Grade 3 Target I

Domain, Target, Standards, DOK, Vertical Alignments, Achievement Levels, Evidence Required, Vocabulary, Response Types, Materials, Attributes, Question Types, and Question Banks (Examples)

Content Domain: Measurement and Data

Target I [m]: 3.MD.C Geometric measurement: understand concepts of area and relate area to multiplication and to addition.3.OA.B Understand properties of multiplication and the relationship between multiplication and division.3.G.A Reason with shapes and their attributes.

Standards included in Target I: 3.MD.C.5, 3.MD.C.6, 3.MD.C.7, 3.OA.B.5 3.G.A, 3.G.A.2

3.MD.C Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

3.MD.C.5 Recognize area as an attribute of plane figures and understand concepts of area measurement. 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. 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.

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.
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.
c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.
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.OA.B Understand properties of multiplication and the relationship between multiplication and division.

3.OA.B.5 Apply properties of operations as strategies to multiply and divide. Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)

3.G.A Reason with shapes and their attributes.

3.G.A.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.

Vertical Alignment

Related Grade 2 standards

2.G.A Reason with shapes and their attributes.

2.G.A.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

2.NBT.B Use place value understanding and properties of operations to add and subtract.

2.NBT.B.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

NBT.B.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

Related Grade 4 Standards

4.MD.A Solve problems involving measurement and conversion of measurements.

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4.MD.A.3 Apply the area and perimeter formulas for rectangles in real-world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

4.G.A Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

4.G.A.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

Achievement Level Descriptors

Level 1 Students should be able to recognize area as an attribute of plane figures and recognize that a square with side lengths of one unit is called a unit square.

Level 2 Students should be able to find the area of a rectilinear figure by counting unit squares.

Level 3 Students should be able to find the area of a rectilinear figure by multiplying side lengths and by decomposing a rectilinear figure into non-overlapping rectangles and adding them together.

Level 4 Students should be able to use multiplication and division within 100 to solve one-step problems involving measurement quantities.

Evidence Required

1. The student measures areas by counting unit squares.

2. The student finds areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts.

3. The student finds the area of a rectangle with whole-number side lengths by tiling it, and shows that the area is the same as would be found by multiplying the side lengths.

Vocabulary

unit square, area, square unit, plane figure, square centimeter, square meter, square inch, square feet

Response Types

Equation/Numeric; Multiple Choice, single correct response

Materials

none

Attributes

All figures in such problems should be rectilinear and coverable without gaps or overlaps by unit

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squares.

Claim 1: Concepts and Procedures (DOK 2) Question Banks
Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

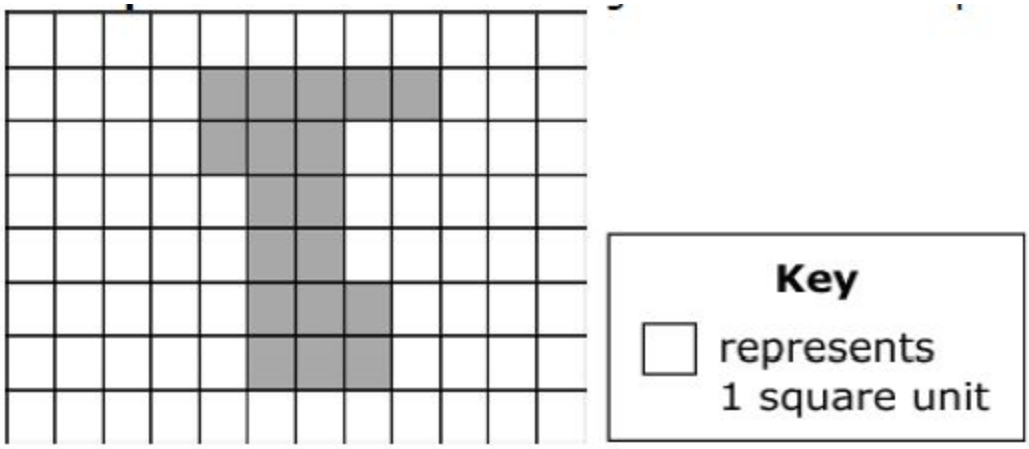
Claim 1 3.MD.C.6 DOK Level 2

Measure areas by counting unit squares (square cm, square m, square in., square ft, and improvised units).

Evidence Required
The student measures areas by counting unit squares.

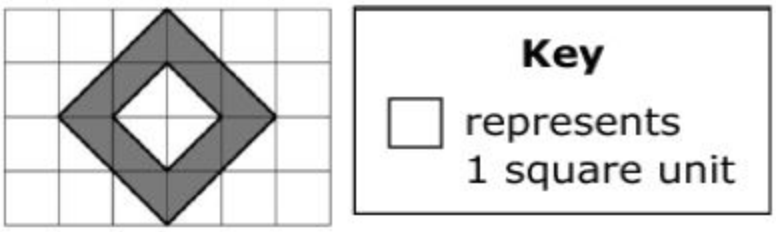
Question Type 1: The student is presented with a shaded figure in a grid and determines the total area, in square units, of the figure.

