What is photosynthesis? What kind of organisms can conduct the process of photosynthesis?
9. Name some ancient photosynthesis products. How are we dependent on them?
10. What happens under the ocean, where there is not enough light for photosynthesis? How do organisms there obtain light and energy?
11. Draw the electromagnetic spectrum and explain the range of rays and the wavelengths of light.
12. What kinds of waves will have more energy?
13. What does visible light do when molecules absorb it? Give an example.
14. What are pigments? Name four different kinds of pigments.
15. Where are light absorbing pigments embedded?
16. Draw figure 4.3 on page 104. Explain the different parts of a chloroplast.
17. What is the stroma? What happens in the stroma?
18. What is the central element of chlorophyll?
19. What are three energy conversion processes that take place in photosynthesis?
20. Why do we see autumn leaves in different colors? Or, why are they different colors and how do they become that way?

21. Draw figure 4.7 on Page 106 and explain your diagram in your own words. (Please label your diagram)
22. What is a light reaction? Where in the chloroplast does it take place?
23. What is the Calvin cycle? Where in the chloroplast does it take place?
24. Give the overall reaction of photosynthesis
25. Read page 107 on Van Helmont's experiment and summarize different scientists' work
26. Draw fig. 4.5 on page 108. Label and explain the diagram
27. What happens to a water molecule in photosynthesis? Give the reaction.
28. What is a thylakoid membrane?
29. Where is photosynthesis I (PS I) and (PS II) embedded?
30. Where is the electron transport system located?
31. What is an electron carrier? Name NADP+
32. Why is the flask shaped enzyme called ATP synthetase? Where can you find this enzyme?
Why is ATP synthetase important for photosynthesis?
33. What is NADPH?
34. What are photosynthetic bacteria? How do they carry photosynthesis? Give equation.
35. Draw 4.13 on page 111. Label your diagram and explain the process.
36. What is the Calvin cycle?
37. What is PGAL?
38. At what stage is CO₂ incorporated into the photosynthetic process?
39. What gives weight to a plant?
40. Draw a labeled diagram of fig. 4.14 on page 112. Explain your diagram.
41. What is the rate of photosynthesis?
42. Draw figure 4.15, 4.16, 4.17, and 4.18. Explain all the diagrams.
43. C₄ and CAM mechanisms of photosynthesis have evolved in some plants. What are the advantages of each type of photosynthesis?
44. The curve in Figure 4.16 shows the effect of temperature increase on the rate of photosynthesis in a typical C₃ plant. Construct and explain a curve showing the response of a C₄ plant to the same increase in temperature.
45. Atmospheric levels of CO₂ have increased from 300 parts per million (ppm) to almost 355ppm in recent years. What will be the effect of this increase on photosynthesis and growth in C₃ plants? In C₄ plants?