Grade 4 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 [s]: 4.MD.A Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
Standards included in Target I: 4.MD.A, 4.MD.A.1, 4.MD.A.2, 4.MD.A.3
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Claim 3 Communicating Reasoning Question Banks
Claim 4 Modeling and Data Analysis Question Banks

Content Domain: Measurement and Data

Target I [s]: 4.MD.A Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

Standards included in Target I: 4.MD.A, 4.MD.A.1, 4.MD.A.2, 4.MD.A.3

4.MD.A Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz; L, mL; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...

4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

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.

Vertical Alignment

Related Grade 3 standards

3.MD.A Solve problems involving measurement and estimation of intervals of time, liquid volumes and masses of objects.

3.MD.A.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (L). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

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

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 model 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.MD.D Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

3.MD.D.8 Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

Related Grade 5 Standards

5.MD.A Convert like measurement units within a given measurement.

5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems.

Achievement Level Descriptors

Level 1 Students should be able to know relative sizes of measurement units within one system of units, including in, ft, yd; km, m, cm; kg, g; lb, oz.; L, mL; and hr, min, sec.

Level 2 Students should be able to express measurements in a larger unit in terms of a smaller unit within a single system of measurement, record measurement equivalents in a two-column table, and apply the perimeter formula to rectangles in mathematical problems.

Level 3 Students should be able to use the four operations to solve problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require
expressing measurements given in a larger unit in terms of a smaller unit; represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale; and apply the area formula to rectangles in mathematical problems.

Level 4 Students should be able to apply the perimeter and area formulas to rectangles in word problems.

Evidence Required

1. The student converts measurements from larger units to smaller units **within** a single system of units.

2. The student records measurement equivalents in a two-column table.

3. The student identifies measurement quantities from diagrams, such as number line diagrams that feature a measurement scale, and uses the information to solve word problems.

4. The student applies the area and perimeter formulas for rectangles to solve mathematical and real-world problems.

Vocabulary
equivalent, mass, volume, interval, area, perimeter, square units

Response Types
Equation/Numeric; Graphing; Matching Tables; Fill-in Tables

Materials
Number lines featuring measurement scales, diagrams, tables, graphics of rectangles, equations, whole numbers, decimals (to the hundredths), fractions (limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100), measurements (in units of km, m, cm; kg, g; lb, oz; L, mL; hr, min,

sec) ounces (oz), liters (L), milliliters (mL), hours (hr), minutes (min), seconds (s), money (whole number $ or ¢ only), yards (yd), feet (ft), inches (in), gallons (gal), quarts (qt), pints (pt), cups

Attributes

• Conversion factors will not be given to students.
• All conversions are within one system of measurement, from a larger unit to a smaller unit.
• Multiplication items are limited to four-digit by one-digit or two-digit by two-digit. Items may not include multiplication with decimals, but may include a whole number times a fraction.
• Division items are limited to four-digit by one-digit division of whole numbers. No division with decimals or fractions.
• Operations on fractions may include addition or subtraction of fractions with like denominators, including mixed numbers.
• Required conversions may include converting from fractions (including improper fractions and mixed numbers), decimals (to the hundredths), or whole numbers to fractions, decimals, or whole numbers.

Claim 1: Concepts and Procedures (DOK 1, 2) Question Banks

Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

Claim 1 4.MD.A.2 DOK Level 1

Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz; L, mL; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...

Evidence Required

The student converts measurements from larger units to smaller units within a single system of units.

Question Type 1: The student is presented with a measurement.

1. Enter the unknown number that makes the statement true.

3.5 centimeters = □ millimeters

2. Enter the unknown number that makes the statement true.

6 feet = □ inches

Rubric: (1 point) The student enters the correct value (e.g., 35; 72).
Response Type: Equation/Numeric

Question Type 2: The student is presented with one measurement in the stem.

Decide whether each measurement is equal to 5 yards. Select Yes or No for each measurement.

	Yes	No
180 inches		
27 inches		
15 feet		

Rubric: (1 point) Student correctly selects yes or no for each of the given equivalencies (e.g., Y, N, Y).

Response Type: Matching Tables

Claim 1 4.MD.A.1 DOK Level 2

Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz; L, mL; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...

Evidence Required
The student records measurement equivalents in a two-column table.

Question Type 1: The student is presented with a two-column table.

Enter the unknown numbers to complete the table of equal measurements.

Feet	Inches
3	
5	

Interaction: The student enters the number of inches into the response boxes.

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Rubric: (1 point) The student enters the correct equivalencies for the given measurements (e.g., 36, 60).

