

Section 21.1

Vocabulary Review

For questions 1–3, match each phrase with a vocabulary term from the Study Guide page.

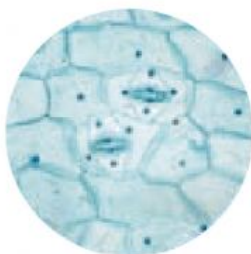
1. plant structure that contains the embryo
2. transport tissue
3. enable exchange of gases

Understand Key Concepts

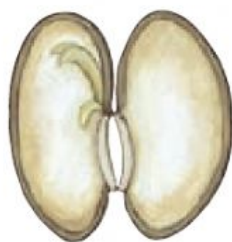
4. Which is part of a seed?
 - A. flower
 - B. embryo
 - C. cone
 - D. fruit
5. Which is not a trait shared by freshwater green algae and plants?
 - A. cellulose cell walls
 - B. chlorophyll
 - C. food stored as starch
 - D. contain vascular tissue
6. Which does not illustrate a plant adaptation to land environments?



A.



C.



B.



D.

7. Which was a major obstacle for plants to live on land?
 - A. obtaining enough light
 - B. obtaining enough soil
 - C. obtaining enough water
 - D. obtaining enough oxygen

Constructed Response

8. **Short Answer** Describe the adaptations that you would expect to find in an aquatic plant.
9. **Open Ended** Of the adaptations discussed in Section 21.1, which one do you predict would be most important to a plant living in the desert?

Think Critically

10. **Organize** the adaptations to life on land from the most important to the least important. Defend your decisions.

Section 21.2

Vocabulary Review

Write a sentence using the following vocabulary term correctly.

11. thallose

Understand Key Concepts

Use the photo below to answer question 12.



12. Which word does not describe the plant shown above?
 - A. multicellular
 - B. nonvascular
 - C. seedless
 - D. thallose

13. Which is a characteristic of mosses?
- A. vascular tissue
 - B. flowers
 - C. seeds
 - D. rhizoids

Constructed Response

14. **Short Answer** Refer to **Figure 21.9** and analyze the need for a nonvascular sporophyte to remain dependent on the gametophyte generation.
15. **Open Ended** Describe a habitat in your community that would support nonvascular plants.

Think Critically

16. **Research** nonvascular plants at biologygmh.com and make a list of those that grow in your state.

Section 21.3

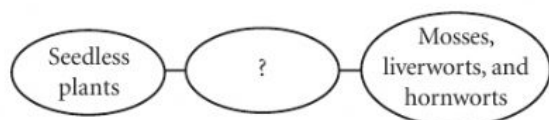
Vocabulary Review

For questions 17–19, match each definition with a vocabulary term from the Study Guide page.

- 17. spore-bearing structures that form a compact cluster
- 18. thick underground stem
- 19. plant that lives anchored to another plant or object

Understand Key Concepts

Use the concept map below to answer question 20.



20. Which term correctly completes the concept map shown above?
- A. nonvascular
 - B. flowering
 - C. vascular
 - D. seed-producing
21. What structure contains clusters of sporangia?
- A. sorus
 - B. frond
 - C. stem
 - D. blade
22. Which is not part of the fern sporophyte generation?
- A. rhizome
 - B. sorus
 - C. frond
 - D. rhizoid

23. Which photo does not show a strobilus?



A.



C.



B.



D.

Constructed Response

24. **Short Answer** Summarize the characteristics of ferns.
25. **Short Answer** Differentiate between Division Pterophyta and Division Lycophyta.

Think Critically

26. **Infer** the advantage of fern sori being on the under surface of fronds rather than on the upper.

Section 21.4

Vocabulary Review

For questions 27–29, replace each underlined word with the correct vocabulary term from the Study Guide page.

27. A root of a seed provide nutrients when it sprouts.
28. A plant that lives for several growing seasons is a rhizome.
29. A flower contains the male or female reproduction structures of gymnosperms.

Understand Key Concepts

30. Which plant division has plants with needlelike or scaly leaves?

A. Gnetophyta C. Coniferophyta
B. Anthophyta D. Cycadophyta

Use the photo below to answer question 31.



31. Which plant division has plants that produce female reproductive structures like those shown above?
- A. Coniferophyta C. Gnetophyta
B. Anthophyta D. Ginkgophyta
32. Which describes the importance of seed dispersal?
- A. ensures more favorable environments for growth
B. creates greater biodiversity
C. limits competition with parent plants and other offspring
D. provides greater resources

Constructed Response

33. **Open Ended** What might be the adaptive advantage of having a gametophyte dependent on a sporophyte?
34. **Short Answer** Make a list of the traits you would use to differentiate between coniferophytes and anthophytes.

Think Critically

35. **Compare and contrast** cones and strobili.
36. **Infer** why there are more conifers than flowering plants in colder environments such as those in northern Canada and Alaska.

Additional Assessment

37. **WRITING in Biology** Imagine yourself as one of the first plants that survived living on land. What stories could you tell your grandchildren about the difficulties you faced?



Document-Based Questions

Data obtained from: Qiu, Yin-Long, et al. 1998. The gain of three mitochondrial introns identifies liverworts as the earliest land plants. *Nature* 394: 671.

Here we survey 352 diverse land plants and find that three mitochondrial Group II introns are present . . . in mosses, hornworts and all major lineages of vascular plants, but are entirely absent from liverworts, green algae and all other eukaryotes. These results indicate that liverworts are the earliest land plants, with the three introns having been acquired in a common ancestor of all other land plants, and have important implications concerning early plant evolution.

38. Evaluate the research above by making a cladogram.
39. Explain how this research lead scientists to suggest that liverworts are the ancestors of all other plants.
40. Apply what you read in Chapter 13 about polymerase chain reactions to predict how the scientists determined which plants contained these introns.

Cumulative Review

41. Describe the cause of Down syndrome. (Chapter 11)
42. Discuss how plate tectonics explains why similar organisms can be associated on distant continents. (Chapter 14)
43. Describe some of the things Darwin saw that caused him to hypothesize that species evolve. (Chapter 15)
44. Compare and contrast the characteristics of prokaryotic and eukaryotic cells. (Chapter 18)