

Comparing Monocot & Dicot Seeds

Name: _____ 

Background Information

Seeds differ in sizes, shapes, and colors. They may have different parts depending upon the type of seed. A corn seed, a monocotyledon (monocot), has a tiny embryo inside it. However, the seed will not separate into two parts when the seed coat is removed. The endosperm food is stored around the embryo. There is only one seed leaf (the cotyledon) which is quite thick and not packed with food. A bean seed, a dicotyledon (dicot), has a tiny embryo tucked between two halves of the seed. These two halves of a bean seed are cotyledons or seed leaves. The cotyledons are filled with stored food. The seed leaves are usually quite different in form from the leaves that develop later.

All angiosperms can be divided into one of two classes, monocots or dicots, based on a variety of anatomical features. Most of these features can be identified with the naked eye including, the number of seed leaves, root form, vein arrangement in the leaf and the number of floral parts. While monocots and dicots are composed of the same tissues (ground, vascular and dermal tissues) the organization or arrangement of these tissues differs.

Research

Define the following terms (include the function):

1. epicotyl _____

2. hypocotyl _____

3. radicle _____

4. plumule _____

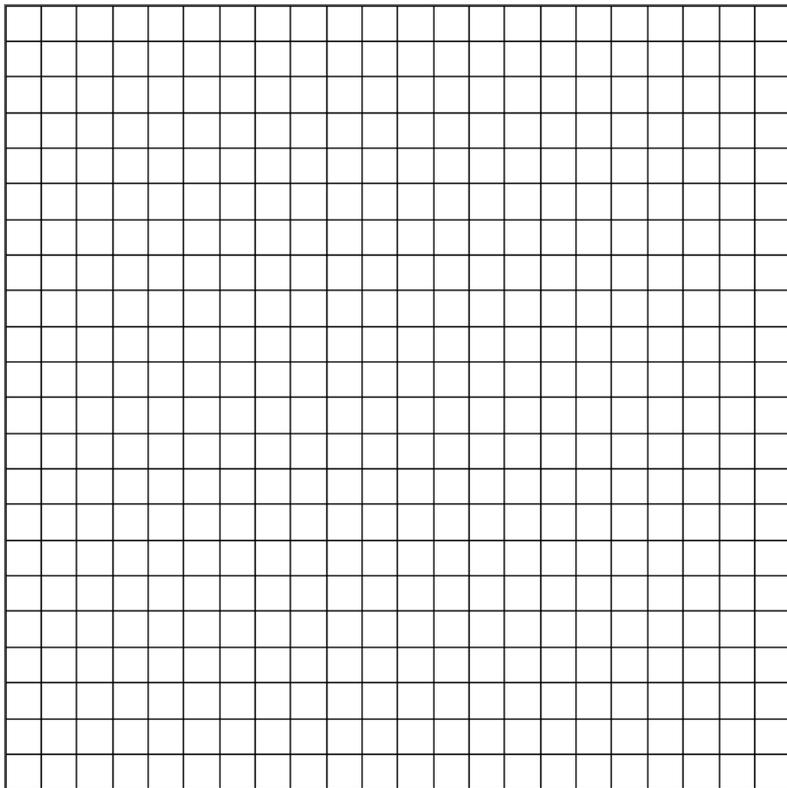
5. cotyledon _____

Procedure

Using masking tape or a permanent marker Label your bag. Take a paper towel and fold it so it will fit into a plastic sandwich bag. Wet the paper towel and place it in the plastic sandwich bag so it is lying flat and fills up the bag. Add a 1cm reservoir of water to the bottom of the bag. With the zipper part at the top find the middle of the plastic sandwich bag and staple across the middle of the bag, making a horizontal line. Place two corn seeds on the right and two bean seeds on the left, equidistant from each other, all resting on the staple line. Zip the bag closed and tape the bag (zipper up) in your greenhouse.



