

# Chapter Resources

## Plants

### Includes:

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#### Reproducible Student Pages

##### ASSESSMENT

- ✓ Chapter Tests
- ✓ Chapter Review

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- ✓ Laboratory Activities
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##### TRANSPARENCY ACTIVITIES

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- ✓ Teaching Transparency Activity
- ✓ Assessment Transparency Activity

##### Teacher Support and Planning

- ✓ Content Outline for Teaching
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- ✓ Teacher Guide and Answers



**Glencoe**

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# Reproducible Student Pages

## Reproducible Student Pages

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# Hands-On Activities



## Measuring Water Absorption by a Moss

### Procedure

1. Place a few teaspoons of *Sphagnum* moss on a piece of **cheesecloth**. Gather the corners of the cloth and twist, then tie them securely to form a ball.
2. Weigh the ball.
3. Put 200 mL of **water** in a **container** and add the ball.
4. After 15 min, remove the ball and drain the excess water into the container.
5. Weigh the ball and measure the amount of water left in the container.
6. Wash your hands after handling the moss.

### Analysis

Calculate how much water was absorbed by the *Sphagnum* moss.

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TRY AT HOME

**Mini  
LAB****Observing Water Moving in a Plant****Procedure**    

1. Into a **clear container** pour **water** to a depth of 1.5 cm. Add 25 drops of **red food coloring** to the water.
2. Put the root end of a **green onion** into the container. Do not cut the onion in any way. Wash your hands.
3. The next day, examine the outside of the onion. Peel off the onion's layers and examine them. **WARNING:** *Do not eat the onion.*

**Analysis**

Infer how the location of red color inside the onion might be related to vascular tissue.

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# Identifying Conifers

## Lab Preview

**Directions:** Answer these questions before you begin the Lab.

1. Identify the two types of conifer leaves.

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2. Why will you need a separate sheet of paper for this lab?

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*How can you tell a pine from a spruce or a cedar from a juniper? One way is to observe their leaves. The leaves of most conifers are either needlelike—shaped like needles—or scalelike—shaped like the scales on a fish. Examine and identify some conifer branches using the key below.*

## Real-World Question

How can leaves be used to classify conifers?

### Materials

short branches of the following conifers:

- pine
- cedar
- spruce
- Douglas fir
- hemlock
- fir
- redwood
- arborvitae
- juniper

\*illustrations of the conifers above

\*Alternate materials

### Goals

- Identify the difference between needlelike and scalelike leaves.
- Classify conifers according to their leaves.

### Safety Precautions



Wash your hands after handling leaves.

### Procedure

1. **Observe** the leaves or illustrations of each conifer, then use the key at the right to identify it.
2. **Write** the number and name of each conifer you identify in the table in the Data and Observations section.

### Key to Classifying Conifer Leaves

- |  |
|--|
| 1. All leaves are needlelike.<br>a. yes, go to 2<br>b. no, go to 8                       |
| 2. Needles are in clusters.<br>a. yes, go to 3<br>b. no, go to 4                         |
| 3. Clusters contain 2, 3, or 5 needles.<br>a. yes, pine<br>b. no, cedar                  |
| 4. Needles grow on all sides of the stem.<br>a. yes, go to 5<br>b. no, go to 7           |
| 5. Needles grow from a woody peg.<br>a. yes, spruce<br>b. no, go to 6                    |
| 6. Needles appear to grow from the branch.<br>a. yes, Douglas fir<br>b. no, hemlock      |
| 7. Most of the needles grow upward<br>a. yes, fir<br>b. no, redwood                      |
| 8. All the leaves are scalelike but not prickly.<br>a. yes, arborvitae<br>b. no, juniper |



(continued)

## Data and Observations

Conifers Identified		
1.	4.	7.
2.	5.	8.
3.	6.	9.

## Conclude and Apply

1. Name two traits of hemlock leaves.

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2. Compare and contrast pine and cedar leaves.

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## Communicating Your Data

Use the information from the key to identify conifers growing on your school grounds. Draw and label a map that locates these conifers. Post the map in your school. **For more help, refer to the Science Skill Handbook.**





## Use the Internet Plants as Medicine

*You may have read about using peppermint to relieve an upset stomach, or taking Echinacea to boost your immune system and fight off illness. But did you know that pioneers brewed a cough medicine from lemon mint? In this lab, you will explore plants and their historical use in treating illness, and the benefits and risks associated with using plants as medicine.*


### Real-World Question

How are plants used in maintaining good health?

#### Goals

- **Identify** two plants that can be used as a treatment for illness or as a supplement to support good health.
- **Research** the cultural and historical use of each of the two selected plants as medical treatments.
- **Review** multiple sources to understand the effectiveness of each of the two selected plants as a medical treatment.
- **Compare and contrast** the research and form a hypothesis about the medicinal effectiveness of each of the two plants.

#### Data Source

 Visit [msscience.com](http://msscience.com) for more information about plants that can be used for maintaining good health and for data collected by other students.

### Analyze Your Data

1. **Write** a description of how different cultures have used each plant as medicine.

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2. How have the plants you investigated been used as medicine historically?

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3. **Record** all the uses suggested by different sources for each plant.

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(continued)

4. **Record** the side effects of using each plant as a treatment.

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### Conclude and Apply

1. After conducting your research, what do you think are the benefits and drawbacks of using these plants as alternative medicines?

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2. **Describe** any conflicting information about using each of these plants as medicine.

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3. Based on your analysis, would you recommend the use of each of these two plants to treat illness or promote good health? Why or why not?

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4. What would you say to someone who was thinking about using any plant-based, over-the-counter, herbal supplement?

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### Communicating Your Data

Find this lab using the link below. Post your data for the two plants you investigated in the tables provided. **Compare** your data to those of other students. Review data that other students have entered about other plants that can be used as medicine.

 [msscience.com](http://msscience.com)

**LAB**  
**1** Laboratory  
 Activity

## Root Structure and Functions

Roots hold a plant in the ground. They also absorb, store, and transport water and minerals. They have small threadlike side roots with root hairs that absorb water and minerals from the soil. Taproots, such as carrots, have a primary root that grows straight down into the soil. Taproots look very different from fibrous roots, such as those on grasses, which have many small roots branching out in different directions.

### Strategy

You will examine a dissected carrot root.

You will label a diagram of a root and list the function of each part.

### Materials

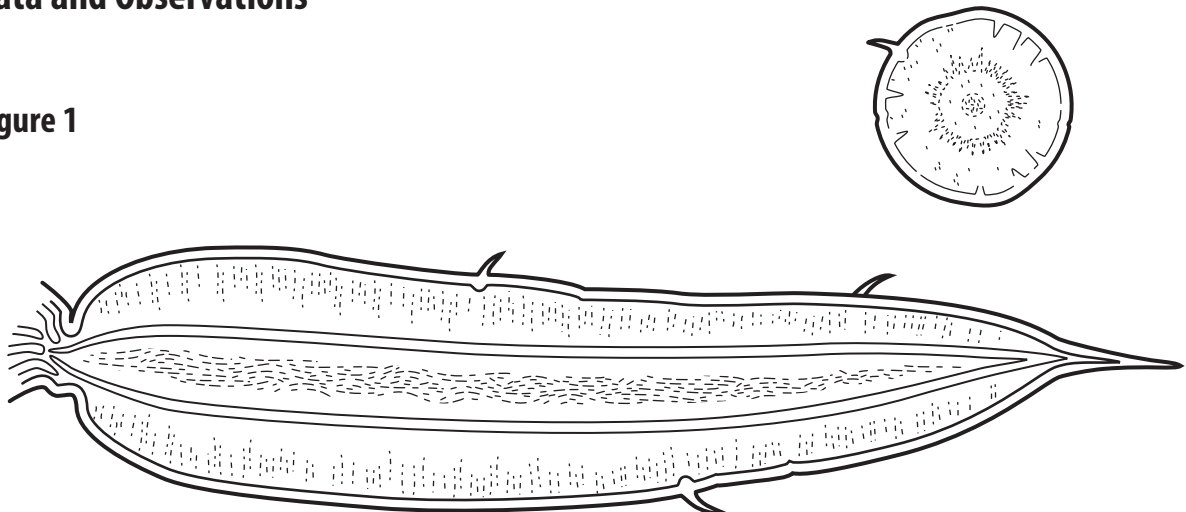
carrot sliced crosswise  
 carrot sliced lengthwise  
 magnifying lens