1. Use this diagram to solve the problem.



Enter the area, in square units, of the shaded figure.

2. Use this diagram to solve the problem.



Enter the area, in square units, of the shaded figure.

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Rubric: (1 point) The student correctly enters the area, in square units, of the shaded figure (e.g., 18; 6).
Response Type: Equation/Numeric

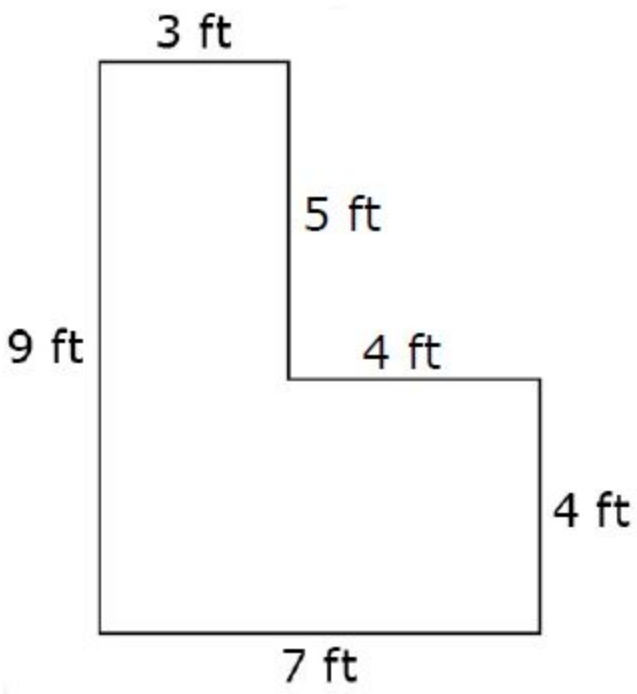
3.MD.C.7d DOK 2
Relate area to the operations of multiplication and addition. d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real-world problems.

Evidence Required

The student finds areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts.

Question Type 1: The student is presented with a non-overlapping rectilinear figure.

1. This figure is made by joining two rectangles.



Enter the total area, in square feet, of the figure.

Rubric: (1 point) The student enters the correct value (e.g., 43).
Response Type: Equation/Numeric

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3.MD.C.7a DOK 2

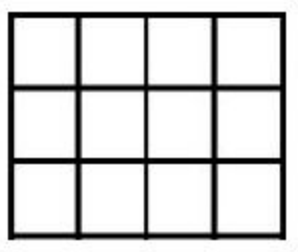
Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

Evidence Required

The student finds the area of a rectangle with whole-number side lengths by tiling it, and shows that the area is the same as would be found by multiplying the side lengths.

Question Type 1: The student is presented with a tiled rectangle made up of square units.

1. This figure is tiled with square units.



Which expression could be used to find the area of this figure in square units?

A. 3 + 4
B. 3 × 4
C. 3 + 3 + 4 + 4
D. 3 × 3 × 4 × 4

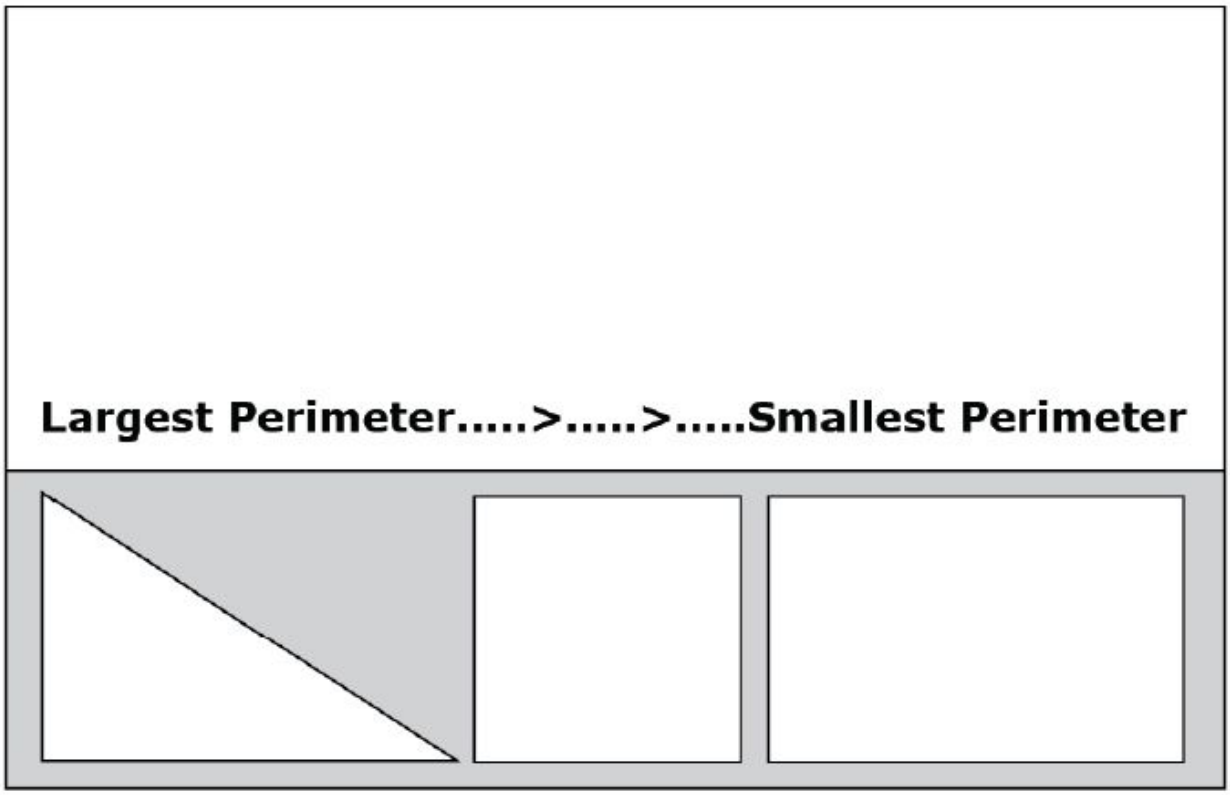
Rubric: (1 point) The student chooses the correct expression (e.g., B).
Response Type: Multiple Choice, single correct response

