Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	
Content Domain: **Operations and Algebraic Thinking**	
Target A [a]: Write and interpret numerical expressions. (DOK 1, 2) Tasks for this target will require students to write expressions to express a calculation and evaluate and interpret expressions. Some of these tasks should incorporate the work of using the associative and distributive properties in writing and evaluating expressions, but expressions will not contain nested grouping symbols.	
Standards: 5.OA.A, 5.OA.A.1, 5.OA.A.2	**5.OA.A Write and interpret numerical expressions.** **5.OA.A.1** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. **5.OA.A.2** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.OA.A, 4.OA.A.2 6.EE.A, 6.EE.A.1, 6.EE.A.2, 6.EE.A.3	**Grade 4 Standards** **4.OA.A Use the four operations with whole numbers to solve problems.** **4.OA.A.2** Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. **Grade 6 Standards** **6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.** **6.EE.A.1** Write and evaluate numerical expressions involving whole-number exponents. **6.EE.A.2** Write, read, and evaluate expressions in which letters stand for numbers. **6.EE.A.3** Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression* 6 *(4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*
DOK Level(s):	1, 2

Achievement Level Descriptors:	
RANGE Achievement Level Descriptor (Range ALD) Target A: Write and interpret numerical expressions.	**Level 1** Students should be able to evaluate numerical expressions that have either parentheses, brackets, or braces.
	Level 2 Students should be able to write and evaluate numerical expressions having two non-nested sets of parentheses, brackets, or braces.
	Level 3 Students should be able to write, evaluate, and interpret numerical expressions having any number of non-nested sets of parentheses, brackets, or braces.
	Level 4 No Descriptor
Evidence Required:	1. The student writes or identifies a numerical expression that records a calculation represented with words. 2. The student interprets numerical expressions in words without evaluating them. 3. The student evaluates numerical expressions with grouping symbols.
Allowable Response Types:	Multiple Choice, single correct response; Equation/Numeric
Allowable Stimulus Materials:	numerical and verbal expressions
Construct-Relevant Vocabulary:	sum, quotient, factor, dividend, divisor
Allowable Tools:	None
Target-Specific Attributes:	Verbal and numeric expressions may contain only non-nested grouping symbols. No negative numbers allowed.
Non-Targeted Constructs:	None
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

	Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	None

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1a **Response Type: Multiple Choice, single correct response** **DOK Level 1** **5.OA.A.2** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.* **Evidence Required:** 1. The student writes or identifies a numerical expression that records a calculation represented with words. **Tools:** None **Version 3 update**: Revised example stem TM1a from an equation/numeric to a multiple choice response type because the response type for this task model presented both authoring and scoring challenges during initial field-testing. Retired TM1b for the same reason as stated above.	**Prompt Features:** The student is prompted to select a numerical expression, which includes up to one set of non-nested grouping symbols, that represents a calculation expressed with words. **Stimulus Guidelines:** • Expressions use whole numbers. • Expressions may include up to 4-digit dividends and 2-digit divisors for division. • Expressions may include single- or multi-digit numbers for addition, subtraction, and multiplication. • Item difficulty may be adjusted via this example method: o Expression does or does not contain grouping symbols. (Expression may include up to one set of grouping symbols.) **TM1a** **Stimulus:** The student is presented with a verbal expression that represents a calculation with up to one set of grouping symbols. **Example Stem:** Which expression correctly shows "12 times the sum of 5 and 7"? A. 12 × 5 + 7 B. 5 + 7 × 12 C. 12 × (5 + 7) D. 5 + (7 × 12) **Rubric:** (1 point) The student selects the correct expression (e.g., C). **Response Type:** Multiple Choice, single correct response

Task Model 1c **Response Type: Multiple Choice, single correct response** **DOK Level 1** **5.OA.A.2** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.* **Evidence Required:** 1. The student writes or identifies a numerical expression that records a calculation represented with words. **Tools:** None	**Prompt Features:** The student is prompted to select a numerical expression, which includes two sets of non-nested grouping symbols, that represents a calculation expressed with words. **Stimulus Guidelines:** • Expressions may include up to 4-digit dividends and 2-digit divisors for division. • Expressions may include single- or multi-digit numbers for addition, subtraction, and multiplication. • Item difficulty may be adjusted via these example methods: o Expression contains one or two operations outside the grouping symbols. o Expression contains whole numbers, fractions, or decimals. ▪ Fractions must have a denominator of 2, 3, 4, 5, 6, 8, 10, 12, or 100. ▪ Addition and subtraction of fractions may include mixed numbers and fractions without common denominators. ▪ Division of fractions is limited to whole number by unit fraction or unit fraction by whole number. ▪ Decimal numbers are limited to the hundredths place. ▪ Multiplication of decimal numbers is limited to tenths by hundredths. ▪ Division of decimal numbers is limited to the factors described for the multiplication of decimals above. **TM1c** **Stimulus:** The student is presented with a verbal expression that represents a calculation with two non-nested sets of grouping symbols. **Example Stem:** Which expression correctly shows the difference between the product of 7 and 9 and the sum of 12 and 5? A. 7 × (9 – 12) + 5 B. 7 × (9 + 12) + 5 C. (7 × 9) – (12 + 5) D. (7 + 9) + (12 + 5) **Rubric:** (1 point) The student selects the correct expression (e.g., C). **Response Type:** Multiple Choice, single correct response

Task Model 2 **Response Type: Multiple Choice, single correct response** **DOK Level 2** **5.OA.A.2** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.* **Evidence Required:** 2. The student interprets numerical expressions in words without evaluating them. **Tools:** None	**Prompt Features:** The student is prompted to interpret a numerical expression without evaluating it. **Stimulus Guidelines:** • Expressions may include up to 4-digit dividends and 2-digit divisors for division. • Expressions may include single- or multi-digit numbers for addition, subtraction, and multiplication. • Item difficulty may be adjusted via these example methods: o Expression contains zero, one, or two non-nested sets of grouping symbols. o Expression contains one or two operations outside the grouping symbols. o Expression contains whole numbers, fractions, or decimals. ▪ Fractions must have a denominator of 2, 3, 4, 5, 6, 8, 10, 12, or 100. ▪ Addition and subtraction of fractions may include mixed numbers and fractions without common denominators. ▪ Division of fractions is limited to whole number by unit fraction or unit fraction by whole number. ▪ Decimal numbers are limited to the hundredths place. ▪ Multiplication of decimal numbers is limited to tenths by hundredths. ▪ Division of decimal numbers is limited to the factors described for the multiplication of decimals above. **TM2** **Stimulus:** The student is presented with a numerical expression. **Example Stem:** Which statement describes the value of the expression 4 × (18,932 + 921)? A. The value is 921 more than the product of 4 and 18,932. B. The value is 18,932 more than the product of 4 and 921. C. The value is 4 times as large as the sum of 18,932 and 921. D. The value is 4 times as large as the product of 18,932 and 921. **Rubric:** (1 point) The student selects the correct interpretation of the expression (e.g., C). **Response Type:** Multiple Choice, single correct response

Task Model 3a **Response Type: Equation / Numeric** **DOK Level 1** **5.OA.A.1** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. **Evidence Required:** 3. The student evaluates numerical expressions with grouping symbols. **Tools:** None	**Prompt Features:** The student is prompted to evaluate numerical expressions that contain non-nested grouping symbols. **Stimulus Guidelines:** The student is presented with a numerical expression that contains one or two non-nested sets of grouping symbols. • Expressions may include up to 4-digit dividends and 2-digit divisors for division. • Expressions may include single- or multi-digit numbers for addition, subtraction, and multiplication. • Item difficulty may be adjusted via these example methods: o Expression contains one or two sets of grouping symbols. o Expression contains one or two operations outside the grouping symbols. o Expression contains whole numbers, fractions, or decimals. ▪ Fractions must have a denominator of 2, 3, 4, 5, 6, 8, 10, 12, or 100. ▪ Addition and subtraction of fractions may include mixed numbers and fractions without common denominators. ▪ Division of fractions is limited to whole number by unit fraction or unit fraction by whole number. ▪ Decimal numbers are limited to the hundredths place. ▪ Multiplication of decimal numbers is limited to tenths by hundredths. ▪ Division of decimal numbers is limited to the factors described for the multiplication of decimals above. **TM3a** **Stimulus:** The student is presented with a numerical expression that contains one set of grouping symbols. **Example Stem 1:** Enter the value of 7 + (5 × 12). **Example Stem 2:** Enter the value of 7 + (5 × 12) — 4. **Rubric:** (1 point) The student enters the correct value (e.g., 67; 63). **Response Type:** Equation/Numeric

Task Model 3b **Response Type: Equation / Numeric** **DOK Level 1** **5.OA.A.1** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. **Evidence Required:** 3. The student evaluates numerical expressions with grouping symbols. **Tools:** None	**TM3b** **Stimulus:** The student is presented with a numerical expression that contains two non-nested sets of grouping symbols. **Example Stem 1:** Enter the value of (5 × 12) + (27 ÷ 9). **Example Stem 2:** Enter the exact value of $(6 \times \frac{2}{3}) + (\frac{2}{8} + \frac{3}{8})$. **Example Stem 3:** Enter the exact value of (2 ÷ 0.1) – (0.3 × 0.4). **Rubric:** (1 point) The student enters the correct value (e.g., 63; $4\frac{5}{8}$ or equivalent; 19.88). **Response Type:** Equation/Numeric

Task Model 3c **Response Type: Multiple choice, single correct response** **DOK Level 1** **5.OA.A.1** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. **Evidence Required:** 3. The student evaluates numerical expressions with grouping symbols. **Tools:** None **Version 3 update:** Added new TM3c.	**TM3c** **Stimulus:** The student is presented with a numerical expression that does not contain non-nested sets of grouping symbols and is prompted to identify the correct placement of parentheses to equal a specific value. **Example Stem:** Taryn must place parentheses around numbers in this expression in order to make it equal 2. 30 ÷ 2 + 4 – 3 Which expression equals 2? A. 30 ÷ (2 + 4 – 3) B. 30 ÷ (2 + 4) – 3 C. 30 ÷ 2 + (4 – 3) D. (30 ÷ 2) + 4 – 3 **Rubric:** (1 point) The student identifies the correct placement of parentheses (e.g., B). **Response Type:** Multiple choice, single correct response

Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	
Content Domain: **Operations and Algebraic Thinking**	
Target B [a]: Analyze patterns and relationships. (DOK 2) Tasks for this target will ask students to compare two related numerical patterns and explain the relationships within sequences of ordered pairs. Tasks for this target may incorporate the work of 5.G Target J.	
Standards: 5.OA.B, 5.OA.B.3	**5.OA.B Analyze patterns and relationships.** **5.OA.B.3** Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.OA.C, 4.OA.C.5 6.NS.C, 6.NS.C.8	**Grade 4 Standards** **4.OA.C Generate and analyze patterns.** **4.OA.C.5** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.* **Grade 6 Standards** **6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.** **6.NS.C.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
DOK Level(s):	2

Achievement LEVEL Descriptors:	
RANGE Achievement Level Descriptor (Range ALD) Target B: Analyze patterns and relationships.	**Level 1** Students should be able to generate two numerical patterns using two given rules involving addition, subtraction, or multiplication.
	Level 2 Students should be able to generate two numerical patterns using two given rules involving all operations. When working with two whole number numerical patterns, they should be able to graph the corresponding whole number ordered pairs on the coordinate plane.
	Level 3 Students should be able to compare and analyze two related numerical patterns and explain the relationship within sequences of ordered pairs, and they should be able to graph the ordered pairs on the coordinate plane.
	Level 4 Students should be able to compare two related numerical patterns and explain the relationship within sequences of ordered pairs that are rational numbers.
Evidence Required:	1. Given two rules, the student identifies and explains apparent relationships between corresponding terms of two related numerical patterns. 2. Given two rules, the student represents corresponding terms from two related numerical patterns as ordered pairs and plots them on a coordinate plane.
Allowable Response Types:	Multiple Choice, single correct response; Graphing; Hot Spot
Allowable Stimulus Materials:	coordinate plane model in quadrant I only
Construct-Relevant Vocabulary:	coordinates, ordered pairs, pattern, sequence
Allowable Tools:	None
Target-Specific Attributes:	Use only whole numbers. Patterns have one-step rules using addition, subtraction, multiplication, or division of whole numbers; and addition, subtraction, or multiplication of fractions. Patterns should be limited to 4–6 terms. Emphasize the use of patterns where there is an apparent relationship between corresponding terms appropriate for students in grade 5 to build toward the grade 6 work in the RP domain.
Non-Targeted Constructs:	None
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level

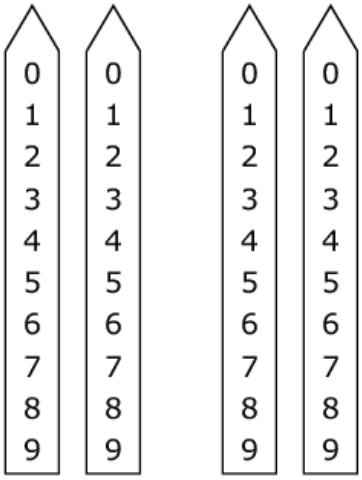
[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

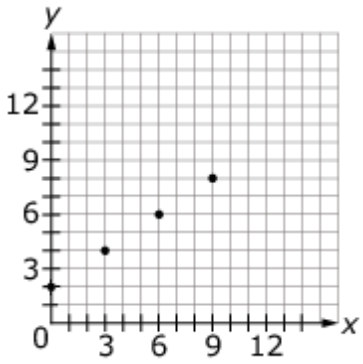
	• Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	The part of the standard that requires explaining informally how corresponding terms from two numerical patterns are related will be assessed in Claim 3.

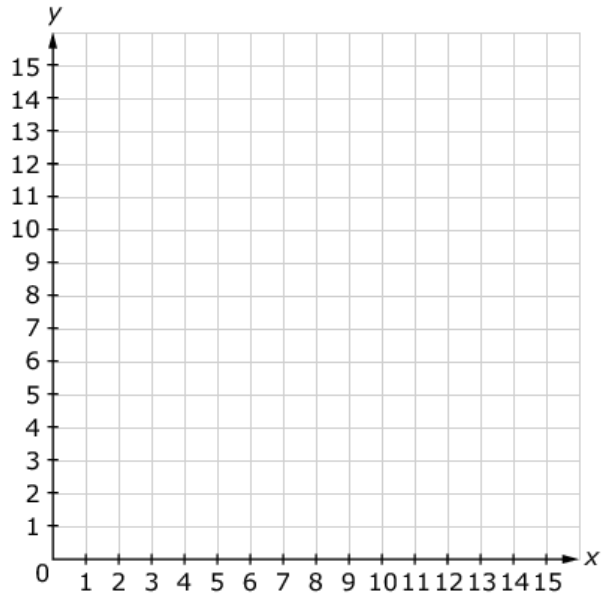
[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1 **Response Type:** **Multiple Choice, single correct response** **DOK Level 2** **5.OA.B.3** Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.* **Evidence Required:** 1. Given two rules, the student identifies and explains apparent relationships between corresponding terms of two related numerical patterns. **Tools:** None	**Prompt Features:** The student is prompted to identify apparent relationships between corresponding terms of two related numerical patterns. **Stimulus Guidelines:** • Item difficulty can be adjusted via these example methods: o One-step rule using addition, subtraction, multiplication, or division (up to 4-digit by 1-digit) of whole numbers o One-step rule using addition and subtraction of fractions with common denominators, or multiplication by unit fractions o One-step rule using addition, subtraction, and multiplication of fractions with non-common denominators **TM1** **Stimulus:** The student is presented with the starting number and rule for two related numerical patterns. **Example Stem:** Patterns A and B are generated using these rules. • Pattern A: Start with 10 and add 5. • Pattern B: Start with 2 and add 1. Which statement **best** describes the relationship between the corresponding terms of Pattern A and Pattern B? A. Each term in Pattern A is $\frac{1}{5}$ of the value of the corresponding term in Pattern B. B. Each term in Pattern A is 4 more than the value of the corresponding term in Pattern B. C. Each term in Pattern A is 5 times the value of the corresponding term in Pattern B. D. Each term in Pattern A is 8 more than the value of the corresponding term in Pattern B. **Rubric:** (1 point) The student selects the correct description of the relationship (e.g., C). **Response Type:** Multiple Choice, single correct response

Task Model 2a **Response Type:** **Multiple Choice, single correct response** **DOK Level 2** **5.OA.B.3** Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.* **Evidence Required:** 2. Given two rules, the student represents corresponding terms from two related numerical patterns as ordered pairs and plots them on a coordinate plane. **Tools:** None	**Prompt Features:** The student is prompted to identify an ordered pair or set of ordered pairs that correspond to a given stimulus. **Stimulus Guidelines:** • Item difficulty can be adjusted via these example methods: o One-step rule using addition, subtraction, multiplication, or division (up to 4-digit by 1-digit) of whole numbers o One-step rule using addition and subtraction of fractions with common denominators, or multiplication by unit fractions o One-step rule using addition, subtraction, and multiplication of fractions with non-common denominators **TM2a** **Stimulus:** The student is presented with the starting number and rule for two related numerical patterns. **Example Stem:** Patterns P and Q are generated using these rules. • Pattern P: Start with 0 and add 1. • Pattern Q: Start with 0 and add $\frac{1}{4}$. Which set of ordered pairs is generated from corresponding terms of Pattern P and Pattern Q? A. $(0, 0), (1, \frac{1}{4}), (2, \frac{1}{2}), (3, \frac{3}{4})$ B. $(1, \frac{1}{4}), (1, \frac{1}{2}), (1, \frac{3}{4}), (1, 1)$ C. $(0, 0), (1, 2), (2, 3), (3, 4)$ D. $(\frac{1}{4}, \frac{1}{2}), (\frac{1}{2}, \frac{3}{4}), (\frac{3}{4}, 1), (1\frac{1}{4}, 1\frac{1}{2})$ **Rubric:** (1 point) The student selects the correct set of ordered pairs (e.g., A). **Response Type:** Multiple Choice, single correct response

Task Model 2b **Response Type:** **Hot Spot** **DOK Level 2** **5.OA.B.3** Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.* **Evidence Required:** 2. Given two rules, the student represents corresponding terms from two related numerical patterns as ordered pairs and plots them on a coordinate plane. **Tools:** None **Version 3 update:** Removed redundant prompt and guidelines from TM2b. **Accessibility Note:** Hot Spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.	**TM2b** **Stimulus:** The student is presented with the starting number and rule for two related numerical patterns. **Example Stem:** Patterns P and Q are generated using these rules. • Pattern P: Start with 2 and add 3. • Pattern Q: Start with 2 and add 2. The first two ordered pairs generated by these rules are (2, 2) and (5, 4). Enter the fifth ordered pair generated from corresponding terms of Pattern P and Pattern Q. (___ ___ , ___ ___)  **Rubric:** (1 point) The student correctly enters the ordered pair for the corresponding fifth terms in the given patterns [e.g., (14, 10)]. **Response Type:** Hot Spot

Task Model 2c **Response Type:** **Multiple Choice, single correct response** **DOK Level 2** **5.OA.B.3** Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.* **Evidence Required:** 2. Given two rules, the student represents corresponding terms from two related numerical patterns as ordered pairs and plots them on a coordinate plane. **Tools:** None	**Prompt Features:** The student is prompted to identify the graph that represents a set of ordered pairs generated by two patterns. **Stimulus Guidelines:** • Answer choices will be graphs showing four points in the first quadrant. • Item difficulty can be adjusted via these example methods: o One-step rule using addition, subtraction, multiplication, or division (up to 4-digit by 1-digit) of whole numbers o One-step rule using addition and subtraction of fractions with common denominators, or multiplication by unit fractions o One-step rule using addition, subtraction, and multiplication of fractions with non-common denominators **TM2c** **Stimulus:** The student is presented with the starting number and rule for two related numerical patterns. **Example Stem:** Patterns X and Y are generated using these rules. • Pattern X: Start with 0 and add 3. • Pattern Y: Start with 2 and add 2. Which graph shows a set of points representing ordered pairs formed by corresponding terms in these two patterns? [Note: Options are four different graphs **Rubric:** (1 point) The student selects the correct graph (e.g., shown below).  **Response Type:** Multiple Choice, single correct response

Task Model 2d **Response Type: Graphing** **DOK Level 2** **5.OA.B.3** Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.* **Evidence Required:** 2. Given two rules, the student represents corresponding terms from two related numerical patterns as ordered pairs and plots them on a coordinate plane. **Tools:** None **Accessibility Note:** Graphing items are not currently able to be Brailled. Minimize the number of items developed to this TM.	**Prompt Features:** The student is prompted to graph three or four ordered pairs on a coordinate plane. **Stimulus Guidelines:** • All points will be in the first quadrant of the coordinate plane. • Item difficulty can be adjusted via these example methods: o One-step rule using addition, subtraction, multiplication, or division (up to 4-digit by 1-digit) of whole numbers o One-step rule using addition and subtraction of fractions with common denominators, or multiplication by unit fractions o One-step rule using addition, subtraction, and multiplication of fractions with non-common denominators **TM2d** **Stimulus:** The student is presented with the starting number and rule for two related numerical patterns. **Example Stem:** Patterns X and Y are generated using these rules. • Pattern X: Start with 5 and add 5. • Pattern Y: Start with 1 and add 2. Graph three points to represent the ordered pairs formed by the first three corresponding terms in Pattern X and Pattern Y.  **Rubric:** (1 point) The student correctly plots three points [e.g., (5, 1), (10, 3), (15, 5) OR (1, 5), (3, 10), (5, 15)]. **Response Type:** Graphing

Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	
Content Domain: **Number and Operations in Base Ten**	
Target C [m]: Understand the place value system. (DOK 1, 2) Tasks for this target ask students to explain patterns in the number of zeroes for powers of 10, including simple calculations with a base of 10 and whole-number exponents, as well as tasks that demonstrate a generalization of the pattern for larger whole-number exponents (e.g., How many zeroes would there be in the answer for 10^{42}?). Other tasks for this target ask students to write, compare, and round decimals to thousandths. Some decimals should be written in expanded form. Comparing and rounding may be combined in some items to highlight essential understandings of connections (e.g., What happens if you compare 3.67 and 3.72 after rounding to the nearest tenth?).	
Standards: 5.NBT.A, 5.NBT.A.1, 5.NBT.A.2, 5.NBT.A.3, 5.NBT.A.3a, 5.NBT.A.3b, 5.NBT.A.4	**5.NBT.A Understand the place value system.** **5.NBT.A.1** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. **5.NBT.A.2** Explain patterns in the number of zeroes of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. **5.NBT.A.3** Read, write, and compare decimals to thousandths. **a**. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). **b.** Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. **5.NBT.A.4** Use place value understanding to round decimals to any place.
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.NBT.A, 4.NBT.A.1, 4.NBT.A.2, 4.NBT.A.3	**Related Grade 4 Standards** **4.NBT.A Generalize place value understanding for multi-digit whole numbers.** **4.NBT.A.1** Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*

6.NS.B, 6.NS.B.2, 6.NS.B.3, 6.NS.C, 6.NS.C.7, 6.NS.C.7a, 6.NS.C.7b	**4.NBT.A.2** Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. **4.NBT.A.3** Use place value understanding to round multi-digit whole numbers to any place. **Related Grade 6 Standards** **6.NS.B Compute fluently with multi-digit numbers and find common factors and multiples.** **6.NS.B.2** Fluently divide multi-digit numbers using the standard algorithm. **6.NS.B.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. **6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.** **6.NS.C.7** Understand ordering and absolute value of rational numbers. **a.** Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right*. **b.** Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 ºC > –7 ºC to express the fact that –3 ºC is warmer than –7 ºC*.
DOK Level(s):	1, 2

Achievement LEVEL Descriptors:	
RANGE Achievement Level Descriptor (Range ALD) Target C: Understand the place-value system.	**Level 1** Students should be able to read and write decimals to the thousandths using base-ten numerals, number names, and expanded form and round decimals to the hundredths.
	Level 2 Students should be able to use repeated reasoning to understand that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. They should be able to explain patterns in numbers of zeroes and/or placement of a decimal point when a number is multiplied or divided by 10.
	Level 3 Students should be able to use whole-number exponents to denote powers of 10; use repeated reasoning to understand and explain patterns in numbers of zeroes and/or placement of a decimal point when a number is multiplied or divided by powers of 10; read, write, and compare two decimals to the thousandths using base-ten numerals, number names, and expanded form, using the symbols >, =, and < to record the results of the comparison; and round decimals to any place.
	Level 4 Students should be able to combine multiplying by powers of 10, comparing, and rounding to highlight essential understandings.
Evidence Required:	1. The student represents powers of 10 by using whole-number exponents. 2. The student reads and writes decimals to the thousandths using base-ten numerals, number names, and expanded form. 3. The student compares two decimals to the thousandths by using >, =, and < symbols. 4. The student rounds decimals to the nearest whole number, tenth, or hundredth.
Allowable Item Types:	Equation/Numeric; Multiple Choice, single correct response; Matching Tables
Allowable Stimulus Materials:	>, <, or = symbols; multi-digit numbers less than or equal to 1,000,000; base-ten models; decimals to the thousandths (except when rounding, which can be to the hundredths)
Construct-Relevant Vocabulary:	round, digit, value, greater than, less than, equal to, equivalent, expression, expanded form, hundredths, tenths, thousandths, word form
Allowable Tools:	None
Target-Specific Attributes:	For division problems with whole numbers, numbers are limited to 4-digit dividends and 2-digit divisors. Reading, writing, and comparing decimal numbers should not exceed the thousandths place. Decimal numbers can be rounded to the hundredths. Use positive exponents only.
Non-Targeted Constructs:	None

Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	Much of the evidence for this target and standards will be measured in Claim 3. For example, a student may be asked to explain patterns in the number of zeroes of the product/quotient when multiplying/dividing a number by powers of 10. 5.NBT.A.1 will not be assessed in isolation. It will be combined with other standards in order to assess this standard in a more meaningful way.