Response Type: Fill-in Table

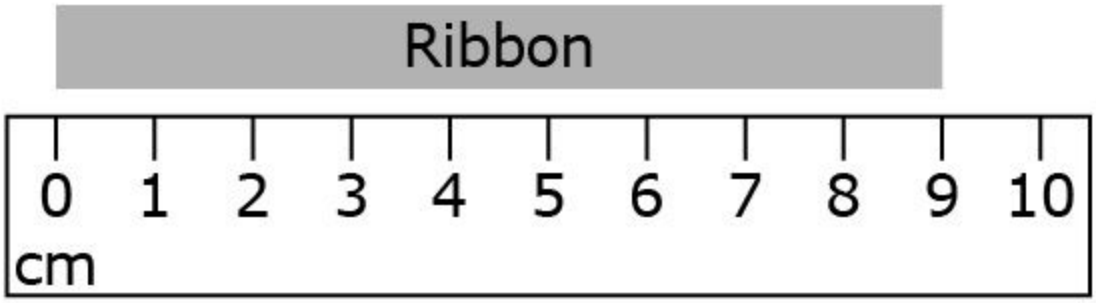
Claim 1 4.MD.A.2 DOK Level 2

Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

Evidence Required
The student identifies measurement quantities from diagrams, such as number line diagrams that feature a measurement scale, and uses the information to solve word problems.

Question Type 1: The student is presented with an object or quantity that can be measured using a number line diagram with a measurement scale.

A ribbon is shown above a centimeter ruler. Enter the length, in **millimeters**, of the ribbon.



Rubric: (1 point) The student enters the correct measurement shown in the diagram (e.g., 90).

Note: Depending on the diagram, a range of responses may need to be accepted. It is reasonable to allow 89-91 mm for the example shown above.

Response Type: Equation/Numeric

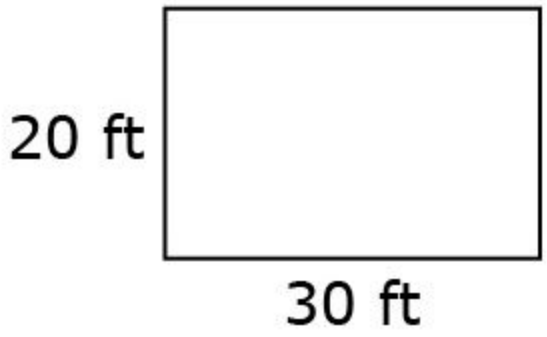
Claim 1 4.MD.A.3 DOK Level 1

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.

Evidence Required
The student uses the area and perimeter formulas for rectangles to solve problems in mathematical and real-world contexts.

Question Type 1: The student is presented with the dimensions of a rectangle.

Use the diagram of the rectangular garden to solve the problem.



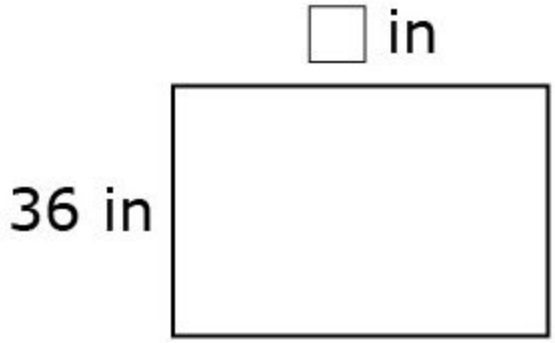
Enter the area, in square feet, of the garden.

Rubric: (1 point) The student enters the correct number (e.g., 600).

Response Type: Equation/Numeric

Question Type 2: The student is presented with one dimension and either the area or perimeter of a rectangle and must find the unknown side length.

Use the diagram of the rectangle to solve the problem.



The perimeter of the rectangle is 192 inches. What is the length, in inches, of the unknown side?

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Rubric: (1 point) The student enters the correct number (e.g., 60).

Response Type: Equation/Numeric

Question Type 3: The student is presented with the area or perimeter of a rectangle.

1. The dimensions for three rectangles are shown. Decide whether each rectangle has an area equal to 100 square feet. Select Yes or No for each rectangle.

	Yes	No
Rectangle 1: • Length = 5 ft • Width = 20 ft		
Rectangle 2: • Length =10 ft • Width = 10 ft		
Rectangle 3: • Length = 4 ft • Width = 25 ft		

2. The dimensions for three rectangular gardens are shown. Decide whether each garden has a perimeter equal to 100 meters. Select Yes or No for each garden.

	Yes	No
Garden 1: • Length = 5 m • Width = 45 m		
Garden 2: • Length = 50 m • Width = 50 m		
Garden 3: • Length = 4 m • Width = 25 m		

Rubric: (1 point) The student selects all of the correct dimensions for the rectangle (e.g., Y, Y, Y; Y, N, N).

Response Type: Matching Tables

Claim 3 Communicating Reasoning Question Banks

Claim Descriptors and Targets

Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

Example 1

• There are 60 seconds in a minute.
• There are 60 minutes in an hour.
• There are 24 hours in a day.

What is the total number of minutes in 1 day? Enter your answer in the first response box.

Write an expression that shows how you found your answer. Enter your expression in the second response box.

Rubric: (2 points) The student enters the correct number of minutes in a day in the first response box (1440) and a correct equation in the second response box (e.g., 60 × 24, 144 × 10, or equivalent expressions).
(1 point) The student enters the correct number of minutes in a day in the first response box or a correct equation in the second response box.

