# GARDEN ARCHITECTS

This two session activity asks students to calculate plant spacing using square feet and inches in part one, and then to design and plot a garden in part two.

## Intermediate & Middle Grades
## Time: Two 20 minute sessions

## Before you begin...

**Gather materials**
- Packet of seeds
- Graph paper
- Plant Spacing Planner worksheet
- Paper and writing utensil for each student (colored pencils)

## Instructions

**Part One**

1. Invite a student to draw a representation of a garden on a whiteboard, alternatively show students an image of a garden planted in rows.

2. Ask students why they think gardens are planted in rows. Explain that most gardeners imitate larger-scale farmers, who have large fields and need to have access to all parts of the field for weeding and maintenance. Ask students what the drawbacks of this type of planting might be (lots of wasted space).

3. Show students a packet of seeds. Have a student locate and share the plant and row spacing information.

4. Tell students that a newer method of gardening has been developed for small scale gardeners. This method is called square foot gardening, and can be used in smaller garden beds. This method eliminates the row spacing, allowing plants to be spaced evenly using a grid.

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5. Explain that today students will design and plan a garden using this method. Show and example of how to plant using this method: draw or project a grid onto your whiteboard.
Outline a 12" x 12" square (1 square foot). Tell students that radishes need to be spaced 2" apart. Using that information, how many will fit in 1 square foot?
- • Find the number of square inches in a square foot (144")
- • Find the area needed for each plant by squaring the spacing (in this case 2" x 2" = 4")
- • Divide the # inches in a square foot (144") by the square inches needed per plant (in this case 4") to figure out how many plants per square foot. (144 / 4= 36 plants per square foot in this case)

6. Instruct students to find the rest of the values. Determine if you will work as a whole group, in pairs, or individually.

7. Review plant spacing (answers) before closing for the day.

**Part Two**

1. Explain to students that they will be using the plant spacing they calculated in the prior session to plan and design a garden today. Review with students the advantages of using the square foot method.

2. Discuss with students the size of garden beds. In thinking about the size of a garden bed, ask students to identify considerations. You want students to understand that because you won't be using rows, you need to be able to reach all plants from the edges of the garden, so the maximum width of a garden bed should be no more than 4', ideally 3', leaving 2' between beds.

3. Tell students they will be designing a garden that is 12' x 12' (feel free to adjust this number). They can decide how many beds will fit into this garden, using the guidelines given (2' between beds, beds no wider than 4'). They will also be deciding what to plant in those beds using the spacing guidelines they calculated. **The objective is to maximize space, and leave no useable space fallow** (unplanted).

4. Have students share their work.

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## Extension

Explore some of these Square Foot Gardening resources:
- http://www.mysquarefootgarden.net/plant-spacing/
- http://www.gardenality.com/Articles/687/Resources/Calculations/How-To-Calculate-Plants-Per-Square-Feet/default.html

This online tool by Gardener's Supply allows users to design a square foot garden online:
- http://www.gardeners.com/on/demandware.store/Sites-Gardeners-Site/default/KGP-Design

## Standards Alignment

**CCSS.MATH.MD.A Measurement & Data**

**CCSS.MATH..G.A.1 Geometry & Area**

**CCSS Math Practices**
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

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## Plant Spacing Planner

**Formula**

- 1 square foot = _____ inches
- Square the spacing between plants to determine the total square inches needed per plant, enter those values in Column 3
- Divide the total inches in a square foot by the total inches needed per plant to determine number of plants per square foot, enter those values in Column 4
- You can't plant half of a plant, so round down when faced with a remainder
- Challenge: For plants requiring more than 12", determine how many square feet would be needed per plant

| Plant Variety | Spacing between Plants | Square Inches Needed per Plant | Number of Plants per Square Foot |
|---|---|---|---|
| Radishes | 2" | | |
| Carrots | 3" | | |
| Beets, Turnips | 4" | | |
| Lettuce | 8" | | |
| Peppers, Potatoes | 12" | | |

CHALLENGE: plants requiring more than 1 square foot per plant

| Plant Variety | Spacing between Plants | Square Inches Needed per Plant | Number of Plants per Square Foot |
|---|---|---|---|
| Cucumber, Broccoli, Corn | 18" | | |
| Tomato, Watermelon, Zucchini | 24" | | |

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**Answer Key**

| Plant Variety | Spacing between Plants | Square Inches Needed per Plant | Number of Plants per Square Foot |
|---|---|---|---|
| Radishes | 2" | 4 square inches | 36 plants |
| Carrots | 3" | 9 square inches | 16 plants |
| Beets, Turnips | 4" | 16 square inches | 9 plants |
| Lettuce | 8" | 64 square inches | 2 plants |
| Peppers, Potatoes | 12" | 144 square inches | 1 plant |
| Cucumber, Broccoli, Corn | 18" | 324 square inches | 4 plants per 9 square feet |
| Tomato, Watermelon, Zucchini | 24" | 576 square inches | 1 plant per 4 square feet |