

## Lesson Plan 3:

# Plant Identification Pictionary

Best for grades 3-12. Can be simplified for K-2.

## Basic Principles:

- Each ecosystem hosts a variety of plants and animals that are uniquely suited to that environment.
- Sustainability, or a renewable balance between man and nature, is necessary for a healthy ecosystem.
- People interact with and impact their environment in both positive and negative ways.
- Healthy rangelands depend on maintaining the water, soil, plant, and animal resources.
- Active management by ranchers maintains healthy ecosystems.
- Livestock grazing is compatible with wildlife use and recreation.
- The aspects of an ecosystem (soil, water, vegetation, animals, etc.) impact and rely upon each other.

## Fundamental Concepts:

- Photosynthesis
- Ecosystems
- Natural resource ecology

## Montana Content Standards Met By This Lesson:

### End of Grade 4

- Science #3: benchmarks 1, 3, & 5
- Speaking/Listening #2: 2, 3, & 5
- Speaking/Listening #3: 1, 2, 3, 4, 8
- Reading #1: benchmark 2
- Reading #4: benchmarks 2 & 6
- Reading #5: benchmarks 1 & 2
- Workplace #1: benchmark 3
- Workplace #2: benchmark 1
- Workplace #3: benchmarks 3 & 4
- Library Media #1: 1, 2, 3, 4, & 5
- Library Media #2: 1, 3, & 4
- Library Media #4: 1, 2, & 3

### End of Grade 8

- Science #3: benchmark 5
- Speaking/Listening #2: 2, 3, & 5
- Speaking/Listening #3: 2, 3, 4, & 8
- Reading #1: benchmark 2
- Reading #4: benchmarks 2 & 7
- Reading #5: benchmarks 1 & 2
- Career & Vo Tech #4: 2, 3, 4, & 5
- Career & Vo Tech #5: 1 & 4
- Workplace #1: benchmark 3
- Workplace #2: benchmark 1
- Workplace #3: benchmarks 3 & 4
- Library Media #1: 1, 2, 3, 4, & 5
- Library Media #2: benchmarks 2 & 3
- Library Media #4: benchmarks 1 & 2

### Upon Graduation-End of Grade 12

- Science #3: benchmark 5
- Speaking/Listening #2: 2, 3, & 5
- Speaking/Listening #3: 2, 3, 4, & 8
- Reading #1: benchmark 2
- Reading #4: benchmarks 2, 3, & 7
- Reading #5: benchmarks 1 & 2
- Career & Vo Tech #4: 1, 2, 3, & 4
- Career & Vo Tech #5: benchmark 4
- Workplace #1: benchmark 3
- Workplace #2: benchmark 1
- Workplace #3: benchmarks 3 & 4
- Library Media #1: 1, 2, 3, 4, & 5
- Library Media #2: benchmarks 2 & 3
- Library Media #4: benchmarks 1 & 2

## Student Inquiries:

- What is an ecosystem?
- How do plants get energy to grow?
- How do the parts of an ecosystem rely upon each other?
- What are the parts of a plant?

## Instructional Objectives:

- Students will identify the basic parts of a plant.
- Students will categorize flora by their characteristics.
- Students will identify various species of plants/vegetation.

*The idea for this lesson plan came from Tracy Brewer, Research Associate, and Tara Fisher, Extension Associate, Animal & Range Sciences, Montana State University.*

## Materials:

- copies of included worksheets of plant characteristics
- copies of the included diagram worksheets
- chalkboard/whiteboard or large notepads on easels (one for each team of students)
- chalk/markers
- large books (for plant press) or a few pairs of small boards connected with bolts and wing nuts
- plain paper or tissue to place between the faces of a plant press
- the plant identification websites listed in the Resources section of this unit may be of additional assistance (<http://www.enchantedlearning.com/subjects/plants/plant/> is an excellent resource for primary grades)
- plant identification field guides
- a field or playground with vegetation
- a variety of houseplants

## Lesson Activities

1) Provide students with copies of the attached plant characteristics sheets. Tell them that they will be collecting plant samples, learning the basic parts of a plant, identifying some different local plant species, and concluding their plant unit with a game of “Plant Identification Pictionary.”

