MA.3.GR.2.4

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

Benchmark of Focus

MA.3.GR.2.4: Solve mathematical and real-world problems involving the perimeter and area of composite figures composed of non-overlapping rectangles with whole-number side lengths.

Example: A pool is comprised of two non-overlapping rectangles in the shape of an "L". The area for a cover of the pool can be found by adding the areas of the two non-overlapping rectangles.

Benchmark Clarifications:

Clarification 1: Composite figures must be composed of non-overlapping rectangles.

Clarification 2: Each rectangle within the composite figure 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.2.2	MA.4.GR.2.1

Terms from the K-12 Glossary

- Composite Figure
- Perimeter
- Rectangle

Purpose and Instructional Strategies

The purpose of this benchmark is for students to solve mathematical and real-world problems involving the perimeter and area of composite figures with whole-number side lengths. This benchmark builds on the work with perimeter done in Grade 2. The area of each rectangle in a composite figure is expected to be within the appropriate multiplication limits for Grade 3 – up to 12 units by 12 units. All side lengths of composite figures should be given, though cases can be provided where students are expected to use a ruler to measure before finding a composite figure's perimeter and/or area.

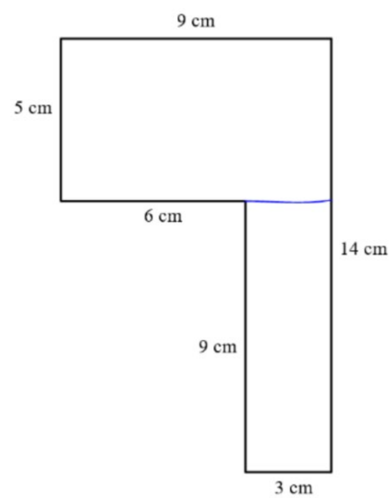
- Students have previous experience with decomposing larger rectangles into smaller rectangles to find individual areas. When students utilized the distributive property in area models to multiply 2-digit factors by a 1-digit factors, students decomposed (broke apart) the 2-digit number as the sum of its tens and ones. Students learned that the product was the sum of smaller rectangles' areas. Students likely used area models to build fluency within 12 × 12 as well. During instruction of this benchmark, teachers should have students make connections to their previous learning as they begin decomposing the composite figures (MTR.2.1, MTR.5.1).

- Instruction of measuring area of composite figures should include opportunities for students to justify how they decompose their composite figures into 2 or more rectangles before calculating. As students share the different ways they decompose their figures, they identify that any correct decomposition will yield the correct calculation (MTR.2.1, MTR.2.1, MTR.3.1).

Common Misconceptions or Errors

- Students can confuse the side lengths when determining area calculations once a composite figure has been decomposed. For example, a potential way to decompose the figure from the task below is seen on the right. A student may not yet understand that once decomposed in this way, the length of 14 cm on the right side of the figure is now the sum of 5 cm + 9 cm. The student may continue to multiply by 14 cm to find the areas of each rectangle instead. Likewise, they may multiply 5 cm by 6 cm (instead of 9 cm) to find the area of the upper rectangle. During instruction, encourage students to label how side lengths change once a composite figure has been decomposed.

Find the area of the figure. Write the area on the line.

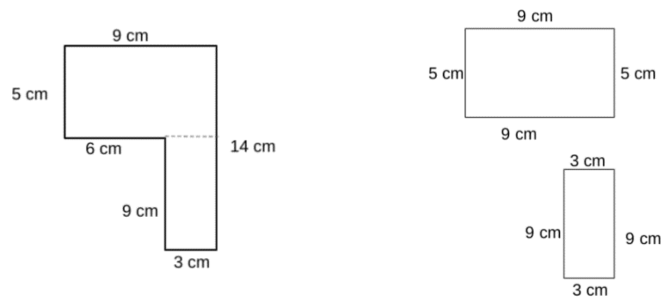


- Students may add all sides of the parts of the figure once it is decomposed to determine the perimeter of the composite figure. For example, in the figure shown, the student may find the perimeter to be (9cm + 9cm + 5cm + 5cm) + (9cm + 9cm + 3cm + 3cm) = 52cm, when the correct answer is 9cm + 14cm + 3cm + 9cm + 6cm + 5cm = 46cm.

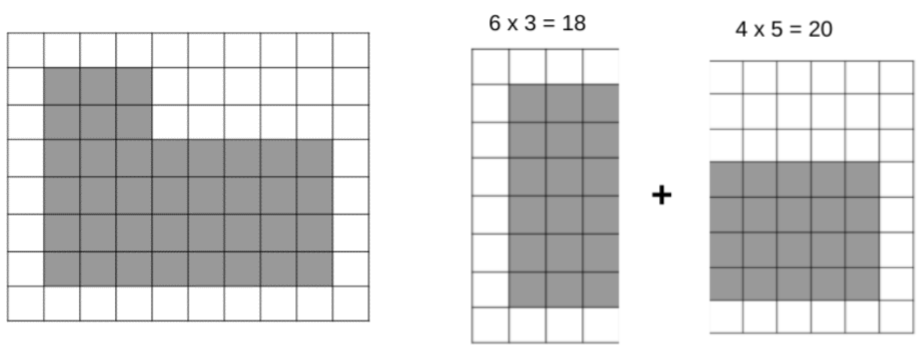
Strategies to Support Tiered Instruction

- Instruction includes decomposing figures in multiple ways, finding the area of each individual rectangle and then finding the sum of the two rectangles.
  - For example, the teacher provides students with a composite figure and asks them to decompose the figure into two rectangles. Students draw and label the two rectangles as separate parts to show their understanding of how the side lengths have changed once the figure was decomposed. Then, students find the area of each individual rectangle. By drawing the two separate rectangles, students identify which measurements to use due to

the decomposing of the figures. One example of how the figure can be decomposed is shown. Students may come up with other ways.



