

## Materials

- Plant diameter cutouts of garden crops of various sizes (poster board, scissors)
- Painter's tape
- Tape measurer or yardstick
- Height and root system illustrations (flip chart paper, markers)
- Letter-size paper and markers

## Preparation

Select 2-3 plants of varying size to feature in this lesson. Consider selecting plants that you will soon be planting in the garden. Consult a garden guide to collect information on selected plants. Note the height and root depth of each mature plant as well as spacing requirements between plants. Use this information to create plant diameter cutouts\* and a flip chart paper illustrating a mature plant's above ground height and root system.

\* For example, if broccoli requires 18" between plants then the circular cutout should be 36" in diameter

## PROCEDURE

### Part 1: Spacing

- Present mature height information for each of the featured garden crops. Use a tape measurer to compare a plant's mature height to other common objects in the classroom. For example, "Broccoli requires 18" between plants for healthy growth. That's about the distance from the top of a school desk to the floor."
- Record height information on corresponding pieces of paper. Then, present plant diameter cutouts for each plant. Explain the spacing requirements for each featured plant and record data on its paper.
- Have students gather in a circle in a carpeted area of the classroom. Use a tape measurer and painter's tape to create a 3X6-foot garden bed on the carpet. Select student volunteers to take measurements of each side and mark the lines with tape. Mention to students that this indoor bed is half the size of the 3X12-foot outdoor raised beds.
- Gather in a circle around the "garden bed". Place diameter cutouts from the largest plant in the center of the garden bed. Have students work together to fit as many cutouts as possible in the garden bed without them touching one another.
- Encourage students to play with their design until they have settled on an ideal layout. Record the total number of plants on the board. Remove first set of plants and repeat this process for the remaining plants. Remove painter's tape.

### Part 2: Root Depth

- Again, have students gather in a large circle. Present the flip chart paper illustration of a plant's mature root system. Record the root system data for all the featured garden plants on the board.
- Starting with the largest plant, select a student volunteer to measure its root depth with a tape measure. Have another student mark this line with painter's tape.
- Move a few feet to the side and repeat the process for the following plants. Compare depth of each plant's taproot to other objects in the classroom. "How many kids can fit in the taproot of a tomato plant?"
- As a group, compare and contrast above ground height vs. root depth for mature garden plants. For example, "Corn is very tall, but has a very shallow root system." Transition to journal activity.

# Investigate Proper Spacing of Plants

## Planning & Design

### ENGAGE

For each plant featured this lesson, post a blank piece of paper on the board. Bring in a few seeds from each of the lesson's featured garden crops. Pass seeds around for students to examine.

After each seed completes its rotation, ask students to describe in detail. "What color is the seed? What it is shaped like?" Compare the seeds to other objects in the classroom. For example, "A broccoli seed is about the size of a pencil tip." Tape seeds to different pieces of paper and label each with the plant name.

### Objectives

- Students will be able to envision the size of a mature garden plant
- Students will use height, spacing, and root depth information to design a planting scheme for a 3X6-foot garden bed

### EXPLAIN

#### Why is it important to envision the size of mature garden plants?

Each garden plant goes through an incredible transformation over the course of its lifetime. The tiny tomato seed grows tall and wide, showering us with a bushy bounty of ripe fruit along the way. A corn seed the size of a pencil eraser magically morphs into a towering giant. A minuscule carrot seed produces a feathery top and robust underground root. Plants get bigger and bigger plants require more space for healthy growth, so it's important that we plan wisely before putting our seeds in the ground.

There are a few main things we want to know when designing our garden beds: the above ground height of a particular plant, its spacing requirements, and the depth of its root system. A plant's height and width will determine how much space it needs between other plants. Plants that are too crowded have to compete for essential resources such as sunlight, water, and soil nutrients. This stresses a plant out and results in poor growth. Plants that are too far apart encourage competition from weeds. A smartly designed bed should allow enough room for plants to thrive, while blocking out enough sunlight to prevent resource competition from weeds.

Below ground growth is as important as what's happening above ground, therefore it's important to know the size and shape of plant's root system when planning your garden. Leeks, for example, grow relatively tall but have shallow root systems, making it possible plant them densely together. Tomato plants, however, have larger root systems and consequently require more space. Knowing a mature plant's size and shape before planting saves you time and energy later, by assuring that your plants have enough space for happy, healthy growth.

### ADDITIONAL CONTENT INTEGRATION *(see previous page)*

1. Split into groups for spacing activity and assign each group a specific plant. How many plants can students fit into their allotted space? Use a digital camera to take pictures of students' different planting layouts. Consult your pictures during the first round of spring planting.
2. Take sun-exposure into account by placing shortest plants facing south and the taller plants on the north side. Try practicing by using students as plants, shortest on the south side so the taller ones get sun, too!

### Additional Materials

- Digital camera

### EVALUATE

**Journal prompt:** Using the plants from this lesson, draw your ideal garden bed layout in your journal. What plants would you grow the most of? How many of each do you think you could fit in your ideal garden bed?