2) Have students review the sheets and ask them to offer insight on what they notice about some of the similarities and differences in the diagrams.

3) Provide students with a means of plant press. This could be a set or two of old encyclopedias, old phone books, or other heavy books. Perhaps the middle or high school’s shop class would be willing to make some small ones as a project for their class. (Squares or rectangles of 1/2-inch plywood connected at the corners with bolts and wing nuts to tighten them would work great. Varying sizes might come in handy, but most only need to be about one to two feet on a side.)

4) Take students outside on the playground or a nearby field. Instruct them to look for plants, grasses, leaves, etc. which bear characteristics similar to those they saw on their plant worksheets. Be sure they are aware that they won’t necessarily find the *exact* same plant or leaves, but rather that the point is to find various vegetation with features similar to the variety on their sheets. Any vegetation they find that is different could also be collected. (If possible, they could do this at home, as well, and bring in their collected samples.)

5) Show the students how to cut or pick the plant/grass by its root and press it between the faces of a press. (Roots may not come up.) Large pieces of white paper or tissue will help to prevent the specimen from sticking to the boards or books. Lay the specimen flat and spread its leaves and blossoms out as much as possible.

6) Secure the nuts or books on top and leave the specimens ‘locked up’ for a few days. Over a weekend would be great because then the students will have a couple days without the temptation of peeking (which, if repeatedly done, could alter the effectiveness of the press).

7) After about three or four days, remove the collected plants from their presses and have the students group and categorize according to similar characteristics. Bring in a variety of houseplants which they could group and categorize along with the collected samples. They may want to refer to their plant characteristic sheets for assistance.

**(Activities 8 & 9 are extensions for intermediate grades; skip to #10 for primary grades)**

8) Borrow some plant field guides from the library or a local plant enthusiast. Your local Extension Office may also have some available to check out.

9) Have the students use the plant references to identify the plants, leaves, and grasses they collected. Bear in mind that not all of them may be identifiable, but most should be.

10) With the plants, etc., that the students were able to identify, have the students prepare them for display somewhere in the school or community. The display can be as simple as

mounting the specimens on decorated tagboard and labeling them with the plant's parts, common name, and scientific name. Enhance the display to whatever degree you and the students desire.

11) The concluding activity for this lesson will be a game of "Plant Identification Pictionary," a fun activity which will call upon the students to recall and integrate their new knowledge of plant anatomy.

12) The following list of plant anatomy terms can be used. Feel free to add your own and adjust the difficulty level for your population of students.

- stem
- vein
- taproot
- midrib
- leaf apex
- entire
- palmately veined
- serrate
- alternate
- lamina
- axillary blade
- node
- petiole
- root cap
- stigma
- terminal bud
- fibrous root
- tuberous root
- elliptic
- axil
- whorled
- crenate
- stamen
- opposite
- petal
- anther
- parallel veined

13) Divide the students into two or three teams with ample space in front of each team to draw pictures. The chalkboard/whiteboard may work for this surface, or gather two or three easels with large notepads instead. The easels can be easily arranged so the teams can't see what the others are drawing.

14) Provide the draw-er from each team the same term and allow them 60 seconds to get their team to guess what it is. "Plant Identification Pictionary" works basically the same way as regular "Pictionary."

15) The moderator (teacher) needs to pay attention to what the students are guessing. In the beginning of the game, letting them know when they are on the right track may help them to get more involved.

16) Some students may not want to draw, but try to have everyone take a turn. Giving those who are less enthused hints as to what to draw can help them to generate ideas and become more easily involved in the game.

17) Some terms can also be drawn with non-plant related pictures. This game is great for creativity!

#### **Assessment:**

- "Plant Identification Pictionary"
- included worksheets
- plant anatomy display of specimens

#### **Ascending Levels of Intellectual Demand:**

- Invite a local botanist to come in and talk with your class about what s/he does for a job and what role that profession plays in the community.
- Students who find themselves most interested in plant anatomy and identification could collect more samples from various locations and put together a 'scrapbook' of their specimens. Sections could be divided by location or vegetation characteristics.
- Teach students about photosynthesis, plant cells, and other plant growth processes.
- Motivated students could search further resources to identify any unidentified specimens from their plant presses.