- Teacher provides composite figures created with unit squares. Students cut the figures to decompose them into two separate rectangles and label the dimensions for each figure. Students then find the sum of the area of the two rectangles.
  - For example, teacher provides students with figures similar to the one below. Students determine how they can decompose them into two rectangles (there could be more than one way). Students then cut the figure apart to show the two rectangles and writes multiplication equations to represent the area of each part. Finally, students find the sum of the two areas and determines if the area is the same as the whole figure.
  - Students can find the perimeters of the two separate rectangles and then determine if the sum of the two perimeters is the same as the perimeter of the composite figure.



Questions to ask students:

Ask students to show two different ways to decompose a composite figure to find the area.

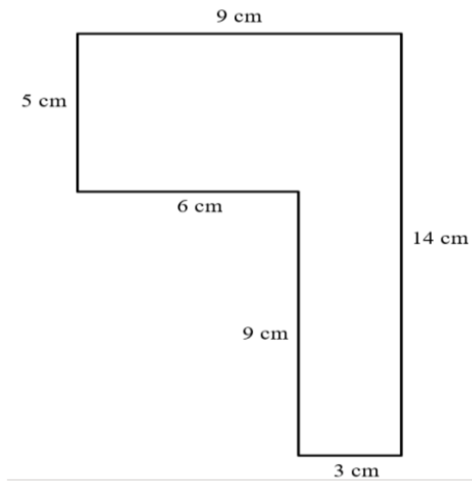
- *Sample answer that indicates understanding:* student is able to explain different ways to break apart a composite shape into smaller rectangles and to identify the side lengths needed to find the area.
- *Sample answer that indicates an incomplete understanding or a misconception:* student may decompose the shape in a way that doesn't form rectangles or may be unsure of how to identify side lengths once the shape is decomposed.

Do you need to decompose a composite figure to find the perimeter?

- *Sample answer that indicates understanding:* No, I can add all of the side lengths of the figure without decomposing it into rectangles.

Instructional Tasks

Instructional Task 1



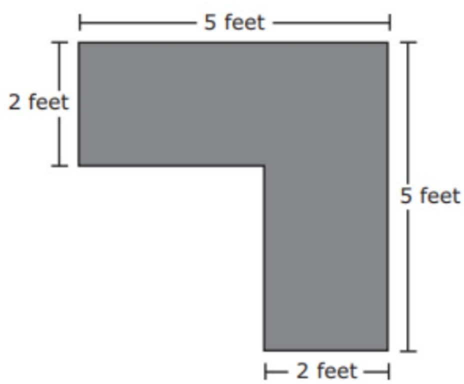
What is the perimeter? __________

What is the area? __________

Instructional Items

Instructional Item 1

A drawing of the top of a desk is shown.



What is the area of the top of the desk?

a. 14 square feet
b. 16 square feet
c. 20 square feet
d. 25 square feet

Achievement Level Descriptors

Benchmark	Context	Assessment Limits
MA.3.GR.2.4 Solve mathematical and real-world problems involving the perimeter and area of composite figures composed of non-overlapping rectangles with whole- number side lengths. Example: A pool is comprised of two non-overlapping rectangles in the shape of an "L". The area for a cover of the pool can be found by adding the areas of the two non-overlapping rectangles. Clarification 1: Composite figures must be composed of non-overlapping rectangles. Clarification 2: Each rectangle within the composite figure cannot exceed 12 units by 12 units and responses must include the appropriate units in word form.	Both	Items will require the students to find the perimeter, the area, or both. Items will not include finding a missing side length.

ALD 2	ALD 3	ALD 4	ALD 5
decomposes a composite figure into non-overlapping rectangles.	solves mathematical problems involving the perimeter and area of composite figures composed of two non-overlapping rectangles with whole number side lengths using unit squares.	solves mathematical or real-world problems involving the perimeter and area of composite figures composed of non-overlapping rectangles with whole number side lengths.	solves mathematical or real-world problems involving the perimeter and area of composite figures composed of non-overlapping rectangles with whole number side lengths in more than one way.

Additional Resources:

CPALMS Resources

Resources/Tasks to Support Your Child at Home:

Ask your child to tell you scenarios for when you might find area and perimeter in real life. For example, carpeting a bedroom requires you to measure the area of the room, but when fencing a backyard, you will need to measure the perimeter of the yard.

Khan Academy: Perimeter of a Shape

Khan Academy: Decomposing Shapes to Find Area: Grids

Khan Academy: Decomposing Shapes to Find Area: Add

LearnZillion Video: Find the Perimeter of a Polygon with More than 4 Sides