

What's Up?**Standard(s):** 3.1, 3.2, 3.3, 3.4, 4.6**Objective(s):**

1. Students will conduct a scientific investigation with pumpkin seeds to determine if the direction of root growth remains constant regardless of the position the seed is planted.
2. Students will make observations, design experiments, record and analyze data, make models, and infer their findings.

Procedure:

1. Lecture discussion:
 - a. Briefly discuss gravity and the force that it exerts influences all things on Earth
 - b. Discuss the experiment and basic setup
2. Use the textbook, internet, or various other sources to find information on the following questions relating to the seed experiment:
 - a. When a farmer or gardener plants a seed, how does he or she know which way to plant it?
 - b. Composition of a seed
 - c. Pumpkin and lima bean germination
 - d. Propagation of seeds
 - e. Germination medium
 - f. Sowing seeds
 - g. Watering and fertilization

Find the definitions to the following seed vocabulary:

- a. germination
- b. embryo
- c. radicle
- d. plumule
- e. cotyledon
- f. epicotyl
- g. hypocotyls
- h. seed coat
- i. endosperm
- j. angiosperm
- k. gymnosperm
- l. dicot
- m. monocot
- n. plant propagation
- o. annuals
- p. perennials

3. After the textbook, internet, or various other sources research is completed we will have a class discussion on what we have found

Follow-up Activities:

1. Once students' pumpkins germinate they may plant them using hydroponics, aquaponics, or traditional methods of growing.
2. Students will plant beans make observations and record information in their germination logs.