# Plant Anatomy!

Name \_\_\_\_\_ Date \_\_\_\_\_

Read the definitions to determine where each term belongs on the diagram.

**axil** - the angle between the upper side of the stem and a leaf, branch, or petiole.

**axillary bud** - a bud that develops in the axil.

**flower** - the reproductive unit of angiosperms.

**flower stalk** - the structure that supports the flower.

**internode** - the area of the stem between any two adjacent nodes.

**lateral shoot (branch)** - an offshoot of the stem of a plant.

**leaf** - an outgrowth of a plant that grows from a node in the stem. Most leaves are flat and contain chloroplasts; their main function is to convert energy from sunlight into chemical energy (food) through photosynthesis.

**node** - the part of the stem of a plant from which a leaf, branch, or aerial root grows; each plant has many nodes.

Label the two lower nodes (the first and second nodes) on the plant diagram.

**petiole** - a leaf stalk; it attaches the leaf to the plant.

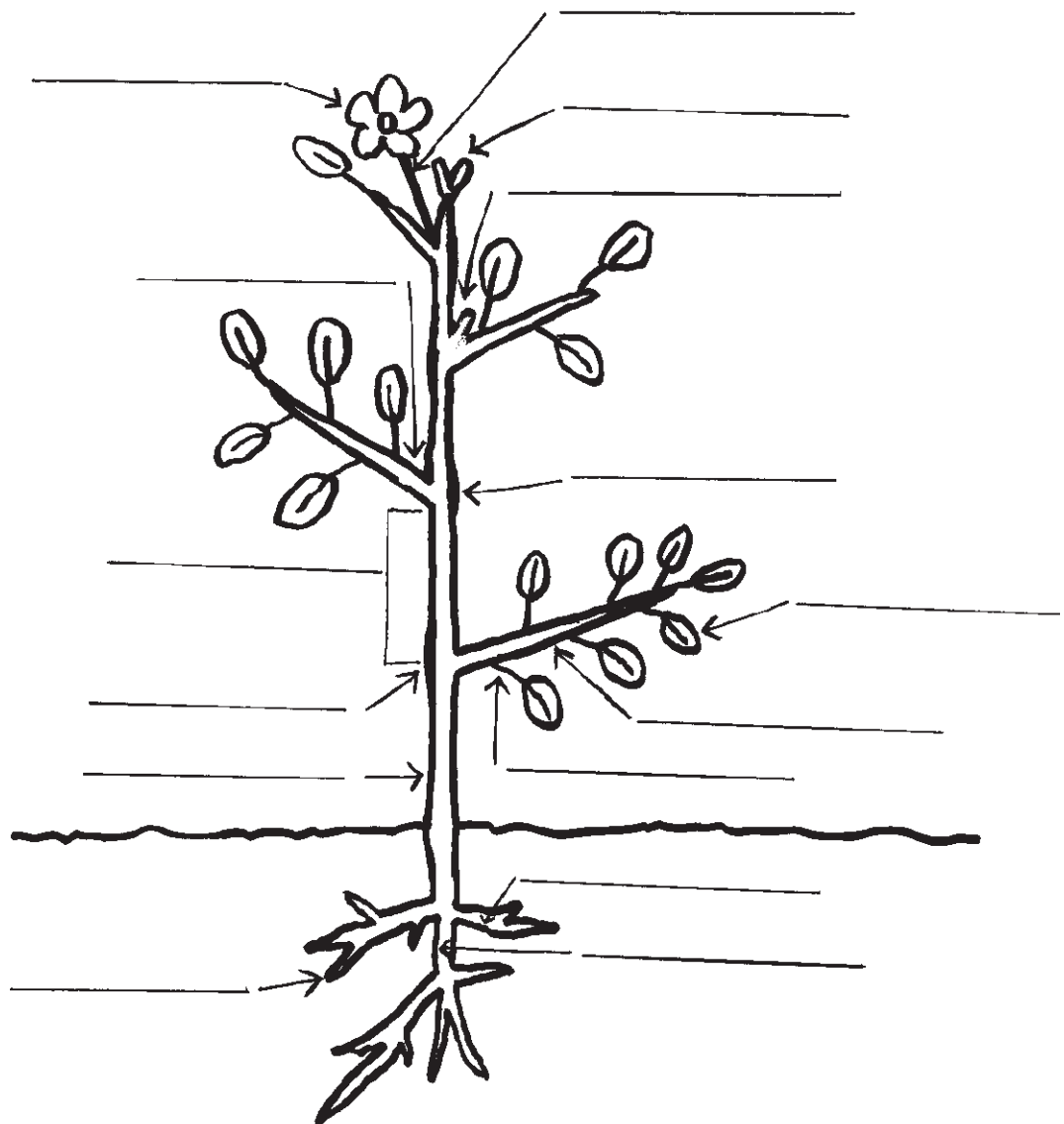
**root** - a root is a plant structure that obtains food and water from the soil, stores energy, and provides support for the plant. Most roots grow underground.