### Procedure

1. Your teacher will prepare a crosswise slice of a carrot for you.
2. Hold the slice up to the light. Compare what you see with Figure 1 under Data and Observations.
3. Examine the lengthwise slice of the carrot. Use the magnifying lens. Look at both the inner and outer parts.
4. The outside layer of the root is the epidermis. Lateral roots grow from the epidermal cells and root hairs grow from them. Label the epidermis, lateral roots, and root hairs if all of these structures are present.
5. Inside the epidermis, you will find several layers of large, loosely packed cells that store food. This is the cortex. Food stored in the cortex can be used by other cells of the plant. Label the cortex.
6. Inside the cortex are tubelike cells from xylem vessels that carry water and minerals in the plant. Label the xylem cells.
7. Other tubelike cells inside the cortex carry food in the plant. These cells are called phloem cells. Label the phloem cells.

### Data and Observations

**Figure 1**



**Laboratory Activity 1 (continued)****Questions and Conclusions**

1. What type of root is the carrot?

\_\_\_\_\_

2. What is the function of the root hairs?

\_\_\_\_\_

\_\_\_\_\_

3. How many different kinds of cells did you see in the carrot slice?

\_\_\_\_\_

4. What is the name and function of the outer ring of cells?

\_\_\_\_\_

5. What is the green part at the top end of the carrot?

\_\_\_\_\_

6. What is the name and function of the thicker layer of cells next to the epidermis?

\_\_\_\_\_

7. What cells are found in the inner core?

\_\_\_\_\_

8. What is the function of these cells?

\_\_\_\_\_

\_\_\_\_\_

9. Why do you think taproots are used as food more often than fibrous roots?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

10. List some other food plants that have a taproot.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Strategy Check**

\_\_\_\_\_ Can you examine a carrot root?

\_\_\_\_\_ Can you identify the locations of each part of a root?

## LAB 2 Laboratory Activity

# Parts of a Fruit

Some of the plants we call vegetables are actually fruits. Fruits are formed inside flowers that have been pollinated and fertilized. After fertilization takes place, the petals fall off and the ovary begins to develop into the fruit.

### Strategy

You will study the structure of typical fleshy and dry fruits. You will examine several fruits and classify the fruits as fleshy or dry.

### Materials

plum	peach	okra	pea in a pod	corn
tomato	peanut	olive	avocado	bean in a pod
apple	acorn	pear	sunflower seed	

### Procedure

1. Read the following paragraphs and study the diagrams.

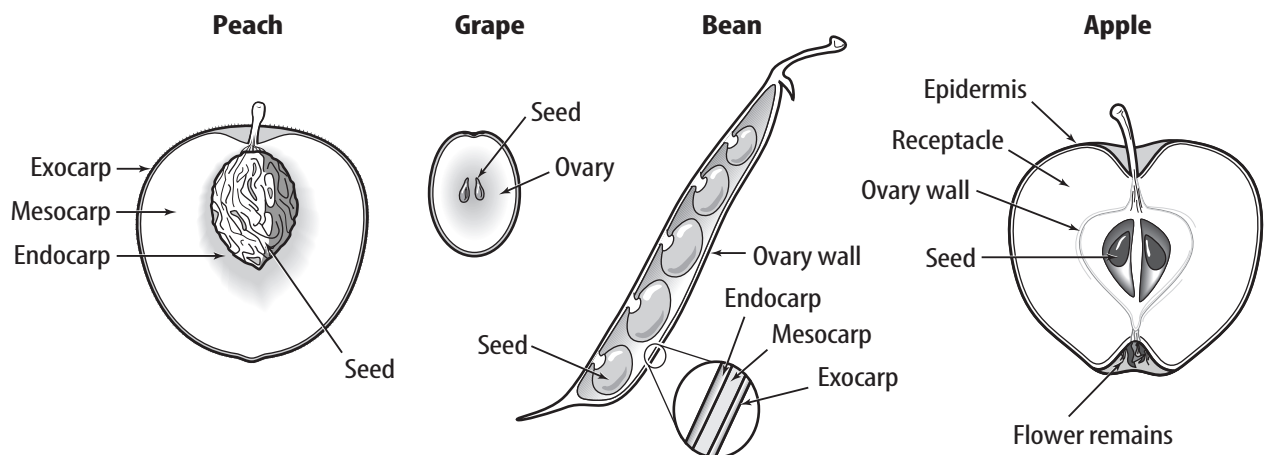
The peach is a fleshy fruit. A fleshy fruit consists of a single ripened ovary with a soft, fleshy ovary wall when ripe. Three kinds of fleshy fruits are the drupe, pome, and the berry. The peach is a drupe. The exocarp is the covering or skin. The mesocarp is fleshy. The endocarp is hard and encloses the seed.

The apple is a pome. The stem is the stalk by which the flower was attached. At the other end are the remains of the sepals, petals, and a ring of dried stamens. The thin skin is the epidermis. The fleshy part inside the skin developed from the receptacle, or flower stalk. The papery core is the ovary wall. Within the ovary are the seeds.

The grape is a berry. The entire ovary is soft.

Dry fruits have an ovary wall that is dry and brittle when ripe. They are classified as dehiscent or indehiscent. A dehiscent fruit splits along a definite seam when ripe. The bean is a dehiscent fruit called a legume. It splits along two seams.

2. Examine each of the fruits listed in Table 1 and determine if they are fleshy or dry. Determine the type of fruit (drupe, pome, or berry; dehiscent or indehiscent). Record your answers in the table.



## Laboratory Activity 2 (continued)

### Data and Observations

Table 1

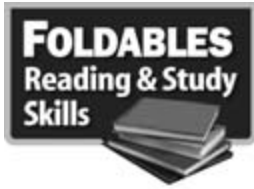
Fruit	Fleshy or dry	Type
1. Plum		
2. Tomato		
3. Apple		
4. Peach		
5. Peanut		
6. Acorn		
7. Okra		
8. Olive		
9. Pear		
10. Pea		
11. Avocado		
12. Sunflower		
13. Corn		
14. Bean		

### Questions and Conclusions

1. What part of a flower becomes the fruit? \_\_\_\_\_
2. What part of a flower becomes the seed? \_\_\_\_\_
3. What are some fruits that we call vegetables? \_\_\_\_\_
4. What are some seeds that people eat? \_\_\_\_\_
5. From what part of the flower does a peach develop? \_\_\_\_\_
6. From what part of the flower does a grape develop? \_\_\_\_\_

### Strategy Check

- \_\_\_\_\_ Did you study the structure of fleshy and dry fruits?
- \_\_\_\_\_ Did you examine several fruits and classify them as fleshy or dry?



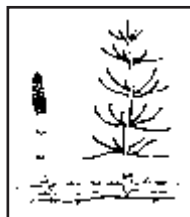
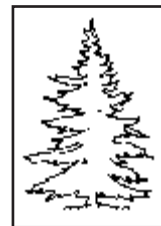
# Plants

**Directions:** Use this page to label your Foldable at the beginning of the chapter.

## Know?

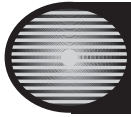
## Like to know?

