

<b>Course</b>	Agricultural Science II
<b>Unit</b>	Plant Science
<b>Lesson</b>	Reproduction – Sexual and Asexual
<b>Estimated Time</b>	Two 50-minute blocks

### Student Outcome

The student will be able to describe how plants reproduce sexually and asexually.

### Learning Objectives

1. Explain the difference between sexual and asexual propagation.
2. Explain what a flower is.
3. Identify the parts of complete and incomplete flowers.
4. Explain what is involved in pollination and fertilization.
5. List the conditions that can influence pollination and fertilization.
6. Identify the plant parts which may be used for asexual propagation.
7. Describe the methods of asexual propagation.

### Grade Level Expectations

SC/LO/3/A/09-11/a	SC/LO/3/B/09-11/a	SC/LO/3/B/09-11/b
SC/LO/3/B/09-11/d	SC/LO/3/B/09-11/e	SC/LO/3/C/09-11/a
SC/LO/3/D/09-11/c	SC/LO/3/E/09-11/a	SC/LO/3/E/09-11/b
SC/EC/3/B/09-11/a		

### Resources, Supplies & Equipment, and Supplemental Information

#### Resources

1. PowerPoint Slide  
☐ Ppt 1 – Parts of a Complete Flower
2. *Plant Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1991.
3. *Plant Science Curriculum Enhancement*. University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

#### Supplies & Equipment

- ☐ Two germination trays (flats) and soil or growing medium
- ☐ Package of seeds for a fast germinating flowering annual
- ☐ Potted geranium plant
- ☐ Propagation knife
- ☐ Rooting hormone

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## Supplemental Information

### 1. Internet Sites

- ❑ Flower Parts. FloridaGardner.com. Accessed January 24, 2008, from <http://www.floridagardener.com/misc/flowersparts.htm>.
- ❑ Plant Morphology: The Parts of a Flower. American Museum of Natural History, New York City. Accessed January 24, 2008, from [http://www.amnh.org/learn/biodiversity\\_counts/ident\\_help/Parts\\_Plants/parts\\_of\\_flower.htm](http://www.amnh.org/learn/biodiversity_counts/ident_help/Parts_Plants/parts_of_flower.htm).
- ❑ Plant Propagation. Basics of Organic Fertilizers. Accessed January 24, 2008, from <http://www.basic-info-4-organic-fertilizers.com/plantpropagation.html>.
- ❑ Plant Propagation. Master Gardener, Ohio State University Extension. Accessed January 24, 2008, from <http://hcs.osu.edu/mg/manual/prop.htm>.
- ❑ Pollination. Biology of Plants, Missouri Botanical Garden, St. Louis. Accessed January 24, 2008, from <http://mbgnet.net/bioplants/pollination.html>.

### 2. Print


- ❑ Parker, Rick. *Introduction to Plant Science*, rev. ed. Clifton Park, NY: Delmar Learning, 2003.
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### Interest Approach

Before class, prepare two germination trays (flats) with soil (or growing medium) in them. Purchase a package of seeds (select a fast germinating flowering annual) and a potted geranium plant. In front of the class, cut up the geranium plant and place the pieces in one flat (asexual propagation). Sow the seeds in the other flat (sexual propagation). Ask students what they think you did. Relate this demonstration to the topic.

### Communicate the Learning Objectives

1. Explain the difference between sexual and asexual propagation.
2. Explain what a flower is.
3. Identify the parts of complete and incomplete flowers.
4. Explain what is involved in pollination and fertilization.
5. List the conditions that can influence pollination and fertilization.
6. Identify the plant parts which may be used for asexual propagation.
7. Describe the methods of asexual propagation.

Instructor Directions	Content Outline
<b>Objective 1</b>  <i>The process of a plant reproducing another plant is called reproduction. The controlled reproduction of plants is called plant propagation. Plant propagation can be accomplished either by sexual or asexual means. Some plants can only reproduce by sexual means. Others will only reproduce by asexual means. Still others can be propagated by either sexual or asexual methods.</i>	<b>Explain the difference between sexual and asexual propagation.</b>  <ol style="list-style-type: none"><li>1. Sexual plant propagation uses seeds to produce new plants.</li><li>2. Asexual plant propagation involves the use of a vegetative part of the plant to produce another plant.</li></ol>
<b>Objective 2</b>  <i>Flowers vary depending on the type of plant. Some flowers are very bright and colorful while other flowers are quite small and almost unnoticeable. Use PPt 1 to identify the parts described.</i>   PPt 1 – Parts of a Complete Flower	<b>Explain what a flower is.</b>  The flower is the sexual reproductive part of a plant. A complete flower has four parts. <ol style="list-style-type: none"><li>1. Sepals – the outer, scale-like covering around the flower bud<ol style="list-style-type: none"><li>a. All the sepals together are called the calyx.</li><li>b. The function of the sepals is to protect the petals, stamens, and pistils when the flower is in the bud stage.</li></ol></li></ol>