**root cap** - a structure at the ends (tips) of the roots. It covers and protects the apical meristem (the actively growing region) of the root.

**stem** - (also called the axis) is the main support of the plant.

**taproot** - the main root of some plants; the taproot extends straight down under the plant.

**terminal bud** - a bud located at the apex (tip) of the stem. Terminal buds have special tissue, called apical meristem, consisting of cells that can divide indefinitely.



# Leaf and Flower Anatomy!

Name \_\_\_\_\_ Date \_\_\_\_\_

Read the LEAF definitions to determine where each term belongs on the diagram.

**axil** - the angle between the upper side of the stem and a leaf or petiole.

**lamina** - the blade of a leaf.

**leaf apex** - the outer end of a leaf; the end that is opposite the petiole.

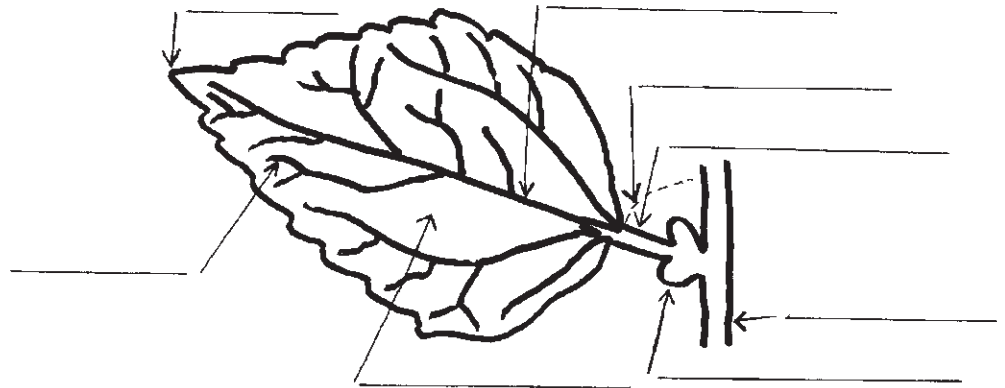
**midrib** - the central rib of a leaf - it is usually continuous with the petiole.

**petiole** - a leaf stalk; it attaches the leaf to the plant.

**stipule** - the small, paired appendages (sometimes leaf-like) that are found at the base of the petiole of leaves of many flowering plants.

**stem** - (also called the axis)  
the main support of the plant.

**vein** - one of the many vascular structures on a leaf. Veins provide supports for the leaf and transport both water and food through the leaf.



Read the FLOWER definitions to determine where each term belongs on the diagram.

**anther** - the anther is the tip of a flower's stamen ( the male reproductive organs of the plant) - it contains the pollen.

**filament** - the filament is the part of the flower that holds the anther (and is part of the stamen, the male reproductive organs of the plant).