## Learned?

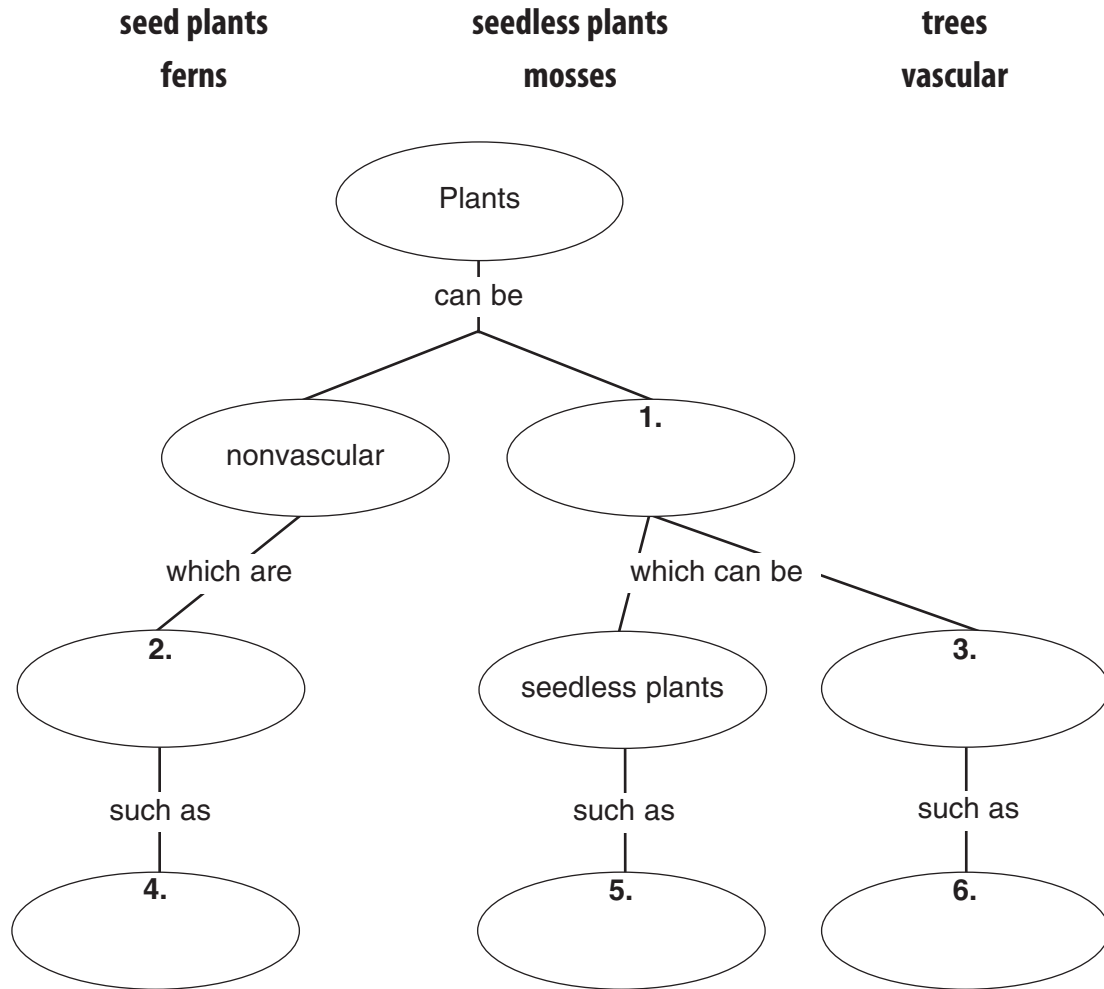


# Meeting Individual Needs



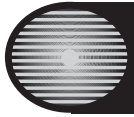


**Directions:** Complete the concept map using the terms in the list below.



**Directions:** Identify plants listed below by writing in the correct designations in the spaces provided. The plants might be **seedless**, **vascular**, or **both**.

- \_\_\_\_\_ 7. ferns
- \_\_\_\_\_ 8. mosses
- \_\_\_\_\_ 9. carrots
- \_\_\_\_\_ 10. redwoods
- \_\_\_\_\_ 11. liverworts
- \_\_\_\_\_ 12. horsetails



Directed Reading for  
Content Mastery

## Section 1 ■ An Overview of Plants

**Directions:** Complete the following sentences using the terms listed below.

**chlorophyll**

**spores**

**binomial nomenclature**

**carotenoids**

1. Plant adaptations include the development of water-resistant \_\_\_\_\_.
2. A system called \_\_\_\_\_ was developed by Linnaeus and gives each species a two-word name.
3. Chlorophyll and \_\_\_\_\_ show that plants and green algae probably had a common ancestor.
4. Most plants are green because their cells contain \_\_\_\_\_.

**Directions:** Answer the following questions on the lines provided.

5. How do cell walls and a cuticle help plants live in deserts?

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6. What is the origin of plants?

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7. How do scientists study evolution of plants?

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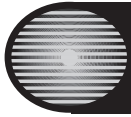
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8. Explain the advantages of life on land for plants.

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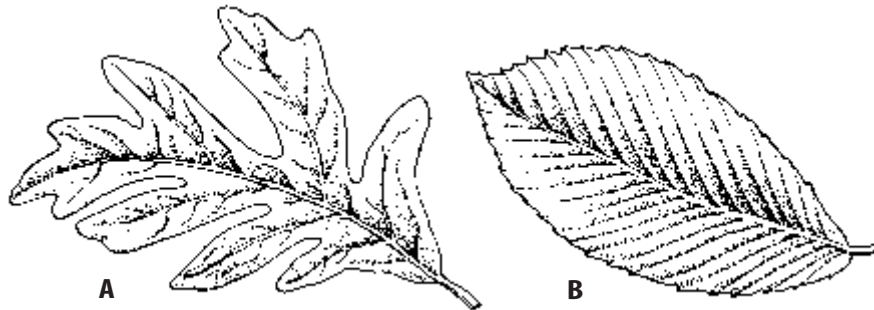
Directed Reading for  
Content Mastery

**Section 2** ■ Seedless Plants  
**Section 3** ■ Seed Plants

**Directions:** *Identify each structure as part of a seedless plant, a seed plant, or both.*

- \_\_\_\_\_ 1. fern leaf  
 \_\_\_\_\_ 2. chloroplast  
 \_\_\_\_\_ 3. yellow flower  
 \_\_\_\_\_ 4. bean  
 \_\_\_\_\_ 5. cellulose  
 \_\_\_\_\_ 6. spore  
 \_\_\_\_\_ 7. cone  
 \_\_\_\_\_ 8. peach

