ATLANTA BOTANICAL GARDEN

Science at Home! Dazzling Dandelions

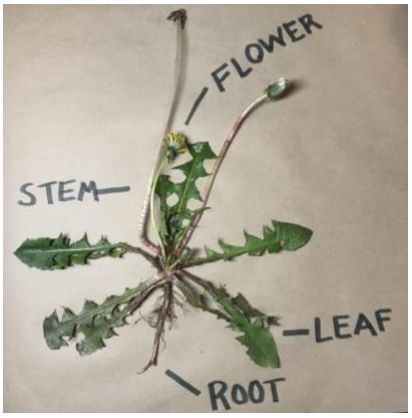
This science experiment can be done using simple household items. Students will have the chance to dissect a dandelion and label the parts of the plant.

What You'll Need:

- Dandelion plants
- Shovel (optional)
- A butter knife or scissors
- Paper towel
- Paper
- Water

How to Start:

Go outside and find a dandelion plant to study. Dandelions can be identified by their bright yellow flowers that emerge from a circle of jagged, toothlike leaves. Pollinated dandelions develop a puffball of seeds that are dispersed in the wind.



Once you find a good specimen, pull at the base of the plant or use a shovel or spoon to dig around the plant and release it from the ground. Shake off the excess dirt. Please do not trespass and get permission before you remove a dandelion from your yard or a neighbor's yard.

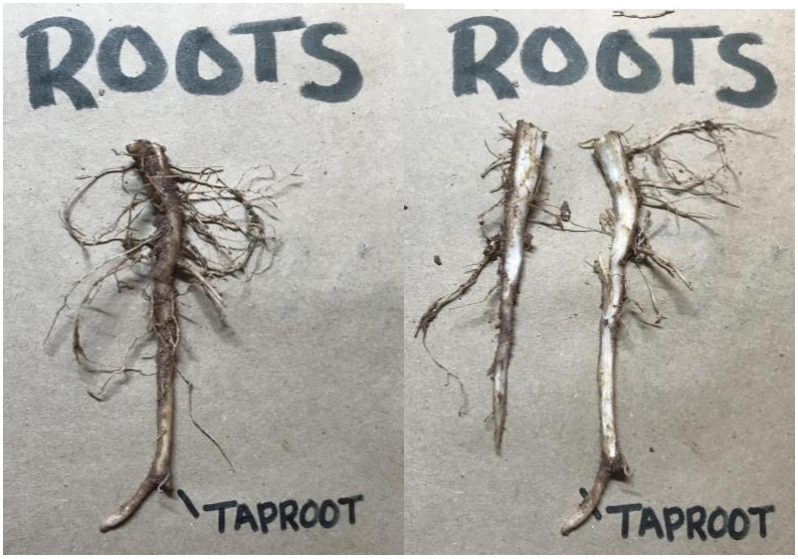
Label the Parts of a Plant

1. Spread out the dandelion on a piece of paper. Label the flower, stem, leaves, roots, and seeds. Take a picture of your plant or draw what you see.

2. Using scissors, a butter knife, or your hands carefully cut to separate the roots, flower, leaves, and seeds from the stems.

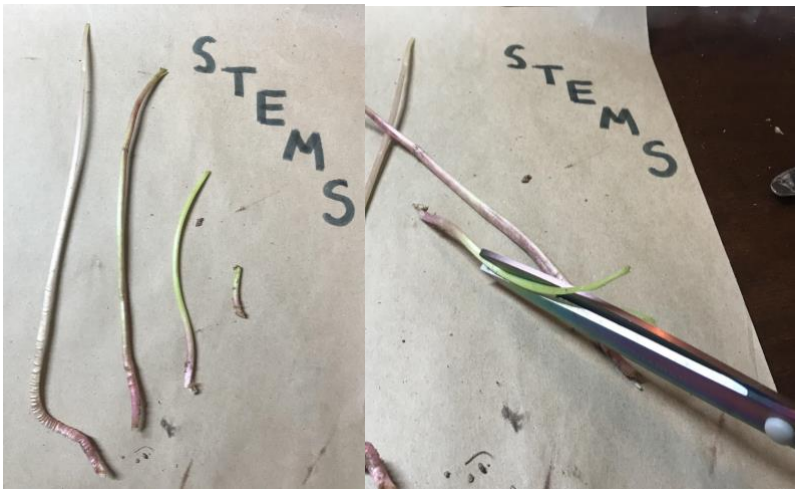
Root dissection

3. Examine the root that has been separated from the rest of the plant. Find the thick central root that smaller roots emerge from. This is the taproot. Why do you think the taproot is important for the dandelion?
4. Measure the length of the taproot.
5. Very carefully cut open the taproot lengthwise and look at the inside. What do you notice?



