Contents

5.1 Plants and the Environment

Read 5.1 (pp. 266–270).

Exercises

Circle the letter of the correct answer.

1. What characteristic is shared by most, but not all, plants?
   - **a.** immobile
   - **b.** photosynthetic
   - **c.** cellulose cell walls
   - **d.** sexual reproduction
2. What term describes organisms that live in trees?
   - **a.** arboreal
   - **b.** epiphytic
   - **c.** photosynthetic
   - **d.** sessile
3. What is *not* a way in which plants affect soil?
   - **a.** prevent erosion
   - **b.** add carbon to the soil
   - **c.** provide habitat for epiphytes
   - **d.** aerate soil to increase water retention
4. How do plants make inorganic nutrients from the soil available to animals and other organisms?
   - **a.** Plants diffuse inorganic nutrients from the soil into the air.
   - **b.** Plants absorb inorganic nutrients and use them to build plant tissue.
   - **c.** Plants use inorganic nutrients to store the energy released during photosynthesis.
   - **d.** Plants convert inorganic nutrients into a form that other organisms can absorb from the soil.
5. What is *not* something that plants contribute to other organisms through photosynthesis?
   - **a.** carbon
   - **b.** energy
   - **c.** hydrogen
   - **d.** oxygen

Circle *T* if the statement is true or *F* if it is false.

6. **T** **F** Plants that lack chlorophyll are autotrophic.

7. **T** **F** Flowers and cones are plant organs that perform reproductive functions.

8. **T** **F** Plants compact and dry out the soil, thus preventing erosion.

9. **T** **F** Fungi and bacteria use carbon that decaying plants add to the soil.

10. **T** **F** Plants are the basis of most terrestrial food chains.

11. **T** **F** Most organisms can directly access inorganic nutrients in the soil.

12. **T** **F** Plants convert carbon dioxide into a usable form of carbon through photosynthesis.

13. **T** **F** Plants store potential energy in the form of organic molecules such as glucose.

Match each description with the plant characteristic it describes.

14. _____ make new plants using seeds or spores

15. _____ cannot move themselves from place to place

16. _____ create food using chlorophyll and solar energy

17. _____ are made stiff by a carbohydrate in their cell walls

18. _____ are made up of many cells that form tissues and organs

a. contain cellulose

b. are immobile

c. are multicellular

d. are photosynthetic

e. reproduce sexually

Complete these exercises.

19. What were the ecological effects of deforestation in Haiti?

_____

20. What three major organs do most plants have?

_____

21. What type of reproduction is exemplified by a plant sending out a runner?

_____

22. Tumbleweeds sometimes travel long distances as they are blown by the wind. Other plants, such as some vines, can grow a foot per day. Do these plants have the characteristic of being sessile? Why or why not?

_____

_____

_____

23. What important nonchemical contribution can plant structures provide for other organisms?

_____

24. Most orchid species are epiphytes. If you were walking through the jungle, where could you find the most orchids growing? _____

25. Plants support life in many different ways. Choose a common plant in the area in which you live, and list at least three ways it benefits or supports life in your local ecosystem.

26. How does photosynthesis affect every structure and function of your body?

5.2 Photosynthesis: Light-Dependent Phase

Read 5.2 (pp. 271–275).

Exercises

Circle the letter of the correct answer(s). One question has multiple answers.

1. What is the name for the membrane-bound disks that are stacked in chloroplasts?
- **a.** stroma
- **b.** organelles
- **c.** thylakoids
- **d.** reaction centers

2. What type of molecule absorbs the energy from sunlight?
- **a.** chlorophyll
- **b.** chloroplast
- **c.** photon
- **d.** thylakoid

3. What processes occur in photosystem II?
- **a.** Energy from electrons is stored in NADPH molecules.
- **b.** Enzymes use potential energy in ATP and NADPH to manufacture glucose.
- **c.** Water molecules are split to replace lost electrons, release oxygen, and store hydrogen ions.
- **d.** The reaction center passes energized electrons to an ETC, which pumps hydrogen ions into the thylakoid space.

4. What process occurs in photosystem I?
- **a.** Hydrogen ions flow from the thylakoid space into the stroma through ATP synthase.
- **b.** Electrons are reenergized and used to form NADPH molecules, which store the potential energy of the electrons.
- **c.** Photosynthesis begins in the reaction center of this photosystem as sunlight energizes electrons, which then move into an ETC.
- **d.** The reaction center passes energized electrons to an ETC, which uses the energy to pump hydrogen ions from the stroma into the thylakoid space.

Circle *T* if the statement is true or *F* if it is false.

5. T F Plant cells can use glucose to construct proteins and other biomolecules.

6. T F Chloroplasts are membrane-bound organelles that contain thylakoids suspended in stroma.

7. T F The light-dependent phase of photosynthesis occurs within the thylakoid membrane.

8. T F Photosystems I and II carry out the light-independent phase of photosynthesis.

9. T F A concentration gradient of hydrogen ions between the stroma and the thylakoid space stores potential energy.

Number the steps of the light-dependent phase of photosynthesis in the order in which they occur.

10. _____ Electrons enter photosystem I after passing through the ETC of photosystem II.