Response Type: Equation/Numeric (2 response boxes)

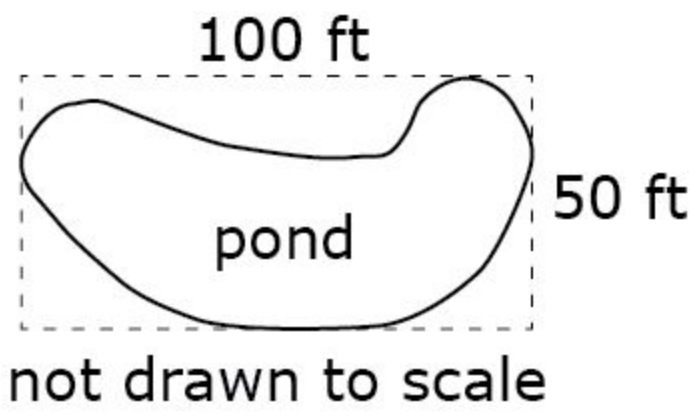
Claim 4 Modeling and Data Analysis Question Banks

Claim Descriptors and Targets

Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.

Example 1

Liam uses string to form a rectangle with length 100 feet and width 50 feet to estimate the area of a small pond.



Enter an estimate for the area of the pond in square feet in the response box. [ ]

Select a statement that supports your estimate:

A. The area of the rectangle is bigger than the area of the pond.
B. The area of the rectangle is smaller than the area of the pond.
C. The distance around the rectangle is bigger than the distance around the pond.
D. The distance around the rectangle is smaller than the distance around the pond.

Rubric: (1 point) The student enters a reasonable estimate and selects the supporting reason (a number between 2500 and 5000; A).

Response Type: Equation/Numeric; Multiple Choice, single correct response

Note: Currently can be formatted as a Drag and Drop and Hot Spot.

Example 2

Tyra wants to enclose a section of her lawn for her dog to be able to have an outdoor play area. She knows that if she uses the side of her house as one side of the play area, her dog will have a larger outdoor play area. Tyra's plan for the play area includes the following:

• It will be in the shape of a rectangle.
• The side of the house will be used as one side of the rectangular area.
• She will use exactly 24 feet of fence material to enclose the play area.
• The length and width of the enclosure will be a whole number of feet.
• She wants the play area to be greater than 60 square feet.

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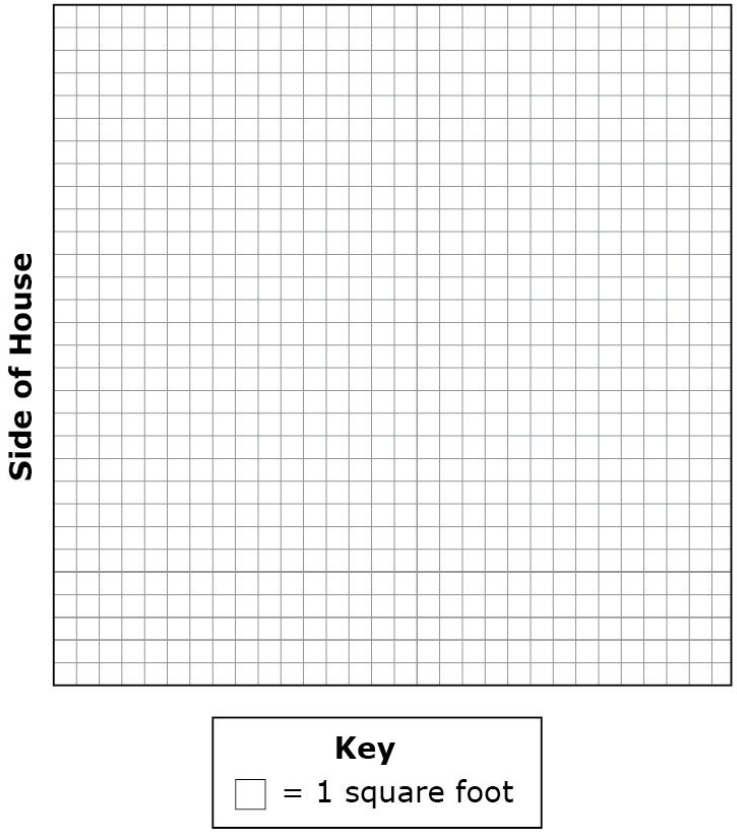
Use the Connect Line tool to create a rectangular play area that meets Tyra's plan.



Rubric: (2 points) The student is able to construct a 4 by 16, 5 by 14, 6 by 12, 7 by 10, or 8 by 8 rectangle using the side of the house for the longer side.
(1 point) Partial credit is possible for constructing a rectangle that uses exactly 24 feet of fencing, but doesn't reflect using the side of the house as one of the sides, nor the area being greater than 60 square feet (e.g., 1 by 11, 2 by 10, 3 by 9, 4 by 8, 5 by 7, or 6 by 6).

Response Type: Graphing

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