MA.3.GR.2.3

Overarching Standard: MA.3.GR.2 *Solve problems involving the perimeter and area of rectangles.*

Benchmark of Focus

MA.3.GR.2.3: Solve mathematical and real-world problems involving the perimeter and area of rectangles with whole-number side lengths using a visual model and a formula.

Benchmark Clarifications:

Clarification 1: Within this benchmark, the expectation is not to find unknown side lengths.

Clarification 2: Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form.

Related Benchmark/Horizontal Alignment

- MA.3.NSO.2.2/2.4
- MA.3.AR.1.2
- MA.3.M.1.1/1.2

Vertical Alignment

Previous Benchmarks	Next Benchmarks
MA.2.GR.1.1/1.2	MA.4.GR.2.1/2.2

Terms from the K-12 Glossary

- Perimeter
- Rectangle

Purpose and Instructional Strategies

The purpose of this benchmark is for students to solve mathematical and real-world problems using the perimeter and area of rectangles using a visual model and/or a formula for each.

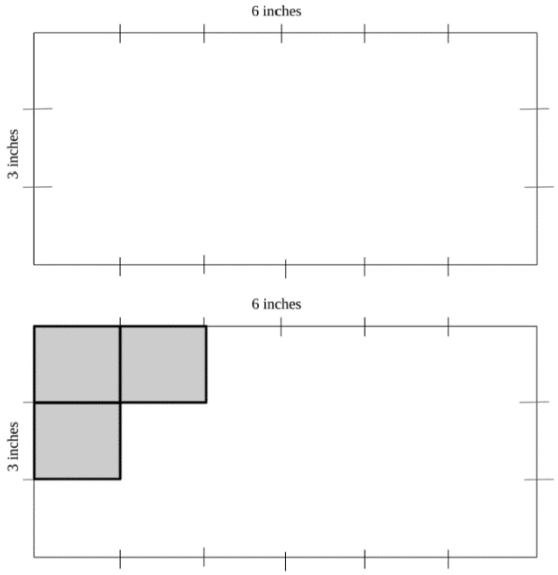
- In the provided mathematical and real-world problems, instruction should include cases where students use a ruler to measure lengths before determining its perimeter and/or area (MTR.3.1).
- Mathematical problems include visual models of rectangles, while examples of real- world problems could include photos or classroom objects (e.g., measuring the area of one face on a tissue box). Students will not be expected to find unknown side lengths until Grade 4 (MTR.7.1).
- This benchmark gives students the chance to measure perimeter and area together and understand their differences – perimeter as a one-dimensional length measurement and area as a two-dimensional measurement. (Note: Though students explored and measured perimeter in Grade 2, they were not expected to determine a formula.) (MTR.5.1)
- As recommended for MA.3.GR.2.2 for a multiplication formula for area, classroom instruction should include activities that allow students to build formulas for perimeter based on patterns they observe (e.g., $P = l + l + w + w$, $P = 2l + 2w$) before expecting them to memorize. Student-created formulas will build conceptual understanding around a formula before memorizing it (MTR.4.1).

Common Misconceptions or Errors

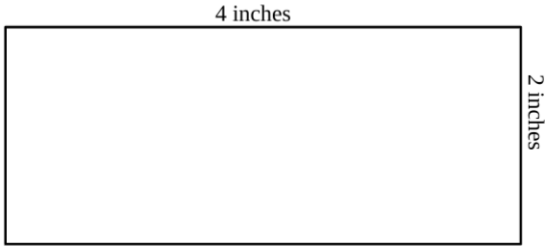
- Students may confuse area and perimeter and use incorrect formulas to find measurements. During instruction, the teacher should continue to emphasize the difference between perimeter as a one-dimensional measurement of length and area as a two-dimensional measurement that covers a shape with unit squares. The teacher can use visuals to show the perimeter (e.g., yarn, string stretched around the rectangle) and area (e.g., square counters, square-shaped sticky notes, square-shaped crackers covering it) to help students differentiate between the measurements.

Strategies to Support Tiered Instruction

- Instruction includes opportunities to explore both area and perimeter of given figures and make connections to the formulas to find each. The teacher provides students with dimensions for a figure that has whole number side lengths that can be measured using inches or centimeters. Students use a ruler to measure the side lengths and place tick marks for each whole number unit. Students then label each side length and use the formula for perimeter to calculate. Next, students use the formula for area to find the area and then use the tick marks made when measuring to draw in the rows and columns to check their work.
    - For example, the teacher asks students to draw a figure with a length of 3 inches and a width of 6 inches. Students use a ruler to draw the figure and place tick marks along each side for each inch. Students then use the formula to find the perimeter ($P = 3 + 3 + 6 + 6$). Next, students use the tick marks made when measuring to draw in the rows and columns to cover the figure with square inches and then use the formula to find area ($A = 3 \times 6$).