**ovary** - the ovary is a female reproductive organ in plants that produces ovules. It is at the base of the pistil.

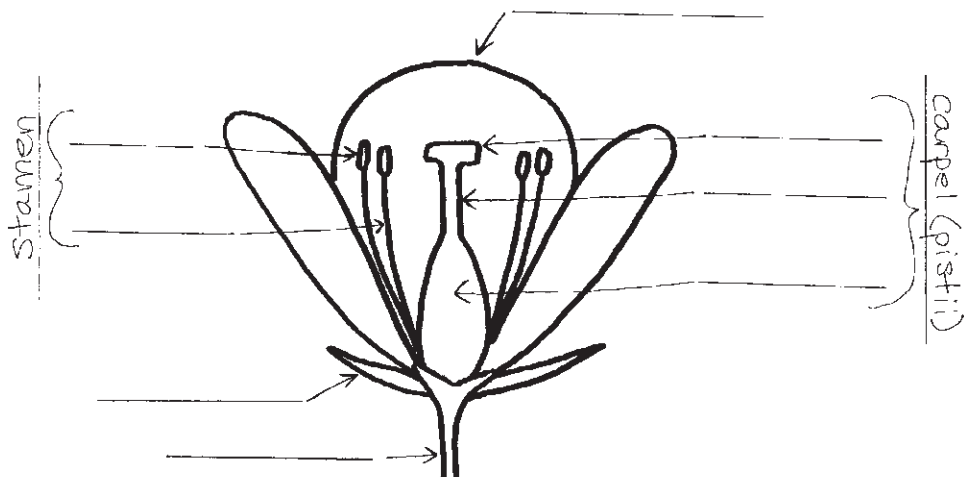
**petal** - a petal is one of the leafy structures that comprise a flower. Petals are often brightly-colored and have many different shapes.

**sepal** - the sepals are small leaves located directly under a flower - they are the outermost part of a flower.

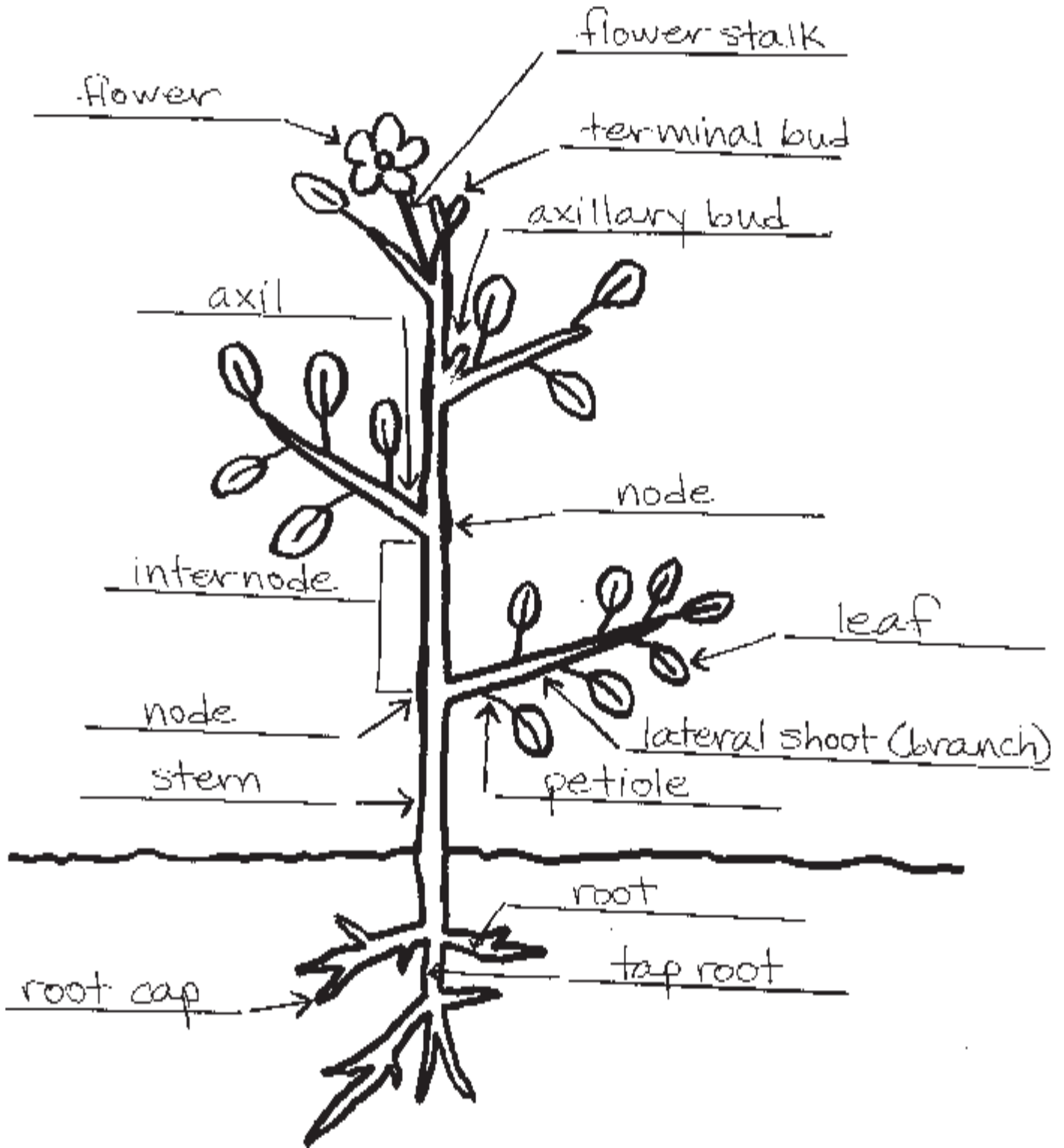
**stem** (also called the peduncle) - the stem supports the plant.

