

Designing Waldena's Dream Garden: A Hands-On Area Project

Materials Needed

- Grid paper (or graph paper)
- Rulers and/or measuring tape
- Pencils, colored markers
- Scissors
- Unit square manipulatives (small tiles, blocks, or sticky notes)
- Outdoor measuring tools: String, rope, or chalk
- Wooden stakes or small flags (for marking the outdoor space)
- Optional: Pictures of different types of garden layouts

Introduction: Planning Our Space (Tell them what you'll teach)

Hook Question: If you had to cover a whole garden bed with a blanket, how would you figure out the exact size of the blanket you need? Would measuring the distance around the garden be enough, or do we need something else?

Today, we are going to become architectural garden designers! We need to learn how to measure the total surface a space covers so we can plan the perfect layout for your plants, Waldena. This measurement is called **Area**.

Learning Objectives

By the end of this lesson, you will be able to:

1. Define Area as the measure of surface coverage using square units.
2. Calculate the area of rectangular shapes using both counting and the formula (Length \times Width).
3. Apply area concepts to create a proportional blueprint for a real or imagined garden space.

Success Criteria

You will know you are successful when you can:

- Explain what a "square unit" is.
- Accurately calculate the area of three different rectangular shapes.
- Design and label a scaled garden blueprint showing the area of at least three planting sections.

The Core Lesson: Measuring the Garden (Teach It)

I Do: Defining and Modeling Area

Focus: Understanding the unit square and the concept of coverage.

1. **Define Area:** Area is the number of square units required to cover a surface completely. It's like tiling a floor. The area tells us how many tiles we need.
2. **Demonstration (Visual/Kinesthetic):** Use the unit square manipulatives. Take a piece of paper (e.g., a postcard). Model covering the paper entirely with the square tiles.
 - "If each of these tiles is 1 square unit, the area of this postcard is the total number of tiles needed to cover it." (Count the tiles.)
3. **Introducing the Formula:** Transition to grid paper. Draw a 3 unit by 4 unit rectangle. Instead of counting every single square, we can count the units across (Length = 4) and the units down (Width = 3).
 - Model the calculation: Area = Length \times Width. (4 units \times 3 units = 12 square units).

We Do: Planning the Blueprint (Guided Practice)

Focus: Applying the L \times W formula to scaled drawings.

1. **Scale Introduction:** Explain that since we can't draw the life-size garden on our paper, we will use a scale. For our grid paper, let 1 square on the paper equal 1 square foot (or 1 square meter) in the real garden.
2. **Practice Calculations:** Work together to calculate the area for different potential garden beds:
 - Bed A: 6 feet long by 2 feet wide. (A = 12 sq ft)
 - Bed B: 5 feet long by 5 feet wide (a square bed). (A = 25 sq ft)*(Formative Assessment Check: Ask students to explain in their own words why we multiply the sides instead of adding them.)*
3. **Drafting the Main Garden Area:** If the total available garden space is 10 feet by 8 feet, draw this outline on the grid paper. Have the learner calculate the total area (80 sq ft).

You Do: Designing the Layout (Independent Application)

Focus: Using constraints and creativity to apply area calculation.

1. **Design Task:** Within the 10 ft x 8 ft total area, the learner must design three separate planting sections:
 - Tomatoes: Needs at least 15 square feet.
 - Herbs: Must be a square shape, area between 9 and 16 square feet.
 - Flowers: Can use the remaining area.
2. **Blueprint Creation:** The learner draws the three rectangular sections onto their grid paper, colors them, and labels the dimensions (Length and Width) and the calculated Area for each section.
3. **Transition to Real World:** Once the blueprint is complete, take the necessary tools (string, measuring tape, stakes) to the designated outdoor space (or a large floor area). Using the dimensions from the blueprint, the learner measures and marks the perimeter of the total garden space (10 ft x 8 ft) using the string and stakes.

Conclusion: Analyzing the Design (Tell them what you taught)

Recap and Reflection

1. **Learner Presentation:** Waldena explains her garden blueprint, walking through the dimensions of each section and stating its calculated area. For example, "My herb section is 4 feet by 4 feet, giving it an area of 16 square feet."
2. **Key Takeaway Question:** If you bought 50 square feet of topsoil, would that be enough to fill your entire 80-square-foot garden? Why or why not? (Reinforces the meaning of area.)
3. **Definition Reinforcement:** Review the definition of area and the importance of labeling the units as "square units" (or sq ft).

Adaptability and Differentiation

Scaffolding for Support

- **Simplified Calculation:** For students struggling with multiplication, limit the dimensions to smaller numbers (e.g., $L=2$, $W=3$) and focus purely on counting the squares on the grid until the formula clicks.
- **Pre-measured Tools:** Provide rulers or measuring tapes pre-marked with tape at the desired lengths (e.g., mark the 10-foot measurement for the outdoor task).
- **Vocabulary Support:** Use visual flashcards linking the words (Area, Unit Square, Length, Width) to the physical shapes.

Extensions for Advanced Learners

- **Composite Area:** Challenge the learner to design an L-shaped or T-shaped garden bed (a composite figure) and calculate the total area by splitting the shape into two smaller rectangles.
- **Perimeter vs. Area Challenge:** Calculate the perimeter (the distance around the garden) for the final 10 ft x 8 ft space. Discuss why this number (perimeter) is important for building a fence, but area is important for buying soil.
- **Cost Analysis:** Research the local cost of topsoil per square foot and calculate how much it would cost to fill their designed area. (Introduces real-world budget constraints).

Assessment

Formative Assessment (During Lesson)

- **Observation:** Observe the learner during the "We Do" phase, specifically watching how they use the grid paper and whether they correctly label the units.
- **Quick Check:** Present a flashcard with a simple rectangle (e.g., 6 units x 3 units) and ask for a quick calculation of the area.

Summative Assessment (End of Lesson)

- **The Garden Blueprint:** Evaluate the final scaled drawing. The blueprint must clearly show the dimensions (L and W) for each section, the calculated area, and the correct unit (square feet). (Success Criteria #3).
- **Real-World Application Check:** Assess the learner's ability to accurately measure and mark the 10 ft x 8 ft space outdoors using the measuring tape and stakes/string.
- **Verbal Justification:** The learner must correctly state the definition of area and explain the L x W formula (Success Criteria #1 & #2).