**Directions:** *Use the illustrations to answer the following questions.*

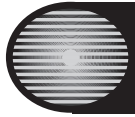


9. Which illustration shows a dicot? Which one shows a monocot?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

10. Explain how you reached your conclusion above.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

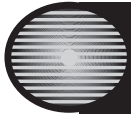


Directed Reading for  
Content Mastery

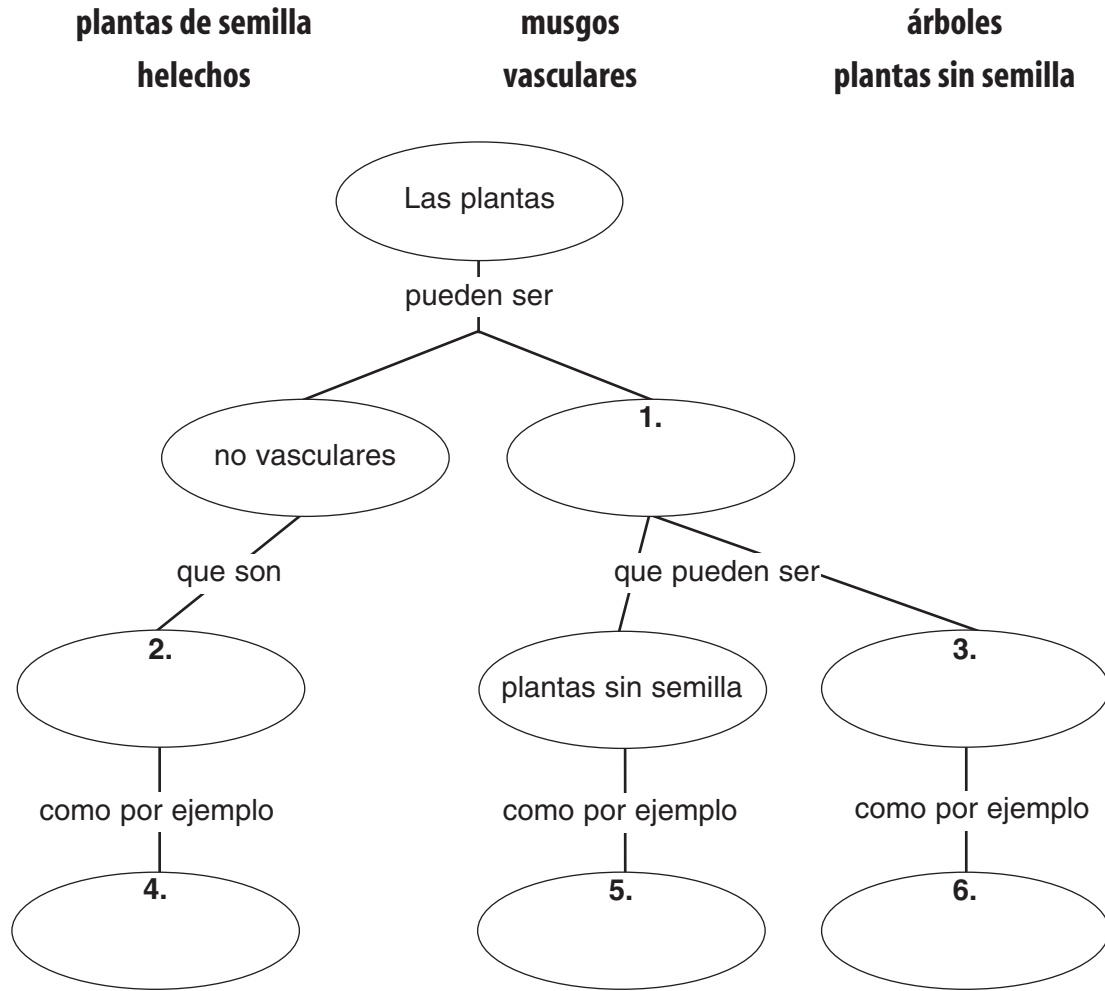
## Key Terms Plants

**Directions:** Draw a line to connect the description on the left to the appropriate term on the right.

- |   |                    |
|---|--------------------|
| 1. tubes that move food from where it is made to other parts of the plant                             | rhizoids           |
| 2. plants without vascular tissues  | phloem             |
| 3. plants with tissues that carry water and nutrients   | cuticle            |
| 4. vessels that carry water and dissolved substances from roots to other parts of the plant           | nonvascular plants |
| 5. vascular plants that produce seeds on the surface of female reproductive structures, such as cones | stomata            |
| 6. vascular plants that flower and have fruits that contain seeds                                     | angiosperms        |
| 7. organisms that are the first to grow in new or disturbed areas                                     | gymnosperms        |
| 8. plants with one cotyledon inside their seeds   | dicots             |
| 9. plants with two cotyledons inside their seeds  | monocots           |
| 10. openings that open and close to allow carbon dioxide, water, and oxygen to enter and exit a leaf  | pioneer species    |
| 11. threadlike structures that anchor nonvascular plants in place                                     | vascular plants    |
| 12. waxy, protective layer on a plant's surface that slows the loss of water                          | xylem              |

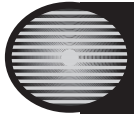


**Instrucciones:** Completa el mapa de conceptos usando los términos de la siguiente lista.



**Instrucciones:** Identifica las siguientes plantas. Escribe las designaciones correctas en los espacios dados. Las plantas pueden ser **sin semilla, vasculares o ambas**.

- \_\_\_\_\_ 7. helechos
- \_\_\_\_\_ 8. musgos
- \_\_\_\_\_ 9. zanahorias
- \_\_\_\_\_ 10. secoyas
- \_\_\_\_\_ 11. hepáticas
- \_\_\_\_\_ 12. colas de caballo



Lectura dirigida para

Dominio del contenido

## Sección 1 ■ Introducción a las plantas

**Instrucciones:** Completa las oraciones con los siguientes términos.

**clorofila****esporas****nomenclatura binaria****carotenoides**

1. Las adaptaciones de las plantas incluyen el desarrollo de \_\_\_\_\_ resistentes al agua.
2. Lineo desarrolló un sistema llamado \_\_\_\_\_, el cual le da a cada especie un nombre con dos partes.
3. La clorofila y los(las) \_\_\_\_\_ muestran que las plantas y las algas verdes probablemente tuvieron un ancestro común.
4. La mayoría de las plantas son verdes porque sus células contienen un pigmento llamado \_\_\_\_\_.

**Instrucciones:** Contesta las siguientes preguntas en el espacio dado.

5. ¿Cómo ayuda a las plantas del desierto el tener paredes celulares y cutícula?

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6. ¿Cuál es el origen de las plantas?

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7. ¿Cómo estudian los científicos la evolución de las plantas?

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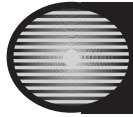
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8. Explica qué ventajas ofrece el vivir sobre tierra para las plantas.

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Lectura dirigida para  
Dominio del contenido

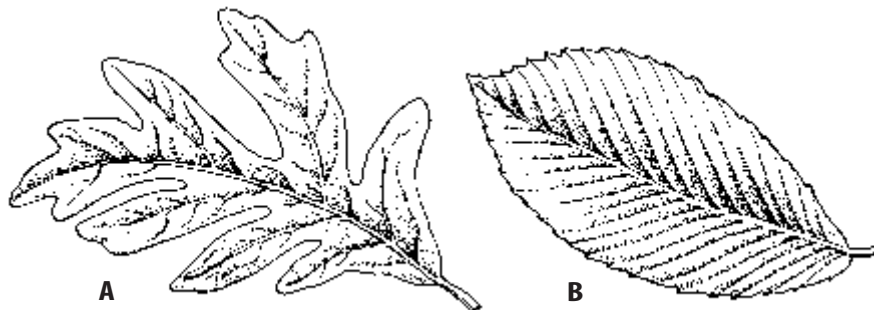
**Sección 2 ■ Plantas sin semilla**

**Sección 3 ■ Plantas de semilla**

**Instrucciones:** *Identifica cada estructura como parte de una planta sin semilla, planta de semilla o ambas.*

- \_\_\_\_\_ 1. hoja de helecho  
 \_\_\_\_\_ 2. cloroplasto  
 \_\_\_\_\_ 3. flor amarilla  
 \_\_\_\_\_ 4. arveja  
 \_\_\_\_\_ 5. celulosa  
 \_\_\_\_\_ 6. espora  
 \_\_\_\_\_ 7. cono  
 \_\_\_\_\_ 8. melocotón

**Instrucciones:** *Usa la ilustración para responder las preguntas.*



9. ¿Cuál ilustración muestra una dicotiledónea? ¿Cuál muestra una monocotiledónea?

\_\_\_\_\_

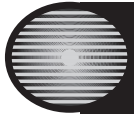
\_\_\_\_\_

10. Explica cómo llegaste a la conclusión de la respuestas anterior.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



Lectura dirigida para

Dominio del contenido

## Términos claves

### Plantas

**Instrucciones:** Conecta con una línea la descripción de la izquierda con el término correcto de la derecha.

- |  |                       |
|--|-----------------------|
| 1. tubos que transportan el alimento desde donde se produce hasta otras partes de la planta                                | rizoide<br>floema     |
| 2. plantas sin tejidos vasculares  |                       |
| 3. plantas con tejidos que transportan agua y nutrientes   | cutícula              |
| 4. vasos que llevan agua y sustancias disueltas desde las raíces hasta otras partes de la planta                           | plantas no vasculares |
| 5. plantas vasculares que producen semillas en la superficie de las estructuras reproductoras femeninas, como conos.       | estomas               |
| 6. plantas vasculares que producen flores y frutos que contienen semillas  | angiospermas          |
| 7. organismos que son los primeros en crecer en áreas nuevas o alteradas.  | gimnospermas          |
| 8. plantas con sólo un cotiledón en la semilla   | dicotiledóneas        |
| 9. plantas con dos cotiledones dentro del xilema de la semilla   | monocotiledóneas      |
| 10. aberturas que se abren y se cierran y dejan que entren o salgan de la hoja el dióxido de carbono, el agua y el oxígeno | especies pioneras     |
| 11. estructuras filamentosas que sostienen una planta no vascular en su sitio  | plantas vasculares    |
| 12. cubierta cerosa protectora en la superficie de las plantas que evita la pérdida de agua                                | xilema                |



**SECTION**  
**1****Reinforcement****An Overview of Plants**

**Directions:** Answer the following questions on the lines provided.

1. Name two things that all plants have in common.

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2. What are two characteristics shared by plants and green algae?