Instructor Directions	Content Outline
	<ol style="list-style-type: none"> <li>2. Petals – usually brightly colored to attract pollinators (usually insects)               <ol style="list-style-type: none"> <li>a. All of the petals together are called the corolla.</li> <li>b. The petals protect the stamens and pistils in the bud stage.</li> </ol> </li> <li>3. Stamens – the male reproductive part (Each stamen consists of two parts: the anther and the filament.)               <ol style="list-style-type: none"> <li>a. The anther produces pollen grains.</li> <li>d. The filament supports the anther.</li> </ol> </li> <li>4. Pistil – the female reproductive part (The pistil consists of the ovary, stigma, and style.)               <ol style="list-style-type: none"> <li>a. The ovary is the enlarged portion at the base of the pistil. The function of the ovary is to produce ovules. Ovules that are fertilized become seeds.</li> <li>b. The stigma receives and holds the pollen grains.</li> <li>c. The style connects the stigma with the ovary. Pollen grains travel through the style to reach the ovary. The style supports the stigma.</li> </ol> </li> </ol>
<p><b>Objective 3</b></p> <p><i>Plants produce flowers as part of their life cycle. Some plants produce complete flowers while others produce incomplete flowers. Refer to PPT 1 again.</i></p> <p> PPT 1 – Parts of a Complete Flower</p>	<p><b>Identify the parts of complete and incomplete flowers.</b></p> <ol style="list-style-type: none"> <li>1. A complete flower contains all four main parts of a flower: sepals, petals, stamens, and pistils.</li> <li>2. An incomplete flower is missing one or more of the main parts of the flower.</li> </ol>
<p><b>Objective 4</b></p> <p><i>Sexual plant reproduction involves pollination and fertilization.</i></p>	<p><b>Explain what is involved in pollination and fertilization.</b></p> <ol style="list-style-type: none"> <li>1. Pollination is the transfer of pollen from the anther to the stigma.</li> <li>2. Fertilization is the union of male and female cells to form the first embryonic cell.</li> </ol>
<p><b>Objective 5</b></p> <p><i>Plants require proper environmental conditions for sexual reproduction to take place.</i></p>	<p><b>List the conditions that can influence pollination and fertilization.</b></p> <ol style="list-style-type: none"> <li>1. Favorable weather conditions</li> <li>2. Wind</li> <li>3. Pollinators (insects, birds)</li> </ol>

Instructor Directions	Content Outline
<p><b>Objective 6</b></p> <p><i>Asexual plant reproduction involves using parts of a plant to produce a new plant without seed.</i></p>	<p><b>Identify the plant parts which may be used for asexual propagation.</b></p> <ol style="list-style-type: none"> <li>1. Stems</li> <li>2. Leaves</li> <li>3. Roots</li> </ol>
<p><b>Objective 7</b></p> <p><i>There are several methods of asexual propagation and the choice of method depends on the plant and the desired objectives of the propagator.</i></p>	<p><b>Describe the methods of asexual propagation.</b></p> <ol style="list-style-type: none"> <li>1. Cuttings – a piece cut from the parent plant and rooted</li> <li>2. Division – separating clumps of plants into smaller groups</li> <li>3. Layering – rooting a new plant part while it is still attached to the parent plant</li> <li>4. Grafting – inserting buds, twigs, or shoots from one plant onto the stem of another plant</li> <li>5. Budding – inserting a bud(s) of one plant into the bark of another variety</li> <li>6. Tissue culture – using a single cell or a small piece of plant tissue (explant) to produce a new plant.</li> </ol>
<p><b>Application</b></p>	<p>Other activities</p> <ol style="list-style-type: none"> <li>1. Instructor can bring to class a selection of flowers for students to dissect, locate, and label parts. Hibiscus is excellent for this activity.</li> <li>2. Instructor can provide the opportunity for students to do several methods of asexual propagation: grafting, air-layering, leaf cutting, etc.</li> </ol>
<p><b>Closure/Summary</b></p>	<p>Plant reproduction can occur in two ways. Sexual reproduction involves the production of seed through the union of two specific cells. The seeds are then used to start new plants. Asexual propagation involves the use of selected plant parts to develop a new plant.</p>
<p><b>Evaluation: Quiz</b></p>	<p>Answers:</p> <ol style="list-style-type: none"> <li>1. False</li> <li>2. True</li> <li>3. True</li> <li>4. True</li> <li>5. Stamen</li> </ol>

Instructor Directions	Content Outline
	<ul style="list-style-type: none"> <li>6. Anther</li> <li>7. Filament</li> <li>8. Sepal</li> <li>9. Petal</li> <li>10. Stigma</li> <li>11. Style</li> <li>12. Ovary</li> <li>13. Pistil</li> <li>14. c</li> <li>15. b</li> <li>16. a</li> <li>17. e</li> <li>18. f</li> <li>19. d</li> </ul>