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1 **Response Type: Equation / Numeric** **DOK Level 1** **5.NBT.A.2** Explain patterns in the number of zeroes of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. **Evidence Required:** 1. The student represents powers of 10 by using whole-number exponents. **Tools:** None	**Prompt Features:** The student is prompted to enter a power of 10 that is equivalent to a whole number. **Stimulus Guidelines:** • Numbers reflect whole number powers of 10. • Numbers are less than or equal to 1,000,000. **TM1** **Stimulus:** The student is presented with a multi-digit whole number that is a power of 10. **Example Stem 1:** Enter 10,000 as a power of 10. **Example Stem 2:** What power of 10 makes this expression equal to 5000? $5 \times 10^{\square}$ **Rubric:** (1 point) The student enters the correct value (e.g., 10^4; 3). **Response Type:** Equation/Numeric

Task Model 2a **Response Type:** **Multiple Choice, single correct response** **DOK Level 1** **5.NBT.A.3a** Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). **Evidence Required:** 2. The student reads and writes decimals to the thousandths using base-ten numerals, number names, and expanded form. **Tools:** None	**Prompt Features:** The student is prompted to identify the expanded form of a given decimal number (up to the thousandths). **Stimulus Guidelines:** • Numbers are less than or equal to 1,000,000. • Item difficulty can be adjusted via these example methods: o The number of digits used in prompt o The presence or absence of zeroes in the number o The order in which place values are presented **TM2a** **Stimulus:** The stem will present a decimal number written as a base-ten numeral. **Example Stem:** Which expression is equal to 473.923? A. $(4 \times 100) + (7 \times 10) + (3 \times 1) + (9 \times \frac{1}{1}) + (2 \times \frac{1}{10}) + (3 \times \frac{1}{100})$ B. $(4 \times 100) + (7 \times 10) + (3 \times 1) + (9 \times 10) + (2 \times 100) + (3 \times 1{,}000)$ C. $(4 \times 100) + (7 \times 10) + (3 \times 1) + (9 \times \frac{1}{10}) + (2 \times \frac{1}{100}) + (3 \times \frac{1}{1000})$ D. $(4 \times 100{,}000) + (7 \times 10{,}000) + (3 \times 1{,}000) + (9 \times 100) + (2 \times 10) + (3 \times 1)$ **Rubric:** (1 point) The student selects the correct expression (e.g., C). **Response Type:** Multiple Choice, single correct response

Task Model 2b **Response Type: Equation / Numeric** **DOK Level 1** **5.NBT.A.3a** Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). **Evidence Required:** 2. The student reads and writes decimals to the thousandths using base-ten numerals, number names, and expanded form. **Tools:** None **Version 3 update:** Added example stem 3 to use decimals in expanded notation.	**Prompt Features:** The student is prompted to enter a decimal (up to the thousandths) that is represented in expanded form. **Stimulus Guidelines:** • Numbers are less than or equal to 1,000,000. • Item difficulty can be adjusted via these example methods: o The number of digits used in prompt o The presence or absence of zeroes in the number o The order in which place values are presented **TM2b** **Stimulus:** The student is presented with a decimal number in expanded form. **Example Stem 1:** Enter a number equal to the value of the expression. $(4 \times 100) + (7 \times 10) + (3 \times 1) + (9 \times \frac{1}{10}) + (2 \times \frac{1}{100}) + (3 \times \frac{1}{1000})$ **Example Stem 2:** Enter a number equal to the value of the expression. $(4 \times 100) + (3 \times 1) + (2 \times \frac{1}{100}) + (7 \times 10) + (9 \times \frac{1}{10}) + (3 \times \frac{1}{1000})$ **Example Stem 3:** Enter a number equal to the value of the expression. (7 x 10) + (4 x 1) + (5 x 0.1) + (3 x 0.01) **Rubric:** (1 point) The student correctly enters the decimal number that is equivalent to the expression (e.g., 473.923; 473.923; 74.53). **Response Type:** Equation/Numeric

Task Model 2d

Response Type:
Matching Tables

DOK Level 2

5.NBT.A.3a
Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).

Evidence Required:
2. The student reads and writes decimals to the thousandths using base-ten numerals, number names, and expanded form.

Tools: None

Prompt Features: The student is prompted to determine whether various expansions of decimal numbers from place value number names are equal to the decimal number.

Stimulus Guidelines:

- Numbers are up to the thousandths place.
- Numbers are less than or equal to 1,000,000.
- Item difficulty can be adjusted via this example method:
  - Place values are presented in descending, ascending, or random order.

TM2d
Stimulus: The student will be presented with a decimal number in numeric form.

Example Stem: Determine whether each expression is equivalent to 638.4. Select Yes or No for each expression.

	Yes	No
63 tens + 8 ones + 4 tenths		
63 hundreds + 8 ones + 4 tenths		
6 hundreds + 3 tens + 84 tenths		
6 hundreds + 38 ones + 4 tenths		

Rubric: (1 point) The student identifies equal expansions for the number (e.g., Y, N, Y, Y).

Response Type: Matching Tables

Task Model 3a

Response Type: Matching Table

DOK Level 2

5.NBT.A.3b
Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Evidence Required:
3. The student compares two decimals to the thousandths by using >, =, and < symbols.

Tools: None

Version 3 Update:
Changed TM3a from an equation/numeric response type to a matching table response type. Updated the stimulus and stem to match the new format. Retired TM3b.

Prompt Features: The student is prompted to compare two pairs of decimals.

Stimulus Guidelines:

- Decimals can be to the thousandths place.
- Numbers are less than or equal to 1,000,000.
- Allowable symbols are >, =, and <.
- Item difficulty may be adjusted via this example method:
  - The numbers selected for each comparison

TM3a
Stimulus: The student is presented with two pairs of decimals and directed to compare them using (<, >, or =).

Example Stem:
Select the symbol (<, >, or =) that correctly compares each pair of numbers.

	<	>	=
0.03 ☐ 0.3			
187.36 ☐ 187.35			

Rubric: (1 point) The student selects the correct symbols (e.g., <, >).

Response Type: Matching Table

Task Model 3c **Response Type: Multiple Choice, single correct response** **DOK Level 2** **5.NBT.A.3b** Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. **Evidence Required:** 3. The student compares two decimals to the thousandths by using >, =, and < symbols. **Tools:** None	**Prompt Features:** The student is prompted to identify a decimal that correctly completes a given comparison. **Stimulus Guidelines:** • Decimals can be to the thousandths place. • Numbers are less than or equal to 1,000,000. • Allowable symbols are >, =, and <. • Item difficulty may be adjusted via this example method: o The numbers selected for each comparison **TM3c** **Stimulus:** The student is presented with an incomplete comparison using decimals and a comparison symbol of >, =, or <. **Example Stem:** Which number makes the comparison true? 3.45 < □ A. 3.249 B. 3.38 C. 3.436 D. 3.47 **Rubric:** (1 point) The student selects the correct number (e.g., D). **Response Type:** Multiple Choice, single correct response

<table>
<tr>
<td>Task Model 3d

Response Type:
Matching Tables

DOK Level 2

5.NBT.A.3b
Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Evidence Required:
3. The student compares two decimals to the thousandths by using >, =, and < symbols.

Tools: None</td>
<td>Prompt Features: The student is prompted to identify correct comparisons of decimal numbers.

Stimulus Guidelines:
• Decimals can be to the thousandths place.
• Numbers are less than or equal to 1,000,000.
• Allowable symbols are >, =, and <.
• Item difficulty may be adjusted via this example method:
o The numbers selected for each comparison

TM3d
Stimulus: The answer choices present three unique decimal number comparisons using >, =, and <.

Example Stem: Determine if each comparison is true or false. Select True or False for each comparison.

<table>
<tr><th></th><th>True</th><th>False</th></tr>
<tr><td>4.3 = 4.300</td><td></td><td></td></tr>
<tr><td>48.2 > 4.829</td><td></td><td></td></tr>
<tr><td>56.78 < 56.760</td><td></td><td></td></tr>
</table>

Rubric: (1 point) The student correctly selects True or False for each comparison (e.g., T, T, F).

Response Type: Matching Tables</td>
</tr>
</table>

Task Model 4 **Response Type: Equation / Numeric** **DOK Level 1** **5.NBT.A.4** Use place value understanding to round decimals to any place. **Evidence Required:** 4. The student rounds decimals to the nearest whole number, tenth, hundredth or thousandth. **Tools:** None	**Prompt Features:** The student is prompted to enter a number that is the result of rounding a multi-digit decimal number to a given place value. **Stimulus Guidelines:** • Decimals can be to the ten-thousandths place. • Number may be rounded to any whole or decimal place value, to the thousandth place. • Numbers are less than or equal to 1,000,000. • Item difficulty may be adjusted via these example methods: o Include numbers where the digit in the rounded place value changes as well as the digit(s) in the adjacent place values(s) to the left. ▪ e.g., 1.998 rounded to the nearest hundredth is 2.00. o Number presented has more or less places (length of the decimal number) **TM4** **Stimulus:** The student is presented with a multi-digit decimal number. **Example Stem:** Round 45.643 to the nearest hundredth. Enter your answer in the response box. **Rubric:** (1 point) The student enters the correct value (e.g., 45.64). **Response Type:** Equation/Numeric

Claim 1: Concepts and Procedures
Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

Content Domain: **Number and Operations in Base Ten**

Target D: [m] Perform operations with multi-digit whole numbers and with decimals to hundredths. (DOK 1, 2)

Some tasks associated with this target will be non-contextual computation problems that assess fluency in multiplication of multi-digit whole numbers.

Other tasks will ask students to find quotients of whole numbers with up to four-digit dividends and two-digit divisors and to use the four operations on decimals to hundredths. These tasks may be presented in the context of measurement conversion (5.MD Target G). Other tasks should highlight students' understanding of the relationships between operations and use of place-value strategies, which may be done as part of tasks developed for Claim 3.

Standards: 5.NBT.B, 5.NBT.B.5, 5.NBT.B.6, 5.NBT.B.7	**5.NBT.B Perform operations with multi-digit whole numbers and with decimals to hundredths.** **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm. **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.NBT.B, 4.NBT.B.4, 4.NBT.B.5, 4.NBT.B.6	**Related Grade 4 Standards** **4.NBT.B Use place value understanding and properties of operations to perform multi-digit arithmetic.** **4.NBT.B.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm. **4.NBT.B.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

6.NS.B, 6.NS.B.2, 6.NS.B.3	**4.NBT.B.6** Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Related Grade 6 Standards** **6.NS.B Compute fluently with multi-digit numbers and find common factors and multiples.** **6.NS.B.2** Fluently divide multi-digit numbers using the standard algorithm. **6.NS.B.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
DOK Level(s):	1, 2
Achievement LEVEL Descriptors:	
RANGE Achievement Level Descriptor (Range ALD) Target D: Perform operations with multi-digit whole numbers and with decimals to the hundredths.	**Level 1** Students should be able to multiply one- and two-digit whole numbers and find whole-number quotients of whole numbers with up to three-digit dividends and one-digit divisors, using arrays or area models. They should be able to perform the four operations on decimals to the tenths and a whole number, e.g., 1.3 × 7.
	Level 2 Students should be able to multiply three- and four-digit whole numbers; find whole-number quotients of whole numbers with up to three-digit dividends and two-digit divisors; and perform the four operations on decimals to the tenths or on decimals to the hundredths and a whole number, e.g., 3.42 × 12.
	Level 3 Students should be able to fluently multiply multi-digit whole numbers using the standard algorithm, find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, and perform the four operations on decimals to the hundredths. They should be able to relate the strategy to a written method and explain the reasoning used.
	Level 4 No Descriptor
Evidence Required:	1. The student multiplies multi-digit whole numbers. 2. The student determines whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. 3. The student adds, subtracts, multiplies, and divides decimals to the hundredths using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

Allowable Response Types:	Multiple Choice, single correct response; Equation/Numeric
Allowable Stimulus Materials:	base-10 array model, equations
Construct-Relevant Vocabulary:	array, area model, equation, quotient, product, factor, divisor, dividend, remainder
Allowable Tools:	None
Target-Specific Attributes:	For division problems with whole numbers, up to and including four-digit dividends and two-digit divisors. Add, subtract, multiply, and divide decimals to the hundredths.
Non-Targeted Constructs:	None
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	Regarding 5.NBT.B.6, items that assess determining the quotient of whole numbers, without actually referencing a particular strategy, should be limited to no more than 10% of the total number of items developed for this claim, target, and standard. Illustrating and explaining the calculation using equations,

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

	rectangular arrays, and/or area models will be assessed in Claim 3. Regarding 5.NBT.B.7, items that assess determining the sum, difference, product, and quotient of decimals, without actually referencing a particular strategy, should be limited to no more than 10% of the total number of items developed for this claim, target, and standard.

Task Model 1 **Response Type: Equation / Numeric** **DOK Level 1** **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm. **Evidence Required:** 1. The student multiplies multi-digit whole numbers. **Tools:** None	**Prompt Features:** The student is prompted to enter the product of a multiplication problem. **Stimulus Guidelines:** • Items use whole numbers only. • Total number of digits in the two factors must be six or fewer. • Item difficulty may be adjusted via this example method: o Using factors with more or fewer digits **TM1a** **Stimulus:** The student is presented with a horizontal multiplication problem. **Example Stem:** Enter the product. 4 × 39 **TM1b** **Stimulus:** The student is presented with a vertical multiplication problem. **Example Stem:** Enter the product. 4238 × 32 **Rubric:** (1 point) The student correctly solves the multiplication problem (e.g., 156; 135,616). **Response Type:** Equation/Numeric

Task Model 2a–b **Response Type: Equation / Numeric** **DOK Level 1** **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Evidence Required:** 2. The student determines whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. **Tools:** None	**Prompt Features:** The student is prompted to enter the quotient of a division problem. **Stimulus Guidelines:** • Items use whole numbers only. • Items include up to four-digit dividends and up to two-digit divisors. • Item difficulty may be adjusted via this example method: o Using numbers with more or fewer digits **TM2a** **Stimulus:** The student is presented with a horizontal division problem using the ÷ symbol. **Example Stem:** Enter the quotient. 335 ÷ 5 **TM2b** **Stimulus:** The student is presented with a division problem using the $\overline{)\#\#\#}$ symbol. **Example Stem:** Enter the quotient. $25\overline{)3375}$ **Rubric:** (1 point) The student correctly solves the division problem (e.g., 67; 135). **Response Type:** Equation/Numeric

Task Model 2c **Response Type: Multiple Choice, single correct response** **DOK Level 1** **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Evidence Required:** 2. The student determines whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. **Tools:** None	**Prompt Features:** The student is prompted to select an equation that has the same unknown as a given division equation. **Stimulus Guidelines:** • Items include multi-digit whole numbers, up to and including four-digit dividends and two-digit divisors. • Item difficulty may be adjusted via this example method: o Writing the expression with the unknown on the opposite side as presented in the given equation (e.g., 228 = □ × 12 and 228 = □ ÷ 12) **TM2c** **Stimulus:** The student is presented with a division equation with an unknown quotient. **Example Stem:** Which equation has the same unknown value as 228 ÷ 12 = ☐? A. 228 × ☐ = 12 B. 12 × ☐ = 228 C. ☐ ÷ 12 = 228 D. ☐ ÷ 228 = 12 **Rubric:** (1 point) The student selects the correct option (e.g., B). **Response Type:** Multiple Choice, single correct response

Task Model 2d **Response Type: Equation / Numeric** **DOK Level 2** **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths. **Evidence Required:** 2. The student determines whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. **Tools:** None	**Prompt Features:** The student is prompted to enter an unknown value in a division equation. **Stimulus Guidelines:** • Unknown divisor or dividend is represented with a ☐. • Items include multi-digit whole numbers, up to and including four-digit dividends and two-digit divisors. **TM2d** **Stimulus:** The student is presented with a division equation with an unknown divisor or dividend. **Example Stem:** Enter the unknown value in the equation. 345 ÷ ☐ = 69 **Rubric:** (1 point) The student enters the correct number (e.g., 5). **Response Type:** Equation/Numeric

Task Model 3a–c **Response Type: Equation / Numeric** **DOK Level 1** **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **Evidence Required:** 3. The student adds, subtracts, multiplies, and divides decimals to the hundredths using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **Tools:** None	**Prompt Features:** The student is prompted to enter the solution to a decimal calculation. **Stimulus Guidelines:** • Decimals up to the hundredths place. • Quotients cannot exceed decimals to the hundredths. • Item difficulty may be adjusted via these example methods: o Varying the number of digits in a decimal number o Using numbers with the same or a differing number of decimal places **TM3a** **Stimulus:** The student is presented with a decimal addition problem with up to four addends. **Example Stem:** Enter the sum. 16 + 5.67 + 8.3 **Rubric:** (1 point) The student correctly calculates the solution to a problem involving decimals (e.g., 29.97). **Response Type:** Equation/Numeric **TM3b** **Stimulus:** The student is presented with a decimal subtraction problem. **Example Stem:** Enter the difference. 20.50 – 3.65 **Rubric:** (1 point) The student correctly calculates the solution to a problem involving decimals (e.g., 16.85). **Response Type:** Equation/Numeric **TM3c** **Stimulus:** The student is presented with a decimal multiplication problem. **Example Stem:** Enter the product. 7.86 × 3 **Rubric:** (1 point) The student correctly calculates the solution to a problem involving decimals (e.g., 23.58). **Response Type:** Equation/Numeric

Task Model 3d **Response Type: Equation / Numeric** **DOK Level 1** **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **Evidence Required:** 3. The student adds, subtracts, multiplies, and divides decimals to the hundredths using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **Tools:** None	**TM3d** **Stimulus:** The student is presented with a decimal division problem. **Example Stem 1:** Enter the quotient. 8.40 ÷ 5 **Example Stem 2:** Enter the quotient. 7 ÷ 0.2 **Rubric:** (1 point) The student correctly calculates the solution to a problem involving decimals (e.g., 1.68; 35). **Response Type:** Equation/Numeric

Task Model 3e **Response Type: Multiple Choice, single correct response** **DOK Level 1** **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **Evidence Required:** 3. The student adds, subtracts, multiplies and divides decimals to the hundredths using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **Tools:** None	**Prompt Features:** The student is prompted to select an equation that has the same unknown as a given addition/subtraction equation. **Stimulus Guidelines:** • Decimals may be to the hundredths place. • Item difficulty may be adjusted via these example methods: o Changing location of the unknown value in the given equation o Placing the operation on the left or right side of the equation **TM3e** **Stimulus:** The student is presented with a decimal addition or subtraction equation involving an unknown value. **Example Stem:** Which equation has the same unknown value as 33.74 – 18.9 = □? A. 18.9 + □ = 33.74 B. 33.74 + □ = 18.9 C. □ – 33.74 = 18.9 D. □ – 18.9 = 33.74 **Rubric:** (1 point) The student selects the correct option (e.g., A). **Response Type:** Multiple Choice, single correct response

Task Model 3f **Response Type: Equation / Numeric** **DOK Level 2** **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **Evidence Required:** 3. The student adds, subtracts, multiplies, and divides decimals to the hundredths using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **Tools:** None	**Prompt Features:** The student is prompted to enter the unknown value in a decimal addition or subtraction equation. **Stimulus Guidelines:** • Decimals may be to the hundredths place. • In addition problems, the unknown value should be one of the addends. • In subtraction problems, the unknown value should be the minuend or subtrahend. • Item difficulty can be varied via these example methods: o Varying the length of the numbers o Having numbers with the same or a differing number of decimal places o Having the result on the left or right side of the equal sign **TM3f** **Stimulus:** The student is presented with a decimal addition or subtraction equation with an unknown value. **Example Stem 1:** Enter the unknown value in the equation. 18.9 + □ = 33.74 **Example Stem 2:** Enter the unknown value in the equation. □ – 18.9 = 33.74 **Rubric:** (1 point) The student enters the correct number (e.g., 14.84; 52.64). **Response Type:** Equation/Numeric

Task Model 3g–h **Response Type: Multiple Choice, single correct response** **DOK Level 1** **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **Evidence Required:** 3. The student adds, subtracts, multiplies, and divides decimals to the hundredths using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **Tools:** None	**Prompt Features:** The student is prompted to select an expression or equation involving multiplication of fractions that shows a correct strategy for multiplication of decimals. **Stimulus Guidelines:** • Decimals may be to the hundredths place. • Numbers may be less than or greater than 1. **TM3g** **Stimulus:** The student is presented with a decimal multiplication expression and answer choices that show equivalent fraction multiplication expressions. **Example Stem:** Which expression is equal to 0.47 × 0.08? A. $\frac{47}{10} \times \frac{8}{10}$ B. $\frac{47}{10} \times \frac{8}{100}$ C. $\frac{47}{100} \times \frac{8}{10}$ D. $\frac{47}{100} \times \frac{8}{100}$ **TM3h** **Stimulus:** The student is presented with a decimal multiplication expression and answer choices that show equivalent fraction multiplication equations. **Example Stem:** Which equation shows a correct strategy and product for the expression shown? 0.4 × 0.8 A. $\frac{4}{10} \times \frac{8}{10} = \frac{32}{10}$ B. $\frac{4}{10} \times \frac{8}{10} = \frac{32}{100}$ C. $\frac{4}{100} \times \frac{8}{100} = \frac{32}{100}$ D. $\frac{4}{100} \times \frac{8}{100} = \frac{32}{10{,}000}$ **Rubric:** (1 point) The student selects the correct option (e.g., D; B). **Response Type:** Multiple Choice, single correct response

Task Model 3i **Response Type: Multiple Choice, single correct response** **DOK Level 1** **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **Evidence Required:** 3. The student adds, subtracts, multiplies, and divides decimals to the hundredths using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **Tools:** None	**Prompt Features:** The student is prompted to select an expression that shows a correct strategy for division of decimals based on place value. **Stimulus Guidelines:** • Decimals may be to the hundredths place. **TM3i** **Stimulus:** The student is presented with a decimal division expression. **Example Stem:** Which expression is equal to 16.25 ÷ 2.5? A. 1.625 ÷ 25 B. 16.25 ÷ 25 C. 162.5 ÷ 25 D. 1625 ÷ 25 **Rubric:** (1 point) The student selects the correct option (e.g., C). **Response Type:** Multiple Choice, single correct response

Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	
Content Domain: **Number and Operations—Fractions**	
Target E [m]: Use equivalent fractions as a strategy to add and subtract fractions. (DOK 1, 2) Tasks associated with this target ask students to add and subtract fractions with unlike denominators, including mixed numbers. Contextual word problems that ask students to apply these operations should be included (often paired with one or more targets from Claim 2). Other tasks should focus on the reasonableness of answers to addition and subtraction problems involving fractions, often by presenting "flawed reasoning" (paired with one or more targets from Claim 3).	
Standards: 5.NF.A.1, 5.NF.A.2	**5.NF.A Use equivalent fractions as a strategy to add and subtract fractions.** **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **5.NF.A.2** Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.NF.A, 4.NF.A.1, 4.NF.A.2, 4.NF.B, 4.NF.B.3, 4.NF.B.3a, 4.NF.B.3b, 4.NF.B.3c, 4.NF.B.3d	**Related Grade 4 Standards** **4.NF.A Extend understanding of fraction equivalence and ordering.** **4.NF.A.1** Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. **4.NF.A.2** Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. **4.NF.B** Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. **4.NF.B.3** Understand a fraction a/b with $a > 1$ as a sum of

	fractions 1/*b*. **a.** Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. **b.** Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8; 3/8 = 1/8 + 2/8; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.* **c.** Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. **d.** Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. **Related Grade 6 Standards** None
DOK Level(s):	1, 2
Achievement LEVEL Descriptors:	
RANGE Achievement Level Descriptor (Range ALD) Target E: Use equivalent fractions as a strategy to add and subtract fractions.	**Level 1** Students should be able to add two fractions and mixed numbers with unlike denominators and subtract two fractions with unlike denominators when one denominator is a factor of the other in mathematical problems (denominators < 12). They should be able to use benchmark fractions (1/4s and 1/2s) and number sense with fractions to estimate mentally and assess the reasonableness of answers.
	Level 2 Students should be able to add fractions and mixed numbers with unlike denominators (denominators ≤12) in mathematical problems, subtract a mixed number from a whole number (denominators up to 4), and use benchmark fractions to estimate mentally and assess the reasonableness of answers (denominators ≤12).
	Level 3 Students should be able to add and subtract fractions and mixed numbers with unlike denominators in word problems and use number sense of fractions to estimate mentally and assess the reasonableness of answers.
	Level 4 No Descriptor
Evidence Required:	1. The student adds or subtracts fractions with unlike denominators (including mixed numbers) by using visual fraction models or equations to represent the problem. 2. The student identifies and explains the use of equivalent fractions when adding or subtracting fractions with unlike denominators (including mixed numbers).
Allowable Response Types:	Multiple Choice, single correct response; Equation/Numeric; Fill-in Table
Allowable Stimulus Materials:	visual fraction models, equations
Construct-Relevant Vocabulary:	equivalent fractions, denominators, numerators, mixed numbers
Allowable Tools:	None
Target-Specific	None

Attributes:	
Non-Targeted Constructs:	None
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	Items that ask students to write an equation that represents a word problem (5.NF.2) will be assessed in Claim 4.

