

## Section 23.1

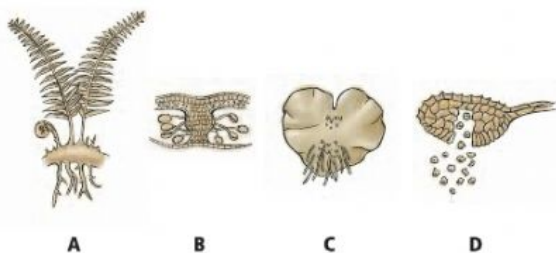
## Vocabulary Review

The sentences below are incorrect. Make each sentence correct by replacing the italicized word with a vocabulary term on the Study Guide page.

1. The *megaspore* of a conifer develops into the pollen grain.
2. A *protonema* is the gametophyte of a fern.
3. *Chemotaxis* is the growth of a new plant from a piece of the old plant.

## Understand Key Concepts

4. Which is a fern prothallus?

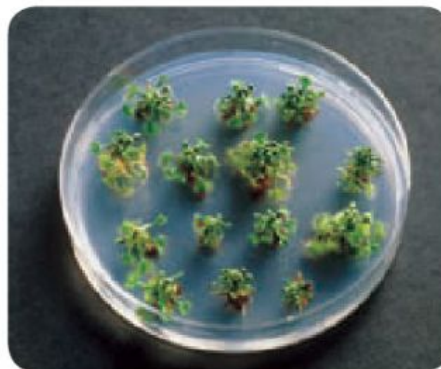


5. Which phrase accurately compares a fern sporophyte to the fern gametophyte?
  - A. smaller than
  - B. larger than
  - C. always independent of
  - D. always dependent on
6. From which structure does a conifer female gametophyte develop?
  - A. prothallus
  - B. fertilized egg
  - C. microspore
  - D. megaspore
7. Which is not an advantage of vegetative reproduction?
  - A. uniform plant features
  - B. genetically identical plants
  - C. faster reproduction
  - D. greater genetic variation

## Constructed Response

8. **Short Answer** Explain the benefits of female gametophyte development within a conifer cone.
9. **Short Answer** What are some advantages and disadvantages of the moss sporophyte growing on the gametophyte?

Use the image below to answer question 10.



10. **Short Answer** Explain the genetic relationship among the offspring shown above.

## Think Critically

11. **Discuss** the advantages or disadvantages of heterosporous plants.
12. **Suggest** a possible mechanism for the development of independent sporophyte generations as seen in conifers.

## Section 23.2

## Vocabulary Review

Distinguish between the vocabulary terms in each set.

13. pistil, stamen
14. long-day plant, short-day plant
15. petal, sepal

## Understand Key Concepts

16. Which flower organ produces pollen?
  - A. stamen
  - B. pistil
  - C. petal
  - D. sepal



17. What dark/light conditions produce flowers in a short-day plant?
- hours of darkness are greater than the hours of light
  - hours of darkness are less than hours of light
  - hours of darkness are equal to hours of light
  - hours of darkness and light are not factors

Use the image below to answer question 18.



18. Which terms describe the flower above?
- perfect, complete
  - perfect, incomplete
  - imperfect, incomplete
  - imperfect, complete
19. Which best describes pollen production in wind-pollinated flowers?
- small amounts of pollen
  - larger pollen grains
  - large amounts of pollen
  - large quantities of nectar
20. Which terms could describe a monocot flower?
- four sepals, four petals
  - five sepals, ten petals
  - twelve sepals, twelve petals
  - four sepals, eight petals

## Constructed Response

21. **Short Answer** Explain why *short-day* and *long-day* are not the best descriptive terms for these types of flowering plants.
22. **Open Ended** Suggest a flower modification that would make water necessary for pollination. Justify your suggestion.

23. **Short Answer** Explain how modifications in flower structure make pollination more successful.

## Think Critically

24. **Design an experiment** to test the ability of butterflies to distinguish between a real flower and an artificial flower.
25. **Assess** the benefits of photoperiodism.

## Section 23.3

### Vocabulary Review

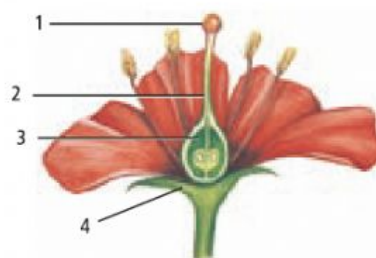
Explain the relationship between the vocabulary terms in each pair below.

- dormancy, germination
- hypocotyl, radicle
- polar nuclei, endosperm

### Understand Key Concepts

29. Which is not part of a seed?
- cotyledon
  - embryo
  - endosperm
  - pollen
30. Which describes the embryo of an anthophyte?
- diploid
  - haploid
  - monoploid
  - triploid
31. From what structure does a pollen grain develop?
- egg
  - embryo
  - endosperm
  - microspore

Use the image below to answer question 32.



32. From which structure is a fruit usually formed?
- 1
  - 2
  - 3
  - 4



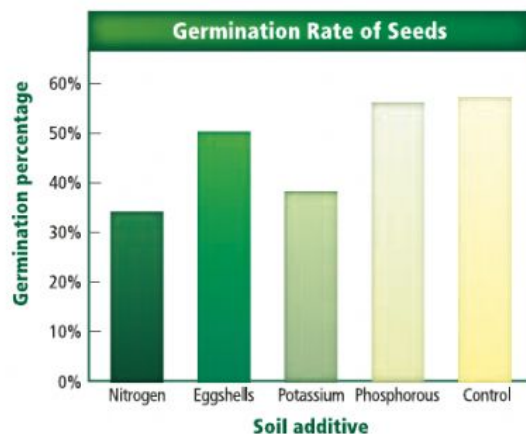
33. What is the inactive period of a seed?
- alternation of generations
  - dormancy
  - fertilization
  - photoperiodism

## Constructed Response

34. **Short Answer** Explain why fruit and/or seed dispersal is so important.
35. **Open Ended** Hypothesize why an anthophyte's female gametophyte produces so many nuclei when only two are involved in fertilization.
36. **Open Ended** When a seed germinates, as shown in **Figure 23.16**, the radicle usually is the first structure to break through the seed coat. Why is this beneficial for the embryo?