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3. What adaptations allowed plants to live successfully on land?

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4. Name one benefit to a plant of living on land compared to living in water.

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5. What is the difference between vascular plants and nonvascular plants?

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6. Explain why most plants are green.

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7. Where do plants that grow from year to year store the food they will need to begin their growth in the spring?

---

**SECTION**  
**2**
**Reinforcement**
**Seedless Plants**

**Directions:** Complete the following sentences using the correct terms. Some of the terms may not be used.

**vascular**
**nonvascular**
**rhizoids**
**mosses**
**liverworts**
**pioneer species**

- Organisms that are the first to grow in new or disturbed areas are called \_\_\_\_\_.
- Ground pines, spike mosses, horsetails, and ferns are all types of seedless \_\_\_\_\_ plants.
- Liverworts, hornworts, and \_\_\_\_\_ are seedless nonvascular plants.
- \_\_\_\_\_ are the threadlike roots of nonvascular plants that absorb and distribute water directly through their cell walls.

**Directions:** Answer the following question on the lines provided.

- What is the relationship between ferns and coal? \_\_\_\_\_  
\_\_\_\_\_

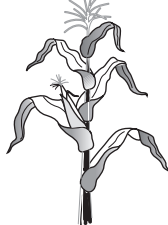
**Directions:** Classify the following plants as **vascular** or **nonvascular**.

Rose



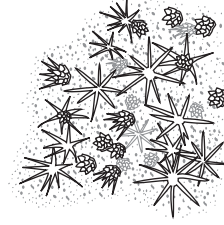
6. \_\_\_\_\_

Corn



7. \_\_\_\_\_

Moss



8. \_\_\_\_\_

Daisy



9. \_\_\_\_\_

Liverwort



10. \_\_\_\_\_

Grass



11. \_\_\_\_\_

**SECTION**  
**3**

**Reinforcement**

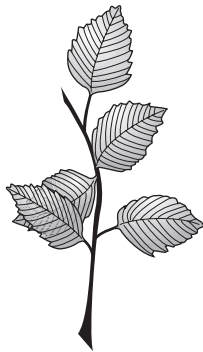
**Seed Plants**

**Directions:** Contrast the two major groups of seed plants by completing the table. Use information from your textbook.

**Table 1**

	Gymnosperms	Angiosperms
1. Characteristics		
2. Examples		

**Directions:** Study the plants pictured below. On the line under each plant, write whether that plant is a **monocot** or a **dicot**.



3. \_\_\_\_\_



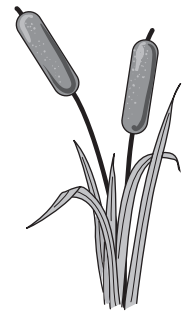
4. \_\_\_\_\_



5. \_\_\_\_\_



6. \_\_\_\_\_



7. \_\_\_\_\_

**Directions:** Answer the following questions on the lines provided.

8. What is a seed plant?

\_\_\_\_\_

9. What are the functions of xylem and phloem?

\_\_\_\_\_

10. What are some economic uses of gymnosperms?

\_\_\_\_\_

\_\_\_\_\_

## SECTION

## 1

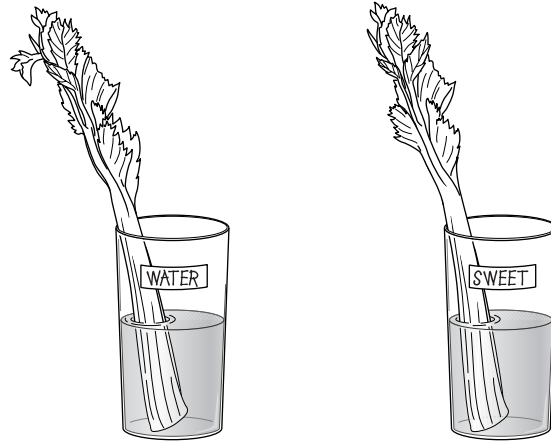
## Enrichment

## Sweet Celery

The following activity will show you how a vascular plant moves nutrients to all its parts.

**Materials**

- 2 fresh, washed stalks of celery with leaves  
(stalks from the middle of the bunch work best)
- 2 tall glasses
- sugar
- measuring spoons
- masking tape
- pen

**Procedure**

1. Fill each glass half-full with water.
2. Add 4 tablespoons of sugar to one of the glasses. Label the glass “sweet” on a piece of masking tape.
3. Label the other glass “water.”
4. Put a celery stalk in each glass and leave them for 48 hours.
5. Taste the leaves from each stalk. **CAUTION:** *Never taste anything in a lab setting. This activity is safe because it uses only celery, sugar, and water.*

**Data and Observations**

1. How did the celery leaf from the sugar water taste? \_\_\_\_\_
2. How did the celery leaf from the plain water taste? \_\_\_\_\_

**Conclude and Apply**

1. How did the sugar get from the water to the celery leaf?

---



---

2. How do plants get nutrients from the soil to their leaves?

---



---

3. What advantages do plants with this adaptation have?

---



---

## SECTION 2

### Enrichment

# From Ocean to Land

Liverworts are small, rootless plants with thin, green leaves shaped like tiny livers. Recent evidence suggests that ancient liverworts were the first multicellular organisms on Earth some 470 million years ago. Scientists are calling the 0.04 mm-high plants “trailblazers” since they started the colonization of Earth, leading other plants and animals.

### Precambrian Explosion

More than three billion years ago, the oceans were full of one-celled organisms and the land was bare except for a few microbes. Then, about 600 million years ago, multicellular plants and animals arose in the ocean during the Precambrian Explosion.

For a long time, scientists hypothesized that liverworts or mosses were the first plants to make their way to land. They thought this because both are simple, rootless plants. But, with almost no fossil evidence, scientists had

to find something else to back up their hypothesis. So they studied the DNA of more than 350 types of modern plants. They were looking for introns, or pieces of genetic information. Specifically, scientists concentrated on trying to find three ancient introns.

### First on Land?

Scientists found the introns in all of the plants that they studied, except liverworts. Only the liverworts lacked the three introns. Scientists found that the three introns are missing from aquatic green algae, too. That indicates that the land plant (liverwort) and the ocean plant (green algae) are closely related. Because of that link, scientists reason that liverworts were probably the first water plants to come ashore.

Of course, scientists don't yet know exactly which of the more than 8,000 species of liverworts was responsible for making the move from ocean to land.

1. How did scientists find the link between land and water plants?

---



---

2. How do you think modern-day plants got the introns that are missing in liverworts and green algae?

---



---

3. Why do you think plants, rather than animals, were the first to live on land?

---



---

4. How do you think scientists can find out which of the thousands of species of liverworts became the first land dwellers?