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1a **Response Type: Equation / Numeric** **DOK Level 1** **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **Evidence Required:** 1. The student adds or subtracts fractions with unlike denominators (including mixed numbers) by using visual fraction models or equations to represent the problem. **Tools:** None	**Prompt Features:** The student is prompted to identify the correct sum of fractions in a mathematical context. **Stimulus Guidelines:** • Item difficulty can be adjusted via these example methods: o The use of proper fractions, improper fractions, and mixed numbers o Fractions with denominators of 10 and 100 o Fractions with denominators where one denominator is a factor of the other o Fractions with unlike denominators that are not factors of each other o Items that require regrouping **TM1a** **Stimulus:** The student is presented with an addition problem involving fractions with unlike denominators. **Example Stem 1:** Enter the sum. $\frac{2}{10} + \frac{30}{100}$ **Example Stem 2:** Enter the sum. $\frac{8}{6} + \frac{3}{12}$ **Example Stem 3:** Enter the sum. $\frac{3}{4} + 1\frac{3}{5}$ **Rubric:** (1 point) The student enters the correct sum (e.g., $\frac{50}{100}$ or $\frac{5}{10}$ or $\frac{1}{2}$; $\frac{19}{12}$ or $1\frac{7}{12}$; $\frac{47}{20}$ or $2\frac{7}{20}$). Allow for equivalencies. **Response Type:** Equation/Numeric

Task Model 1b **Response Type:** **Equation / Numeric** **DOK Level 1** **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **Evidence Required:** 1. The student adds or subtracts fractions with unlike denominators (including mixed numbers) by using visual fraction models or equations to represent the problem. **Tools:** None	**Prompt Features:** The student is prompted to identify the correct difference of fractions in a mathematical context. **Stimulus Guidelines:** • Item difficulty can be adjusted via these example methods: o The use of proper fractions, improper fractions, and mixed numbers o Fractions with denominators of 10 and 100 o Fractions with denominators where one denominator is a factor of the other o Fractions with unlike denominators that are not factors of each other o Items that require regrouping **TM1b** **Stimulus:** The student is presented with a subtraction problem involving fractions with unlike denominators. **Example Stem 1:** Enter the difference. $\frac{6}{10} - \frac{20}{100}$ **Example Stem 2:** Enter the difference. $\frac{15}{12} - \frac{3}{4}$ **Example Stem 3:** Enter the difference. $2\frac{7}{9} - \frac{3}{8}$ **Rubric:** (1 point) The student correctly calculates the solution to a subtraction problem involving fractions (e.g., $\frac{40}{100}$ or $\frac{4}{10}$ or $\frac{2}{5}$; $\frac{6}{12}$ or $\frac{1}{2}$; $\frac{173}{72}$ or $2\frac{29}{72}$). **Response Type:** Equation/Numeric

Task Model 2a **Response Type:** **Multiple Choice, single correct response** **DOK Level 2** **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **Evidence Required:** 2. The student identifies and explains the use of equivalent fractions when adding or subtracting fractions with unlike denominators (including mixed numbers). **Tools:** None	**Prompt Features:** The student is prompted to identify the set of steps which correctly find the sum or difference of fractions with unlike denominators. **Stimulus Guidelines:** • Item difficulty can be adjusted via these example methods: o The use of proper fractions, improper fractions, and mixed numbers o Fractions with denominators of 10 and 100 o Fractions with denominators where one denominator is a factor of the other o Fractions with unlike denominators that are not factors of each other **TM2a** **Stimulus:** The student is presented with an addition or subtraction expression involving fractions with unlike denominators. **Example Stem:** Which example shows a correct strategy and solution for subtracting $1\frac{3}{4} - \frac{1}{3}$. A. $\frac{3}{4\times3} - \frac{1}{3\times4}$ $= \frac{3}{12} - \frac{1}{12}$ $= \frac{2}{12} = \frac{1}{6}$ B. $\frac{7}{4\times3} - \frac{1}{3\times4}$ $= \frac{7}{12} - \frac{1}{12}$ $= \frac{6}{12} = \frac{1}{2}$ C. $\frac{7\times3}{4\times3} - \frac{1\times4}{3\times4}$ $= \frac{21}{12} - \frac{4}{12}$ $= \frac{17}{12} = 1\frac{5}{12}$ D. $\frac{7\times3}{4\times3} - \frac{1\times3}{3\times4}$ $= \frac{21}{12} - \frac{3}{12}$ $= \frac{18}{12} = 1\frac{6}{12} = 1\frac{1}{2}$ **Rubric:** (1 point) The student selects the correct set of steps (e.g., C). **Response Type:** Multiple Choice, single correct response

Task Model 2b-c **Response Type:** **Multiple Choice, single correct response** **DOK Level 1** **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **Evidence Required:** 2. The student identifies and explains the use of equivalent fractions when adding or subtracting fractions with unlike denominators (including mixed numbers). **Tools:** None	**Prompt Features:** The student is prompted to identify an equivalent expression with like denominators that produced an equivalent sum or difference of fractions with unlike denominators. **Stimulus Guidelines:** • Item difficulty can be adjusted via these example methods: o The use of proper fractions, improper fractions, and mixed numbers o Fractions with denominators of 10 and 100 o Fractions with denominators where one denominator is a factor of the other o Fractions with unlike denominators that are not factors of each other **TM2b** **Stimulus:** The student is presented with a real-world addition problem involving fractions with unlike denominators. **Example Stem:** David used $2\frac{1}{4}$ feet of cloth to make a shirt. He also used $3\frac{1}{3}$ feet to make a scarf. Which expression could be used to correctly determine the amount of cloth, in feet, David used altogether? A. $5 + \frac{1}{12}$ B. $5 + \frac{2}{7}$ C. $2 + 3 + \frac{1}{12} + \frac{1}{12}$ D. $2 + 3 + \frac{3}{12} + \frac{4}{12}$ **TM2c** **Stimulus:** The student is presented with a real-world subtraction problem involving fractions with unlike denominators. **Example Stem:** Sara has $1\frac{3}{4}$ feet of cloth. She used $\frac{1}{3}$ foot to make a bow. Which expression could be used to correctly determine the amount of cloth, in feet, that remains? A. $1 - \frac{3}{12} - \frac{1}{12}$ B. $1 - \frac{9}{12} - \frac{4}{12}$ C. $1 + \frac{3}{12} - \frac{1}{12}$ D. $1 + \frac{9}{12} - \frac{4}{12}$ **Rubric:** (1 point) The student selects the correct equivalent expression (e.g., D; D). **Response Type:** Multiple Choice, single correct response

Task Model 2d **Response Type:** **Multiple Choice, single correct response** **DOK Level 1** **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **Evidence Required:** 2. The student identifies and explains the use of equivalent fractions when adding or subtracting fractions with unlike denominators (including mixed numbers). **Tools:** None	**Prompt Features:** The student is prompted to identify an expression that can be used to find the solution to the given expression. **Stimulus Guidelines:** • Item difficulty can be adjusted via these example methods: o The use of proper fractions, improper fractions, and mixed numbers o Fractions with denominators of 10 and 100 o Fractions with denominators where one denominator is a factor of the other o Fractions with unlike denominators that are not factors of each other **TM2d** **Stimulus:** The student is presented with an addition or subtraction expression involving fractions with unlike denominators. **Example Stem 1:** Which expression is equivalent to $2-\frac{1}{3}+\frac{2}{5}$? A. $\frac{2}{15}-\frac{1}{15}+\frac{2}{15}$ C. $\frac{17}{15}-\frac{7}{15}+\frac{8}{15}$ B. $\frac{2}{15}-\frac{5}{15}+\frac{6}{15}$ D. $\frac{30}{15}-\frac{5}{15}+\frac{6}{15}$ **Rubric:** (1 point) The student selects the correct expression (e.g., D). **Response Type:** Multiple Choice, single correct response

Task Model 2e **Response Type:** **Equation / Numeric** **DOK Level 2** **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **Evidence Required:** 2. The student identifies and explains the use of equivalent fractions when adding or subtracting fractions with unlike denominators (including mixed numbers). **Tools:** None	**Prompt Features:** The student is prompted to enter the unknown number in an equation used to solve an addition or subtraction problem involving fractions. **Stimulus Guidelines:** • Item difficulty can be adjusted via these example methods: o The use of proper fractions, improper fractions, and mixed numbers o Fractions with denominators of 10 and 100 o Fractions with denominators where one denominator is a factor of the other o Fractions with unlike denominators that are not factors of each other **TM2e** **Stimulus:** The student is presented with a fraction equation showing equivalent fractions used to add or subtract fractions with unlike denominators. **Example Stem 1:** Enter the numerator that makes the equation true. $1\frac{3}{4} + 1\frac{1}{3} = 1\frac{\square}{12} + 1\frac{4}{12}$ **Example Stem 2:** Enter the numerator that makes the equation true. $1\frac{3}{4} + 1\frac{1}{3} = 1 + 1 + \frac{\square}{12} + \frac{4}{12}$ **Rubric:** (1 point) The student enters the number that will make the equation true (e.g., 9; 9). **Response Type:** Equation/Numeric

Claim 1: *Concepts and Procedures*

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

Content Domain: **Number and Operations—Fractions**

Target F [m]: Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (DOK 1, 2)

Tasks for this target will ask students to multiply and divide fractions, including division of whole numbers where the answer is expressed by a fraction or mixed number. Division tasks should be limited to those that focus on dividing a unit fraction by a whole number or whole number by a unit fraction. Extended tasks posed as real-world problems related to this target will be assessed with targets from Claim 2 and Claim 4.

Other tasks will ask students to find the area of a rectangle with fractional side lengths or use technology-enhanced items to build visual models of multiplication and/or division of fractions, where the student is able to partition and shade circles or rectangles as part of an explanation. Students' ability to interpret multiplication as scaling will be assessed with the targets for Claim 3.

Standards: 5.NF.B, 5.NF.B.3, 5.NF.B.4, 5.NF.B.4a, 5.NF.B.4b, 5.NF.B.5, 5.NF.B.5a, 5.NF.B.5b, 5.NF.B.6, 5.NF.B.7, 5.NF.B.7a, 5.NF.B.7b, 5.NF.B.7c	**5.NF.B Apply and extend previous understandings of multiplication and division to multiply and divide fractions.** **5.NF.B.3** Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?* **5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. **a.** Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)* **b.** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

	5.NF.B.5 Interpret multiplication as scaling (resizing), by: **a.** Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. **b.** Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1. **5.NF.B.6** Solve real-world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. **5.NF.B.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. **a.** Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.* **b.** Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* **c.** Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.NF.B, 4.NF.B.4, 4.NF.B.4a, 4.NF.B.4b, 4.NF.B.4c 6.NS.A, 6.NS.A.1	**Related Grade 4 Standards** **4.NF.B Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.** **4.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. **a.** Understand a fraction a/b as a multiple of $1/b$. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).* **b.** Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 ×*

	(1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.) **c.** Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* **Related Grade 6 Standards** **6.NS.A Apply and extend previous understandings of multiplication and division to divide fractions by fractions.** **6.NS.A.1** Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*
DOK Level(s):	1, 2
Achievement LEVEL Descriptors:	
RANGE Achievement Level Descriptors (Range ALD) Target F: Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	**Level 1** Students should be able to apply their previous understandings of multiplication to multiply a fraction by a fraction; know the effect that whole number multiplication has on fractions; use or create visual models when multiplying a whole number by a fraction between 0 and 1; and interpret and perform division of a whole number by 1/2 or 1/3.
	Level 2 Students should be able to multiply a whole number by a mixed number; know the effect that a fraction greater than or less than 1 has on a whole number when multiplied; use or create visual models when multiplying two fractions between 0 and 1; extend their previous understandings of division to divide a unit fraction by a whole number; and understand that division of whole numbers can result in fractions.
	Level 3 Students should be able to multiply a mixed number by a mixed number; know the effect that a fraction has on another fraction when multiplied (proper and improper fractions); use or create visual models when multiplying two fractions, including when one fraction is larger than 1; and interpret and perform division of any unit fraction by a whole number.
	Level 4 Students should be able to understand and use the fact that a fraction multiplied by 1 in the form of a/a is equivalent to the original fraction.

Evidence Required:	1. The student interprets a fraction as division of the numerator by the denominator. 2. The student solves problems involving division of whole numbers leading to quotients in the form of fractions or mixed numbers, with or without fraction models. 3. The student multiplies a fraction or whole number by a fraction. 4. The student multiplies fractional side lengths to find areas of rectangles. 5. The student compares the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. 6. The student solves real-world problems involving multiplication of fractions and mixed numbers, with or without visual fraction models. 7. The student solves real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, with or without visual fraction models.
Allowable Response Types:	Multiple Choice, single correct response; Equation/Numeric
Allowable Stimulus Materials:	visual fraction models (circles, rectangles, tape diagrams, number lines)
Construct-Relevant Vocabulary:	fraction, equivalent, denominator, numerator, sum, difference, product, mixed number
Allowable Tools:	fraction modeling tool
Target-Specific Attributes:	Division tasks should be limited to those dividing a unit fraction (written $1/a$, such that a is any non-zero whole number) by a whole number or a whole number by a unit fraction.
Non-Targeted Constructs:	None

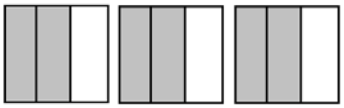
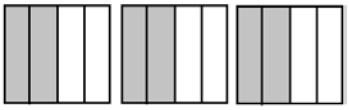
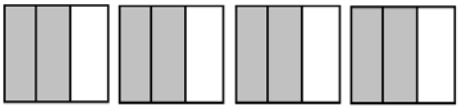
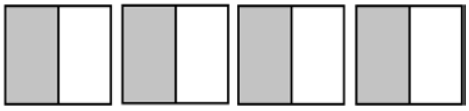
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	The portion of this standard (5.NF.B) that requires student explanation and modeling will be assessed in Claim 3. Items posed as real-world problems related to this target will be assessed with targets from Claim 2 and Claim 4. Items asking the student to find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths (5.NF.B.4b) will be presented in Claim 2.

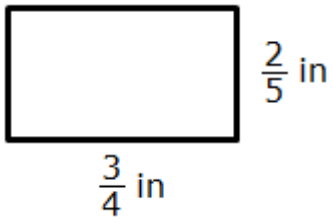
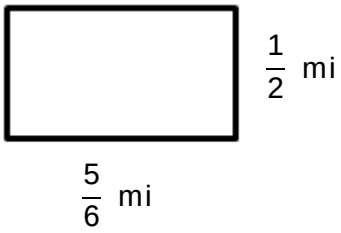
[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1 **Response Type:** **Multiple Choice, single correct response** **DOK Level 1** **5.NF.B.3** Interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?* **Evidence Required:** 1. The student interprets a fraction as division of the numerator by the denominator. **Tools:** None	**Prompt Features:** The student is prompted to interpret a fraction as division of the numerator by the denominator. **Stimulus Guidelines:** • Division tasks should be limited to those dividing a unit fraction (written 1/*a*, such that *a* is any non-zero whole number) by a whole number or a whole number by a unit fraction. **TM1a** **Stimulus:** The stem will present a fraction and ask for an equivalent expression for the fraction. **Example Stem:** Which expression is equal to $\frac{3}{4}$? A. 3 × 4 B. 4 × 3 C. 4 ÷ 3 D. 3 ÷ 4 **TM1b** **Stimulus:** The student is presented with a contextual division problem that will result in a fractional quotient. **Example Stem:** An art teacher divided 22 ounces of beads equally among 6 groups of students. How many ounces of beads did each group receive? A. $\frac{1}{16}$ ounce B. $\frac{1}{28}$ ounce C. $\frac{6}{22}$ ounce D. $\frac{22}{6}$ ounces **Rubric:** (1 point) The student identifies the correct fractional quotient (e.g., D; D). **Response Type:** Multiple Choice, single correct response

Task Model 2 **Response Type:** **Equation / Numeric** **DOK Level 1** **5.NF.B.3** Interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?* **Evidence Required:** 2. The student solves problems involving division of whole numbers leading to quotients in the form of fractions or mixed numbers, with or without fraction models. **Tools:** None	**Prompt Features:** The student is prompted to identify the solutions to problems involving quotients in the form of fractions or mixed numbers. The problems may or may not involve fraction models. **Stimulus Guidelines:** • Items should be limited to up to four-digit dividends and up to two-digit divisors. **TM2** **Stimulus:** The student is presented with a real-world division problem. **Example Stem:** John has 25 ounces of juice. He pours an equal amount of juice into 7 cups. Enter the number of ounces of juice in each cup. **Rubric:** (1 point) The student correctly enters a fraction which represents a solution involving quotients (e.g., $\frac{25}{7}$ or $3\frac{4}{7}$). **Response Type:** Equation/Numeric

Task Model 3 **Response Type:** **Multiple Choice, single correct response** **DOK Level 1** **5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. **a.** Interpret the product (*a*/*b*) × *q* as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a* × *q* ÷ *b*. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)* **Evidence Required:** 3. The student multiplies a fraction or whole number by a fraction. **Tools:** None	**Prompt Features:** The student is prompted to identify a visual fraction model that best represents the product of a fraction and a whole number. **Stimulus Guidelines:** • Answer choices will present visual fraction models as either circles or rectangles. **TM3** **Stimulus:** The student is presented with a multiplication problem involving a whole number and a fraction that includes fraction models. **Example Stem:** Which fraction model best represents $4 \times \frac{2}{3}$? A.  B.  C.  D.  **Rubric:** (1 point) The student identifies the correct fraction model for the given multiplication problem (e.g., C). **Response Type:** Multiple Choice, single correct response

Task Model 4 **Response Type:** **Equation / Numeric** **DOK Level 2** **5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. **b.** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. **Evidence Required:** 4. The student multiplies fractional side lengths to find areas of rectangles. **Tools:** None	**Prompt Features:** The student is prompted to identify the area of a given rectangle with fractional side lengths. **Stimulus Guidelines:** • The rectangle's fractional side lengths may be proper fractions or mixed numbers. **TM4a** **Stimulus:** The student is presented with a rectangle with fractional side lengths. **Example Stem:** Use this diagram to solve the problem.  Enter the area, in square inches, of the rectangle. **TM4b** **Stimulus:** The student is presented with a contextual problem involving a rectangle with fractional side lengths. **Example Stem:** Cherrytown Park is in the shape of a rectangle. • The width of the park is $\frac{1}{2}$ mile. • The length of the park is $\frac{5}{6}$ mile.  Enter the area, in square miles, of Cherrytown Park. **Rubric:** (1 point) The student correctly finds the area of a given rectangle with fractional side length (e.g., $\frac{6}{20}$; $\frac{5}{12}$). **Response Type:** Equation/Numeric

Task Model 5 **Response Type:** **Equation / Numeric** **DOK Level 2** **5.NF.B.5** Interpret multiplication as scaling (resizing), by: **a.** Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. **Evidence Required:** 5. The student compares the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. **Tools:** None	**Prompt Features:** The student is prompted to identify the value of a factor that makes a given statement true. **Stimulus Guidelines:** • Multiplication expression contains one whole number and one variable. • Range for correct product will either be between 0 and the given whole number, or between the given whole number and twice the given whole number. **TM5a** **Stimulus:** The student is presented with a multiplication expression and the range from 0 to the whole number. **Example Stem:** Enter a value for *b* that makes this statement true: 5 × *b* is less than 5 but greater than 0. **TM5b** **Stimulus:** The student is presented with a multiplication expression and the range from the whole number to twice the whole number. **Example Stem:** Enter a value for *b* that makes this statement true: 5 × *b* is greater than 5 but less than 10. **Rubric:** (1 point) The student enters a correct value in the given range (e.g., $\frac{1}{2}$; $1\frac{1}{2}$). **Response Type:** Equation/Numeric

Task Model 6

Response Type:
Equation / Numeric

DOK Level 2

5.NF.B.6
Solve real-world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

Evidence Required:
6. The student solves real-world problems involving multiplication of fractions and mixed numbers, with or without visual fraction models.

Tools: None

Prompt Features: The student is prompted to solve real-world problems involving multiplication of a fraction and a mixed number, with or without visual fraction models.

Stimulus Guidelines:

- Items with models do not use a partition of 1 in the model, and all models must include the same number of shaded partitions.
- Item difficulty can be adjusted via this example method:
  - The product is a whole number, fraction, or mixed number

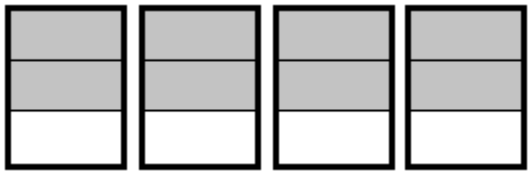
TM6a
Stimulus: The student is presented with a real-world context multiplication problem involving a fraction and a mixed number.

Example Stem: Julie bikes $6\frac{2}{3}$ miles along the river trail on Saturday. Greg swims $\frac{3}{4}$ of that distance. Enter the distance, in miles, that Greg swims.