Claim 2 Problem Solving Question Banks
Claim Descriptors and Targets

Students can solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.
Example 1

Order all three figures so that the one on the left has the largest perimeter and the one on the right has the smallest perimeter.

Drag each figure into the space in order of its perimeter.



Rubric: (1 point) The student correctly orders the figures with the square first, the triangle second, and the rectangle third.
Response Type: Drag and drop.

Interaction: A GI background is given with active measuring and drawing tools. All three figures are presented in the bottom non-refreshable palette and the student must drag each figure into a correct arrangement, largest to smallest perimeter.

Commentary: The student has the choice of using the ruler in the Drawing and Measurement Tool or judging the perimeter without the use of tools. Strategic choices will make it easier for them to complete this item. It can be established that the rectangle has the largest perimeter by direct comparison, but it is harder to compare the perimeters of the square and the triangle without measuring the side-lengths.

Example 2

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What is the area of each figure

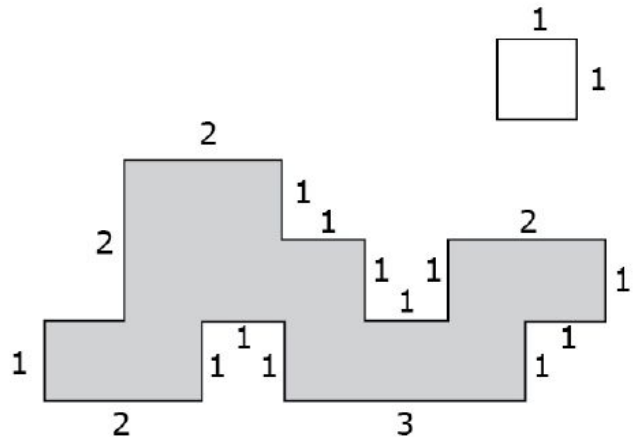

Figure A

The area of Figure A is ☐ square units.

What is the area of each figure

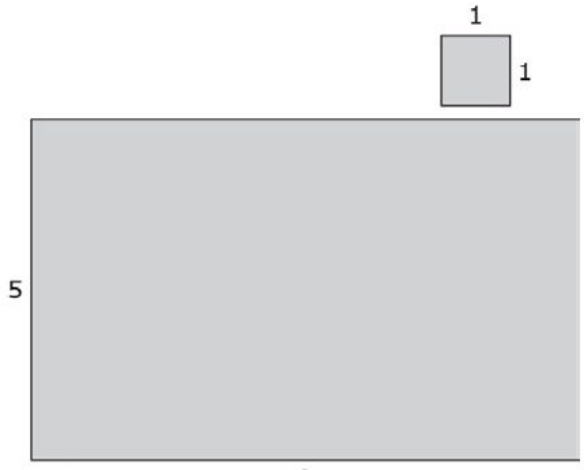

Figure B

The area of Figure B is ☐ square units.

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Rubric: (2 points) The student enters the correct area for each figure, 1 point for each (12 and 40).

Response Type: Equation/numeric with graphing and a combination of tiling and drag and drop as part of the unscored interaction.

Commentary: This item gives the student access to a tiling tool that can be used to cover a region with square units. The item has two parts, one where the tool can be profitably used to help the student keep track of the number of square units that are needed to cover the region without gaps or overlap, and one where knowing the relationship between the side-lengths and area of a rectangle is more efficient than using the tiling tool.