

**CHAPTER 12** Introduction to Plants  
**SECTION 3** **Seed Plants**



**California Science Standards**

7.2.a, 7.5.f

**BEFORE YOU READ**

After you read this section, you should be able to answer these questions:

- How are seed plants different from seedless plants?
- What are the parts of a seed?
- How do gymnosperms and angiosperms reproduce?

**STUDY TIP**

**List** As you read this section, list the characteristics of gymnosperms and angiosperms.

**What Are Seed Plants?**

Many of the plants you are most familiar with are seed plants. Seed plants include trees, such as oaks and pine trees, as well as flowers, such as roses and dandelions. Seed plants are one of the two main groups of vascular plants.

Like all plants, seed plants have a two-stage life cycle. However, seed plants differ from seedless plants, as shown below.

Seedless plants	Seed plants
They do not produce seeds.	They produce seeds.
The gametophyte grows as an independent plant.	The gametophyte lives inside the sporophyte.
Sperm need water to swim to the eggs.	Sperm are carried to the eggs by pollen.

**READING CHECK**

**1. Explain** Why can seed plants live in more habitats than seedless plants?

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Seed plants do not depend on moist habitats for reproduction, the way seedless plants do. Seed plants can live in many more places than seedless plants can. ✓

**CALIFORNIA STANDARDS CHECK**

**7.5.f** Students know the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.

**Word Help: generate**  
to bring about; to produce

**2. Identify** What process must occur before a seed can develop?

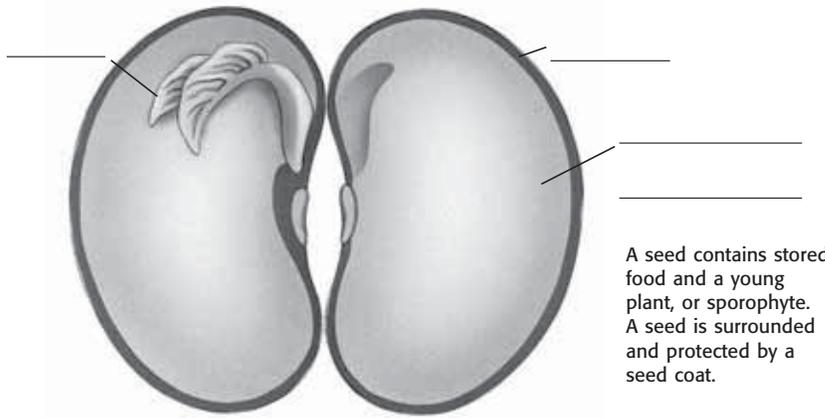
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**What Is a Seed?**

A *seed* is a structure that feeds and protects a young plant. It forms after fertilization, when a sperm and an egg join. A seed has the following three main parts:

- a young plant, or sporophyte
- *cotyledons*, early leaves that provide food for the young plant
- a seed coat that covers and protects the young plant

**SECTION 3** Seed Plants *continued*



A seed contains stored food and a young plant, or sporophyte. A seed is surrounded and protected by a seed coat.

**TAKE A LOOK**

**3. Label** Label the parts of a seed with these terms: young plant, seed coat, cotyledon.

**ADVANTAGES OF HAVING SEEDS**

Seeds give plants some advantages. For example, when the young plant inside a seed begins to grow, it uses the food stored in the seed. In contrast, the spores of seedless plants don't have stored food to help a new plant grow. Therefore, they will live only if they land in an area with enough resources.

Another advantage is that seeds can be spread by animals. The spores of seedless plants are usually spread by wind. Animals often spread seeds more efficiently than the wind spreads spores. Therefore, seeds that are spread by animals are more likely to find a good place to grow.

*Critical Thinking*

**4. Apply Concepts** It is helpful for seed plants to have a supply of food in the seed. What do you think is the reason?

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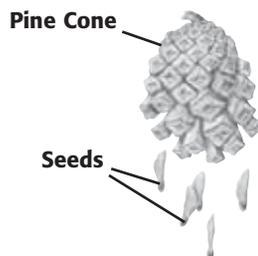
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**What Kinds of Plants Have Seeds?**

Seed plants are divided into two main groups: gymnosperms and angiosperms. *Gymnosperms* are non-flowering plants, and *angiosperms* are flowering plants.

**GYMNOSPERMS**

Gymnosperms are seed plants that do not have flowers or fruits. They include plants such as pine trees and redwood trees. Many gymnosperms are evergreen, which means that they keep their leaves all year. Gymnosperm seeds usually develop in a cone, like a pine cone. ✓



**READING CHECK**

**5. Identify** What structure do gymnosperm seeds usually develop in?

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**SECTION 3** Seed Plants *continued*

**REPRODUCTION IN GYMNOSPERMS**

The most well-known gymnosperms are the conifers. Conifers are evergreen trees and shrubs, such as pines, spruces, and firs, that make cones to reproduce. They have male cones and female cones. Spores in male cones develop into male gametophytes, and spores in female cones develop into female gametophytes. The gametophytes produce sperm and eggs.

A **pollen** grain contains the tiny male gametophyte. When the wind blows, it carries pollen from the male cones to the female cones. This movement of pollen to the female cones is called **pollination**. Pollination is part of sexual reproduction in plants. ✓

After pollination, sperm fertilize the eggs in the female cones. A fertilized egg develops into a new sporophyte inside a seed. Eventually, the seeds fall from the cone. If the conditions are right, the seeds will grow.