TM6b
Stimulus: The student is presented with a real-world context multiplication problem involving a fraction and a whole number, including a visual model.

Example Stem: Lisa is painting her kitchen and bathroom.

- She uses 4 gallons of paint in the kitchen.
- She uses $\frac{2}{3}$ of that amount in the bathroom.
- The shaded portions in this model represent the amount of paint she uses in the bathroom.



Enter the amount of paint, in gallons, Lisa uses in the bathroom.

Rubric: (1 point) The student correctly enters the solution (e.g., 5 or $\frac{60}{12}$; $\frac{8}{3}$ or $2\frac{2}{3}$).

Response Type: Equation/Numeric

Task Model 7 **Response Type:** **Equation / Numeric** **DOK Level 1** **5.NF.B.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. **c.** Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?* **Evidence Required:** 7. The student solves real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, with or without visual fraction models. **Tools:** None	**Prompt Features:** The student is prompted to solve real-world problems involving division of a unit fraction by a non-zero whole number or a non-zero whole number by a unit fraction, with or without visual fraction models. **Stimulus Guidelines:** • The wording of the item indicates that the quantity is being divided. Item includes terms such as "divides," "portions," "distributes," etc. **TM7** **Stimulus:** The student is presented with a real-world context division problem involving a unit fraction and a whole number. **Example Stem:** Ryan has $\frac{1}{2}$ pound of chocolate. He divides it into 4 equal portions. Enter the amount of chocolate, in pounds, in each portion. **Rubric:** (1 point) The student correctly enters the solution to the division problem (e.g., $\frac{1}{8}$). **Response Type:** Equation/Numeric

Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	
Content Domain: **Measurement and Data**	
Target G [s]: Convert like measurement units within a given measurement system. (DOK 1) Tasks for this target ask students to convert measurements and should be used to provide context for the assessment of 5.NBT Target D. Some tasks will involve contextual problems and will contribute evidence for Claim 2 or Claim 4. (DOK 2)	
Standards: 5.MD.A, 5.MD.A.1	**5.MD.A Convert like measurement units within a given measurement system.** **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.
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.MD.A, 4.MD.A.1, 4.MD.A.2 6.RP.A, 6.RP.A.3d	**Related Grade 4 Standards** **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. **Related Grade 6 Standards** **6.RP.A Understand ratio concepts and use ratio reasoning to solve problems.** **6.RP.A.3d** Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
DOK Level(s):	1, 2

Achievement LEVEL Descriptors:	
RANGE Achievement Level Descriptors (Range ALD) Target G: Convert like measurement units within a given measurement system.	**Level 1** Students should be able to convert a whole number metric measurement to a different metric measurement resulting in a whole number; and convert a whole number customary measurement to a different customary measurement resulting in a whole number.
	Level 2 Students should be able to convert a metric measurement to the tenths place to a different metric measurement and convert a standard measurement given to the 1/4 unit (fractions/mixed numbers) from a larger measurement unit to a smaller one.
	Level 3 Students should be able to convert like measurements within a system using whole numbers, fractions (standard system), and decimals (metric system).
	Level 4 No Descriptor
Evidence Required:	1. The student converts units of linear measure within a single measurement system. 2. The student converts units of weight/mass measure within a single measurement system. 3. The student converts units of liquid volume measure within a single measurement system. 4. The student converts units of time measure within a single measurement system.
Allowable Response Types:	Equation/Numeric
Allowable Stimulus Materials:	None
Construct-Relevant Vocabulary:	mass, weight, length, time, kilometer, meter, centimeter, kilogram, gram, liter, milliliter, inch, foot, yard, mile, ounce, pound, cup, pint, quart, gallon, hour, minute, second
Allowable Tools:	None
Target-Specific Attributes:	Metric or customary units (length, mass, liquid, time) Measurement conversions are within a single system including kilometer (km), meter (m), centimeter (cm), kilogram (kg), gram (g), liter (L), milliliter (mL), inch (in), foot (ft), yard (yd), mile (mi), ounce (oz), pound (lb), cup, pint (pt), quart (qt), gallon (gal), hour (hr), minute (min), second (s). Decimal numbers can be to the thousandths place. Division of whole numbers is limited to four-digit dividends and two-digit divisors. Division of fractions is limited to whole number by unit fraction or unit fraction by whole number.
Non-Targeted Constructs:	None

Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	Some tasks will involve contextual problems and will contribute evidence for Claim 2 or Claim 4.

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1 **Response Type:** **Equation / Numeric** **DOK Level 1** **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. **Evidence Required:** 1. The student converts units of linear measure within a single measurement system. **Tools:** None	**Prompt Features:** The student is prompted to convert a unit of linear measure to a larger or smaller unit within the same system. **Stimulus Guidelines:** • Measurement conversions are within a single system including kilometer (km), meter (m), centimeter (cm), inch (in), foot (ft), yard (yd), mile (mi). • Decimal numbers can be to the thousandths place. • Conversions involving division of fractions are limited to a whole number by a unit fraction or unit fraction by a whole number. • Item difficulty can be adjusted via these example methods: o Single-unit conversions using adjacent common units of measure (e.g., 1 foot = 12 inches) o Whole number conversion problems which use one step of separation between units o Single-step conversion problems containing fractions or decimals or multi-step conversion problems using whole numbers o Multi-step conversion problems containing fractions or decimals **TM1a** **Stimulus:** The stem presents a length measurement in customary units. **Example Stem:** Enter the number of **inches** equal to 7 yards. **TM1b** **Stimulus:** The stem presents a length measurement in metric units. **Example Stem:** Enter the number of **millimeters** equal to 7 centimeters. **Rubric:** (1 point) The student correctly converts from one measurement to another measurement (e.g., 252; 70). **Response Type:** Equation/Numeric

Task Model 2 **Response Type:** **Equation / Numeric** **DOK Level 1** **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. **Evidence Required:** 2. The student converts units of weight/mass measure within a single measurement system. **Tools:** None	**Prompt Features:** The student is prompted to convert a unit of weight/mass measure to a larger or smaller unit within the same system. **Stimulus Guidelines:** • Measurement conversions are within a single system including kilogram (kg), gram (g), ounce (oz), pound (lb). • Decimal numbers can be to the thousandths place. • Conversions involving division of fractions are limited to a whole number by a unit fraction or unit fraction by a whole number. • Item difficulty can be adjusted via these example methods: o Single-unit conversions using adjacent common units of measure (e.g., 1 pound = 16 ounces) o Whole number conversion problems which use one step of separation between units o Single-step conversion problems containing fractions or decimals or multi-step conversion problems using whole numbers o Multi-step conversion problems containing fractions or decimals **TM2a** **Stimulus:** The stem presents a weight measurement in customary units. **Example Stem:** Enter the number of **ounces** equal to $7\frac{1}{2}$ pounds. **TM2b** **Stimulus:** The stem presents a mass measurement in metric units. **Example Stem:** Enter the number of **grams** equal to 24.7 kilograms. **Rubric:** (1 point) The student correctly converts from one measurement to another measurement (e.g., 120; 24,700). **Response Type:** Equation/Numeric

Task Model 3 **Response Type:** **Equation / Numeric** **DOK Level 1** **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. **Evidence Required:** 3. The student converts units of liquid volume measure within a single measurement system. **Tools:** None	**Prompt Features:** The student is prompted to convert a unit of liquid measure to a larger or smaller unit within the same system. **Stimulus Guidelines:** • Measurement conversions are within a single system including liter (L), milliliter (mL), cup, pint (pt), quart (qt), gallon (gal). • Decimal numbers can be to the thousandths place. • Conversions involving division of fractions are limited to a whole number by a unit fraction or unit fraction by a whole number. • Item difficulty can be adjusted via these example methods: o Single-unit conversions using adjacent common units of measure (e.g., 1 gallon = 16 cups) o Whole number conversion problems which use one step of separation between units o Single-step conversion problems containing fractions or decimals or multi-step conversion problems using whole numbers o Multi-step conversion problems containing fractions or decimals **TM3a** **Stimulus:** The stem presents a liquid volume measurement in customary units. **Example Stem:** Enter the number of **cups** equal to $2\frac{1}{8}$ gallons. **TM3b** **Stimulus:** The stem presents a liquid volume measurement in metric units. **Example Stem:** Enter the number of **milliliters** equal to 4.6 liters. **Rubric:** (1 point) The student correctly converts from one measurement to another measurement (e.g., 34; 4600). **Response Type:** Equation/Numeric

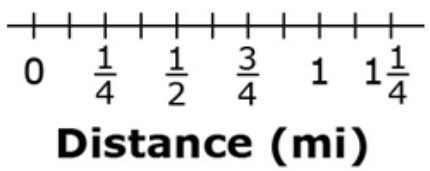
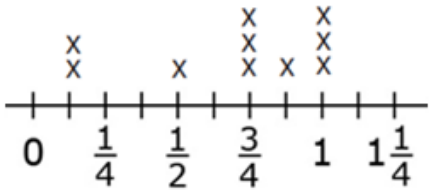
Task Model 4 **Response Type:** **Equation / Numeric** **DOK Level 1** **5.MD.A.1** Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems. **Evidence Required:** 4. The student converts units of time measure within a single measurement system. **Tools:** None	**Prompt Features:** The student is prompted to convert a unit of time measure to a larger or smaller unit. **Stimulus Guidelines:** • Measurement conversions are within a single system including hour, minute, second. • Decimal numbers can be to the thousandths place. • Conversions involving division of fractions are limited to a whole number by a unit fraction or unit fraction by a whole number. • Item difficulty can be adjusted via these example methods: o Single-unit conversions using adjacent common units of measure (e.g., 1 minute = 60 seconds) o Whole number conversion problems which use one step of separation between units o Single-step conversion problems containing fractions or decimals or multi-step conversion problems using whole numbers o Multi-step conversion problems containing fractions or decimals **TM4** **Stimulus:** The stem presents a measurement of time. **Example Stem:** Enter the number of **minutes** equal to $\frac{3}{4}$ hour. **Rubric:** (1 point) The student correctly converts from one measurement to another measurement (e.g., 45). **Response Type:** Equation/Numeric

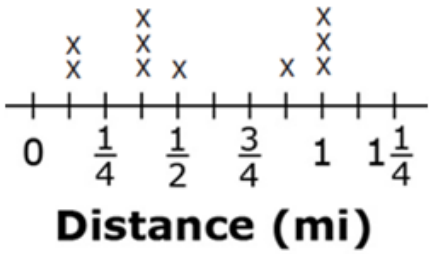
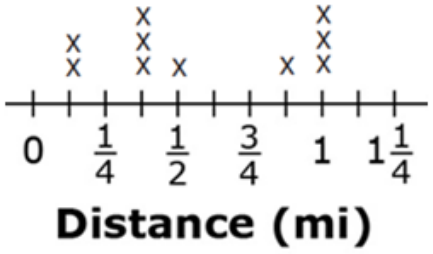
Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	
Content Domain: **Measurement and Data**	
Target H [s]: Represent and interpret data. (DOK 2) Tasks for this target ask students to make and interpret line plots with fractional units and should be used to provide context for the assessment of 5.NF Target E and 5.NF Target F. Some tasks will involve contextual problems and will contribute evidence for Claim 2 or Claim 4.	
Standards: 5.MD.B, 5.MD.B.2	**5.MD.B Represent and interpret data.** **5.MD.B.2** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.MD.B, 4.MD.B.4 6.SP.B, 6.SP.B.4	**Related Grade 4 Standards** **4.MD.B Represent and interpret data.** **4.MD.B.4** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection*. **Related Grade 6 Standards** **6.SP.B Summarize and describe distributions.** **6.SP.B.4** Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
DOK Level(s):	2
Achievement LEVEL Descriptors:	
RANGE Achievement Level Descriptors (Range ALD) Target H: Represent and interpret data.	**Level 1** Students should be able to make a line plot and represent data sets in whole units.
	Level 2 Students should be able to make a line plot and display data sets in fractions of a unit (1/2, 1/4, 1/8).
	Level 3 Students should be able to interpret a line plot to display data sets in fractions of a unit (1/2, 1/4, 1/8) and solve problems using information from line plots that require addition, subtraction, and multiplication of fractions.
	Level 4 No Descriptor
Evidence Required:	1. The student completes or identifies a line plot with fractional units to display a data set. 2. The student uses operations on fractions to solve problems involving information presented in line plots.

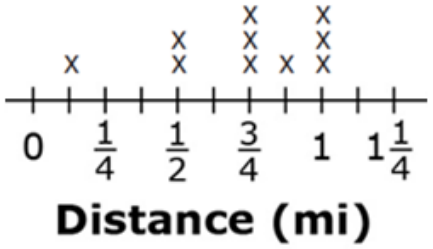
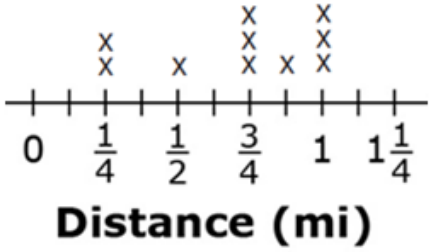
Allowable Response Types:	Hot Spot; Multiple Choice, single correct response; Equation/Numeric
Allowable Stimulus Materials:	line plots, tables
Construct-Relevant Vocabulary:	line plot, table, measurement, data set, interval, unit fraction, mixed number
Allowable Tools:	None
Target-Specific Attributes:	Fractions used in line plots are limited to denominators of 2, 4, 8 and 12.
Non-Targeted Constructs:	None
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	Creating a line plot from scratch (where the student must partition the number line, choose an appropriate scale, and label the scale accordingly) will be assessed in Claim 4. Using operations on fractions to interpret data involving line plots will be assessed in Claim 4.

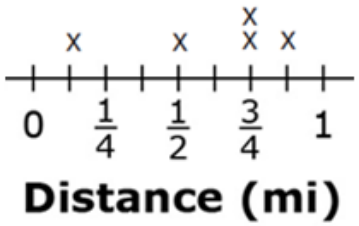
[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1a **Response Type:** **Hot Spot** **DOK Level 2** **5.MD.B.2** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.* **Evidence Required:** 1. The student completes or identifies a line plot with fractional units to display a data set. **Tools:** None **Accessibility Note:** Hot spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.	**Prompt Features:** The student is prompted to complete a line plot that displays a given data set. **Stimulus Guidelines:** • Data set includes up to 10 measurements in fractions of a unit (e.g., 1/2, 1/4, 1/8, 1/12). • Item difficulty may be adjusted via these example methods: o How many measurements are presented o Which/how many tick marks are labeled on the line plot o The range of measurements used o The use of like or unlike denominators **TM1a** **Stimulus:** The student is presented with a data set collected from a real-world context. **Example Stem:** Ten students in a class recorded the distances they ran, in miles, yesterday. $\frac{7}{8}$, $\frac{3}{4}$, 1, $\frac{3}{4}$, 1, 1, $\frac{1}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{8}$ Click above the tick marks to complete the line plot that displays the data.  **Distance (mi)** **Rubric:** (1 point) The student correctly completes a line plot that displays all 10 data points with no incorrect or missing points (e.g., shown below).  **Distance (mi)** **Response Type:** Hot Spot

Task Model 1b **Response Type:** **Multiple Choice, single correct response** **DOK Level 2** **5.MD.B.2** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.* **Evidence Required:** 1. The student completes or identifies a line plot with fractional units to display a data set. **Tools:** None	**Prompt Features:** The student is prompted to identify a line plot that correctly displays a given data set. **Stimulus Guidelines:** • Data set includes up to 10 measurements in fractions of a unit (e.g., 1/2, 1/4, 1/8, 1/12). • Item difficulty may be adjusted via these example methods: o How many measurements are presented o Which/how many tick marks are labeled on the line plot o The range of measurements used o The use of like or unlike denominators **TM1b** **Stimulus:** The student is presented with a data set collected from a real-world context. **Example Stem:** Ten students in a class recorded the distances they ran, in miles, yesterday. $\frac{7}{8}$, $\frac{3}{4}$, 1, $\frac{3}{4}$, 1, 1, $\frac{1}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{8}$ Select the line plot that correctly displays this data. A.  B. 

Task Model 1b **Response Type:** **Multiple Choice, single correct response** **DOK Level 2** **5.MD.B.2** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.* **Evidence Required:** 1. The student completes or identifies a line plot with fractional units to display a data set. **Tools:** None	C.  D.  **Rubric:** (1 point) The student selects the line plot that correctly displays the data (e.g., D). **Response Type:** Multiple Choice, single correct response

Task Model 2 **Response Type: Equation / Numeric** **DOK Level 2** **5.MD.B.2** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.* **Evidence Required:** 2. The student uses operations on fractions to solve problems involving information presented in line plots. **Tools:** None	**Prompt Features:** The student is prompted to solve a problem involving information presented in a line plot. **Stimulus Guidelines:** • Division problems can be a whole number divided by a unit fraction, a unit fraction divided by a whole number, or a whole number divided by number. • Item difficulty can be adjusted via these example methods: o How many measurements are presented o Which/how many tick marks are labeled on the line plot o The range of measurements used o The use of like or unlike denominators **TM2** **Stimulus:** The student is presented with a line plot with measurements in fractions of a unit (e.g., 1/2, 1/4, 1/8). **Example Stem:** The line plot shows the distance, in miles, that five students ran in a race.  Enter the total distance, in miles, these students ran in the race. **Rubric:** (1 point) The student correctly uses the data from a line plot to find a sum (e.g., 3). **Response Type:** Equation/Numeric

Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	
Content Domain: **Measurement and Data**	
Target I [m]: Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (DOK 1, 2) Tasks for this target will ask students to find the volume of right rectangular prisms with whole-number edge lengths using unit cubes and formulas. Some tasks should ask students to consider the effect of changing the size of the unit cube (e.g., doubling the edge length of a unit cube) using values that do not cause gaps or overlaps when packed into the solid. Other tasks will ask students to find the volume of two non-overlapping right rectangular prisms, often together with targets from Claim 2 or Claim 4.	
Standards: 5.MD.C, 5.MD.C.3, 5.MD.C.3a, 5.MD.C.3b, 5.MD.C.4, 5.MD.C.5, 5.MD.C.5a, 5.MD.C.5b, 5.MD.C.5c	**5.MD.C Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.** **5.MD.C.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement. **a.** A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. **b.** A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units. **5.MD.C.4** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. **5.MD.C.5** Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume. **a.** Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. **b.** Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real-world and mathematical problems. **c.** Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.

Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.MD.A, 4.MD.A.2, 4.MD.A.3 6.G.A, 6.G.A.2	**Related Grade 4 Standards** **4.MD.A Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.** **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.* **Related Grade 6 Standards** **6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.** **6.G.A.2** Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
DOK Level(s):	1, 2
Achievement LEVEL Descriptors:	
RANGE Achievement Level Descriptors (Range ALD) Target I: Geometric measurement: understand concepts of volume and relate volume to multiplication and addition.	**Level 1** Students should be able to use unit cubes to find the volume of rectangular prisms with whole-number edge lengths.
	Level 2 Students should be able to understand the concept that the volume of a rectangular prism packed with unit cubes is related to the edge lengths.
	Level 3 Students should be able to use the formulas $V = l \times w \times h$ and $V = b \times h$ to find the volume of rectangular prisms. They should be able to find the volume of two non-overlapping right rectangular prisms.
	Level 4 Students should be able to find the volume of a right rectangular prism after doubling the edge length of a side and compare it to the original.
Evidence Required:	1. The student determines the volume of a right rectangular prism with whole-number side lengths by counting or packing unit cubes. 2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms.

Allowable Response Types:	Matching Tables; Equation/Numeric
Allowable Stimulus Materials:	right rectangular prism models
Construct-Relevant Vocabulary:	area array, right rectangular prism, associative property, cube, volume, length, width
Allowable Tools:	None
Target-Specific Attributes:	Items are limited to right rectangular prisms with whole-number edge lengths.
Non-Targeted Constructs:	None
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	Other tasks will ask students to find the volume of two non-overlapping right rectangular prisms, often together with targets from Claim 2 or Claim 4. Tasks that ask students to show that the volume of a prism found by packing it with unit cubes is the same as would be found by multiplying the side lengths will be assessed in Claim 3.

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1a

Response Type:
Equation / Numeric

DOK Level 2

5.MD.C.3
Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

5.MD.4
Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

Evidence Required:
1. The student determines the volume of a right rectangular prism with whole-number side lengths by counting or packing unit cubes.

Tools: None

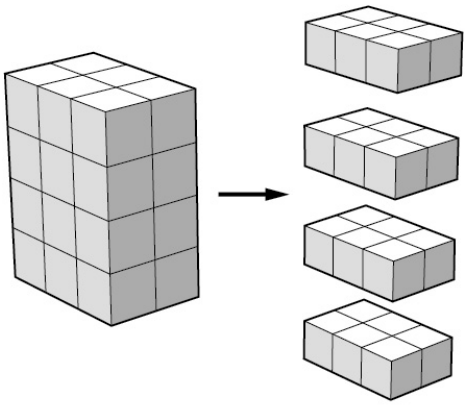
Accessibility Note:
Care should be given to make sure the dimensions of the prism and layers can be adequately Brailled.

Prompt Features: The student is prompted to determine the volume of a right rectangular prism with whole-number side lengths by counting unit cubes.

Stimulus Guidelines:
- Items are limited to right rectangular prisms with whole-number edge lengths.
- Right rectangular prisms can be filled or partially filled with customary unit cubes.
- The volume of a single unit cube is provided.

TM1a
Stimulus: The student is presented with a model of a completed right rectangular prism and a diagram of the individual layers of the prism.

Example Stem: The layers of a rectangular prism are shown to the right of the prism.



Enter the volume, in cubic centimeters, of the rectangular prism.

Rubric: (1 point) The student correctly enters the volume of the completed rectangular prism (e.g., 24).

Response Type: Equation/Numeric

Task Model 1b-c

Response Type:
Equation / Numeric

DOK Level 2

5.MD.C.3
Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

5.MD.C.4
Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

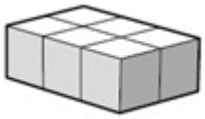
Evidence Required:
1. The student determines the volume of a right rectangular prism with whole-number side lengths by counting or packing unit cubes.

Tools: None

Accessibility Note:
Care should be given to make sure the dimensions of the prism and layers can be adequately Brailled.

TM1b
Stimulus: The student is presented with the model of the bottom layer of a right rectangular prism and the number of layers in the completed prism.

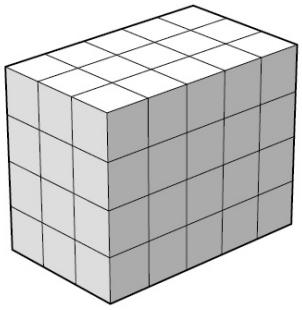
Example Stem: Elias is building a rectangular prism. The bottom layer of the rectangular prism is shown.



He builds a prism that has 4 layers. Enter the volume, in cubic centimeters, of the **completed** rectangular prism.

TM1c
Stimulus: The student is presented with a model of a completed right rectangular prism.

Example Stem: The rectangular prism shown is solid.



Enter the volume, in cubic centimeters, of the rectangular prism.

Rubric: (1 point) The student correctly enters the volume of the completed rectangular prism (e.g., 24; 60).

Response Type: Equation/Numeric

Note: TM1d has been retired.

Task Model 2a-b

Response Type: Equation / Numeric

DOK Level 1

5.MD.C.5
Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume.
b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems.

Evidence Required:
2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms.

Tools: None

Accessibility Note: Include the dimensions in the stem to increase access.

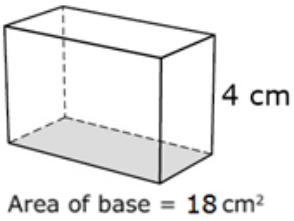
Prompt Features: The student is prompted to apply the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving rectangular prisms.

Stimulus Guidelines:

- The student is presented with right rectangular prisms in a mathematical or real-world context.
- Items may or may not include a visual model.
- Item difficulty can be adjusted via these example methods:
  - Area of base and height given as whole number values
  - Length, width, and height given as whole number values

TM2a
Stimulus: The student is presented with the model of a right rectangular prism in a mathematical context, with the height and area of the base labeled.

