



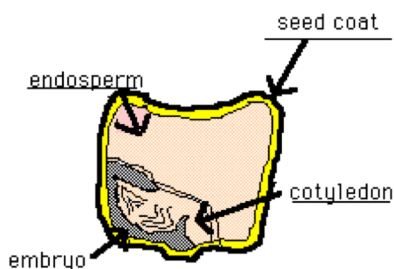
## What is in a seed? How do plants develop?

### Student Learning Targets:

- Compare/contrast dicotyledon and monocotyledon seeds.
- Identify the seed coat, the embryo, the cotyledon, and the endosperm for each plant.
- Predict which seed type will germinate first.

### Background:

The two main types of flowering plants are called monocots (or monocotyledons) and dicots (or dicotyledons) which differ in the morphological characteristics of leaves, stems, flowers, fruit, and roots. A monocot plant has parallel leaf veins, petals in multiples of three, and fibrous roots. A dicot plant has branching leaf veins, petals in multiples of four or five with possible fruit, and a taproot system. Monocots also differ from dicots by having only one seed leaf (cotyledon) whereas dicots have two seed leaves (dicotyledon). Every seed has an endosperm (food source for growing plant), an embryo, cotyledon (first leaf to be developed by the embryo), and a seed coat (the protective covering of a seed).



### Define:

Dicotyledon:  
Monocotyledon:  
Embryo:  
Cotyledon:  
Seed Coat:  
Endosperm:

### Materials:

soaked soybean seed (24 hours)	dry soybean seed
soaked corn seed (24 hours)	dry corn seed
toothpick	forceps
scissors	hand magnifying lens

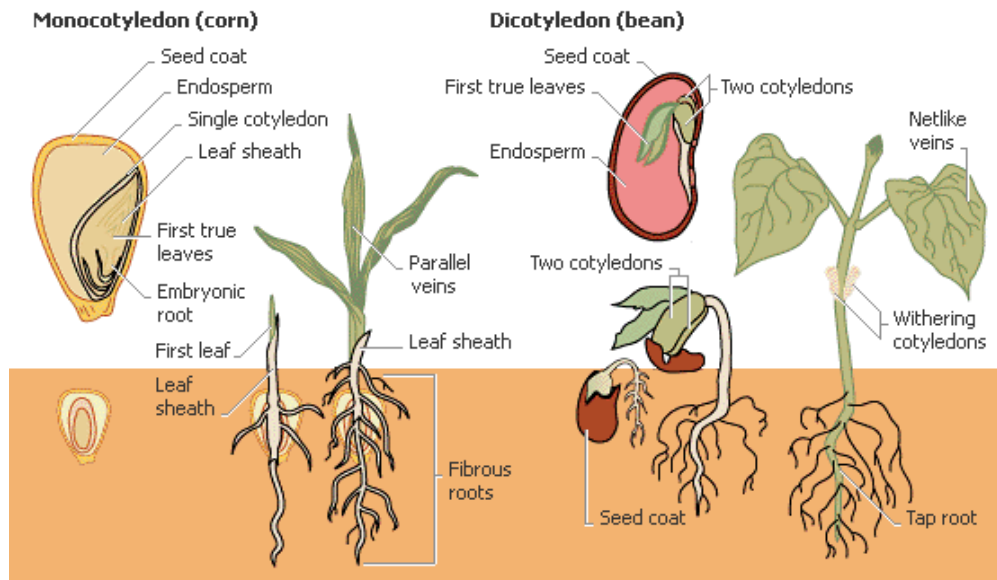
### Procedure:

1. Give each student a dry soybean and corn seed, and a soaked soybean and corn seed.
2. Give each student a hand-magnifying lens.
3. Have students take measurements of each of the four seeds and record their observations. Place the appropriate measurements under each seed drawing.
4. Have students carefully remove the seed coat of each of the two soy seeds using the forceps. Ask students to describe how the dry seed differs from its matching wet seed. Carefully write these descriptions under the seed drawings.
5. Have the students use a toothpick to split each seed carefully and record how each seed splits.



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6. Have the students use their lenses to try to locate the embryo inside the seed. Students should also look for the leaves, stem, and root stalk of embryo.
7. Ask the students to draw the internal view of the seed including the cotyledon, embryo, endosperm, and seed coat.
8. Have students find the food storage area of the seed, label on the internal drawing.
9. Ask students to write at least five observations of a dicot seed.
10. Continue the lesson and direct students to look at the exterior of the dry and soaked corn seed. Have students draw their observations.
11. Tell students to remove the seed coat from the soaked corn seed and try to split the seed into two parts. (Hint: It won't split!! Use scissors to cut in half lengthwise).
12. Have the students use their hand lenses and try to locate the embryo inside the seed.
13. Ask students to draw the internal view of the seed including the embryo, endosperm, cotyledon, and seed coat on the handout.



Closure:

1. What did you observe in both seeds that have been split into 2 parts? How are they alike, how are they different?
2. Predict which seed type you think will germinate first based upon your observations? Explain. (Be sure to include specific seed parts to back up your prediction).



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3. Why is there an embryo in each seed? How long do you think that embryo can remain viable (alive)?
  
4. How does each seed type grow? What are the advantages/disadvantages of each growth style?