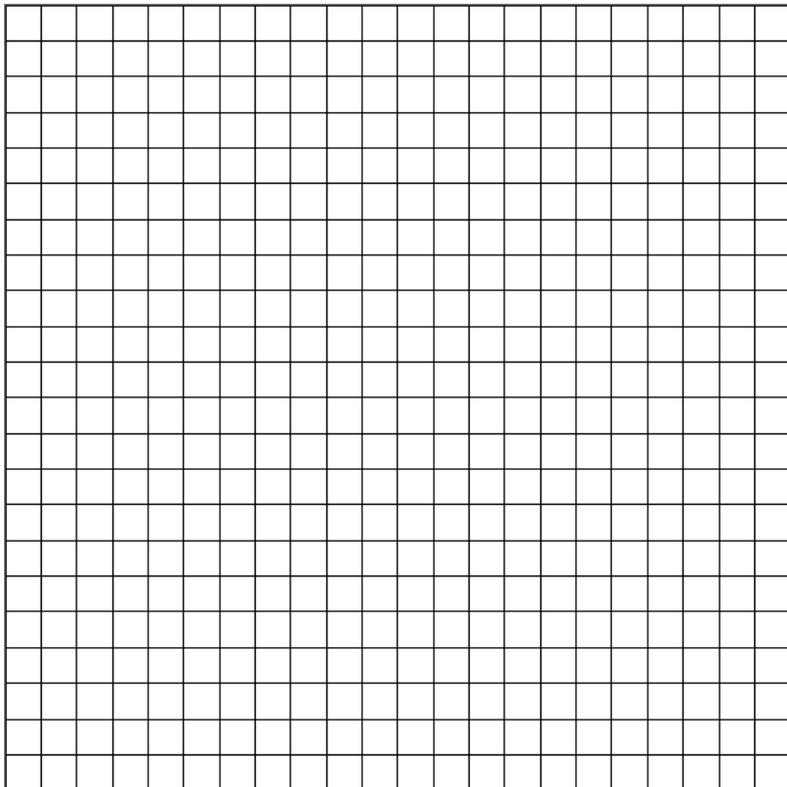
Stem Growth



Bean seed _____
(color used on graph)

Corn seed _____
(color used on graph)

Root Growth



Bean seed _____
(color used on graph)

Corn seed _____
(color used on graph)

Conclusions

11. Which seed sprouted first? Hypothesize why you think this was the case _____

12. Did the root or stem sprout first? Hypothesize why you think this was the case _____

13. How many days did it take for the first leaves to appear on the lima bean seed? _____

14. How many days did it take for the first leaves to appear on the corn seed? _____

15. What did the seeds need to grow? _____

16. How was the growth in both seeds alike? _____

17. How was their growth different? _____

18. What else did you observe about your seeds? _____

19. What might prevent seeds from growing? _____

20. What could you do differently next time to improve your results? _____

On an attached sheet of paper, sketch and label a lifesize diagram of your bean and corn plant. Make a rubbing (using a crayon) of a representative of each of the leaves.

Make sure you label the following on your drawings:

- Dicotyledon
- True leaves
- Parallel venation
- Netted venation
- Stem
- Tap root
- Fibrous root



Dissecting Seeds

All seeds contain a little plant called an embryo. Seeds also contain a small amount of food to nourish the little plant. Seeds are like a spaceship. The seed cover protects the embryo until it finds an appropriate place to grow, while the seed leaves, or cotyledons provide the necessary food energy until roots and true leaves form.

What Are Seeds?

The most common seeds come from flowering plants. There are two kinds of these seeds: Monocotyledons and Dicotyledons. (monocots and dicots) Dicots are familiar to you as food seeds. Some of those are peas, beans, peanuts, apples and tomatoes. The seed has two halves. These are called seed leaves, or cotyledons. There is ample food stored in the fleshy seed leaves to nourish the new plant until its roots and true leaves are established. Usually, the first two seed leaves look quite different from the adult leaves, which will develop later.



Dicot Seed

Monocot seeds will not separate into two Halves. Instead, the food is stored around the embryo. Monocots have one seed leaf which is generally long and thin, like grass. Some monocot seeds are, rice, wheat, Corn, coconuts and grasses.