**stigma** - the stigma is uppermost part of the pistil, the female reproductive tissue of a flower. The stigma receives the male pollen grains during fertilization, when they travel through the style to the ovary.

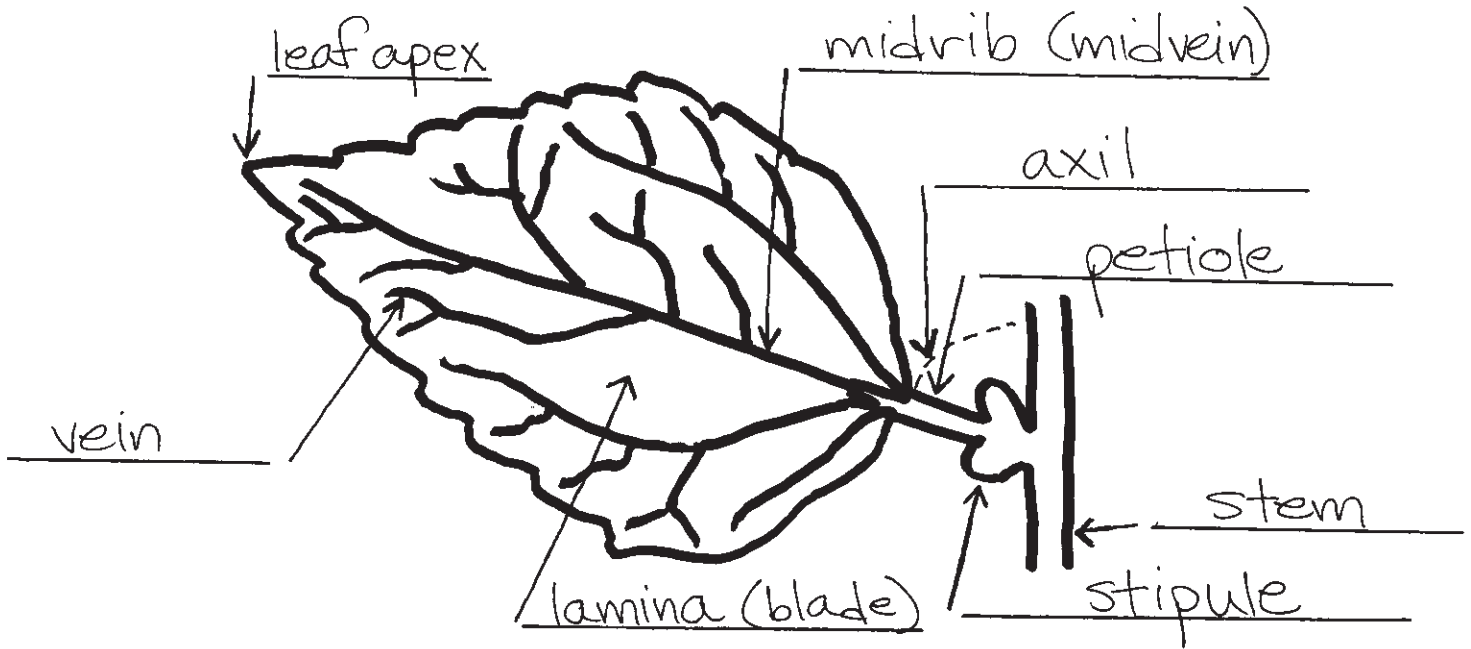
**style** - the style is part of the pistil, the female reproductive tissue of a flower. The style is a long tube on top of the ovary, and below the stigma.