11. _____ Energized electrons transfer energy between chlorophyll molecules until the energy reaches the reaction center of photosystem II.

12. _____ A photon energizes an electron in a molecule of chlorophyll.

13. _____ As energized electrons move down an ETC, their energy is used to pump hydrogen ions from the stroma into the thylakoid space.

14. _____ Hydrogen ions in the thylakoid space flow through ATP synthase into the stroma. ATP synthase uses the flow of ions to make ATP.

15. _____ Reenergized electrons travel through an ETC and enter the stroma, where they are used to make NADPH.

Match each description with the phase of photosynthesis it describes.

16. _____ occurs in the thylakoid membrane

17. _____ produces glucose

18. _____ uses energy from molecules

19. _____ uses energy from sunlight

20. _____ produces ATP and NADPH

21. _____ occurs in the stroma

a. light-dependent phase

b. light-independent phase

Answer these questions.

22. How do autotrophs supply the carbon that living organisms need for their cells?

_____

_____

23. What are the reactants and products of photosynthesis and cellular respiration?

a. Photosynthesis reactants: _____

b. Photosynthesis products: _____

c. Cellular respiration reactants: _____

d. Cellular respiration products: _____

24. How do photosynthesis and cellular respiration work together to form a cycle?

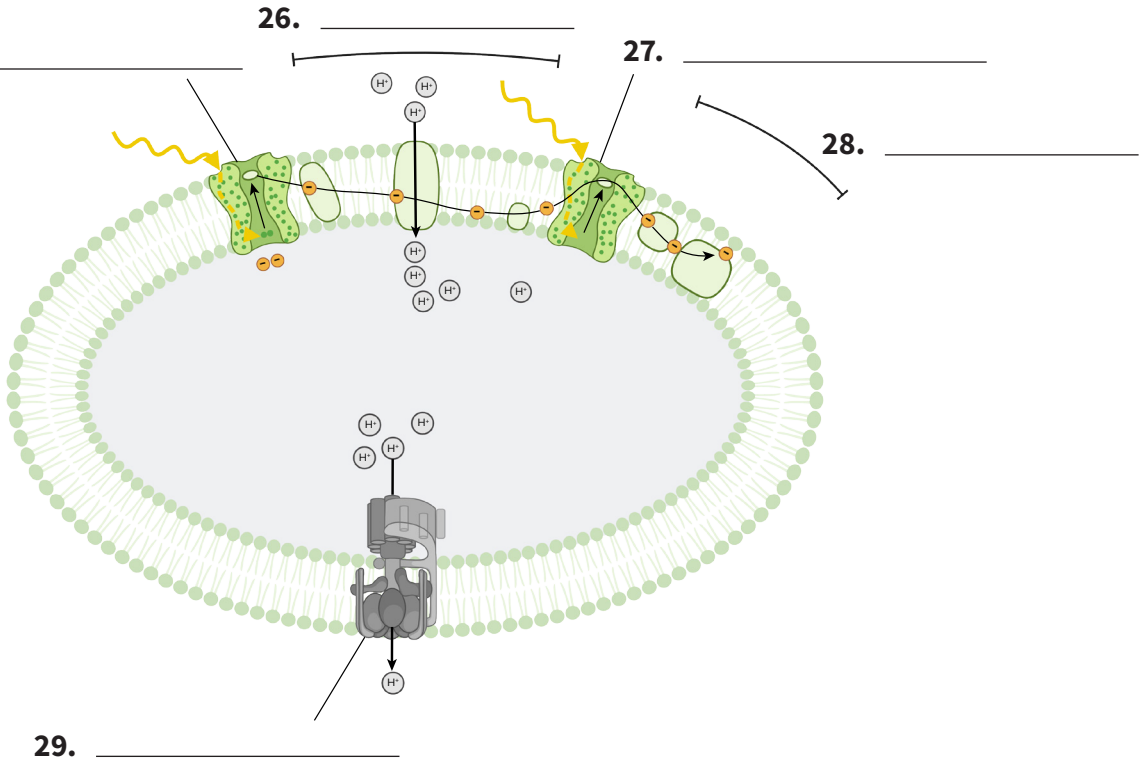
_____

_____

_____

5.2

Label each structure involved in photosynthesis.



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Review

Circle the letters of the correct answers. Each question has multiple answers. 5.1

30. What ecological contributions do plants make in their ecosystems?

- **a.** Plants break down dead organisms.
- **b.** Plants create habitats for organisms.
- **c.** Plants convert inaccessible inorganic nutrients to usable forms.
- **d.** Plants produce organic compounds, oxygen, and energy through photosynthesis.

31. In what ways do plants affect the soil?

- **a.** Plants prevent soil erosion.
- **b.** Plants loosen the soil to help absorb and retain water.
- **c.** Plants add calcium, potassium, and phosphorus to the soil.
- **d.** Plants contribute carbon to the soil when they die and decay.

Circle *T* if the statement is true or *F* if it is false. Correct the italicized part of any false statement. 5.1

32. **T** **F** Plants add *nitrogen* into the food chain by using carbon dioxide during photosynthesis.

33. **T** **F** *Carbon* enters the atmosphere as a by-product of photosynthesis.