Stem dissection

6. Examine the stem of the dandelion. Why is the stem important for the dandelion?
7. Measure the length of the stem. How does the length of the stem compare with the length of the root?
8. Open the dandelion stem using a knife and cut into small strips. What do you notice?



9. (Optional): Place the stem strips in water. What happens? The cells on the inside of the stem are hydrophilic, or water-loving. They soak up all the water that they can and get bigger in the process. The cells on the outside of the stem are hydrophobic and do not like water. Those cells repel water and stay the same size. The growth of only one side of the cells of the stem causes the entire stem to curl. You are actually seeing the effects of water movement, or osmosis, in the stem. Note: If nothing happens, cut the stems into thinner strips.

Leaf Examination

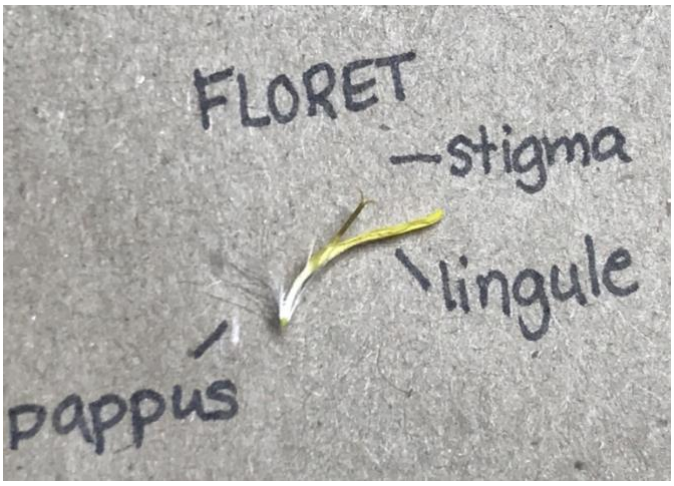
10. Examine the leaves of the dandelion. How many leaves did your dandelion plant have? How long are each of the leaves?
11. Take note of the color difference between the top and bottom of the leaf. Find the central vein in each leaf and notice how smaller veins connect and branch out from this vein to form a network.

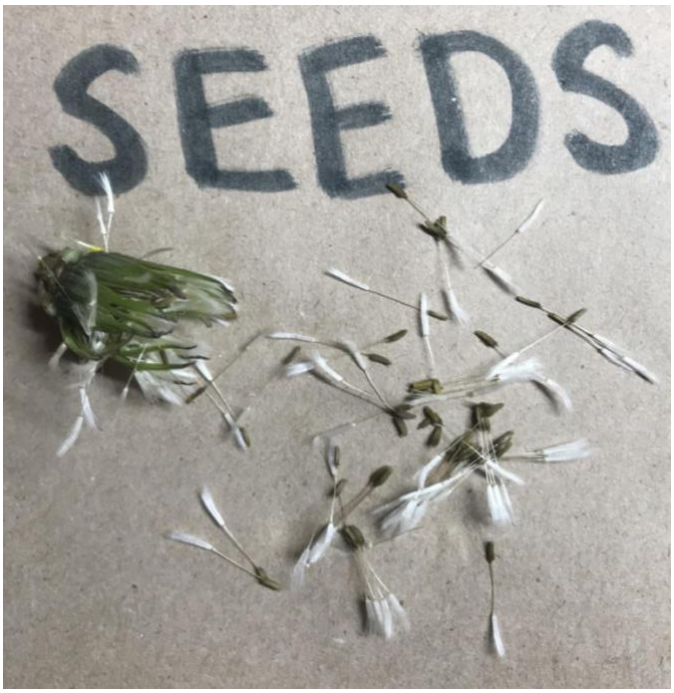
Flower Dissection

12. Examine the flower of the dandelion. The large yellow structure is actually made of much smaller flowers called florets. Each petal is its own floret.
13. Cut open the flower and look at a single floret. The green part of the flower holding all of the florets together is called the involucre. The petal of the floret is called lingule. At the bottom of the lingule you may see a fuzzy white area. This is called pappus and will form the feather like structure of the seed once the flower is pollinated. What else do you notice?