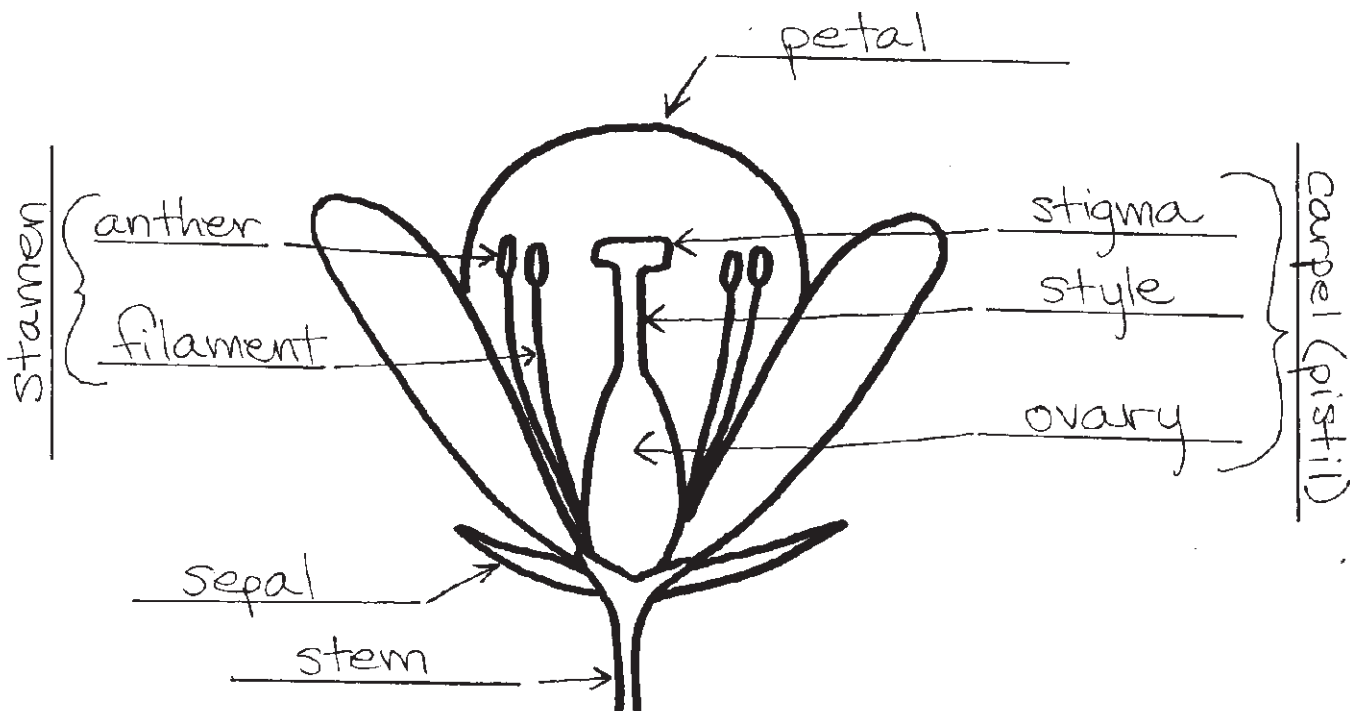
# Answer Key for Plant Anatomy Diagram



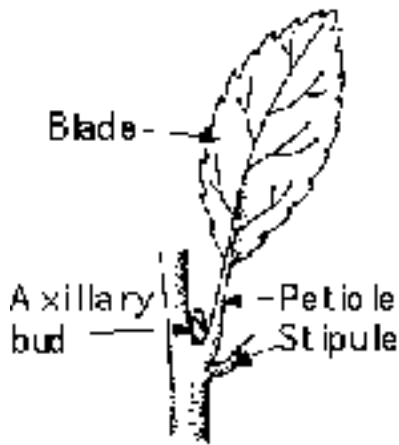
## Answer Key for Simple Leaf Diagram



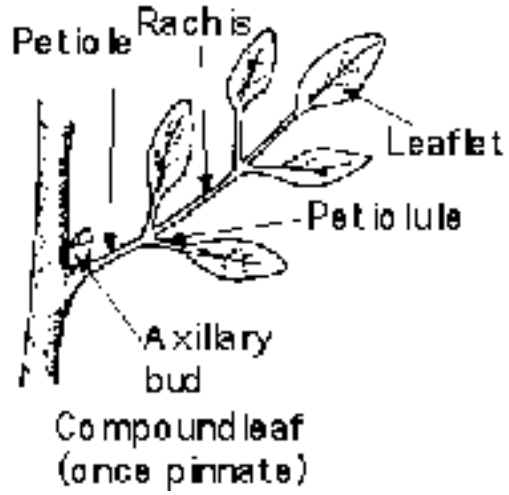
## Answer Key for Flower Diagram



# Leaf Types

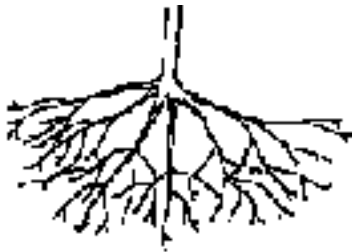


Simple leaf

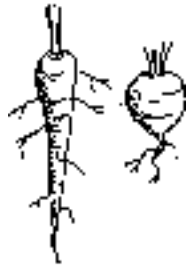


Compound leaf (once pinnate)

## Root Types (the different types of root arrangements)



FIBROUS



TAP



TUBEROUS

## Leaf Venation (how the veins of the leaf are arranged)



Palmately Veined



Pinnately Veined



Parallel

