

# ***Grasses and Forbs: A Major Difference***

## **Overview**

***By examining two major groups of flowering plants (monocots and dicots) in the laboratory, students learn to recognize the differences between the groups. This skill facilitates the identification of prairie plants under field conditions.***



**Title**

Grasses and Forbs: A Major Difference

**Investigative Question**

What are some of the differences between monocots and dicots?

**Overview**

By examining two major groups of flowering plants (monocots and dicots) in the laboratory, students learn to recognize the differences between the groups. This skill facilitates the identification of prairie plants under field conditions.

**Objective**

Students examine the structures of monocots and dicots and determine the characteristics that distinguish these two major groups of plants.

**Materials**

Per class: 10-12 potted grasses and other monocots in flower (big bluestem, little bluestem, lilies, irises, orchids, onion, corn); 10-12 potted forbs and other dicots in flower (impatiens, zinnia, carrots, beans). Cuttings may be substituted for potted plants. Check your local garden center for plants.

Per group of four students: hand lens or dissecting (stereo) microscope;

Student Pages 1, 2 and 3.

For the assessment activity: reserve one or two monocots and dicots when the plants are distributed to the class. Students should not examine these plants until the assessment.

**Time**

One 50-minute class period.

**Advance Preparation**

Copy Student Pages 1, 2, and 3. Students can share 1 and 2, but each student needs a copy of 3. Assemble materials. You may be able to obtain potted plants from a local nursery or greenhouse for this activity. During the off-

season, you may also be able to obtain cuttings of the various plant types from a local florist. You may be able to obtain free or at reduced cost flowers and grasses that are past their prime as cut flowers from a florist. If you can plan ahead, you can grow some of these plants from seed, for example, onions, corn, carrots, and beans. Number each plant specimen so you can assess student answers on Student Page 3.

**Introductory Activity**

Adapt the following remarks. "On prom night, that special corsage and boutonniere a couple present to each other are usually from two very different kinds of flowering plants. Any ideas what these two might be? Well, if the boy gives the girl an orchid, she received a monocot. If he, on the other hand, gets a carnation, he has received a dicot. While this nomenclature is a somewhat less than romantic way to view this spring ritual, it leads us to explore the differences between the two-flowers, that is."

**Procedure**

1. Discuss the material on monocots and dicots (Student Pages 1 and 2).
2. Divide the class into groups of four and distribute the materials. Give each group one of the plants. Each group examines its plant, decides whether it is a monocot or a dicot, and considers the questions on Student Page 3. Groups then exchange plants and repeat the process. They do not answer the questions, however, until they have examined at least two monocots and two dicots.

**Assessing the Activity**

Student groups examine the plants you have held in reserve and decide whether they are monocots or dicots. They then jot down a few sentences that justify their decisions.

### **Extending the Activity**

Students are now equipped to visit a prairie or prairie reconstruction and identify some of the plants that occur there. The first step is deciding if the plant is a monocot or a dicot. With the aid of a field manual they should be able to identify many of the most common plants in a midwestern prairie.

### **State Goals**

11, 12 (Objective 12.7.17)

### **Concept**

The flowering plants (angiosperms) can be divided into two groups, monocots and dicots, based on observable characteristics.

### **Safety and Waste Disposal**

No dangerous or hazardous materials are used.



## Student Page 1: The Two Great Classes of Angiosperms (Flowering Plants)

When studying a prairie, we must be able to identify the plants that are found there. Any method of identification that allows us to narrow the possibilities as we look at an unknown plant in the field is extremely useful. Two categories into which the vast majority of prairie plants (and all flowering plants) can be placed are grasses and forbs. When we hear the word *grasses*, we have no difficulty picturing what a typical plant might look like: a thin, relatively long leaf sticking up vertically out of the ground. Prairie grasses are typically unlike the grass you might have in your yard because they tend to be tall, ranging from 2 to 10 feet in height; they also grow in discrete bunches. The term forb, however, is not so familiar to most people. A forb is a plant that is more typical of what people have in their flower gardens. Many of the wildflowers that you see on a walk through the woods in the spring or summer are forbs.

Determining whether a plant is a monocot or a dicot is a system of classification for flowering plants that scientists have used for many years. These two terms are abbreviations for monocotyledon and dicotyledon. A cotyledon is the first leaf or one of the first pair of leaves developed by a plant embryo. Monocotyledon, therefore, means one (mono-) seed leaf (cotyledon); dicotyledon, on the other hand, means two (di-) seed leaves (cotyledons). Take a look at the material in the box below and at the drawings on the following page to learn the major characteristics of each group.