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# SECTION 3

## Enrichment

# Mapping Gymnosperms and Angiosperms

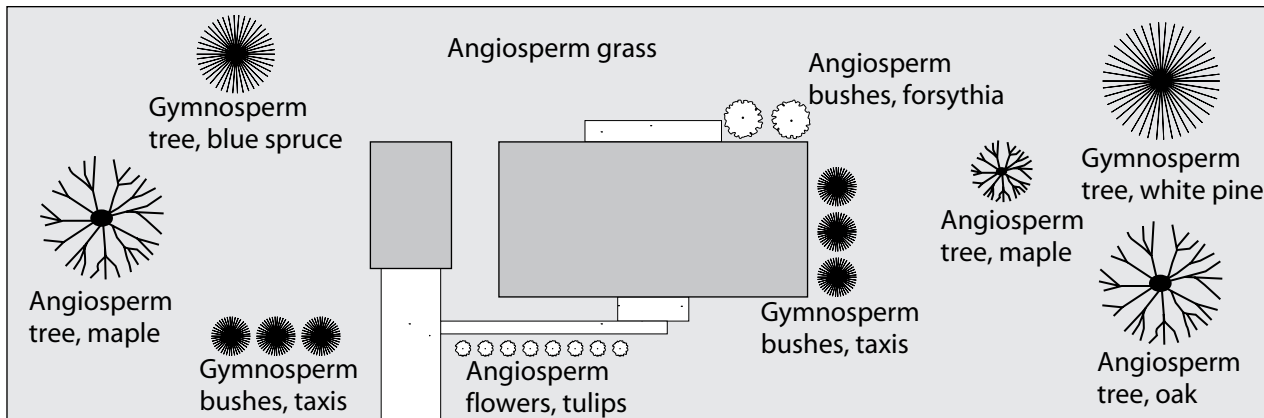
### Materials

paper  
pencil

### Procedure

1. Choose an area with which you are familiar—a yard or a small park or the school grounds. Using a blank sheet of paper, make a map of the area that shows the major plants and identifies them as either gymnosperms or angiosperms. Make your map similar to the one on this page.
2. Identify the plants you map as specifically as you can. As shown on the example map, first write “Angiosperm” or “Gymnosperm.”

You may use information in your textbook to help you identify the plants as either an angiosperm or a gymnosperm. Then, write a general term such as “tree,” “bush,” “flower,” or “grass.” Finally, write the specific name for any plants that you know. Ask adults for help. Many adults will be glad to tell you the names of the bushes and trees they have planted in their yard. Also, you can find books on tree and bush identification in almost any library.



### Conclude and Apply

1. Did you find more angiosperms or gymnosperms?

\_\_\_\_\_

2. Of the angiosperms you identified, which are monocots and which are dicots?

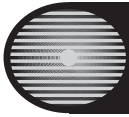
\_\_\_\_\_

\_\_\_\_\_

3. What can you conclude about the variety of plants in an area?

\_\_\_\_\_

\_\_\_\_\_



## Note-taking Worksheet

# Plants

## Section 1 An Overview of Plants

### A. Plant cells

1. Unlike animal cells, plant cells have \_\_\_\_\_, which provide structure and protection.
2. Most plant cells contain the green pigment \_\_\_\_\_.
  - a. \_\_\_\_\_—process where plants use chlorophyll to make food
  - b. Chlorophyll is found in a cell structure called a \_\_\_\_\_.
3. Most of the space inside many plant cells is taken up by a large, membrane-bound structure called a central \_\_\_\_\_, which regulates water content.

### B. Scientists think plants probably evolved from \_\_\_\_\_ in the sea because:

1. Plants and green algae have the same types of \_\_\_\_\_ and \_\_\_\_\_.
2. Fossils of early plants are similar to the \_\_\_\_\_.

### C. When plants moved to land, they had to \_\_\_\_\_ to new conditions.

1. More sunlight and \_\_\_\_\_ were available.
2. Plants developed a \_\_\_\_\_—a waxy, protective layer secreted onto the surface of the plant which holds water in and allows plants to live in drier conditions.
3. Cell walls developed \_\_\_\_\_, a chemical compound that provides structure and support, which allows plants to stand upright on land.
4. Water-resistant \_\_\_\_\_ and \_\_\_\_\_ enabled plants to reproduce on land.

### D. Plant classification

1. **Vascular plants** use \_\_\_\_\_ that carry water and nutrients throughout the plant.
2. \_\_\_\_\_ **plants** lack tubelike structures and use other ways to move water and nutrients.

## Section 2 Seedless Plants

### A. Nonvascular plants—very small plants that have **rhizoids** rather than \_\_\_\_\_

1. Water is absorbed and distributed directly through cell membranes and \_\_\_\_\_.
2. Grow in \_\_\_\_\_ environments
3. Reproduce by \_\_\_\_\_ rather than seeds
4. Examples of nonvascular plants:
  - a. \_\_\_\_\_—green, leaflike growths arranged around a central stalk
  - b. \_\_\_\_\_—flattened, leaflike bodies

## Note-taking Worksheet (continued)

- c. \_\_\_\_\_—have only one chloroplast in each of their cells
5. Frequently pioneer species—organisms that are the first to grow in new or disturbed areas and which change \_\_\_\_\_ conditions
- B. Seedless vascular plants**—reproduce by spores, but have \_\_\_\_\_ tissue that carries water and nutrients throughout the plant
- Can grow \_\_\_\_\_ and \_\_\_\_\_ than nonvascular plants
  - \_\_\_\_\_—largest group of seedless vascular plants
    - Have stems, leaves, and \_\_\_\_\_
    - \_\_\_\_\_ are called fronds
    - Reproduce by \_\_\_\_\_ found on the back of their fronds
  - Club mosses—needlelike leaves
  - Horsetails—jointed stem with a \_\_\_\_\_ center
- C. Importance of seedless plants**
- Fuel—decaying seedless plants are compressed into peat and eventually \_\_\_\_\_
  - Soil conditioners
  - \_\_\_\_\_ can be used for weaving material and basketry

### Section 3 Seed Plants

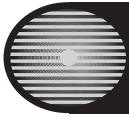
- A. Characteristics of seed plants**
- Have leaves, stems, roots, and \_\_\_\_\_
  - Reproduce by \_\_\_\_\_, which contain an embryo and stored food
- B. Leaves trap \_\_\_\_\_ and make food through photosynthesis.**
- \_\_\_\_\_—a thin layer of cells on the upper and lower surfaces of a leaf
    - May have a waxy \_\_\_\_\_ coating the epidermis
    - \_\_\_\_\_—small openings in the epidermis that allow carbon dioxide, water, and oxygen to enter and exit a leaf
    - Each stoma is surrounded by two \_\_\_\_\_ that open and close it.
  - Palisade layer—contains \_\_\_\_\_, where most food is made
  - \_\_\_\_\_ layer—loosely arranged cells and air
- C. Stems allow the movement of materials between \_\_\_\_\_ and \_\_\_\_\_.**
- Usually \_\_\_\_\_ ground
  - \_\_\_\_\_ the branches, leaves, and flowers



**Note-taking Worksheet (continued)**

3. May store \_\_\_\_\_
4. Two kinds:
  - a. \_\_\_\_\_ stems—soft and green
  - b. \_\_\_\_\_ stems—hard, rigid, and woody
- D. Roots collect \_\_\_\_\_ and nutrients from the ground.
  1. Roots \_\_\_\_\_ plants so they don't blow away.
  2. May store food or \_\_\_\_\_.
- E. Vascular tissue
  1. **Xylem** tissue—transports \_\_\_\_\_ from the roots throughout the plant
  2. **Phloem** tissue—moves \_\_\_\_\_ from where it is made to other parts of the plant
  3. **Cambium** tissue—produces new \_\_\_\_\_ and \_\_\_\_\_ cells
- F. \_\_\_\_\_—vascular plants that produce seeds that are not protected by fruit
  1. \_\_\_\_\_ trees alive
  2. Gymnosperms have no \_\_\_\_\_.
  3. Leaves are often \_\_\_\_\_ or scalelike, evergreens
  4. Four divisions: \_\_\_\_\_, cycads, ginkgoes, and gnetophytes
  5. Conifers reproduce by male and female \_\_\_\_\_.
- G. \_\_\_\_\_—vascular plants that flower and have fruit that contains seeds
  1. Fruit develops from \_\_\_\_\_.
  2. Most fruit contains \_\_\_\_\_.
  3. Two groups:
    - a. \_\_\_\_\_—have one cotyledon used for food storage inside their seeds
    - b. \_\_\_\_\_—have two cotyledons inside their seeds
  4. Different angiosperms have different life cycles:
    - a. Annual—the plant's life cycle is completed within \_\_\_\_\_
    - b. Biennial—the plant's life cycle is completed in \_\_\_\_\_
    - c. \_\_\_\_\_—takes more than two years to grow to maturity
- H. Human life depends on \_\_\_\_\_.
  1. Wood for construction and paper products comes from \_\_\_\_\_.
  2. Angiosperms form the basis of \_\_\_\_\_ for most animals, including humans.