Seed Examination

14. If your dandelion has produced seeds, examine them. Find the tiny seed and view under a magnifying glass if available. Why do you think the seeds have a fluffy white extension?





Diving Deeper:

Seed Race

Using paper and markers or chalk on pavement, create a race field. Collect dandelion seeds and other seeds found in your yard and in your home. Examples of seeds that could be used are acorns, grass seed, helicopter seeds, beans, pepper seeds, sunflower seeds, etc. Line all of the seeds up at the starting line. Using a straw, blow one seed at a time as fast as you can to the finish line. Have an adult time how long it takes for each seed to complete the race. Which seed was the fastest? Which was the slowest?

Dandelion Classification and Math Practice

Dandelions are classified as dicots. A dicot tends to have petals and other flower parts in multiples of four or five. Dicots also have leaves with veins that branch out and overlap to form a network. Monocots tend to have a number of flower parts that are divisible by three. A monocot leaf has veins that run parallel and do not overlap.

Examine your dandelion and count its florets. Can you find evidence to support a claim that dandelions are dicots? Do all dandelions have the same number of florets or petals?

Go on a walk to look at plants. Can you find any monocots in your neighborhood? What about other dicots? Count the petals of flowers and practice dividing the petal number by 3, 4, and 5 to help you identify it as a monocot or dicot.

Dandelion Count/Population Density

Create a scientific sampling tool, called a quadrat, by bending a wire hanger into a square. (You can also make larger quadrats out of pvc pipe, wood, wire, etc; or use a hula hoop and find the area using πr^2.)Measure the sides of the square and calculate the area by multiplying the length of the square by the width of the square.

Once you have made your quadrat, walk outside to an area with dandelions. Toss your quadrat over the area, and count how many dandelions are within the square. If a dandelion plant is growing both inside and outside your quadrant (on the edge), then only count it if more than 50% of the plant is inside the quadrant. If less than 50% of the plant is inside the quadrant, for example only a leaf or two is inside and the rest of the plant is outside, then do not

count the plant. Calculate the population density of dandelions in this area by using the following equation:

$$\#\ of\ Dandelions\ within\ quadrat / area\ of\ quadrat = dandelion\ population\ density$$

Pick up your quadrat, toss over a nearby area and calculate population density again. After taking 5 population density samples, add up all of the densities calculated and divide by five to get the average dandelion density of the area.

Additional Dandelion Resources

Dandelion Life Cycle - https://www.youtube.com/watch?v=OQsfedMrjs8
Dandelion Time Lapse from Flower to Seed-https://www.youtube.com/watch?v=UQ_QqtXoyQw
"Dandelions" by Mida Posada https://www.youtube.com/watch?v=s5EL4SzmaAs
"Dandelions" by Eve Bunting https://www.youtube.com/watch?v=Sy7maYcFqf8
The Secret Physics of Dandelion Seeds https://www.youtube.com/watch?v=N2UbaDV9O9Q

Georgia Science Standards of Excellence Covered:

S1L1. Obtain, evaluate, and communicate information about the basic needs of plants and animals.
- a. Develop models to identify the parts of a plant—root, stem, leaf, and flower.

S2L1. Obtain, evaluate, and communicate information about the life cycles of different living organisms.
- b. Plan and carry out an investigation of the life cycle of a plant by growing a plant from a seed and by recording changes over a period of time.
- c. Construct an explanation of an animal's role in dispersing seeds or in the pollination of plants.

S5L1. Obtain, evaluate, and communicate information to group organisms using scientific classification procedures.
- b. Develop a model that illustrates how plants are sorted into groups (seed producers, non-seed producers) using data from multiple sources.

S7L1. Obtain, evaluate, and communicate information to investigate the diversity of living organisms and how they can be compared scientifically.

S7L2. Obtain, evaluate, and communicate information to describe how cell structures, cells, tissues, organs, and organ systems interact to maintain the basic needs of organisms.

SB4. Obtain, evaluate, and communicate information to illustrate the organization of interacting systems within single-celled and multi-celled organisms.
- a. Construct an argument supported by scientific information to explain patterns in structures and function among clades of organisms, including the origin of eukaryotes by endosymbiosis. Clades should include: archaea bacteria eukaryotes fungi plants animals

SB5. Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment.
- a. Plan and carry out investigations and analyze data to support explanations about factors affecting biodiversity and populations in ecosystems. (Clarification statement: Factors include pop