**Leaf Shapes (what the shape of the leaf is)**



Obovate



Ovate



Peltate



Perfoliate



Reniform



Spatulate

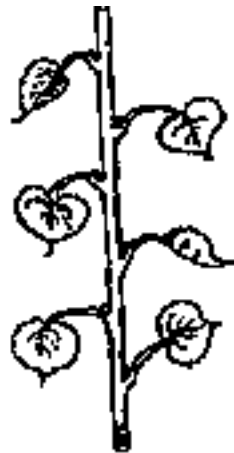


Subulate

**Leaf Arrangement (how the leaves are arranged on the stem)**



Opposite



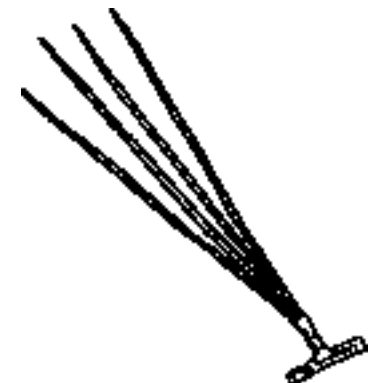
Alternate



Whorled



Imbricate



Fascicled

Leaf Margins (what the edges of the leaves look like)



Entire



Undulate



Crenate



Serrate



Double-Serrate



Dentate



Denticulate



Ciliate



Incised



Lacerate



Laciniate



Lobed



Cleft



Parted



Pinnatifid



Palmatifid



Crispate