# Assessment



## Chapter Review

# Plants

### Part A. Vocabulary Review

**Directions:** Complete the following sentences using the terms listed below.

**cellulose**  
**cuticle**

**rhizoids**  
**nonvascular plants**

**vascular plants**  
**pioneer species**

- The first plants to grow in new environments are called \_\_\_\_\_.
- Cell walls are made of \_\_\_\_\_.
- Moss plants are held in place by rootlike filaments called \_\_\_\_\_.
- \_\_\_\_\_ are plants that have vessels.
- The waxy, protective layer on stems and leaves of plants is the \_\_\_\_\_.
- \_\_\_\_\_ lack a tubelike system of vessels.

**Directions:** Unscramble the terms on the left to form the correct word for each definition on the right.

- |                       |   |
|-----------------------|---|
| _____ 7. tocdi        | flowering plant with two cotyledons in its seed |
| _____ 8. lymex        | tissue of tubular vessels that move water       |
| _____ 9. hemplo       | tissue that moves food from leaves and stems    |
| _____ 10. micmuab     | tissue that produces new xylem and phloem cells |
| _____ 11. amosatt     | small pores in the leaf surface                 |
| _____ 12. rugad slecl | cells that open and close stomata               |

**Directions:** Study the meanings of the word parts listed below. Then write a word containing a word part from the list next to its definition.

- |  |                     |                  |                    |
|--|---------------------|------------------|--------------------|
| <b>angio</b> —enclose  | <b>gymno</b> —naked | <b>mono</b> —one | <b>sperm</b> —seed |
| _____ 13. flowering vascular plants with seeds inside a fruit      |                     |                  |                    |
| _____ 14. nonflowering vascular plants that produce seeds on cones |                     |                  |                    |
| _____ 15. flowering plants with one cotyledon in their seeds       |                     |                  |                    |

**Directions:** Match the plant part with the correct function. Some plant parts will be used more than once.

- |                                      |         |
|--------------------------------------|---------|
| _____ 16. absorbs water and minerals | a. leaf |
| _____ 17. transports food and water  | b. root |
| _____ 18. stores food for the plant  | c. stem |
| _____ 19. makes food for the plant   |         |
| _____ 20. supports the plant         |         |

## Chapter Review (continued)

### Part B. Concept Review

**Directions:** List four characteristics of plants.

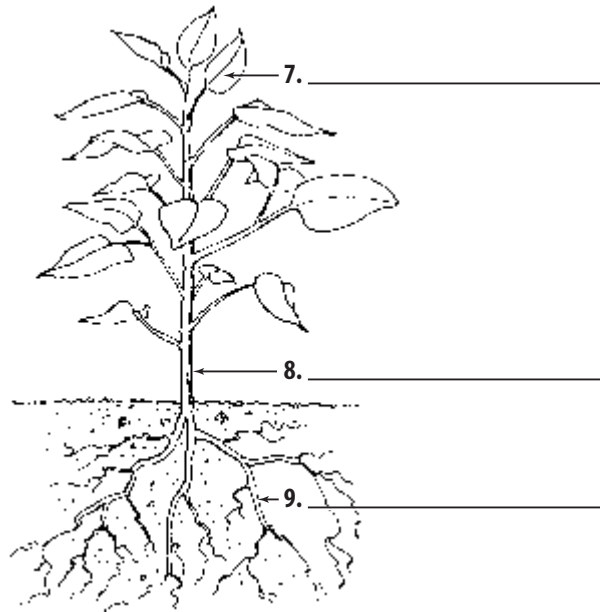
1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

**Directions:** Describe two structural adaptations of plants that enabled them to live on land.

5. \_\_\_\_\_
6. \_\_\_\_\_

**Directions:** Identify each plant part and write what it does on the lines provided.

7. \_\_\_\_\_  
\_\_\_\_\_
8. \_\_\_\_\_  
\_\_\_\_\_
9. \_\_\_\_\_  
\_\_\_\_\_



**Directions:** Answer the following question using complete sentences.

10. Explain three ways in which nonvascular and vascular spore-producing plants are important.

\_\_\_\_\_

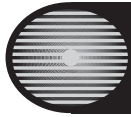
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## Chapter Test

# Plants

### I. Testing Concepts

**Directions:** Match the description in Column I with the item in Column II by writing the correct letter in the space provided. Some items in the second column may not be used.

- |   |                       |
|---|-----------------------|
| _____ 1. composes the cell walls of plants  | a. angiosperm         |
| _____ 2. waxy layer on stems and leaves   | b. cambium            |
| _____ 3. plants with a tubelike system of vessels                                 | c. cellulose          |
| _____ 4. rootlike filament that holds a moss in place                             | d. cuticle            |
| _____ 5. vascular plants with no flowers or fruit; produce seeds in cones         | e. dicot              |
| _____ 6. vascular plants with flowers; produce seeds inside fruit                 | f. guard cells        |
| _____ 7. flowering plants with two cotyledons in their seeds                      | g. gymnosperms        |
| _____ 8. name given to the first plants to grow in new environments               | h. monocots           |
| _____ 9. tissue that moves food from leaves to other plant parts                  | i. nonvascular plants |
| _____ 10. tissue that produces new xylem and phloem cells                         | j. phloem             |
| _____ 11. in a plant leaf, cells that surround the stomata to open and close them | k. pioneer species    |
|   | l. rhizoid            |
|   | m. stomata            |
|   | n. vascular plants    |
|   | o. xylem              |

**Directions:** For each of the following, write the letter of the term or phrase that best completes the sentence.

- \_\_\_\_\_ 12. Scientists hypothesize plants evolved directly from \_\_\_\_\_.  
 a. cellulose                      b. fungi                      c. bacteria                      d. green algae
- \_\_\_\_\_ 13. Seedless nonvascular plants include \_\_\_\_\_.  
 a. ferns and horsetails                      c. liverworts and ferns  
 b. horsetails and mosses                      d. mosses and liverworts
- \_\_\_\_\_ 14. Vascular plants **DO NOT** include \_\_\_\_\_.  
 a. hornworts                      b. carrots                      c. rose bushes                      d. trees
- \_\_\_\_\_ 15. Nonvascular plants lack all of the following **EXCEPT** \_\_\_\_\_.  
 a. leaves                      b. roots                      c. seeds                      d. stalks
- \_\_\_\_\_ 16. Moss plants are held in place by threads made up of only a few long cells called \_\_\_\_\_.  
 a. guard cells                      b. rhizoids                      c. stomata                      d. vascular tissue
- \_\_\_\_\_ 17. The first plants to grow in new environments are \_\_\_\_\_.  
 a. ferns and horsetails                      c. liverworts and mosses  
 b. trees                      d. large flowering plants

**Chapter Test (continued)**

- \_\_\_\_\_ 18. The oldest trees alive today are \_\_\_\_\_.  
a. angiosperms      b. herbaceous      c. gymnosperms      d. monocots
- \_\_\_\_\_ 19. The major function of leaves is to \_\_\_\_\_.  
a. store food      c. absorb water and minerals  
b. make food      d. move water to other plant parts
- \_\_\_\_\_ 20. Roots usually have all of the following functions **EXCEPT** \_\_\_\_\_.  
a. absorbing water and minerals      c. making food  
b. anchoring the plant      d. storing food
- \_\_\_\_\_ 21. Stems usually have all of the following functions **EXCEPT** \_\_\_\_\_.  
a. absorbing nutrients from soil  
b. storing food  
c. supporting the aboveground parts of the plant  
d. allowing movement of materials between leaves and roots
- \_\_\_\_\_ 22. Monocots have all of the following characteristics **EXCEPT** \_\_\_\_\_.  
a. one cotyledon in their seeds      c. vascular bundles throughout the stems  
b. vascular bundles in rings      d. flower parts in threes
- \_\_\_\_\_ 23. Seed plants have all of the following **EXCEPT** \_\_\_\_\_.  
a. rhizoids      c. roots  
b. vascular tissue      d. leaves
- \_\_\_\_\_ 24. Ferns are the most abundant of the \_\_\_\_\_ plants.  
a. seedless nonvascular      c. nonvascular  
b. seedless vascular      d. vascular
- \_\_\_\_\_ 25. Peat is actually the earliest stage of \_\_\_\_\_.  
a. coal      b. natural gas      c. petroleum      d. petrified wood
- \_\_\_\_\_ 26. Small pores in the leaf surface are called \_\_\_\_\_.  
a. the cuticle      b. the epidermis      c. guard cells      d. stomata
- \_\_\_\_\_ 27. The cells of the \_\_\_\_\_ have chloroplasts filled with chlorophyll.  
a. cuticle      b. epidermis      c. palisade layer      d. xylem
- \_\_\_\_\_ 28. \_\_\_\_\_ tissue is made up of tubular vessels that transport water and minerals up from the roots throughout the plant.  
a. Cambium      b. Palisade      c. Phloem      d. Xylem