**READING CHECK**

**6. Explain** How is gymnosperm pollen carried from one plant to another?

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**TAKE A LOOK**

**7. Explain** Does this picture show an example of sexual or asexual reproduction? Explain.

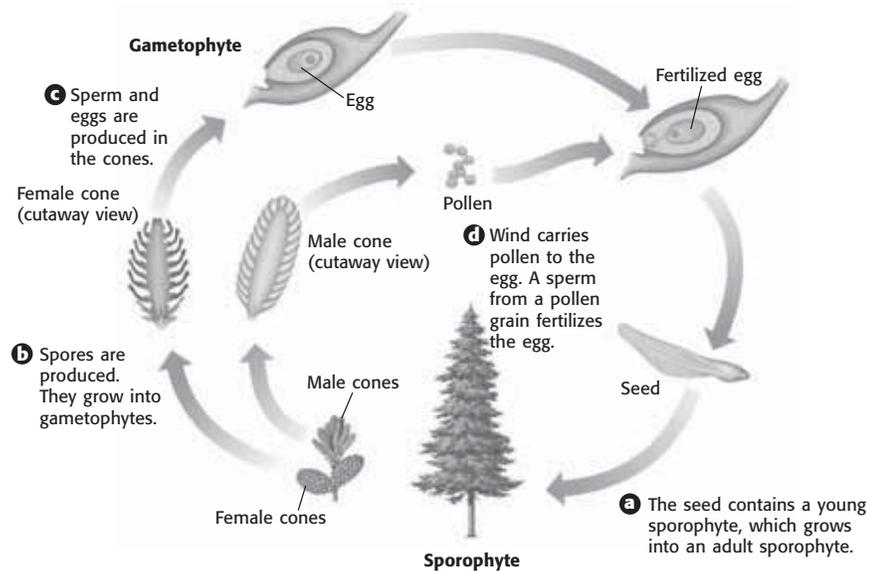
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**IMPORTANCE OF GYMNOSPERMS**

Gymnosperms are used to make many products, such as medicines, building materials, and household products. Some conifers produce a drug used to fight cancer. Many trees are cut so that their wood can be used to build homes and furniture. Pine trees make a sticky substance called resin. Resin can be used to make soap, paint, and ink.

**SECTION 3** Seed Plants *continued***What Are Angiosperms?**

Angiosperms are seed plants that produce flowers and fruit. Maple trees, daisies, and blackberries are all examples of angiosperms. There are more angiosperms on Earth than any other kind of plant. They can be found in almost every land ecosystem, including grasslands, deserts, and forests.

**REPRODUCTION IN ANGIOSPERMS**

In angiosperms, pollination takes place in flowers. Some angiosperms depend on the wind for pollination. Others rely on animals such as bees and birds to carry pollen from flower to flower.

Angiosperm seeds develop inside fruits. Some fruits and seeds, like those of a dandelion, are made to help the wind carry them. Other fruits, such as blackberries, attract animals that eat them. The animals drop the seeds in new places, where they can grow into plants. Some fruits, such as burrs, travel by sticking to animal fur. ✓

**IMPORTANCE OF ANGIOSPERMS**

Flowering plants provide food for animals. A mouse that eats seeds and berries uses flowering plants directly as food. An owl that eats a field mouse uses flowering plants indirectly as food. Flowering plants can also provide food for the animals that pollinate them.

People use flowering plants, too. Major food crops, such as corn, wheat, and rice, come from flowering plants. Many flowering trees, such as oak trees, can be used for building materials. Plants such as cotton and flax are used to make clothing and rope. Flowering plants are also used to make medicines, rubber, and perfume oils.

**Math Focus**

**8. Calculate** There are 300,000 species of angiosperms on Earth and 840 species of gymnosperms. What percentage of seed plants are angiosperms?

 **READING CHECK**

**9. Identify** Where do angiosperm seeds develop?

 **Say It**

**Describe** Think of all the products you used today that came from angiosperms. Describe to the class five items you used in some way and what kind of angiosperm they came from.

# Section 3 Review

7.2.a, 7.5.f 

## SECTION VOCABULARY

<b>pollen</b> the tiny granules that contain the male gametophyte of seed plants	<b>pollination</b> the transfer of pollen from the male reproductive structures to the female structures of seed plants
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1. **Compare** How are the gametophytes of seed plants different from the gametophytes of seedless plants?

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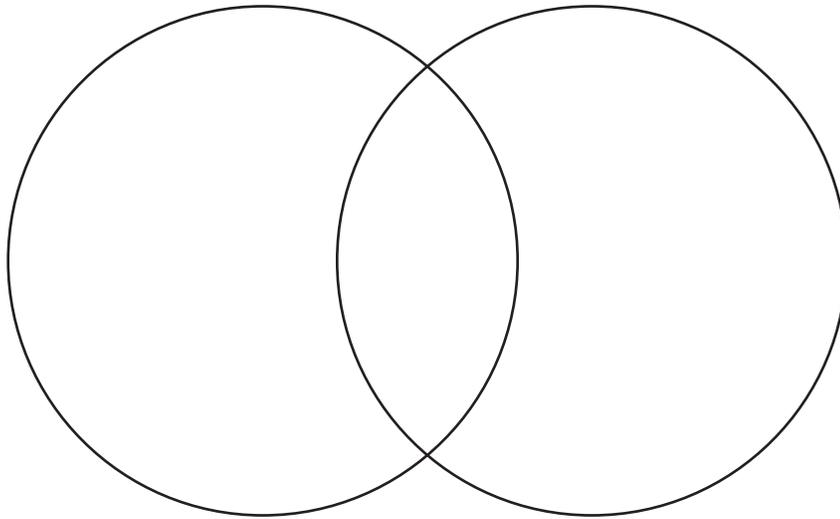
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2. **Describe** What happens during pollination?

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3. **Compare** Use a Venn Diagram to compare gymnosperms and angiosperms.



4. **Identify** What two structures are unique to angiosperms?

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5. **List** What are the three main parts of a seed? What does each part do?

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