



Title: Create Your Own Square Foot Radish Garden!

Grade Level: 3-5

GPS/CC Standards:

- 3.MD.C.5. Recognize area as an attribute of plane figures and understand concepts of area measurement.
- 3.MD.C.5.A. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.
- 3.MD.C.5.B. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.
- 3.MD.C.6. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
- 3.MD.C.7. Relate area to the operations of multiplication and addition.
- 3.MD.C.7.A. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.
- 3.MD.C.7.B. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.
- 3.MD.C.7.D. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.
- 3.MD.D.8. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
- 4.G.A.1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
- 5.G.B.3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

Materials Needed:

- Variety of seed packets
- Radish seeds (16 seeds / small group)
- Newspaper (1 page / small group)
- Rulers
- Pencils
- 1 inch square tiles (144 / small group)



Time Needed: 45 minutes

Goals:

Students will cut out a square foot of newspaper using their knowledge of area. Using information they've gathered from seed packets, they will "paste" the correct number of radish seeds with the appropriate amount of space on the newspaper. They will then bury that paper in the garden and provide the seeds with what they need to grow radishes!

Objectives:

- Students should be able to use 1-inch tiles to draw out a square foot garden.
- Students should be able to count 1-inch tiles to determine the area of a square foot garden (in terms of square inches).
- Students should be able to explain the area of their square foot garden using multiplication and addition.
- Students should be able to plan, draw, and cut out their square foot garden using line segments, right angles, and parallel and perpendicular lines.
- Students should be able to determine the area and perimeter of the shape created when the class combines their square foot gardens and name the shape based on its attributes.

Lesson Plan:

Engage (10 min):

Yoga sequence to represent a seed growing into a plant.

Teacher models while students follow. (See example provided.)

- Child's Pose
 - Cat Pose
 - Dog Pose
 - Transition: Plank / Hop feet forward to hands
 - Mountain Pose
 - Tree Pose
1. Complete sequence where every student has enough personal space in the designated area to complete poses. Ask students to imagine if they were a seed – Did they have enough room to grow? Could any other "seeds" fit in their "farm"?
 2. Complete the sequence where students are side by side in child's pose and carefully move from pose to pose right next to each other – Did they have enough room to grow?



Explore (5 min):

Examine seed packets to determine seed spacing for different plants (Ignore “row spacing,” focus on “seed spacing.” Packets may list a very small seed spacing (i.e. $\frac{1}{2}$ inch), and also list “Plant spacing after thinning” (i.e. 1-3 inches). “Thinning” means planting more seeds than you want to harvest, and removing some plants after they sprout. For this activity, use the distance for “Plant spacing after thinning” since that is the ultimate distance you want between plants.)

Explain (5 min):

Plants that grow too close together will compete for nutrients, space, and water resulting in stunted root growth.

Extend – Small Groups (25 min):

Create a Square Foot Garden on Newspaper Base

1. Cut out a 1-foot square section of newspaper (measured using 1-inch tiles)
 - Reminder: 12 inches = 1 foot
 - Use multiplication to explain the area of your garden in terms of square inches.
 - Count the squares in your garden to double check the area in square inches.
2. Read seed packets to find seed spacing (one radish every 3 inches). Measure and draw 3-inch squares for each seed.
 - Students will use words such as line segment, right angles, perpendicular lines, and parallel lines to describe how they will mark these 3 inch squares before completing on their own newspaper square.For example:

0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0



3. Paste seeds in the middle of 3-inch squares.
 - Students should determine how many seeds they can fit in their square foot garden based on their 3-inch squares (16).
 - Students can paste their seeds to the newspaper using flour and just enough water to make it sticky.
4. Combine all student squares to create a class garden in a polygon shape.
 - Students will describe the attributes and accurately name the two-dimensional shape they created.
 - Students will determine the area of their class garden with each student's garden combined into one. Does the area change based on the arrangement?
 - Students will determine the perimeter of their class garden with each student's garden combined into one. Does the perimeter change based on the arrangement?
5. Plant square foot gardens!
 - In an area that receives plenty of sunlight and consistent moisture, bury the newspapers under about $\frac{1}{2}$ inch of soil.

Evaluate:

Rubric

3.MD.C.5	Uses 1-inch tiles to create a one foot square.	___ / 20
3.MD.C.6	Counts 1-inch tiles to determine area of square foot garden in terms of square inches.	___ / 20
3.MD.C.7	Explains area of square foot garden in terms of multiplication and addition.	___ / 20
4.G.A.1	Accurately draws and cuts out square foot garden using line segments, right angles, parallel, and perpendicular lines.	___ / 20
5.G.B.3	Identifies area and perimeter of class garden. Identifies the attributes and names of the shape of the class garden.	___ / 20
TOTAL		___ / 100

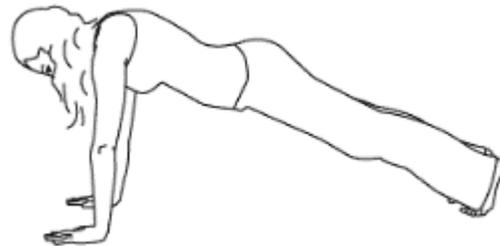


Yoga Poses to Model Plant Growth

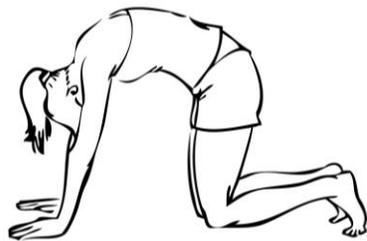
1.) Child's Pose



4.) Transition: Plank / Hope feet forward to hands



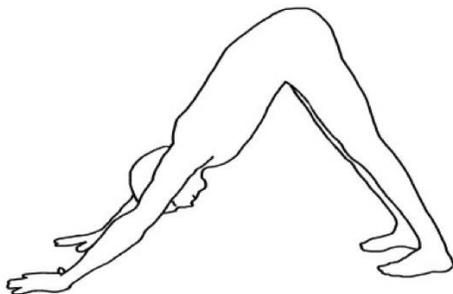
2.) Cat Pose



5.) Mountain Pose



3.) Dog Pose



6.) Tree Pose