**II. Understanding Concepts****Skill: Hypothesizing**

1. Volcanic activity, floods, fires, hurricanes, and development by humans can disturb the environment drastically. Hypothesize what might happen if there were no pioneer species.

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## Chapter Test (continued)

### Skill: Outlining

2. Complete the following outline using the correct terms.

### Seedless Plants

#### I. Vascular Plants

##### A. Types

1. club mosses \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

##### B. Characteristics

1. \_\_\_\_\_
2. roots \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

#### II. Nonvascular plants

##### A. \_\_\_\_\_

1. mosses \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

##### B. Characteristics

1. \_\_\_\_\_
2. stalks that look like stems \_\_\_\_\_
3. leaflike green growths \_\_\_\_\_
4. \_\_\_\_\_

### Skill: Observing and Inferring

**Directions:** List two structural adaptations that occurred in plants as they moved from their original habitat, and tell what function those structures serve.

3. Adaptation and function: \_\_\_\_\_  
\_\_\_\_\_
4. Adaptation and function: \_\_\_\_\_  
\_\_\_\_\_

### Skill: Classifying

**Directions:** Classify the following examples as a **gymnosperm**, a **monocot angiosperm**, or a **dicot angiosperm**.

5. maple tree: \_\_\_\_\_
6. pine tree: \_\_\_\_\_
7. orange: \_\_\_\_\_
8. corn: \_\_\_\_\_
9. ginkgo: \_\_\_\_\_
10. wheat: \_\_\_\_\_

## Chapter Test (continued)

### Skill: Comparing and Contrasting

**Directions:** Descriptions of gymnosperm and angiosperm evolution are listed in the table below. Complete the table by writing the correct name of the group next to its description.

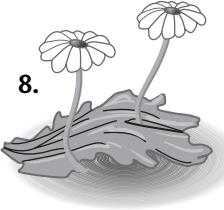
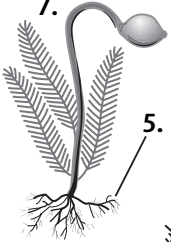

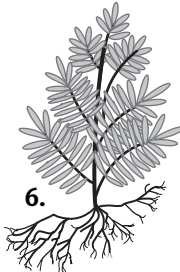
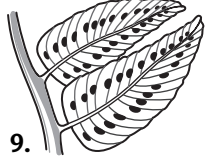
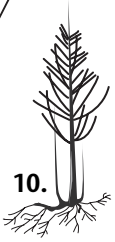
Seed Plant Evolution	
11.	Origin: uncertain; in Cretaceous period, 120 million years ago
12.	Origin: a group of plants in Paleozoic period, 350 million years ago

### III. Applying Concepts

**Directions:** List four main characteristics of seed plants.

1. \_\_\_\_\_ 3. \_\_\_\_\_  
 2. \_\_\_\_\_ 4. \_\_\_\_\_

**Directions:** Match each organism or structure with its name.

_____ 5.		a. club moss
_____ 6.		b. fern
_____ 7.		c. horsetail
_____ 8.		d. liverwort
_____ 9.		e. moss
_____ 10.		f. rhizoid

**Directions:** Classify each of the plants below as a **seedless nonvascular**, a **seedless vascular**, or a **seed plant**.

11. hornwort: \_\_\_\_\_ 14. horsetail: \_\_\_\_\_  
 12. fern: \_\_\_\_\_ 15. tulip: \_\_\_\_\_  
 13. liverwort: \_\_\_\_\_

### Writing Skills

**Directions:** Answer the following question using complete sentences.

16. Gardeners find dandelions difficult to successfully hand-weed. Why would this be true?

\_\_\_\_\_

\_\_\_\_\_



# Transparency Activities

## SECTION

## 1

Section Focus  
Transparency Activity**A Lot Can Happen  
in 4,000 Years.**

Bristlecone pines live a very long time. The oldest one is thought to be over 4,600 years old. From the time the pyramids at Giza were built through this very moment, it has lived in a quiet spot in eastern California. Bristlecones are usually found at high altitudes where it is very dry.



1. Looking at the picture, describe the bristlecone pine's environment.
2. What might some advantages be to the bristlecone's habitat?  
What might be disadvantages?

**SECTION**  
**2****Section Focus**  
**Transparency Activity****A Fresh Start**

After a forest fire has burned out, what happens to the barren acres of land? Will lush vegetation ever thrive in these areas again? Probably. In fact, it could even be better than before!



1. What life can you identify in the top picture?
2. What life can you identify in the bottom picture? What function might these first plants serve?

**SECTION****3****Section Focus  
Transparency Activity****Rooted in Nature**

Bonsai is an ancient method of growing trees or shrubs in small containers. The plants are kept small by pruning the branches and roots. Because some types of plants used for bonsai can live for more than 100 years, they are passed from generation to generation.



1. What are some advantages to having bonsai plants? What might some disadvantages be?
2. What qualities do you think would be important in practicing bonsai?

**SECTION**  
**3**

**Teaching Transparency**  
**Activity**

# Monocots and Dicots

**Monocot**



Vascular bundles

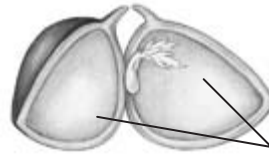
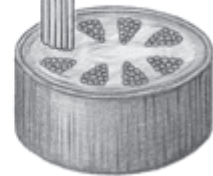


Cotyledon

**Dicot**



Vascular bundle



Cotyledons

**Teaching Transparency Activity (continued)**

1. What is a cotyledon?

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2. How do the number of flower parts and cotyledons differ in monocots and dicots?

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3. What is the function of vascular tissue in plants?

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4. How do vascular bundles of monocots and dicots differ?

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5. What is the name given to vascular plants in which the seed is enclosed inside a fruit?

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6. Cereal grains such as corn, rice, oats, and wheat are examples of what type of flowering plants?

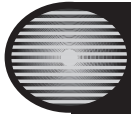
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7. Trees such as oaks and maples, vegetables such as lettuce and beans, and fruits such as watermelons and oranges are examples of what type of flowering plants?

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**Assessment  
Transparency Activity**

# Plants

**Directions:** Carefully review the table and answer the following questions.

Watering and Plant Growth				
Day	Plant A with no water	Plant B watered monthly	Plant C watered weekly	Plant D watered daily
1	10 cm	11 cm	12 cm	8 cm
5	10 cm	12 cm	13 cm	12 cm
10	10 cm	12 cm	15 cm	18 cm
15	10 cm	13 cm	17 cm	19 cm
20	10 cm	13 cm	20 cm	23 cm
25	10 cm	?	22 cm	27 cm

- According to the table, which plant was the tallest on Day 5?
  - A Plant A
  - B Plant B
  - C Plant C
  - D Plant D
- According to the table, which plant grew the most between Day 1 and Day 20?
  - F Plant A
  - G Plant B
  - H Plant C
  - J Plant D
- If everything remains the same, what is a reasonable prediction for the height of Plant B on Day 25?
  - A 10 cm
  - B 14 cm
  - C 18 cm
  - D 24 cm