### Monocotyledons

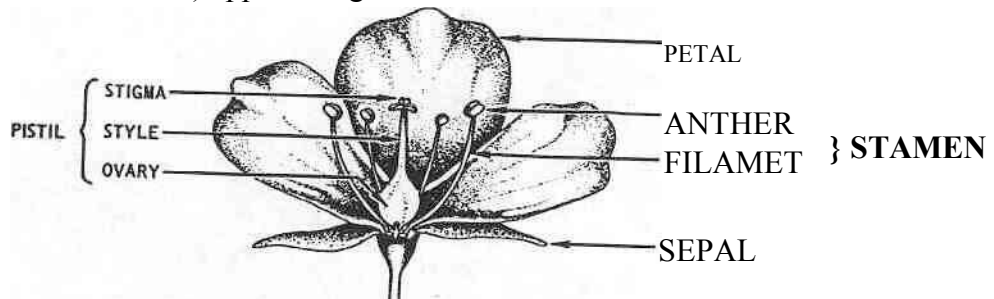
**Examples:** grasses, lilies, irises, orchids, cattails, palms

**Major characteristics:** flower parts usually in threes, leaf veins usually parallel, a single cotyledon (embryonic seed leaf) appears at germination

### Dicotyledons

**Examples:** most deciduous trees, shrubs, and many herbaceous plants

**Major characteristics:** flower parts usually in fours or fives, leaf veins usually netlike, a pair of cotyledons (embryonic seed leaves) appears at germination

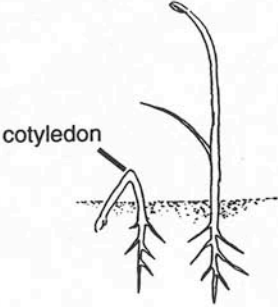
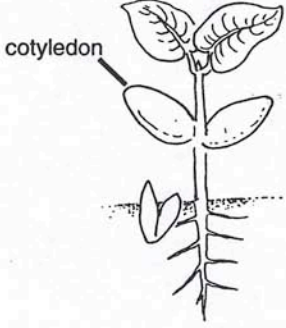
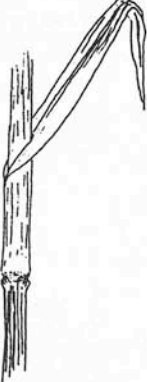

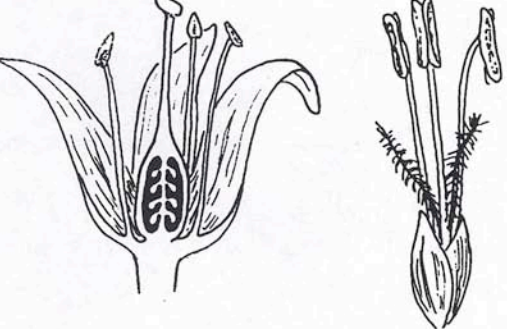
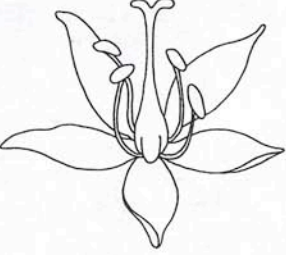


Parts of a Flower

Student Page 2: General Differences between Monocots and Dicots

Monocot

Dicot

 <p>A diagram of a monocot seedling. A single cotyledon is shown below the ground line, with a label 'cotyledon' pointing to it. The stem is fibrous and lacks a central pith. A single leaf is shown emerging from the stem.</p>	 <p>A diagram of a dicot seedling. Two cotyledons are shown above the ground line, with a label 'cotyledon' pointing to one of them. The stem is woody and has a central pith. Two leaves are shown emerging from the stem.</p>
 <p>A diagram of a monocot stem. It shows fibrous roots at the base and scattered vascular bundles throughout the stem. A single leaf is attached to the stem.</p>	 <p>A diagram of a dicot leaf. It shows a net-like venation pattern, where the veins branch out and connect to form a mesh. The leaf is broad and flat.</p>
 <p>A diagram of a monocot flower. It shows three sepals, three petals, and six stamens. The ovary is located in the center of the flower.</p>	 <p>A diagram of a dicot flower. It shows five petals and five stamens. The ovary is located in the center of the flower.</p>

**Student Page 3: Distinguishing Monocots and Dicots    Name.**

Examine the plant your group has been given. Based on the information you have been given, decide if it is a monocot or a dicot. Write its number in the appropriate blank below. Consider the relevant questions but do not answer them until you have examined at least two plants in each group.

**Dicots**

Write their numbers here: \_\_\_\_\_

1. Why do you think this plant (number \_\_\_\_\_) is a dicot?
  
2. Inspect the flowers of one of the dicots (number \_\_\_\_\_). What structures do you see? How are the stamens arranged around the flower?
  
3. Inspect the leaves of the plants you have classified as dicots. How would you describe the pattern of the veins on the leaves?
  
4. What other external characteristics do you see?

**Monocots**

1. Look at one of the plants you have classified as a monocot (number \_\_\_\_\_). Do you see any flowers? If so, describe their structure.
  
2. How do the flowers of a monocot differ from the flowers of a dicot?
  
3. Inspect a leaf on a corn plant and compare it to one of the leaves on a sample of big bluestem or other grass. (Your teacher may substitute other plants for those mentioned above.) In what ways are they similar?

How are the veins arranged on a monocot leaf? How does this pattern differ from the leaf vein pattern on a dicot?