Example Stem: The area of the base of this right rectangular prism is 18 square centimeters and the height is 4 centimeters.

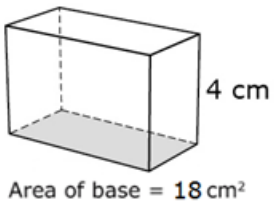


Enter the volume, in cubic centimeters, of this prism.

TM2b
Stimulus: The student is presented with the model of a right rectangular prism in a real-world context, with the height and area of the base labeled.

Example Stem: Sam has a small box in the shape of a right rectangular prism.

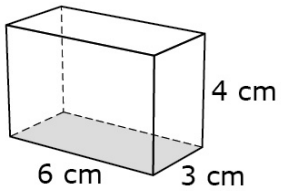
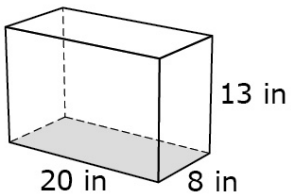
- The area of the base of the box is 18 square centimeters.
- The height of the box is 4 centimeters.



Enter the volume, in cubic centimeters, of Sam's box.

Rubric: (1 point) The student correctly enters the volume of the right rectangular prism (e.g., 72; 72; 72; 72; 2080).

Response Type: Equation/Numeric

Task Model 2c-e **Response Type: Equation / Numeric** **DOK Level 1** **5.MD.C.5** Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume. b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems. **Evidence Required:** 2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms. **Tools:** None **Accessibility Note:** Include the dimensions in the stem to increase access.	**TM2c** **Stimulus:** The student is presented with the height and area of the base of a right rectangular prism in a real-world context. **Example Stem:** Sara has a small box in the shape of a right rectangular prism. • The area of the base of the box is 18 square centimeters. • The height of the box is 4 centimeters. Enter the volume, in cubic centimeters, of Sara's box. **TM2d** **Stimulus:** The student is presented with a model of a right rectangular prism in mathematical context, with all three dimensions labeled. **Example Stem:** The edge lengths, in centimeters, of the right rectangular prism shown are 4, 3, and 6.  Enter the volume, in cubic centimeters, of this prism. **TM2e** **Stimulus:** The student is presented with a model of a right rectangular prism in a real-world context, with all three dimensions labeled. **Example Stem:** Danny has a fish tank, in the shape of a right rectangular prism. The edge lengths of the prism, in inches, are 8, 13, and 20.  Enter the volume, in cubic inches, of the fish tank. **Rubric:** (1 point) The student correctly enters the volume of the right rectangular prism (e.g., 72; 72; 2080). **Response Type:** Equation/Numeric

Task Model 2f

Response Type: Equation / Numeric

DOK Level 2

5.MD.C.5
Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume.
b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems.

Evidence Required:
2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms.

Tools: None

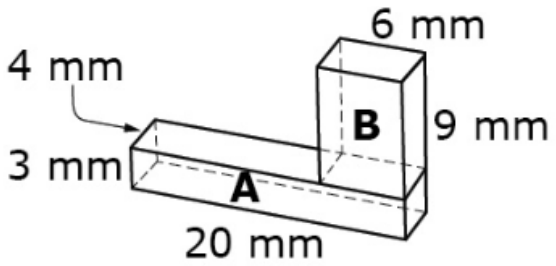
Accessibility Note:
Include the dimensions in the stem to increase access.

Prompt Features: The student is prompted to calculate the volume of two non-overlapping right rectangular prisms of given dimensions.

Stimulus Guidelines:
- All dimensions are whole numbers using the same units.
- All dimensions must be given in the stem and/or labeled on the prisms.

TM2f
Stimulus: The student is presented with a model showing two non-overlapping right rectangular prisms with whole number dimensions in a mathematical context and all dimensions given/labeled.

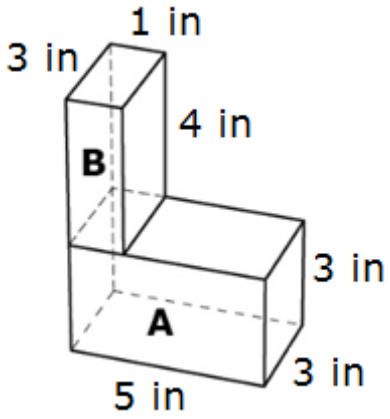
Example Stem: Right rectangular prisms A and B are combined to create this model.
- The dimensions of Prism A are 4 by 3 by 20 millimeters.
- The dimensions of Prism B are 6 by 9 by 4 millimeters.



Enter the combined volume, in cubic millimeters, of Prisms A and B.

Rubric: (1 point) The student correctly enters the combined volume in the specified units (e.g., 456).

Response Type: Equation/Numeric

Task Model 2g **Response Type: Equation / Numeric** **DOK Level 2** **5.MD.C.5** Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume. b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems. **Evidence Required:** 2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms. **Tools:** None **Accessibility Note:** Include the dimensions in the stem to increase access.	**TM2g** **Stimulus:** The student is presented with a model showing two non-overlapping right rectangular prisms with whole number dimensions in a real-world context. **Example Stem:** Sally uses Block A and Block B to create this model of a building. • The dimensions of Block A are 3 by 3 by 5 inches. • The dimensions of Block B are 1 by 3 by 4 inches.  Enter the combined volume, in cubic inches, of the entire model. **Rubric:** (1 point) The student correctly enters the combined volume in the specified units (e.g., 57). **Response Type:** Equation/Numeric

Task Model 2h

Response Type:
Matching Tables

DOK Level 2

5.MD.C.5
Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume.
b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems.

Evidence Required:
2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms.

Tools: None

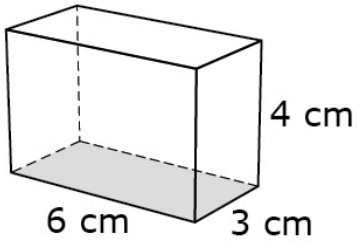
Accessibility Note:
Include the dimensions in the stem to increase access.

Prompt Features: The student is prompted to identify methods for finding the volume of a right rectangular prism.

Stimulus Guidelines:
- All dimensions are whole numbers using the same units.
- All items must use the same five equations in the table; only change the numbers in the equations to create an item.

TM2h
Stimulus: The student is presented with a visual model showing the dimensions of a right rectangular prism.

Example Stem: The right rectangular prism shown has a length 6 centimeters, width 3 centimeters, and height 4 centimeters.



Determine whether each equation can be used to find the volume (V) of this prism. Select Yes or No for each equation.

	Yes	No
$V = 18 \times 4$		
$V = (6 + 3) \times 4$		
$V = 6 \times 3 \times 4$		
$V = 9 \times 4$		
$V = 6 \times (3 \times 4)$		

Rubric: (1 point) The student correctly selects all of the equations that show a variety of ways volume can be determined with given dimensions, including $V = l \times w \times h$ and $V = b \times h$ (e.g., Y, N, Y, N, Y).

Response Type: Matching Tables

Claim 1: Concepts and Procedures
Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

Content Domain: **Geometry**

Target J [a]: Graph points on the coordinate plane to solve real-world and mathematical problems. (DOK 1)

Tasks for this target ask students to plot coordinate pairs in the first quadrant. Some of these tasks will be created by pairing this target with 5.OA Target B, which would raise the DOK level.

Standards: 5.G.A, 5.G.A.1, 5.G.A.2	**5.G.A Graph points on the coordinate plane to solve real-world and mathematical problems.** **5.G.A.1** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). **5.G.A.2** Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.MD.A, 4.MD.A.4, 4.G.A, 4.G.A.1 6.NS.C, 6.NS.C.6, 6.NS.C.6a, 6.NS.C.6b, 6.NS.C.6c, 6.NS.C.8, 6.EE.C, 6.EE.C.9, 6.G.A, 6.G.A.3	**Grade 4 Standards** **4.MD.A Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.** **4.MD.A.4** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection*. **4.G.A Draw and identify lines and angles, and classify shapes by properties of their lines and angles.** **4.G.A.1** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. **Grade 6 Standards** **6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.**

	6.NS.C.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. **a.** Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. **b.** Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. **c.** Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. **6.NS.C.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. **6.EE.C Represent and analyze quantitative relationships between dependent and independent variables.** **6.EE.C.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time*. **6.G. A Solve real-world and mathematical problems involving area, surface area, and volume.** **6.G.A.3** Draw polygons in the coordinate plane given the coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
DOK Level:	1

Achievement Level Descriptors:	
RANGE Achievement Level Descriptor (Range ALD) Target J: Graph points on the coordinate plane to solve real-world and mathematical problems.	**Level 1** Students should be able to graph whole-number coordinate pairs in the first quadrant of a coordinate plane with unit axis increments.
	Level 2 Students should be able to graph whole-number coordinate pairs on a coordinate plane with whole-number axis increments to solve problems.
	Level 3 Students should be able to graph coordinate pairs where one term is a whole number and one is a fraction on a coordinate plane with whole-number axis increments.
	Level 4 Students should be able to graph coordinate pairs where both terms are fractions on a coordinate plane with fractional axis increments.
Evidence Required:	1. The student interprets coordinate values of points graphed on a coordinate plane, or in the context of a given situation. 2. The student graphs points on the coordinate plane representing real-world or mathematical problems.
Allowable Response Types:	Multiple Choice, single correct response; Hot Spot; Graphing; Drag and Drop
Allowable Stimulus Materials:	visual coordinate plane
Construct-Relevant Vocabulary:	origin, coordinate plane, coordinate system, coordinate pair, *x*-coordinate, *y*-coordinate, first quadrant, point, *x*-axis, *y*-axis, ordered pair
Allowable Tools:	
Target-Specific Attributes:	First quadrant only, positive numbers
Non-Targeted Constructs:	None
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

	necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	None

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1a

Response Type: Multiple Choice, single correct response

DOK Level 1

5.G.A.1
Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

Evidence Required:
1. The student interprets coordinate values of points graphed on a coordinate plane, or in the context of a given situation.

Tools: None

Accessibility Note:
Minimize extra, unnecessary grid space.

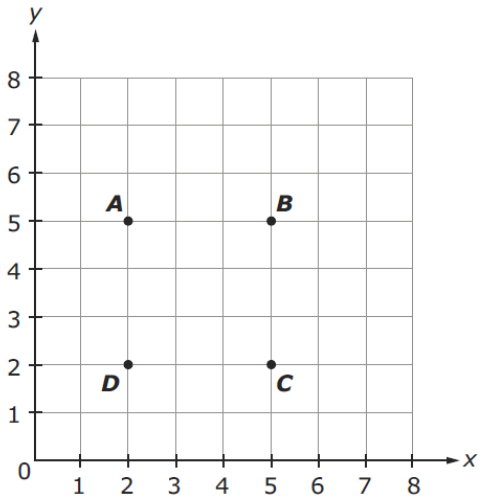
Prompt Feature: The student is prompted to identify the location of points in the first quadrant of the coordinate plane.

Stimulus Guidelines:

- First quadrant only, positive numbers.
- Item difficulty can be adjusted via these example methods:
  - Generate coordinate pairs using whole-number coordinate pairs with whole-number axis increments.
  - Identify an incorrectly plotted point.
  - Identify coordinate pairs where one term is a whole number and one is a fraction on a grid with whole-number axis increments.
- Misreading the numbers should not be used for distractors as this is a bias issue for visually impaired students.
- Construct coordinate grids so that unnecessary space is eliminated and the ordered pairs are easily discernable.

TM1a
Stimulus: The student is presented with a mathematical context that involves points using whole-number coordinate pairs with unit axis increments.

Example Stem: Use the graph to answer the question.



Which point is located at (5, 2)?

A. Point *A*
B. Point *B*
C. Point *C*
D. Point *D*

Rubric: (1 point) The student correctly identifies the point located at the given coordinate (e.g., C).

Response Type: Multiple Choice, single correct response

Task Model 1b

Response Type: Multiple Choice, single correct response

DOK Level 1

5.G.A.1
Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

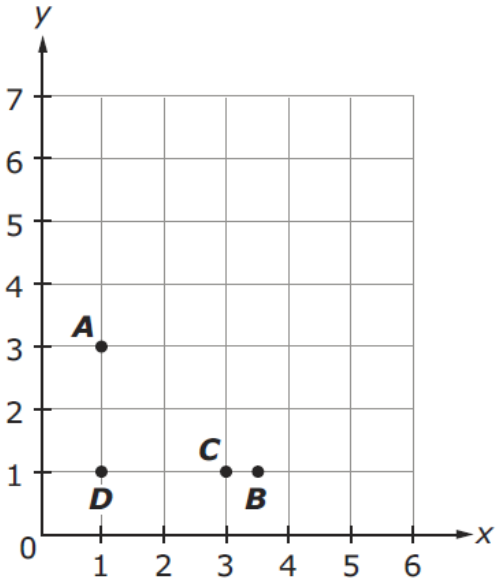
Evidence Required:
1. The student interprets coordinate values of points graphed on a coordinate plane, or in the context of a given situation.

Tools: None

Accessibility Note:
Minimize extra, unnecessary grid space.

TM1b
Stimulus: The student is presented with a mathematical context that involves points using coordinate pairs where one term is a whole number and one is a fraction on a grid with whole-number increments.

Example Stem: Use the graph to answer the question.



Which point is located at $(3\frac{1}{2}, 1)$?

A. Point *A*
B. Point *B*
C. Point *C*
D. Point *D*

Rubric: (1 point) The student correctly identifies the point located at the given coordinate (e.g., B).

Response Type: Multiple Choice, single correct response

Task Model 1c

Response Type: Multiple Choice, single correct response

DOK Level 1

5.G.A.1
Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

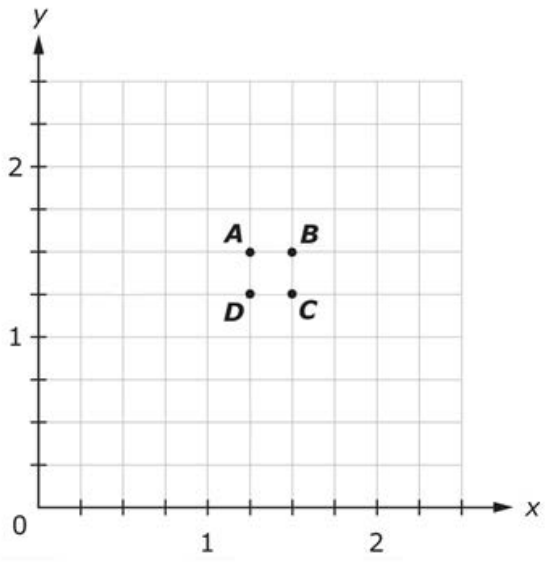
Evidence Required:
1. The student interprets coordinate values of points graphed on a coordinate plane, or in the context of a given situation.

Tools: None

Accessibility Note:
Minimize extra, unnecessary grid space.

TM1c
Stimulus: The student is presented with a mathematical context that involves points using coordinate pairs where both terms are fractions on a grid with fractional axis increments.

Example Stem: Use the graph to answer the question.

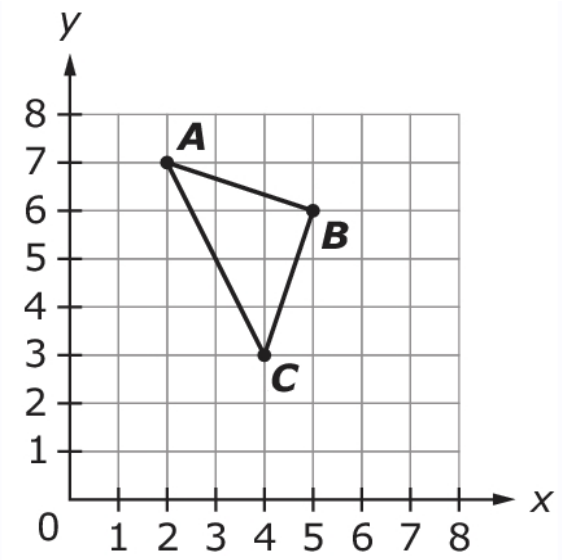


Which point is located at $(1\frac{1}{2}, 1\frac{1}{4})$?

A. Point *A*
B. Point *B*
C. Point *C*
D. Point *D*

Rubric: (1 point) The student correctly identifies the point located at the given coordinate (e.g., C).

Response Type: Multiple Choice, single correct response

Task Model 1d **Response Type: Multiple Choice, single correct response** **DOK Level 1** **5.G.A.1** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). **Evidence Required:** 1. The student interprets coordinate values of points graphed on a coordinate plane, or in the context of a given situation. **Tools:** None **Accessibility Note:** Minimize extra, unnecessary grid space.	**TM1d** **Stimulus:** The student is presented with a mathematical context that involves three to four points in the first quadrant of the coordinate plane. **Example Stem:** Use the graph to answer the question.  Which set of ordered pairs shows the coordinates of points *A*, *B*, and *C*? A. (7, 2), (6, 5), (3, 4) B. (7, 2), (5, 6), (3, 3) C. (2, 7), (5, 6), (4, 3) D. (2, 7), (6, 5), (4, 3) **Rubric:** (1 point) The student correctly identifies the ordered pairs for the figure (e.g., C). **Response Type:** Multiple Choice, single correct response

Task Model 1e

Response Type: Multiple Choice, single correct response

DOK Level 1

5.G.A.1
Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

Evidence Required:
1. The student interprets coordinate values of points graphed on a coordinate plane, or in the context of a given situation.

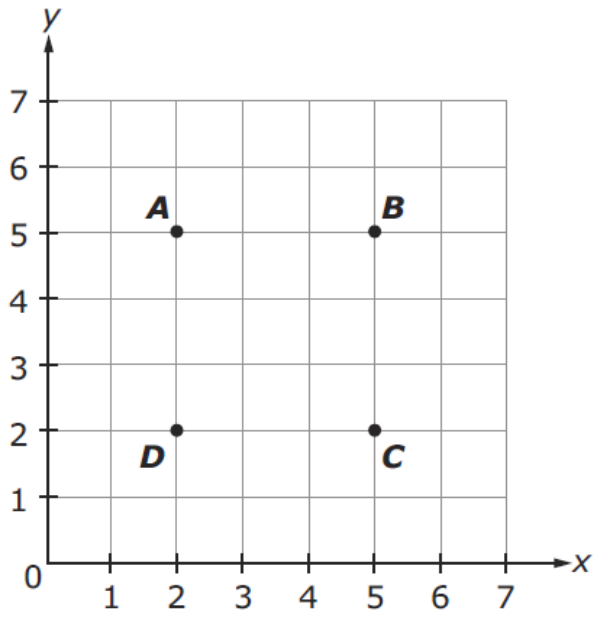
Tools: None

Accessibility Note:
Minimize extra, unnecessary grid space.

TM1e
Stimulus: The student is presented with a mathematical context that involves points using whole-number coordinate pairs with unit axis increments.

Example Stem: A student plots the following points:

- Point *A* (2, 5)
- Point *B* (6, 5)
- Point *C* (5, 2)
- Point *D* (2, 2)



Which point was **not** plotted correctly?

A. Point *A*
B. Point *B*
C. Point *C*
D. Point *D*

Rubric: (1 point) The student correctly identifies the point that is incorrectly plotted (e.g., B).

Response Type: Multiple Choice, single correct response

Task Model 1f

Response Type:
Hot Spot

DOK Level 1

5.G.A.1
Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

Evidence Required:
1. The student interprets coordinate values of points graphed on a coordinate plane, or in the context of a given situation.

Tools: None

Accessibility Note:
Hot spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.

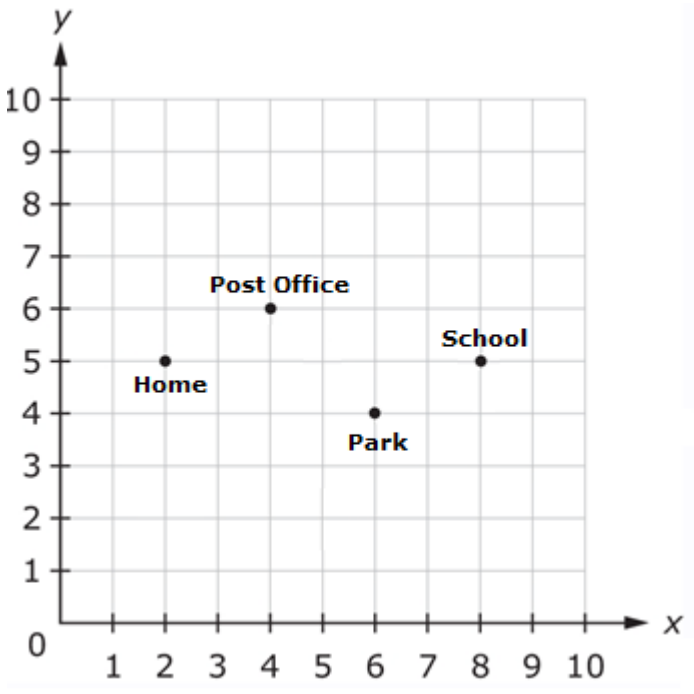
Prompt Feature: The student is prompted to identify the location of points in the first quadrant of the coordinate plane.

Stimulus Guidelines:

- First quadrant only, positive numbers.
- Item difficulty can be adjusted via these example methods:
  - Generate coordinate pairs using whole-number coordinate pairs with whole-number axis increments.
  - Identify coordinate pairs where one term is a whole number and one is a fraction on a grid with whole-number axis increments.
  - Generate coordinate pairs on a grid with fractional axis increments.
- Misreading the numbers should not be used for distractors as this is a bias issue for visually impaired students.

TM1f
Stimulus: The student is presented with a real-world context that involves points using whole-number coordinate pairs with unit axis increments.

Example Stem: The graph shows the locations of Nina's home, the park, her school, and the post office.



Select the numbers to create the coordinate pair that represents the location of the post office.

Task Model 1f

Response Type:
Hot Spot

DOK Level 1

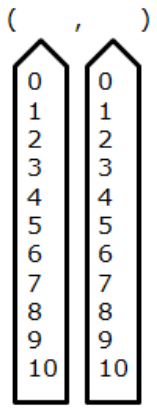
5.G.A.1
Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

Evidence Required:
1. The student interprets coordinate values of points graphed on a coordinate plane, or in the context of a given situation.

Tools: None

Accessibility Note:
Hot spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.

TM1f (continued)



Rubric: (1 point) The student selects the correct numbers for the coordinate pair indicated [e.g., (4, 6)].

Response Type: Hot Spot

Task Model 1g

Response Type:
Drag and Drop

DOK Level 1

5.G.A.1
Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

Evidence Required:
1. The student interprets coordinate values of points graphed on a coordinate plane, or in the context of a given situation.

Tools: None

Accessibility Note:
Drag and Drop items are not currently able to be Brailled. Minimize the number of items developed to this TM.

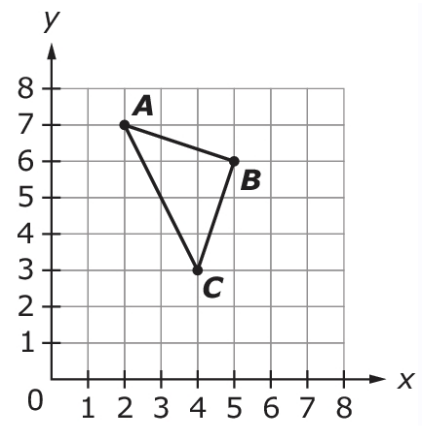
Prompt Feature: The student is prompted to identify the location of points in the first quadrant of the coordinate plane.

Stimulus Guidelines:

- First quadrant only, positive numbers.
- Item difficulty can be adjusted via these example methods:
  - Generate coordinate pairs using whole-number coordinate pairs with whole-number axis increments.
  - Identify coordinate pairs where one term is a whole number and one is a fraction on a grid with whole-number axis increments.
  - Generate coordinate pairs on a grid with fractional axis increments.
- Misreading the numbers should not be used for distractors as this is a bias issue for visually impaired students.