## Think Critically

Use the graph below to answer questions 37–38.



37. **Compare** the effects of each soil additive on the rate of germination to the control's rate of germination.
38. **Design** an experiment to test the effect on the rate of germination for various amounts of a soil additive. Choose one of the soil additives listed in the graph above.
39. **Analyze** the reduction in size of the gametophyte from mosses, to ferns, to anthophytes. What are the advantages or disadvantages of this trend?

## Additional Assessment

40. **WRITING in Biology** Write a short story about the life of a pollen grain.



## Document-Based Questions

Data obtained from: Lang, A. et al. 1977. Promotion and inhibition of flower formation in a day-neutral plant in grafts with a short-day plant and a long-day plant. *Proc. Natl. Acad. Sci.* 74 (6): 2412-2416.



The day-neutral plant flowered sooner when it was grafted to the short-day plant that was exposed to its critical period. The flowering of another day-neutral plant also was accelerated when it was grafted to a long-day plant that was exposed to its critical period.

41. Examine the drawings. Form a hypothesis about why the grafted day-neutral plants flowered before the day-neutral plant that was not grafted.
42. Predict what might happen if a long-day plant was grafted to a short-day plant and they were exposed to the critical period of the short-day plant.
43. Design an experiment to determine the "longest day" under which a long-day plant flowers.

## Cumulative Review

44. Relate genetic engineering to agriculture. (**Chapter 13**)
45. Choose three lines of evidence that support evolution. Give an example of each. (**Chapter 15**)
46. Describe the types of environments where you would expect to find protists. (**Chapter 19**)

## Cumulative

### Multiple Choice

- Which vascular tissue is composed of living tubular cells that carry sugars from the leaves to other parts of the plant?
  - cambium
  - parenchyma
  - phloem
  - xylem

Use the diagram below to answer question 2.



- Which labeled structure is part of a flower's male reproductive organ?
  - 1
  - 2
  - 3
  - 4
- Which statement provides evidence that anthophytes evolved after other seed plants?
  - About 75 percent of all plants are anthophytes.
  - Anthophytes do not require water to facilitate the fertilization of an egg.
  - Prehistoric tree-like ferns were the main coal-forming plants.
  - The seeds of anthophytes are more advanced than those of other seed plants.

- Which precedes the haploid generation in seedless vascular plants?
  - epiphytes
  - gametophytes
  - rhizomes
  - spores
- Which is the primary pollinator for conifers?
  - birds
  - insects
  - water
  - wind

Use the diagram below to answer question 6.



- Which structure produces cells that result in an increase in length of the root?
  - 1
  - 2
  - 3
  - 4
- Which statement is true of an aseptate fungus?
  - Cell walls are made of cellulose.
  - Cell walls are made of thin membranes.
  - Hyphae are not divided by cross walls.
  - Hyphae are not present except during reproduction.
- A tuber is an adaptation of which structure?
  - cell
  - leaf
  - root
  - stem

## Short Answer

Use the diagram below to answer question 9.



9. Describe two ways that bread mold could spread in a kitchen.
10. List two characteristics of nonvascular plants that compensate for their lack of transport tissues.
11. A certain type of fern has a chromosome number of 14. What would be the chromosome number of the prothallus? Explain why.
12. Explain the benefit to nonvascular plants of having very thin rhizoids and leaflike structures.
13. Name and describe the three types of plant cells and their functions.
14. Interpret how the actions of plate tectonics affected the evolution of primates.
15. Imagine that a friend who lives in Montana gives you some seeds from a plant. You plant the seeds in Florida but they do not grow. Predict why the seeds do not germinate in Florida.

## Extended Response

16. Infer how collenchyma cells support surrounding plant tissues.
17. Critique the idea that roots in the ground do not need oxygen to survive.
18. A forest near a city provides drainage for rainfall runoff. A group of citizens is protesting new housing developments in the forest because they believe flooding and property destruction will result. Analyze the value of biodiversity that describes their concern.
19. Suppose that a couple wants to have children and neither the man nor the woman has cystic fibrosis. However, some distant family members have cystic fibrosis. Could their child have the disease? Write an explanation summarizing the risk for this couple.

## Essay Question

Water is important for functions in plants. For example, it is one of the reactants in the chemical reactions of photosynthesis. Water enters a plant by diffusion. Most of the water that enters a plant diffuses into roots. Therefore, water must be in a higher concentration in the soil than in the roots. After water enters the roots, it moves through vascular tissue to tissues that contain chloroplasts. The water also diffuses into the plants' cells, making them rigid.

Using the information in the paragraph above, answer the following question in essay format.

20. When more water leaves a plant than enters it, the plant begins to wilt. Explain the role of guard cells in regulating the amount of water in a plant.

If You Missed Question . . .	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Review Section . . .	22.1	23.2	21.4	21.3	23.1	22.1	20.1	22.2	20.3	21.2	23.1	21.2	22.1	16.1	23.3	22.1	22.2	5.1	11.1	22.2
Georgia Standards	B3b	B3b	B5b	B3b	B4a	B3b	B3b	B3b	B4a	B4e	B2e	B1d	B3b	B5a	B4a	B3b	S6c	B4c	S6c	B3b

B = Biology Content Standard, S = Characteristics of Science Standard