- Teacher provides a figure that has whole number side lengths that can be measured using inches. Students use a visual representation such as string or yarn to measure the distance around the figure and then measure the length of the string to make the connection to perimeter being a one-dimensional measurement. Students then use a different visual representation such as 1-inch tiles or square sticky notes to cover the figure to find the area and make the connection to area being a two-dimensional measurement.
    - For example, the teacher provides an image like the example below. Students use a piece of string to measure the distance around the figure and then use a tape measure to measure the length of the string. Or students can use the string to measure the 2 sides, then add the 2 lengths and multiply by 2 to determine the perimeter. Students will then use square tiles to cover the image to determine the area



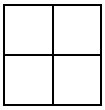
Questions to ask students:

Ask students to explain how to find the perimeter of a shape.

- *Sample answer that indicates understanding:* I can measure the distance around the shape and add them together to find the perimeter.
- Sample answer that indicates an incomplete understanding or a misconception: I can make squares inside the shape and count the squares.

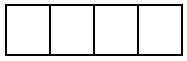
Does every rectangle with the same area have the same perimeter? Does every rectangle with the same perimeter have the same area? How do you know?

- *Sample answer that indicates understanding:* No, I can have rectangles with the same area but different perimeters, and I can have rectangles with the same perimeter but different areas. For example, a 2×2 rectangle has an area of 4 square units, and a perimeter of 8 units; and a 1×4 rectangle also has an area of 4 square units, but the perimeter is 10 units. They have the same area, but different perimeters. A 2×2 and a 1×3 rectangle both have a perimeter of 8 units, but one has an area of 4 square units and the other has an area of 3 square units; they have the same perimeter but different areas.



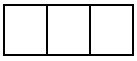
Area = 4 sq. units

Perimeter = 8 units



Area = 4 sq. units

Perimeter = 10 units



Area = 3 sq. units

Perimeter = 8 units

Instructional Tasks

Instructional Task 1

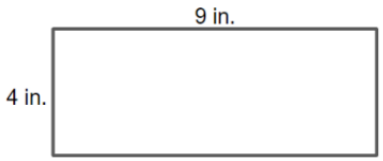
Find the whole number length and whole number width of every rectangle with an area of 18 square feet. Record the length, width and perimeter of each rectangle in the table.

Instructional Items

Instructional Item 1

Which of the following rectangles has a perimeter of 24 inches and an area of 36 square inches?

a.



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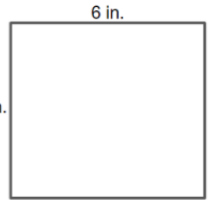
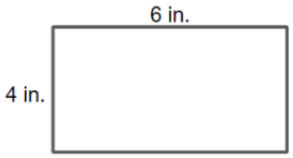
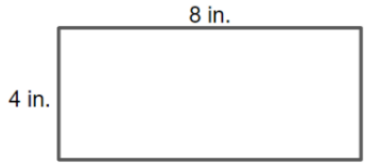


c.



d.



Instructional Item 2

A rectangle is 12 centimeters long and 9 centimeters wide. What is the area of the rectangle?

Area	Length	Width	Perimeter
18 sq. ft.			
18 sq. ft.			
18 sq. ft.			
18 sq. ft.			
18 sq. ft.			
18 sq. ft.			

Achievement Level Descriptors

Benchmark	Context	Assessment Limits
MA.3.GR.2.3 Solve mathematical and real-world problems involving the perimeter and area of rectangles with whole-number side lengths using a visual model and a formula. Clarification 1: Within this benchmark, the expectation is not to find unknown side lengths. Clarification 2: Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form.	Both	Items will require the student to find the perimeter, the area, or both.

ALD 2	ALD 3	ALD 4	ALD 5
solves mathematical or real-world problems involving the perimeter of rectangles with whole number side	solves mathematical or real-world problems involving the perimeter and area of rectangles with whole number	solves mathematical or real-world problems involving the perimeter and area of rectangles with whole number side lengths using a	solves problems involving the perimeter and area of rectangles with whole number side and

lengths using unit squares.	side lengths using unit squares	visual model and a formula.	analyzes errors in given solutions.

Additional Resources:

CPALMS Resources

Resources/Tasks to Support Your Child at Home:

Give your child the opportunity to measure to find the perimeter of various flat surfaces around the house (i.e., picture frames, books, small rugs).

Ask your child about the dimensions of different rectangular objects. *What is the length of this table? What is the width? How can you find the perimeter and the area of this table if you know the length and width?*

Khan Academy: Perimeter: Introduction

Khan Academy: Perimeter & Area

LearnZillion Video: Find the Perimeter of a Polygon

LearnZillion Video: Find the Perimeter of a Square or Rectangle by Adding Side Lengths

LearnZillion Video: Use a Chart to Understand How Rectangles can have the Same Perimeter with Different Areas