TM1g
Stimulus: The student is presented with a mathematical context that involves three to four points in the first quadrant of the coordinate plane.

Example Stem: Use the graph to complete the problem.



Drag numbers from the palette to show the coordinates of points *A*, *B*, and *C*.

Point *A*: (□, □) Point *B*: (□, □) Point *C*: (□, □)

Rubric: (1 point) The student correctly creates all three coordinate pairs [e.g., Point *A*: (2, 7), Point *B*: (5, 6), Point *C*: (4, 3)].

Response Type: Drag and Drop

Task Model 2

Response Type: Graphing

DOK Level 1

5.G.A.2
Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Evidence Required:
2. The student graphs points on the coordinate plane representing real-world or mathematical problems.

Tools: None

Accessibility Note:
Graphing items are not currently able to be Brailled. Minimize the number of items developed to this TM.

Prompt Feature: The student is prompted to graph points in the first quadrant of the coordinate plane.

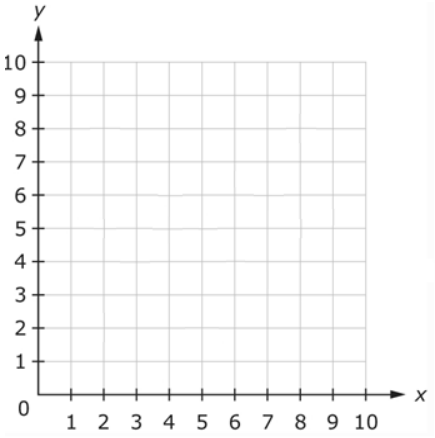
Stimulus Guidelines:

- All numbers should be changed to create new items.
- First quadrant only, positive numbers.
- Item difficulty can be adjusted via these example methods:
  - Whole-number coordinate pairs with whole-number axis increments
  - Coordinate pairs where one coordinate is a whole number and one is a fraction on a grid with whole-number increments
  - Coordinate pairs where both coordinates are fractions on a grid with fractional axis increments

TM2
Stimulus: The student is presented with a mathematical problem that involves two to three points in the first quadrant of the coordinate plane.

Example Stem 1: Use the Add Point tool to plot each point on the coordinate plane.

Part A: Plot the point (2, 8).
Part B: Plot the point (4, 5).
Part C: Plot the point (7, 6).

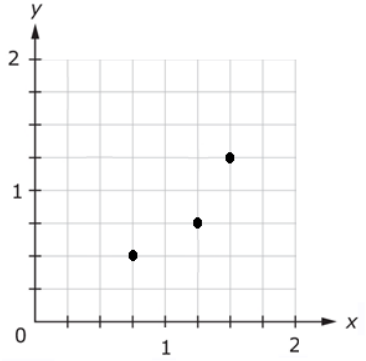


Rubric: (1 point) The student correctly plots all three points on the coordinate grid.

Response Type: Graphing

Example Stem 2: Use the Add Point tool to plot each point on the coordinate plane.

Part A: Plot the point $(7, 6\frac{1}{2})$.
Part B: Plot the point $(4, 5\frac{1}{2})$.

Task Model 2 **Response Type: Graphing** **DOK Level 1** **5.G.A.2** Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. **Evidence Required:** 2. The student graphs points on the coordinate plane representing real-world or mathematical problems. **Tools:** None **Accessibility Note:** Graphing items are not currently able to be Brailled. Minimize the number of items developed to this TM.	**Rubric:** (1 point) The student correctly plots both points on the coordinate grid. **Response Type:** Graphing **Example Stem 3:** Use the Add Point tool to plot each point on the coordinate plane. Part A: Plot the point $(1\frac{1}{4}, \frac{3}{4})$. Part B: Plot the point $(1\frac{1}{2}, 1\frac{1}{4})$. Part C: Plot the point $(\frac{3}{4}, \frac{1}{2})$. **Rubric:** (1 point) The student correctly plots all three points on the coordinate grid (see below).  **Response Type:** Graphing

<table>
<tr><td colspan="2">Claim 1: Concepts and Procedures
Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.</td></tr>
<tr><td colspan="2">Content Domain: Geometry</td></tr>
<tr><td colspan="2">Target K [a]: Classify two-dimensional figures into categories based on their properties. (DOK 2)

Tasks for this target ask students to classify two-dimensional figures based on a hierarchy. Technology-enhanced items may be used to construct a hierarchy, or tasks may ask the student to select all classifications that apply to a figure based on given information.</td></tr>
<tr><td>Standards:
5.G.B, 5.G.B.3, 5.G.B.4</td><td>5.G.B Classify two-dimensional figures into categories based on their properties.

5.G.B.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

5.G.B.4 Classify two-dimensional figures in a hierarchy based on properties.</td></tr>
<tr><td>Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling:

4.G.A, 4.G.A.2, 4.G.A.3

6.G.A, 6.G.A.1, 6.G.A.3, 6.G.A.4</td><td>Related Grade 4 Standards

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.

4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Related Grade 6 Standards

6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.

6.G.A.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

6.G.A.3 Draw polygons in the coordinate plane given the coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.</td></tr>
</table>

	6.G.A.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
DOK Levels:	2
Achievement Level Descriptors:	
RANGE Achievement Level Descriptors (Range ALD) Target K: Classify two-dimensional figures into categories based on their properties.	**Level 1** No Descriptor
	Level 2 Students should be able to classify two-dimensional figures into categories by their attributes or properties.
	Level 3 Students should be able to classify two-dimensional figures into subcategories by their attributes or properties.
	Level 4 No Descriptor
Evidence Required:	1. The student classifies two-dimensional figures into categories and/or subcategories based on their properties.
Allowable Response Types:	Matching Tables
Allowable Stimulus Materials:	grid, two-dimensional figures, points, lines, line segments, angles
Construct-Relevant Vocabulary:	right, acute, obtuse, line segments, parallel, perpendicular, symmetrical, line of symmetry
Allowable Tools:	For some items rulers and/or protractors may be used.
Target-Specific Attributes:	Two-dimensional figures can have up to 10 sides.
Non-Targeted Constructs:	None
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

	Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	Classifying two-dimensional figures in a hierarchy based on an analysis of the relationship between properties of categories and subcategories will be assessed in Claim 3. Determining if a shape "is always," "is sometimes," or "is never" classified in a category will also be assessed in Claim 3.

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1

Response Type: Matching Tables

DOK Level 2

5.G.B.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*

Evidence Required:
1. The student classifies two-dimensional figures into categories and/or subcategories based on their properties.

Tools: None

Accessibility Note: Either identify the polygons by name or by properties.

Prompt Feature: The student is prompted to classify two-dimensional figures into categories/subcategories based on their properties.

Stimulus Guidelines:

- Two-dimensional figures can have up to 10 sides.
- Shapes may include rhombus, rectangle, square, kite, triangle, quadrilateral, parallelogram, pentagon, hexagon, trapezoid, circle, half circle, and quarter circle.
- Characteristics may include parallel or perpendicular sides, side length, angles (right, acute, obtuse), and polygon.
- Item difficulty can be adjusted via these example methods:
  - Student is presented with a descriptive attribute corresponding to the given polygon name with one polygon per answer choice.
  - Student is presented with a descriptive attribute corresponding to the given polygon name with two polygons per answer choice.
  - Student is not presented with a descriptive attribute corresponding to the given polygon name with one or two polygons per answer choice.

TM1a
Stimulus: The student is presented with the name of a category/subcategory of shapes and one descriptive property of that category/subcategory.

Example Stem: All parallelograms have two pairs of opposite, parallel, equal-length sides.

Determine whether each polygon shown is also a parallelogram. Select Yes or No for each polygon.

	Yes	No
 Rectangle	☐	☐
 Trapezoid	☐	☐
 Rhombus	☐	☐

Rubric: (1 point) The student correctly identifies if the given polygon is a parallelogram for all answer choices (e.g., Y, N, Y).

Response Type: Matching Tables

Task Model 1

Response Type:
Matching Tables

DOK Level 2

5.G.B.3
Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*

Evidence Required:
1. The student classifies two-dimensional figures into categories and/or subcategories based on their properties.

Tools: None

Accessibility Note:
Either identify the polygons by name or properties.

Version 3 Update:
Retired TM 1b.

Prompt Features: The student is prompted to classify shapes based on the properties of each figure in relationship to the properties of a category/subcategory.

Stimulus Guidelines:

- Item difficulty can be adjusted via these example methods:
  - Student is presented with one category or subcategory.
  - Student is presented with two categories and/or subcategories with a column for Neither.
  - Student is presented with three categories and/or subcategories with a column for None of These.

TM1c
Stimulus: The student is presented with three to six two-dimensional figures and categories/subcategories in a table.

Example Stem 1: Determine if each polygon is also a rhombus.

Select Yes for each polygon that is a rhombus and No for each polygon that is **not** a rhombus.

	Yes	No
 Rectangle		
 Trapezoid		
 Square		
 Parallelogram		
 Hexagon		

Rubric: (1 point) The student correctly identifies each shape (e.g., N, N, Y, N, N).

Response Type: Matching Tables

Grade 3-5 Mathematics Item Specification Claim 2	
Problem solving, which of course builds on a foundation of knowledge and procedural proficiency, sits at the core of *doing* mathematics. Proficiency at problem solving requires students to choose to use concepts and procedures from across the content domains and check their work using alternative methods. As problem solving skills develop, student understanding of and access to mathematical concepts becomes more deeply established. (*Mathematics Content Specifications, p.56*)	
Primary Claim 2: Problem Solving Students can solve a range of well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.	
Secondary Claim(s): Items/tasks written primarily to assess Claim 2 will necessarily involve some Claim 1 content targets. Related Claim 1 targets should be listed below the Claim 2 targets in the item form. If Claim 3 or 4 targets are also directly related to the item/task, list those following the Claim 1 targets in order of prominence.	
Primary Content Domain: Each item/task should be classified as having a primary, or dominant, content focus. The content should draw upon the knowledge and skills articulated in the progression of standards leading up to and including the targeted grade within and across domains.	
Secondary Content Domain(s): While tasks developed to assess Claim 2 will have a primary content focus, components of these tasks will likely produce enough evidence for other content domains that a separate listing of these content domains needs to be included where appropriate. The standards in the NBT domain in grades 3-5 can be used to construct higher difficulty items for the adaptive pool. The integration of the OA, G, and MD domains with NBT allows for higher content limits within the grade level than might be allowed when staying within the primary content domain.	
DOK Levels	1, 2, 3
Allowable Response Types	**Response Types:** Multiple Choice, single correct response (MC); Multiple Choice, multiple correct response (MS); Equation/Numeric (EQ); Drag and Drop, Hot Spot, and Graphing (GI); Matching Tables (MA); Fill-in Table (TI) No more than five choices in MS and MA items. Short Text–Performance tasks only **Scoring:** Scoring rules and answer choices will focus on a student's ability to solve problems and/or to apply appropriate strategies to solve problems. For some problems, multiple correct responses and/or strategies are possible. • MC and MS items will be scored as correct/incorrect (1 point) • If MA items require two skills, they will be scored as:

	○ All correct choices (2 points); at least ½ but less than all correct choices (1 point) ○ Justification[1] for more than 1 point **must be** clear in the scoring rules ○ Where possible, include a "disqualifier" option that if selected would result in a score of 0 points, whether or not the student answered ½ correctly. • EQ, GI, and TI items will be scored as: ○ Single requirement items will be scored as correct/incorrect (1 point) ○ Multiple requirement items: All components correct (2 points); at least ½ but less than all correct (1 point) ○ Justification for more than 1 point **must be** clear in the scoring rules
Allowable Stimulus Materials	Effort must be made to minimize the reading load in problem situations. Use tables, diagrams with labels, and other strategies to lessen the reading load. Use simple subject-verb-object (SVO) sentences; use contexts that are familiar and relevant to students at the targeted grade level. Target-specific stimuli will be derived from the Claim 1 targets used in the problem situation. All real-world problem contexts will be relevant to the age of the students. Stimulus guidelines specific to task models are given below.
Construct Relevant Vocabulary	Refer to the Claim 1 specifications to determine Construct Relevant Vocabulary associated with specific content standards.
Allowable Tools	Any mathematical tools appropriate to the problem situation and the Claim 1 target(s). Some tools are identified in Standard for Mathematical Practice #5 and others can be found in the language of specific standards.
Target-Specific Attributes	CAT items should take from 2 to 5 minutes to solve; Claim 2 items that are part of a performance task may take 2 to 8 minutes to solve.
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[2] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the

[1] For a CAT item to score multiple points, either distinct skills must be demonstrated that earn separate points or distinct levels of understanding of a complex skill must be tied directly to earning one or more points.

[2] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

	understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[3]

[3] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Development Notes	Tasks generating evidence for Claim 2 in a given grade will draw upon knowledge and skills articulated in the progression of standards up through that grade, though more complex problem-solving tasks may draw upon knowledge and skills from lower grade levels. Claim 1 *Specifications* that cover the following standards should be used to help inform an item writer's understanding of the difference between how these standards are measured in Claim 1 versus Claim 2. Development notes have been added to many of the Claim 1 specifications that call out specific topics that should be assessed under Claim 2. There are some other useful distinctions between Claim 1 and Claim 2 in grades 3-5 that have supported the approach to alignment. The following points describe some attributes of items in Claim 2: • Multiple approaches are feasible or a range of responses is expected (e.g., if a student can solve a word problem by identifying a key word or words and selecting operations, then it is Claim 1). • The use of tools in Claim 2 is intended to support the problem solving process. In some cases, students may be asked to display their answer on the tool (e.g., by clicking the appropriate point or interval on a number line or ruler). • Assessing the reasonableness of answers to problems is a Claim 2 skill with items that align to Target C. In grades 3-5, Claim 2 tasks should be written to support two key themes: • Solving problems with fractions • Solving problems with the four operations As noted in the table below, the Measurement/Data and Geometry clusters should be used to support these two key themes. At least 80% of the items written to Claim 2 should primarily assess the standards and clusters listed in the table.

Grade 3	Grade 4	Grade 5
3.OA.A	4.OA.A	5.NBT.B
3.OA.D	4.NBT.B	5.NF.A
3.NBT.A*	4.NF.A	5.NF.B
3.MD.A	4.NF.B	5.MD.A*
3.MD.B*	4.NF.C	5.MD.C
3.MD.C	4.MD.A*	5.G.A*
3.MD.D*	4.MD.C*	

* Denotes additional and supporting clusters

Assessment Targets: Any given item/task should provide evidence for two or more Claim 2 assessment targets. Each of the following targets should not lead to a separate task: it is in *using* content from different areas, including work studied in earlier grades, that students demonstrate their problem solving proficiency. Multiple targets should be listed in order of prominence as related to the item/task.

Target A: Apply mathematics to solve well-posed problems in pure mathematics and arising in everyday life, society, and the workplace. (DOK 2, 3)
Under Claim 2, the problems should be completely formulated, and students should be asked to find a solution path from among their readily available tools.

Target B: Select and use appropriate tools strategically. (DOK 1, 2)
Tasks used to assess this target should allow students to find and choose tools; for example, using a "Search" feature to call up a formula (as opposed to including the formula in the item stem) or using a protractor in physical space.

Target C: Interpret results in the context of a situation. (DOK 2)
Tasks used to assess this target should ask students to link their answer(s) back to the problem's context. In early grades, this might include a judgment by the student of whether to express an answer to a division problem using a remainder or not based on the problem's context. In later grades, this might include a rationalization for the domain of a function being limited to positive integers based on a problem's context (e.g., understanding that the number of buses required for a given situation cannot be 32½, or that the negative values for the independent variable in a quadratic function modeling a basketball shot have no meaning in this context).

Target D: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). (DOK 1, 2, 3)
For Claim 2 tasks, this may be a separate target of assessment explicitly asking students to use one or more potential mappings to understand the relationship between quantities. In some cases, item stems might suggest ways of mapping relationships to scaffold a problem for Claim 2 evidence.

What sufficient evidence looks like for Claim 2 (Problem-Solving)[4]:
"Although items and tasks designed to provide evidence for this claim must primarily assess the student's ability to identify the problem and to arrive at an acceptable solution, mathematical problems nevertheless require students to apply mathematical concepts and procedures."

Properties of items/tasks that assess Claim 2: The assessment of many relatively discrete and/or single-step problems can be accomplished using short constructed response items, or even computer-enhanced or selected response items.
More extensive constructed response items can effectively assess multi-stage problem solving and can also indicate unique and elegant strategies used by some students to solve a given problem, and can illuminate flaws in student's approach to solving a problem. These tasks could:

- Present non-routine[5] problems where a substantial part of the challenge is in deciding what to do, and which mathematical tools to use; and
- Involve chains of autonomous[6] reasoning, in which some tasks may take a successful student 2 to 5 minutes, depending on the age of student and complexity of the task.

"A distinctive feature of both single-step and multi-step items and tasks for Claim 2 is that they are "well-posed." That is, whether the problem deals with pure or applied contexts, the problem itself is completely formulated; the challenge is in identifying or using an appropriate solution path."

[4] Text excerpted from the Smarter Balanced Mathematics Content Specifications (p. 56-57).
[5] As noted earlier, by "non-routine" we mean that the student will not have been taught a closely similar problem, so will not be expected to *remember* a solution path but will have to *adapt* or *extend* their earlier knowledge to find one.
[6] By "autonomous" we mean that the student responds to a single prompt, without further guidance within the task.

Grade 3 Content Combinations:	**The following standards can be effectively used in various combinations in Grade 3 Claim 2 items:** **Primary emphasis for Claim 2 items: Operations and Algebraic Thinking** **Operations and Algebraic Thinking (OA)** **3.OA.A: Represent and solve problems involving multiplication and division.** **3.OA.A.1** Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* **3.OA.A.2** Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* **3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.[1] **3.OA.A.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = □ ÷ 3, 6 × 6 = ?.* **3.OA.D: Solve problems involving the four operations, and identify and explain patterns in arithmetic.** **3.OA.D.8** Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.[3] **3.OA.D.9** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.* **Standards to integrate with the focus on whole number operations:** **Numbers and Operations—Base Ten (NBT)** **3.NBT.A: Use place value understanding and properties of operations to perform multi-digit arithmetic.** **3.NBT.A.1** Use place value understanding to round whole numbers to the nearest 10 or 100. **3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **3.NBT.A.3** Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.

Measurement and Data (MD)

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).[6] 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.[7]

3.MD.B: Represent and interpret data.

3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*

3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.

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 $a \times b$ and $a \times c$. 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.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.

Grade 4 Content Combinations:	**The following standards can be effectively used in various combinations in Grade 4 Claim 2 items:** **Primary emphasis for Claim 2 items at Grade 4: Operations and Algebraic Thinking, Number and Operations—Base Ten, and Number and Operations—Fractions** **Operations and Algebraic Thinking (OA)** **4.OA.A: Use the four operations with whole numbers to solve problems.** **4.OA.A.1** Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. **4.OA.A.2** Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.[1] **4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **Number and Operations—Fractions (NF)** **4.NF.A: Extend understanding of fraction equivalence and ordering.** **4.NF.A.1** Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. **4.NF.A.2** Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. **4.NF.B: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.**

4.NF.B.3 Understand a fraction *a*/*b* with *a* > 1 as a sum of fractions 1/*b*.

- **a.** Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
- **b.** Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*
- **c.** Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
- **d.** Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

- **a.** Understand a fraction *a*/*b* as a multiple of 1/*b*. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*
- **b.** Understand a multiple of *a*/*b* as a multiple of 1/*b*, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*
- **c.** Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

4.NF.C: Understand decimal notation for fractions, and compare decimal fractions.

4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.[4] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*

4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*

4.NF.C.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

Number and Operations—Base Ten (NBT)

4.NBT.B: Use place value understanding and properties of operations to perform multi-digit arithmetic.

4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate

and explain the calculation by using equations, rectangular arrays, and/or area models.

4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Standards to integrate with the focus on operations:

Measurement and Data (MD)

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.*

4.MD.C: Geometric measurement: understand concepts of angle and measure angles.

4.MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.

b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.

4.MD.C.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

4.MD.C.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

Grade 5 Content Combinations:	**The following standards can be effectively used in various combinations in Grade 5 Claim 2 items:** **Primary emphasis for Grade 5 Claim 2 items: Number and Operations—Base Ten and Number and Operations—Fractions** **Number and Operations—Base Ten (NBT)** **5.NBT.B: Perform operations with multi-digit whole numbers and with decimals to hundredths.** **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm. **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **Number and Operations—Fractions (NF)** **5.NF.A: Use equivalent fractions as a strategy to add and subtract fractions.** **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example,* *2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **5.NF.A.2** Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.* **5.NF.B: Apply and extend previous understandings of multiplication and division to multiply and divide fractions.** **5.NF.B.3** Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

5.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

- **a.** Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show* $(2/3) \times 4 = 8/3$, *and create a story context for this equation. Do the same with* $(2/3) \times (4/5) = 8/15$. *(In general,* $(a/b) \times (c/d) = ac/bd$.*)*
- **b.** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

5.NF.B.5 Interpret multiplication as scaling (resizing), by:

- **a.** Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
- **b.** Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

5.NF.B.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1]

- **a.** Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for* $(1/3) \div 4$, *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $(1/3) \div 4 = 1/12$ *because* $(1/12) \times 4 = 1/3$.
- **b.** Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for* $4 \div (1/5)$, *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $4 \div (1/5) = 20$ *because* $20 \times (1/5) = 4$.
- **c.** Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

Standards to integrate with the focus on operations:

Measurement and Data (MD)

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

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. **5.MD.C: Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.** **5.MD.C.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement. **a.** A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. **b.** A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units. **5.MD.C.4** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. **5.MD.C.5** Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. **a.** Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. **b.** Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems. **c.** Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems. **Geometry (G)** **5.G.A: Graph points on the coordinate plane to solve real-world and mathematical problems.** **5.G.A.1** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). **5.G.A.2** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Range ALDs – Claim 2 Grades 3-5	**Level 1** Students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.
	Level 2 Students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.
	Level 3 Students should be able to map, display, and identify relationships, use appropriate tools strategically, and apply mathematics accurately in everyday life, society, and the workplace. They should be able to interpret information and results in the context of an unfamiliar situation.
	Level 4 Students should be able to analyze and interpret the context of an unfamiliar situation for problems of increasing complexity and solve problems with optimal solutions.

Target 2A: Apply mathematics to solve well-posed problems in pure mathematics and those arising in everyday life, society, and the workplace.

General Task Model Expectations for Target 2A

- The student is asked to solve a well-posed problem arising in a mathematical context or everyday life, society, or the workplace.
- Mathematical information from the context is presented in a table, graph, or diagram, or is extracted from a verbal description or pictorial representation of the context.
- Solving the problem requires one or more steps consisting of one of the four operations with whole numbers or fractions (division of fractions is limited to division of a whole number by a unit fraction or a unit fraction by a whole number).
- Understandings from geometry or measurement may be needed to determine the operations to be performed.
- The task does not indicate by key words or other scaffolding which operations are to be performed or in what order.
- Difficulty of the task may be adjusted by varying (a) the difficulty of extracting information from the context, (b) the number of steps, (c) the complexity of the numbers used, or (d) the complexity of the interpretation required.
- Tasks have DOK Level 2 or 3

Task Model 2A.1

Expectations:

- The student solves a multi-step problem with the four operations in a context involving measurement quantities.
- Items in this task model require the student to identify quantities of interest and map their relationships, often via diagrams or equations.
- Dimensions along which to vary the item include (a) varying the context, (b) varying the type of operations to be used, or (c) varying the magnitude or the types of numbers to be used.

Example Item 2A.1a (Grade 3):
Primary Target 2A (Content Domain MD), Secondary Target 1D (CCSS 3.OA.D), Tertiary Target 1G (CCSS 3.MD.A), Quaternary Target 2D

James gets home from school at 3:30 p.m. He completes 2 chores. Then he plays his computer game until 5:00 p.m.

Chore	Time to Complete
Walk dog	20 minutes
Clean room	40 minutes

Enter the **greatest** number of minutes that James can play his computer game.