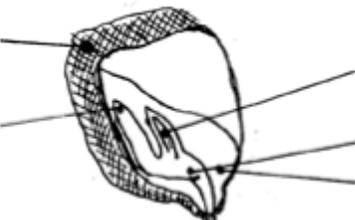


Monocot Seed

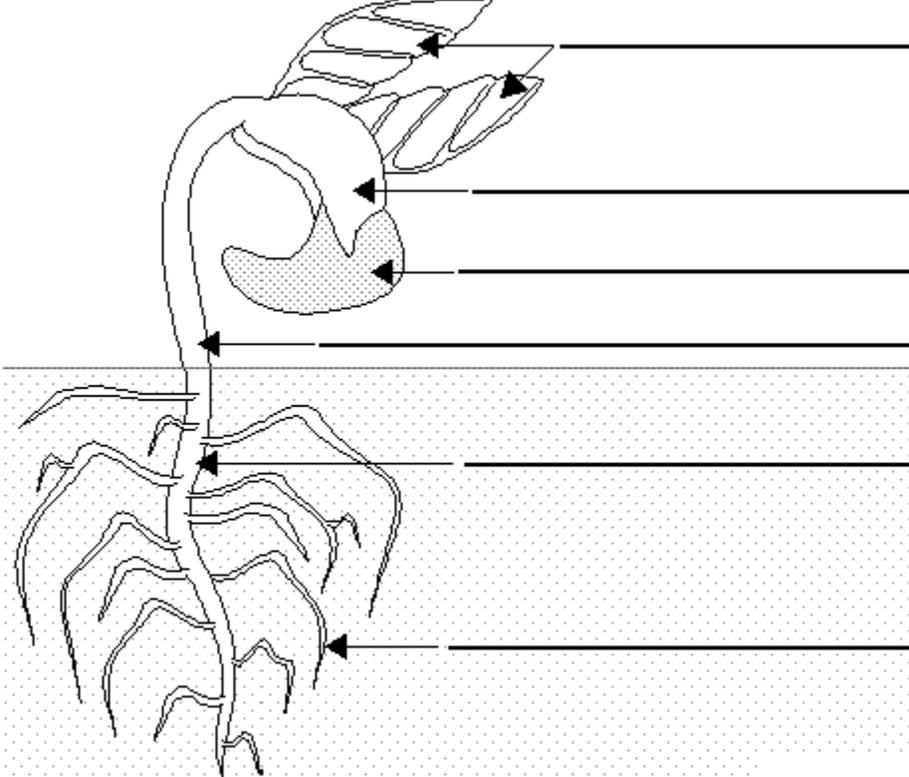
Label the parts of a lima bean seed.



Label the parts of a corn seed.



Lima Bean Plant
Label the diagram of a bean plant below using the following terms: cotyledon, first true leaves, hypocotyl, primary root, secondary root, seed coat.



Look at the **exterior** a **soaked bean** seed. Draw what you see. →
Carefully remove the seed coat of the soaked bean.
19. Why do you think the seed needs a seed coat?

Try to remove the seed coat from the dry bean seed.
20. Describe how the dry seed differs from the wet?

Use your thumb nail to split the seed carefully.
21. Does the seed split naturally into parts?

22. How many parts?

Use a magnifying lens to try to locate the embryo **inside** the seed. Also look for the two cotyledons, the embryonic shoot (plumule), the embryonic root (radicle), the embryonic stem (hypocotyl). Draw the inside of the seed **label these parts**. →

Look at the **exterior** a **soaked corn** seed. Draw what you see. →
Carefully remove the seed coat of the soaked corn seed and try to split the seed into two parts.

23. Does the corn seed split easily into two parts?

Use a magnifying lens to try to locate the embryo **inside** the seed. Also look for the cotyledon, epicotyl, hypocotyl, radicle, and endosperm. Draw the inside of the seed labeling these parts. →

24. Explain how the monocot seed is different than the dicot seed based on your observations.

25. Why is there an embryo in every seed?

26. What is the economic importance of seeds?

