Figure 3.10. ***Our Vegetable Garden:*** **Grades 6–8 Adapted Task**

Our Vegetable Garden

Overview: Teacher Notes	
Students will communicate how changes in area affect perimeter.	**Prerequisite Understandings** Students can find the perimeter and area of various geometric figures.

Cognitively Relevant and Culturally Demanding Framework Connection (Figure 1.8)

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Task Rating: Developing Task	Task Rating Reflection
Requires considerable cognitive effort AND is embedded in cultural/self/community inquiry and activity • The task is centered in real-world situations requiring students to inquire deeply about themselves, their communities, and the world about them. • Requires students to draw from, use, and embrace community and cultural knowledge directly in developing strategy and solution processes. • Task content seeks to add to this knowledge through mathematical activity.	This task has students looking at both gardening in their community and how students can get together to help their community. The task has students thinking about gardens they have seen in their family and community and sharing what they already know. Students are adding to their own cultural knowledge and learning about their classmates through this task as they compare gardens they design and talk about the vegetables they would include based on their own cultural heritage.

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Our Vegetable Garden (continued)

Curriculum Content

Content Standards	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q, and x are all nonnegative rational numbers. Ratio standard
Mathematical Process Standards	**Model with mathematics:** Students create a model of a rectangle and its dilations to gather data and answer questions. They can create a model of their own community garden. **Look for and express regularity in repeated reasoning:** Students are asked to respond to the question, "Will this always be true?" **Construct viable arguments and critique the reasoning of others:** Students compare area models in order to make and analyze generalizations.

Task

Supplies

- One-inch graph paper
- Square tiles
- Colored pencils
- Rulers

Core Activity

Students will apply understanding of area and perimeter to investigate the impact of changing dimensions of a vegetable garden on area and perimeter.

Launch

Ask:

What do you know about gardens?

What types of vegetables or other things do you grow in your garden?

What part of the garden is the area? What part is the perimeter? How do you know?

Read the book *Harlem Grown: How One Big Idea Transformed a Neighborhood* by Tony Hillery or show a short video about a community garden.

Extension(s)

Have students explore how other adjustments to the length of the vegetable garden will affect the area and perimeter, such as tripling side lengths, halving one side and doubling another, and so on.

Have students explore other vegetable gardens shaped as a composite figure to determine perimeter and area.

Have students design their own irregular-shaped garden and identify what vegetables they would choose to grow. Have students find the area and perimeter of the garden.

Have students research where local produce comes from in their community. Where is it sold? How much does it cost, and is it easily accessible for them to get?

Activity

Salvador's grandfather has a small vegetable garden. He grows tomatoes in one part of the garden and eggplants in the other part. There are three rows of tomato plants with five plants in each row. There are two rows of eggplants with three plants in each row. How many tomatoes and how many eggplants does grandfather have in the garden? How much fencing is needed for each section of the garden?

Salvador was inspired by his grandfather's garden. He has already planted tomatoes and eggplants, just like his grandfather, but now wants to plant peas and beans. To do this, he needs to double the area of his garden. His sister Naelly told him that if he doubles the lengths of the sides, the new garden will be twice as large. Salvador isn't convinced. Complete the following activity to help Salvador decide whether he should follow Naelly's suggestion.

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Our Vegetable Garden (continued)

1. Construct a rectangular garden using square tiles or on graph paper. Record the dimensions on the left side of the table "Original Vegetable Garden." Find the perimeter and area of the rectangular garden and record on the left side of the table.
2. Double the lengths of the sides of the vegetable garden and record the new dimensions, the perimeter, and the area on the right side of the table "Vegetable Garden with Double the Side Lengths."

Original Vegetable Garden				Vegetable Garden With Double the Side Lengths			
Length	**Width**	**Perimeter**	**Area**	**Length**	**Width**	**Perimeter**	**Area**

3. Repeat Steps 1 and 2 by constructing a rectangular vegetable garden with different dimensions. Record your results in the table.
4. Record examples created by your peers in additional table rows.
5. Think about the effect of doubling the lengths of the sides on the areas of the rectangles. Write a description of this relationship.
6. Is this relationship always true? Create an argument using your diagrams and comparing the areas of the pairs of figures. Create an argument using the formula for area.
   Original Area: $A = lw$ **Doubled Area:** $A = (2l)(2w)$ or $A = 4lw$.
7. Think about the effect of doubling the lengths of the sides on the perimeters of the rectangular vegetable gardens. Write a description of this relationship.
8. Is this relationship always true? Create an argument using the diagrams and comparing the perimeters of the pairs of rectangles. Create an argument using the formula for perimeter: **Original Perimeter:** $P = 2l + 2w$ or $2(l + w)$ **Doubled Perimeter:** $P = 2(2l) + 2(2w)$ or $4(l + w)$
9. Should Salvador follow Naelly's suggestion and double the length of the sides of the vegetable garden in order to double the area? Why or why not?

Independent and Group Work

Students should work independently to calculate areas and perimeters of community gardens either in their community or a nearby community that is unlike theirs. Based on that data collection, consider the ratio of community garden space in each of the two communities. What do you notice and wonder? Are there inequities between the amount of garden spaces in the two communities?

Questions to Guide Discussion

What is the perimeter of the community garden in each of the different communities you identified?

What is the area of each community garden in each community you identified?

Compare the ratio of the garden space with the total size of each community. Do both communities have equal access to fresh food?

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Our Vegetable Garden (continued)

Extension Ideas

- Have students explore how other adjustments to the length of the vegetable garden will affect the area and perimeter, such as tripling side lengths, halving one side and doubling another, and so on.
- Have students explore other vegetable gardens shaped as a composite figure to determine perimeter and area.
- Have students design their own irregular-shaped garden and identify what vegetables they would choose to grow. Have students find the area and perimeter of the garden.
- Have students research where local produce comes from in their community. Where is it sold? How much does it cost and is it easily accessible for them to get?

Supports

- Display the garden design for their classmates to see.
- Provide calculators and multiplication chart as needed.
- Access Google maps to locate gardens in their community.
- Invite in families to have the students talk about their gardens.
- Have students compare the gardens.
- Extension support: Visit an actual community garden and have them look to raise money for vegetables for that garden or create their own garden at school.

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