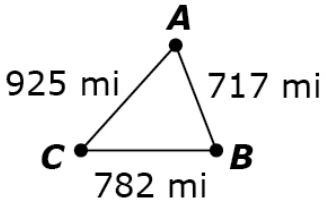
Rubric: (1 point) The student enters the correct number of minutes (30 or 30 min).

Response Type: Equation/Numeric

Commentary: This item requires the student to identify the relationship between given start and end times and the elapsed times presented in the table, and to identify the unknown quantity as the elapsed time remaining between the start and end times given. Seeing these different quantities and mapping their relationships draws on the skill set identified in Target 2D.

Example Item 2A.1b (Grade 4):
Primary Target 2A (Content Domain OA), Secondary Target 1A (CCSS 4.OA.A)

Pia's family drove from City A to City B, then City C, and back to City A. The map shows the distances.



How many miles did they drive all together? Enter your answer in the response box.

Rubric: (1 point) The student enters the correct total distance (2424 or 2424 mi).

Response Type: Equation/Numeric

Commentary: The level of difficulty for this item can be raised by changing the number of cities or having distances in the diagram that are not needed to answer the question, although adding in these extra levels of complexity moves the item closer to a Claim 4 task.

Grades 3-5, Claim 2

Example Item 2A.1c (Grade 5):

Primary Target 2A (Content Domain OA), Secondary Target 1A (CCSS 5.NF.B), Tertiary Target 2D

Luke buys a bicycle that is on sale for $\frac{1}{2}$ of the original price. The sale price is $80 less than the original price. What is the original price, in dollars, of the bicycle?

Enter your answer in the response box.

Rubric: (1 point) The student enters the correct original price (160 or $160).

Response Type: Equation/Numeric

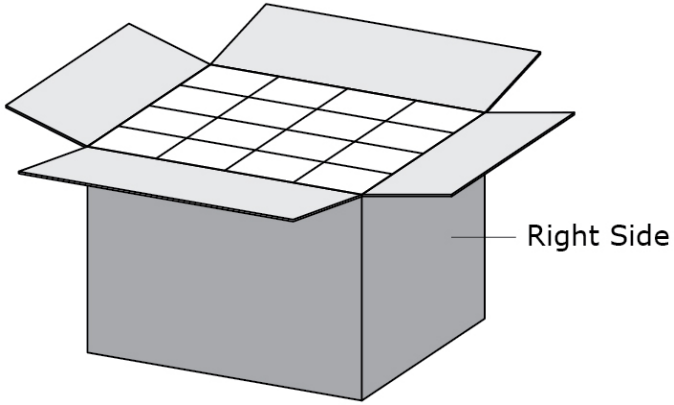
Commentary: This item requires the student to identify the sale price and the original price of a bicycle as the quantities of interest in this problem and to identify the relationship between them, and so draws on the skill set identified in Target 2D. Changing the fraction would change the difficulty level.

Grades 3-5, Claim 2

Example Item 2A.1d (Grade 5):

Primary Target 2A (Content Domain MD), Secondary Target 1I (CCSS 5.MD.C), Tertiary Target 1B (CCSS 4.OA.B), Quaternary Target 2D

A rectangular box is completely filled with 48 same-sized cubes arranged as shown. Julie opens the top of the box and sees 16 cubes.



Julie closes the top and then opens the right side of the box. How many cubes should she see?

Enter your answer in the response box.

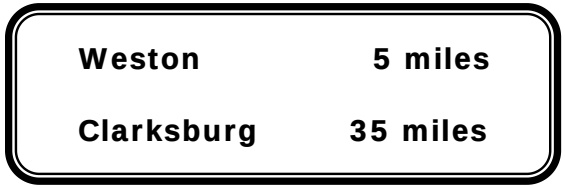
Rubric: (1 point) The student provides the correct number of cubes for the right side of the box (12).

Response Type: Equation/Numeric

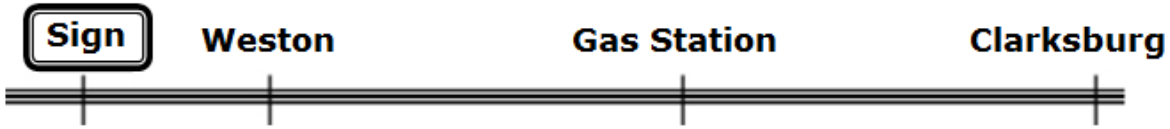
Commentary: This item requires the student to identify the volume and areas of the faces of the rectangular box as quantities of interest and to use the small cubes (and their faces) as units in order to relate the two quantities, and so draws on the skill set identified in Target 2D.

Example Item 2A.1e (Grade 5):
Primary Target 2A (Content Domain NF), Secondary Target 1F (CCSS 5.NF.B), Tertiary Target 2D

Mia is traveling along a road toward Clarksburg and sees the following sign.



Mia knows there is a gas station located halfway between Weston and Clarksburg, as shown on this diagram.



How many miles is it from Weston to Clarksburg?
Enter your answer in the first response box.

How many miles is it from the sign to the gas station?
Enter your answer in the second response box.

Rubric: (2 points) The student enters the correct distances for each question (30 or 30 mi; 20 or 20 mi).
(1 point) The student enters only one correct distance (e.g., 30 or 20).

Response Type: Equation/Numeric (2 response boxes)

Commentary: This item requires the student to identify the distances between the sign and the different cities as well as the distances between cities and understand the relationships between these quantities, and so draws on the skill set identified in Target 2D.

Task Model 2A.2

Expectations:

- The student solves a problem in a real-world or mathematical context that requires understanding of the base-ten number system.
- Items in this task model require the student to interpret base-ten numbers in terms of the context.
- Dimensions along which to vary the item include: (a) varying the context, (b) varying the type of operations to be used, or (c) varying the magnitude of the numbers to be used.

Example Item 2A.2a (Grade 3):
Primary Target 2A (Content Domain NBT), Secondary Target 1E (CCSS 3.NBT.A), Tertiary Target 2C

> Sabina has a jar full of dimes. A pack of cards costs 76 cents. How many dimes would she need to buy the cards if she uses no other coins?
>
> Enter your answer in the response box.

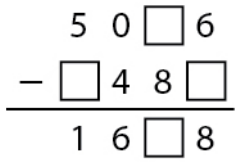
Rubric: (1 point) The student enters the correct number of dimes (8).

Response Type: Equation/Numeric

Commentary: This item requires the student to interpret the value of a collection of dimes as a multiple of ten, and so draws on the skill set identified in Claim 2C.

Example Item 2A.2b (Grade 4):
Primary Target 2A (Content Domain NBT), Secondary Target 1E (CCSS 4.NBT.B)

Drag one number into each box to complete the subtraction problem shown.



Interaction: The student drags digits 0-9 from the multi-use palette.

Rubric: (1 point) The student drags the correct digits to complete the subtraction problem (5096 – 3488 = 1608).

Response Type: Drag and Drop

Commentary: Small changes to this item change the complexity considerably. The reason that there is a unique solution is that the placement of the unknown digits and the value of the digits was highly engineered; just changing the 8 in the second number to a 5, for example, means that there will be four solutions instead of 1:

5096-3458=1638
5086-3458=1628
5076-3458=1618
5066-3458=1608

Allowing an unknown digit in the hundreds place instead of the ones place changes the complexity significantly.

Task Model 2A.3

Expectations:

- The student makes estimations about quantities in a context.
- Dimensions along which to vary the item include (a) varying the context, (b) requiring no operations (easier) or requiring computations with estimated quantities or estimating the result of computations with quantities (harder), (c) varying the magnitude of the numbers to be used.

Example Item 2A.3a (Grade 4):
Primary Target 2A (Content Domain NBT), Secondary Target 1E (CCSS 4.NBT.B), Tertiary Target 1I (CCSS 4.MD.A)

Select the response that correctly completes this statement:

41 inches is between _____.

A. 2 feet and 3 feet.
B. 3 feet and 4 feet.
C. 4 feet and 5 feet.
D. 5 feet and 6 feet.

Rubric: (1 point) The student selects the correct range (B).

Response Type: Multiple Choice, single correct response

Example Item 2A.3b (Grade 5):
Primary Target 2A (Content Domain NF), Secondary Target 1F (CCSS 5.NF.B)

Graciela walked her dog every day for the last 5 days. The time for each walk was between $\frac{1}{2}$ and $\frac{3}{4}$ of an hour. Make an estimate for the total number of minutes she walked her dog in the last 5 days.

Enter your estimate, in minutes, in the response box.

Rubric: (1 point) The student enters a value in the correct range (any number from 150 to 225, inclusive).

Response Type: Equation/numeric

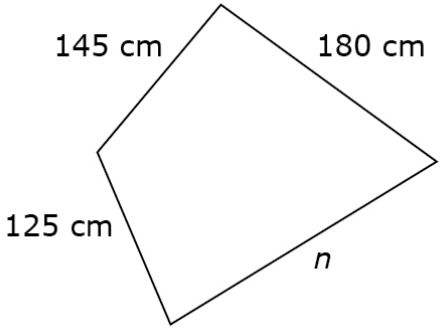
Task Model 2A.4

Expectations:

- The student solves a multi-step problem with the four operations involving whole-numbers and fractions in a purely mathematical context.
- Items in this task model require the student to identify quantities of interest and map their relationships, often via diagrams or equations.
- Dimensions along which to vary the item include (a) varying the context, (b) varying the type of operations to be used, or (c) varying the magnitude or the types of numbers to be used.

Example Item 2A.4a (Grade 3):
Primary Target 2A (Content Domain MD), Secondary Target 1D (CCSS, 3.OA.D), Tertiary Target 1J (CCSS 3.MD.D)

This quadrilateral has a perimeter of 680 centimeters.



Enter the length, in centimeters, of side *n*.

Rubric: (1 point) The student correctly enters the length of the unknown side (230 or 230 cm).

Response Type: Equation/Numeric

Example Item 2A.4b (Grade 4):
Primary Target 2A (Content Domain OA), Secondary Target 1A (CCSS 4.OA.A)

Tina and Marco play a number game. Tina gives Marco a number and he does three computations.

- He multiplies the number by 2.
- He adds 7 to the answer.
- Then, he subtracts 2 from that answer.

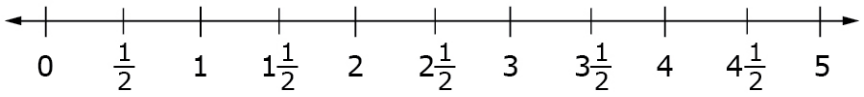
What number should Tina give Marco so that the final answer is 37 ?

Rubric: (1 point) The student enters the correct number (16).

Response Type: Equation/Numeric

Example Item 2A.4c (Grade 4):
Primary Target 2A (Content Domain NF), Secondary Target 1G (CCSS 4.NF.B), Tertiary Target 2B

Plot the value of $5 \times \frac{1}{2}$ on the number line shown.



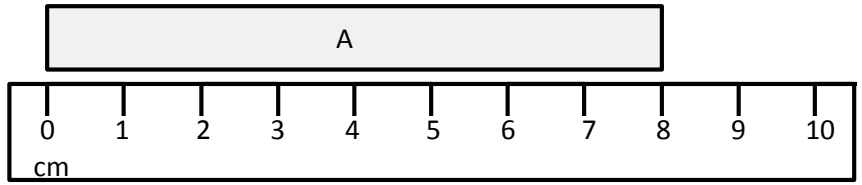
Rubric: (1 point) The student correctly plots a point at $2\frac{1}{2}$ (with a graphing tolerance of +/- $\frac{1}{16}$ or points snap to tick marks).

Response Type: Graphing (Interaction: The student is able to plot a single point somewhere on the line.)

Commentary: A variation on this item would show points on a number line and ask which one represents the product, or shows one point and asks which of four products it could be (MC). Asking for the approximate location on the number line for the results of computations would also be appropriate.

Example Item 2A.4d (Grade 5):
Primary Target 2A (Content Domain NF), Secondary Target 1F (CCSS 5.NF.B)

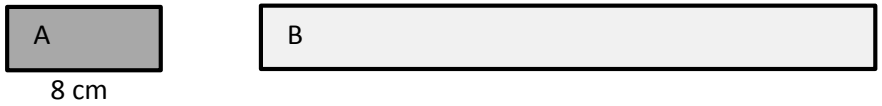
Rectangle A (shown) is $\frac{1}{4}$ as long as rectangle B (not shown). How long is rectangle B?



A. 2 cm
B. 6 cm
C. 8 cm
D. 32 cm

OR

Rectangle A is $\frac{1}{4}$ as long as rectangle B. How long is rectangle B?



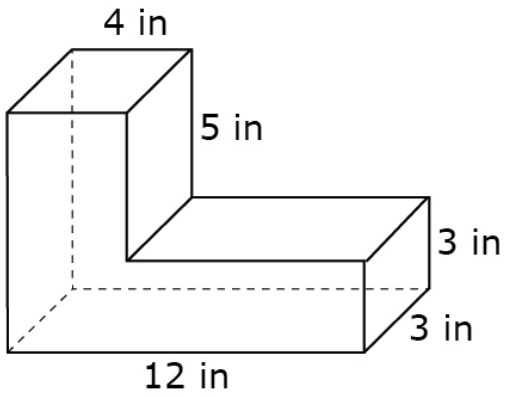
A. 2 cm
B. 6 cm
C. 8 cm
D. 32 cm

Rubric: (1 point) The student selects the correct option (D).

Response Type: Multiple Choice, single correct response

Example Item 2A.4f (Grade 5):
Primary Target 2A (Content Domain MD), Secondary Target 1I (CCSS 5.MD.C)

The figure shown was created by joining two rectangular prisms.



What is the total volume, in cubic centimeters, of the figure?

Enter your answer in the response box.

Rubric: (1 point) The student correctly enters the total volume of the figure in cubic centimeters (168 or 168 cm^3).

Response Type: Equation/Numeric

Target 2B: Select and use appropriate tools strategically.

General Task Model Expectations for Target 2B

- Mathematical information from the context is presented in a table, graph, or diagram, or is extracted from a verbal description or pictorial representation of the context.
- The student uses tools or makes strategic selection of tools.
- Tasks may require the student to use a familiar tool in a non-standard way, for example using a ruler from a non-standard starting point or using a number line to represent time.
- Difficulty of the task may be adjusted by varying (a) the difficulty of extracting information from the context (b) the number of steps (c) the complexity of the numbers used or (d) the complexity of the interpretation required.
- Task has DOK Level 1 or 2

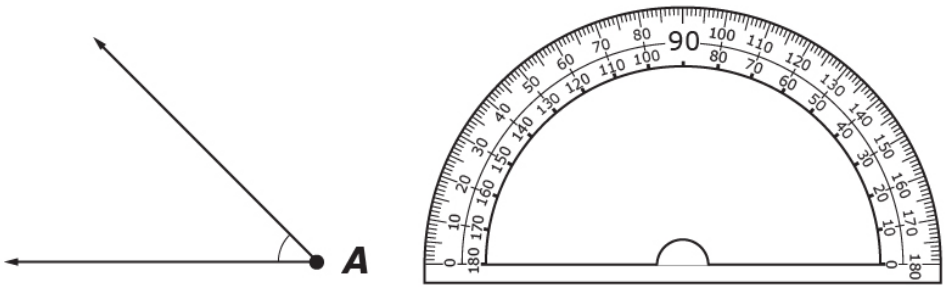
Task Model 2B.1

Expectations:

- The student demonstrates proficiency with a tool specifically identfied in the content standards.
- Tasks aligned to this task model focus on using tools (rather than selecting tools).
- Tools include measurement tools, such as rulers, protractors, and clocks, presented virtually, or number lines.
- Dimensions along which to vary the item include (a) varying the context, (b) varying the tool to be used, or (c) varying the complexity of the numbers to be used.

Example Item 2B.1a (Grade 4):
Primary Target 2B (Content Domain MD), Secondary Target 1G (CCSS 4.MD.C)

Use the protractor to find the measure of angle A.



Enter the measure of angle A, to the nearest whole degree, in the response box.

Interaction: The student can move the protractor to any point on the screen and rotate the protractor to align it with a side of the angle. See an example for how this could work here:
http://sandcastle.kasandbox.org/media/castles/Khan:master/exercises/measuring_angles.html

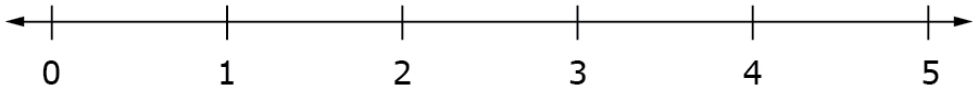
Rubric: (1 point) Student enters the correct angle measure in degrees (45+/-?).

Response Type: Equation/numeric

Commentary: Note that this technology is not currently available. An item that could assess the same construct with current technology would show a protractor with an angle whose vertex is aligned to the center point of the angle but whose rays are not aligned to the 0 or 180 marks on the protractor. This item type would fall under task model 2B.

Example Item 2B.1b (Grades 5):
Primary Target 2B (Content Domain NF), Secondary Target 1J (CCSS 5.NF.B)

Plot the value of $\frac{1}{3}$ x $\frac{5}{2}$ on the number line below. Add more tick marks and make sure the point is on a tick mark.



Interaction: The student sees a number line that has tick marks denoting the whole numbers. There is a slider or some other widget that allows the student to select the appropriate number of tick marks between whole numbers. See an example for how this could work here: https://www.youtube.com/watch?v=TEzH_PbHZIw

Rubric: (1 point) The student chooses a refinement of the number line that includes sixths and correctly plots a point at $\frac{5}{6}$ (with a graphing tolerance of +/- $\frac{1}{16}$ or there is a snap-to feature and points snap to tick marks).

Response Type: Graphing

Commentary: Note that this technology is not currently available. An item that could assess the same construct with current technology could show two or more number lines with different refinements and ask the student to use one to plot the product or to plot the product as close as possible to the correct location and have a tolerance around the location for scoring.

Grades 3-5, Claim 2

Task Model 2B.2

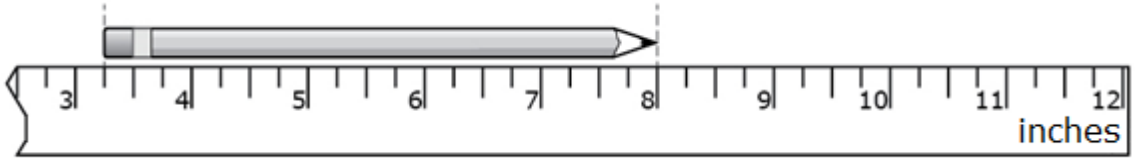
Expectations:

- The student uses a familiar tool in a non-standard way, in multi-step problem, or a problem that requires identifying quantities of interest and mapping the relationships between them.
- Dimensions along which to vary the item include (a) varying the context, (b) varying the type of operations to be used, or (c) varying the complexiy of the numbers to be used (d) varying the complexity of the interpretation required.

Example Item 2B.2a (Grade 4):

Primary Target 2B (Content Domain MD), Secondary Target 1G (CCSS 4.NF.B), Tertiary Target 1H (CCSS 3.MD.B)

What is the length, in inches, of the pencil shown?



Enter your answer in the response box.

Rubric: (1 point) The student enters the correct length in inches ($4\frac{3}{4}$).

Response Type: Equation/Numeric

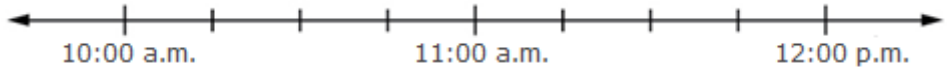
Grades 3-5, Claim 2

Example Item 2B.2b (Grade 3):

Primary Target 2B (Content Domain MD), Secondary Target 1G (CCSS 3.MD.A), Tertiary Target 2D

Math class begins at 10:45 a.m. and is 45 minutes long.

Use the Add Point tool to put a point on the number line that shows when math class ends.



Rubric: (1 point) Student places a point on the number line at the correct location (11:30 p.m.).

Response Type: Graphing

Scoring / Interaction: Scoring/interaction must allow for point to "snap to" tick marks or allow for a tolerance of +/- 5 minutes on the number line.

Commentary: This item requires the student to identify the start time, end time, and elapsed time as quantities of interest and map the relationship between them using the number line, and so draws on the skill set identified in Target 2D.

Grades 3-5, Claim 2
Example Item 2B.2c (Grade 3):

Primary Target 2B (Content Domain MD), Secondary Target 1G (CCSS 3.MD.A), Tertiary Target 2D

Mary started her homework 25 minutes before the time shown on the clock.

Fill in the table to show the time when Mary started her homework.

__ :__

Rubric: (1 point) The student shows the correct time (4:25).

Response Type: Fill-in-table

Commentary: This item requires the student to identify the start time, end time, and elapsed time as quantities of interest and map the relationship between them, and so draws on the skill set identified in Target 2D.

Task Model 2B.3

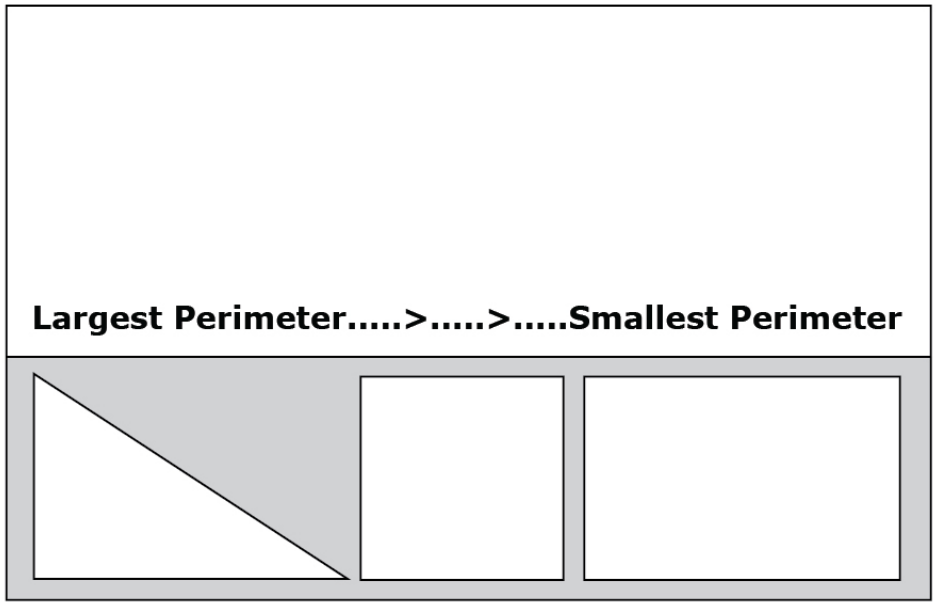
Expectations:

- The student makes strategic choices about using tools.
- The student has access to a tool that is more appropriate for some problems than others. The student may choose to use the tool or not.
- Dimensions along which to vary the item include: (a) varying the context, (b) varying the tool to be used, (c) varying the complexity of the numbers to be used.

Example Item 2B.3b (Grade 3):
Primary Target 2B (Content Domain MD), Secondary Target 1G (CCSS 3.MD.C)

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.

Grades 3-5, Claim 2

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 Item 2B.3a (Grade 3):
Primary Target 2B (Content Domain MD), Secondary Target 1G (CCSS 3.MD.C)

What is the area of each figure?

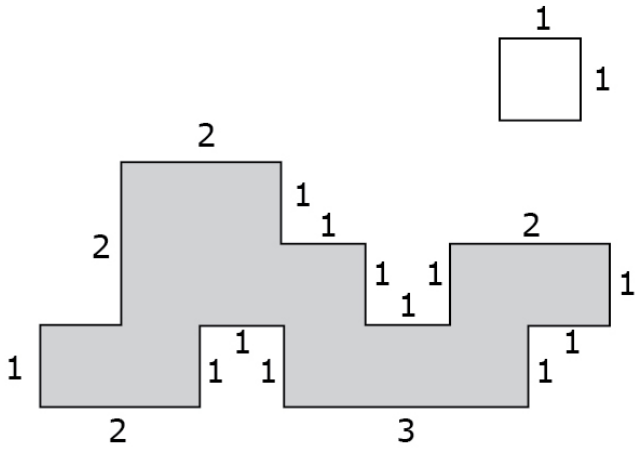


Figure A

The area of Figure A is ☐ square units.

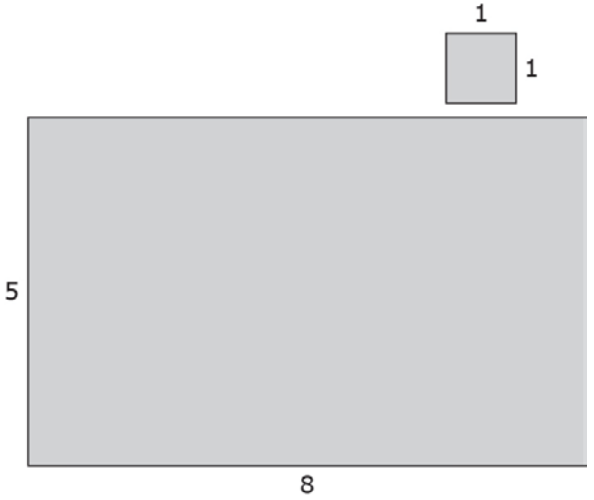


Figure B

The area of Figure B is ☐ square units.

See how the interface might work here: https://www.youtube.com/watch?v=EVoKzudbrE4

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.

Target 2C: Interpret results in the context of a situation.

General Task Model Expectations for Target 2C

- The student provides a numeric answer to a problem where the context requires them to go beyond the result of a single computation.
- The student may be asked to choose a value that falls into a range of acceptable values limited by information given in a real-world context.
- The student may be asked to round up or round down based on the constraints of the context.
- The student may be asked to interpret the meaning of mathematical computations, for example, the different interpretations of arithmetic operations.
- The student may be asked to interpret the meaning of points on the number line or in the coordinate plane in a real-world context.
- The student may be asked to solve a problem that requires the integration of concepts and skills from multiple domains.
- Difficulty of the task may be adjusted by varying (a) the difficulty of extracting information from the context (b) the number of steps (c) the complexity of the numbers used or (d) the complexity of the interpretation required.
- Tasks have DOK Level 1 or 2.

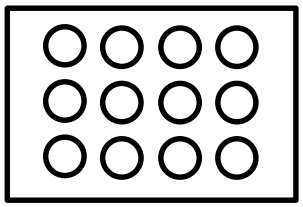
Task Model 2C.1

Expectations:

- The student chooses one value from a range of possible values that is determined by constraints in a context.
- Dimensions along which to vary the item include (a) varying the context, (b) varying the type of operations to be used, or (c) varying the type of numbers to be used.
- Tasks in this model have DOK Level 2-3.

Example Item 2C.1a (Grade 3):
Primary Target 2C (Content Domain OA), Secondary Target 1A (CCSS 3.OA.A)

Steven is baking cupcakes. A cupcake pan has 3 rows with a place to put 4 cupcakes in each row.
He filled two pans completely and part of another pan.

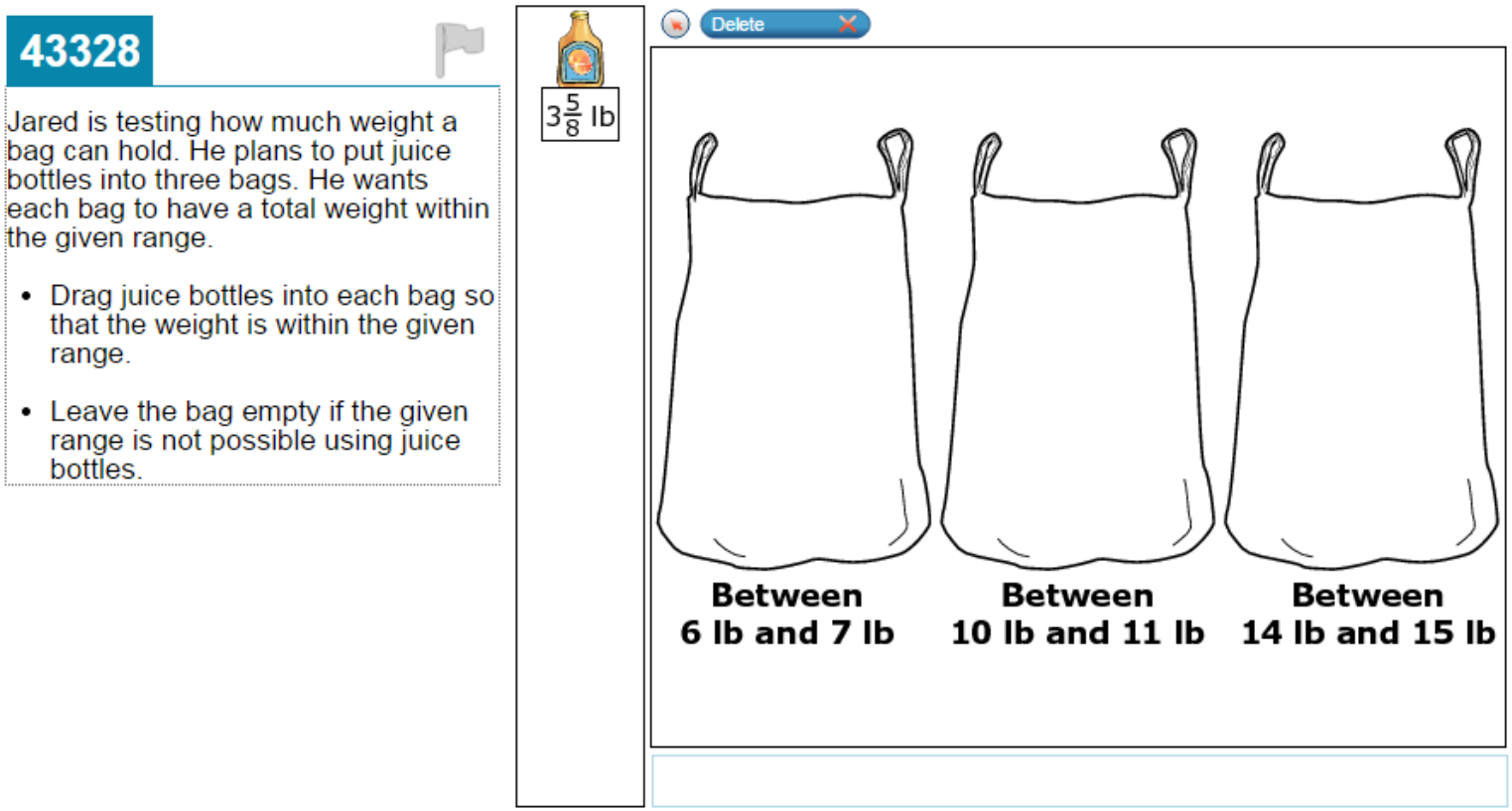


How many cupcakes could Steven have made? Enter your answer in the response box.

Rubric: (1 point) The student enters a whole number between 25 and 35, inclusive.

Response Type: Equation/Numeric

Example Item 2C.1b (Grade 4):
Primary Target 2C (Content Domain OA), Secondary Target 1G (CCSS 4.NF.B), Tertiary Target 2A (Content Domain NF).



Rubric: (2 point) The student enters the correct number of juice bottles for all three bags for 2 points or for two of the three bags for 1 point (no bottles, 3, 4).

Response Type: Drag and drop.

Example Item 2C.1c (Grade 5):
Primary Target 2C (Content Domain NF), Secondary Target 1E (CCSS 5.NF.A)

Janet has some money. She spends $\frac{1}{2}$ of her money on books. She spends some more money on videos.

Which number is a reasonable choice for the fraction of Janet's total money that she spends on books and videos?

A. $\frac{2}{7}$

B. $\frac{3}{5}$

C. $\frac{3}{2}$

D. $\frac{1}{2}$

Rubric: (1 point) The student enters the most reasonable choice (B).

Response Type: Multiple Choice, single correct response

Task Model 2C.2

Task Expectations:

- The student reports a number other than the direct result of the computations implied by the problem context because the context provides additional constraints on the allowable answers.
- Dimensions along which to vary the item include (a) varying the context, (b) varying the type of operations to be used, or (c) varying the type of numbers to be used.
- Tasks in this model have DOK Level 1 or 2.

Example Item 2C.2a (Grade 3)
Primary Target 2C (Content Domain OA), Secondary Target 1A (CCSS 3.OA.A)

Vera is making 6 picture frames. Each picture frame requires 8 craft sticks. Craft sticks are sold in packs of 10.

What is the **fewest** number of packs of craft sticks Vera can buy to get the total she needs?

Enter your answer in the response box.

Rubric: (1 point) The student enters the correct number of packs (5).

Response Type: Equation/Numeric

Grades 3-5, Claim 2

Example Item 2C.2b (Grade 4):

Primary Target 2C (Content Domain OA), Secondary Target 1A (CCSS 4.OA.A)

There are 70 students traveling to a soccer tournament. All of the vans can take 9 students each.

How many vans are needed to take all of the students to the tournament?

Enter your answer in the response box.

Rubric: (1 point) The student enters the correct number of vans needed (8).

Response Type: Equation/Numeric

Example Item 2C.2c (Grade 5):

Primary Target 2C (Content Domain NF), Secondary Target 1F (CCSS 5.NF.B)

Carl feeds his dog $2\frac{1}{2}$ cups of dog food every day. Each bag contains 64 cups of dog food.

What is the **maximum** number of days that Carl can feed his dog exactly $2\frac{1}{2}$ cups of dog food from one full bag?

Enter your answer in the response box.

Rubric: (1 point) The student is able to determine the total number of servings in one bag of food and interpret the remainder as not being enough for another whole serving (25).

Response Type: Equation/Numeric

Grades 3-5, Claim 2
Example Item 2C.2d (Grade 5):
Primary Target 2C (Content Domain NBT), Secondary Target 1D (CCSS 5.NBT.B)

Scott is buying water bottles and apples for his soccer team. The cost of buying packs of water bottles and bags of apples is shown in the table.

Item	Cost
One pack of 6 water bottles	$4.80
One bag of 5 apples	$3.20

What is the **least** amount of money that he can spend on whole packs of water bottles and bags of apple so that all 18 players on his team can have both a bottle of water and an apple?

Enter your answer, in dollars, in the response box.

Rubric: (1 point) The student enters the correct minimum cost (27.20).

Response Type: Equation/Numeric

Task Model 2C.3

Expectations:

- The student is asked to interpret the meaning of symbolic statements in a real-world context.
- Dimensions along which to vary the item include (a) varying the context, (b) varying the type of operations to be used, or (c) varying the type of the numbers to be used.
- Tasks in this model have DOK Level 2.

Example Item 2C.3a (Grade 3):
Primary Target 2C (Content Domain OA), Secondary Target 1A (CCSS 3.OA.A)

Billy has 9 full cans of juice. He has 9×8 ounces of juice all together. What could the 8 mean?

A. There are 8 ounces of juice in one full can.
B. There are 8 people who want juice.
C. He already drank 8 cans of juice.
D. He spilled 8 ounces of juice.

Rubric: (1 point) The student selects the correct option (A).

Response Type: Multiple choice, single correct response

Example Item 2C.3b (Grade 4):
Primary Target 2C (Content Domain OA), Secondary Target 1A (CCSS 4.OA.A)

Najoo is 10 years old. Her pet turtle is 40 years old. How do their ages compare?

A. Najoo is 4 years older than her turtle.
B. Her turtle is 4 years older than Najoo.
C. Najoo is 4 times as old as her turtle.
D. Her turtle is 4 times as old as Najoo.

Rubric: (1 point) The student selects the correct option (D).

Response Type: Multiple choice, single correct response

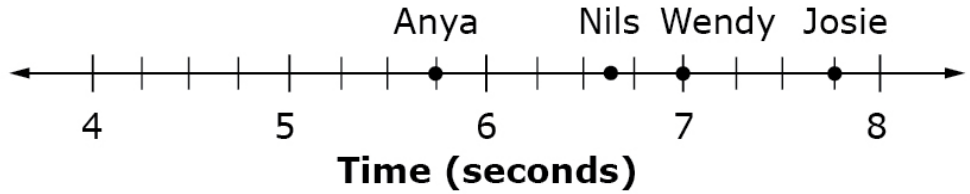
Task Model 2C.4

Task Expectations:

- The student is asked to interpret the meaning of points on a number line or in the coordinate plane in a real-world context.
- Dimensions along which to vary the item include (a) varying the context or (b) varying the type of the numbers to be used.
- Tasks in this model have DOK Level 1 or 2.

Example Item 2C.4a (Grade 3):
Primary Target 2C (Content Domain NF), Secondary Target 1F (CCSS 3.NF.A)

Three friends ran a race. The points on the number line represent the race times, in seconds, for each friend.



Who had the shortest time?

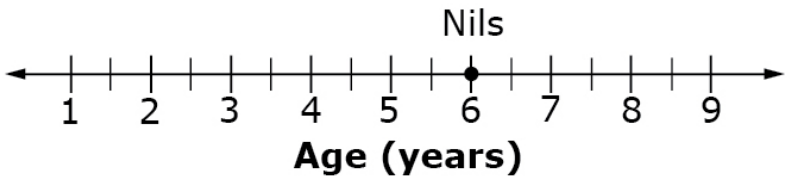
A. Anya
B. Nils
C. Wendy
D. Josie

Rubric: (1 point) The student selects the correct option (A).

Response Type: Multiple choice, single correct response

Example Item 2C.4b (Grade 3):
Primary Target 2C (Content Domain NF), Secondary Target 1F (CCSS 4.NF.C)

Hank is 8.5 years old. Nils' age in years is plotted on the number line shown.



How many years older is Hank than Nils?

Enter the number of years in the response box.

Rubric: (1 point) The student enters the correct age difference (2.5 or 2 ½).

Response Type: Equation/numeric

Grades 3-5, Claim 2
Example Item 2C.4c (Grade 5):
Primary Target 2C (Content Domain G), Secondary Target 1J (CCSS 5.G.A)

Six students ran a race. The graph shows the ages and times of the six students.

What was Petra's time in seconds?

Rubric: (1 point) The student correctly identifies Petra's time (e.g., 14.8).
Note: Accept a tolerance of +/- 0.2 seconds

Response Type: Equation/Numeric

Commentary: Variations on this item include comparing quantities that are represented by the coordinates of points on the graph or asking the student to plot a point that satisfies a given condition, for example, asking the student to plot a point for Wendy, who has a shorter race time than Petra.

Target 2D: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).

Target 2D identifies a key step in the modeling cycle, and is thus frequently present in problems with real-world contexts. Note that Target 2D is rarely the primary target for an item, but is frequently a Secondary or Tertiary Target for an item with primary alignment to 2A, 2B, or 2C. See Items 1, 3, 4, and 5 in Task Model 1a, Item 1 in Task model 1d, and Items 2 and 3 in Task model 2a for examples that draw upon the skill set described in Target 2D.

General Task Model Expectations for Target 2D

- The student is presented with a mathematical problem in a real-world context where the quantities of interest are not named explicitly, are named but represented in different ways, or the relationship between the quantities is not immediately clear.
- The student is asked to solve a problem that may require the integration of concepts and skills from multiple domains.

Grades 3-5 Mathematics Item Specification Claim 3	
This claim refers to a recurring theme in the CCSSM content and practice standards: the ability to construct and present a clear, logical, convincing argument. For older students this may take the form of a rigorous deductive proof based on clearly stated axioms. For younger students this will involve more informal justifications. Assessment tasks that address this claim will typically present a claim or a proposed solution to a problem and will ask students to provide, for example, a justification, an explanation, or counter-example. (*Mathematics Content Specifications, p.63*) Communicating mathematical reasoning is not just a requirement of the Standards for Mathematical Practice—it is also a recurrent theme in the Standards for Mathematical Content. For example, many content standards call for students to explain, justify, or illustrate.	
Primary Claim 3: Communicating Reasoning: Students clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.	
Secondary Claim(s): Items/tasks written primarily to assess Claim 3 will necessarily involve some Claim 1 content targets. Related Claim 1 targets should be listed below the Claim 3 targets in the item form. If Claim 2 or Claim 4 targets are also directly related to the item/task, list those following the Claim 1 targets in order of prominence.	
Primary Content Domain: Each item/task should be classified as having a primary, or dominant, content focus. The content should draw upon the knowledge and skills articulated in the progression of standards leading up to and including the targeted grade within and across domains.	
Secondary Content Domain(s): While tasks developed to assess Claim 3 will have a primary content focus, components of these tasks will likely produce enough evidence for other content domains that a separate listing of these content domains needs to be included where appropriate.	
DOK Levels	1, 2, 3
Allowable Response Types	**Response Types:** Multiple Choice, single correct response (MC); Multiple Choice, multiple correct response (MS); Equation/Numeric (EQ); Drag and Drop, Hot Spot, and Graphing (GI); Matching Table (MA); Fill-in Table (TI) No more than five choices in MS and MA items. Short Text–Performance tasks only **Scoring:** Scoring rules and answer choices will focus on a student's ability to solve problems and/or to apply appropriate strategies to solve problems. For some problems, multiple correct responses and/or strategies are possible. • MC and MS items will be scored as correct/incorrect (1 point) • If MA items require two skills, they will be scored as: o All correct choices (2 points); at least ½ but less than all correct choices (1 point)

	○ Justification[1] for more than 1 point **must be** clear in the scoring rules ○ Where possible, include a "disqualifier" option that if selected would result in a score of 0 points, whether or not the student answered ½ correctly. • EQ, GI, and TI items will be scored as: ○ Single requirement items will be scored as correct/incorrect (1 point) ○ Multiple requirement items: All components correct (2 points); at least ½ but less than all correct (1 point) ○ Justification for more than 1 point **must be** clear in the scoring rules
Allowable Stimulus Materials	Effort must be made to minimize the reading load in problem situations. Use tables, diagrams with labels, and other strategies to lessen the reading load. Use simple subject-verb-object (SVO) sentences; use contexts that are familiar and relevant to students at the targeted grade level. Target-specific stimuli will be derived from the Claim 1 targets used in the problem situation. All real-world problem contexts will be relevant to the age of the students. Stimulus guidelines specific to task models are given below.
Construct Relevant Vocabulary	Refer to the Claim 1 specifications to determine Construct Relevant Vocabulary associated with specific content standards.
Allowable Tools	Any mathematical tools appropriate to the problem situation and the Claim 1 target(s). Some tools are identified in Standard for Mathematical Practice #5 and others can be found in the language of specific standards.
Target-Specific Attributes	CAT items should take from 2 to 5 minutes to solve; Claim 3 items that are part of a performance task may take 3 to 10 minutes to solve.
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[2] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear,

[1] For a CAT item to score multiple points, either distinct skills must be demonstrated that earn separate points or distinct levels of understanding of a complex skill must be tied directly to earning one or more points.

[2] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

	concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[3]
Development Notes	• Items and task assessing Claim 3 may involve application of more than one standard. The focus is on communicating reasoning rather than demonstrating mathematical concepts or simple applications of mathematical procedures. • Targeted content standards for Claim 3 should belong to the major work of the grade (reference table of standards shown below). • Claim 1 *Specifications* that cover the following standards should be used to help inform an item writer's understanding of the difference between how these standards are measured in Claim 1 versus Claim 3. Development notes have been added to many of the Claim 1 specifications that call out specific topics that should be assessed under Claim 3. • Claim 3 items that require any degree of hand scoring can only be developed for performance tasks for grades 3-5. At least 80% of the items written to Claim 3 should primarily assess the standards and clusters listed in the table that follows.

Grade 3	Grade 4	Grade 5
3.OA.B	4.OA.A.3	5.NBT.A.2
3.NF.A	4.NBT.A	5.NBT.B.6
3.NF.A.1	4.NBT.B.5	5.NBT.B.7
3.NF.A.2	4.NBT.B.6	5.NF.A.1
3.NF.A.3	4.NF.A	5.NF.A.2
3.MD.A	4.NF.A.1	5.NF.B
3.MD.C.7	4.NF.A.2	5.NF.B.3
	4.NF.B.3a	5.NF.B.4
	4.NF.B.3b	5.NF.B.7a
	4.NF.B.3c	5.NF.B.7b
	4.NF.B.4a	5.MD.C
	4.NF.B.4b	5.MD.C.5a
	4.NF.C	5.MD.C.5b
	4.NF.C.7	5.G.B*
		5.G.B.4*

*Denotes additional and supporting clusters

[3] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Assessment Targets: Any given item/task should provide evidence for several of the following assessment targets; each of the following targets should not lead to a separate task. Multiple targets should be listed in order of prominence as related to the item/task.

Target A: Test propositions or conjectures with specific examples. (DOK 2)
Tasks used to assess this target should ask for specific examples to support or refute a proposition or conjecture (e.g., An item stem might begin, "Provide 3 examples to show why/how…").

Target B: Construct, autonomously[4], chains of reasoning that will justify or refute propositions or conjectures[5]. (DOK 3, 4)
Tasks used to assess this target should ask students to develop a chain of reasoning to justify or refute a conjecture. Tasks for Target B might include the types of examples called for in Target A as part of this reasoning, but should do so with a lesser degree of scaffolding than tasks that assess Target A alone. Some tasks for this target will ask students to formulate and justify a conjecture.

Target C: State logical assumptions being used. (DOK 2, 3)
Tasks used to assess this target should ask students to use stated assumptions, definitions, and previously established results in developing their reasoning. In some cases, the task may require students to provide missing information by researching or providing a reasoned estimate.

Target D: Use the technique of breaking an argument into cases. (DOK 2, 3)
Tasks used to assess this target should ask students to determine under what conditions an argument is true, to determine under what conditions an argument is not true, or both.

Target E: Distinguish correct logic or reasoning from that which is flawed and—if there is a flaw in the argument—explain what it is. (DOK 2, 3, 4)
Tasks used to assess this target present students with one or more flawed arguments and ask students to choose which (if any) is correct, explain the flaws in reasoning, and/or correct flawed reasoning.

Target F: Base arguments on concrete referents such as objects, drawings, diagrams, and actions. (DOK 2, 3)
In earlier grades, the desired student response might be in the form of concrete referents. In later grades, concrete referents will often support generalizations as part of the justification rather than constituting the entire expected response.

[4] By "autonomous" we mean that the student responds to a single prompt, without further guidance within the task.

[5] At the secondary level, these chains may take a successful student 10 minutes to construct and explain. Times will be somewhat shorter for younger students, but still giving them time to think and explain. For a minority of these tasks, subtasks may be constructed to facilitate entry and assess student progress towards expertise. Even for such "apprentice tasks" part of the task will involve a chain of autonomous reasoning that takes at least 5 minutes.

Grade 3 standards that lend themselves to communicating reasoning	**The following standards can be effectively used in various combinations in Grade 3 Claim 3 items:** **Operations and Algebraic Thinking (OA)** **3.OA.B:** Understand properties of multiplication and the relationship between multiplication and division. **Number and Operations—Fractions (NF)** **3.NF.A:** Develop understanding of fractions as numbers. **3.NF.A.1** Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*. **3.NF.A.2** Understand a fraction as a number on the number line; represent fractions on a number line diagram. **3.NF.A.3** Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. **Measurement and Data (MD)** **3.MD.A:** Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. **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.

Grade 4 standards that lend themselves to communicating reasoning	**The following standards can be effectively used in various combinations in Grade 4 Claim 3 items:** **Operations and Algebraic Thinking (OA)** **4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **Number and Operations in Base Ten (NBT)** **4.NBT.B:** Use place value understanding and properties of operations to perform multi-digit arithmetic **4.NBT.B5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **4.NBT.B.6** Find whole-number quotients and remainders with up to four-digit dividends and one-

Grade 4 standards that lend themselves to communicating reasoning	digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Number and Operations—Fractions (NF)** **4.NF.A:** Extend understanding of fraction equivalence and ordering. **4.NF.A.1** Explain why a fraction *a*/*b* is equivalent to a fraction (*n* × *a*)/(*n* × *b*) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. **4.NF.A.2** Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. **4.NF.B:** Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. **4.NF.B.3** Understand a fraction *a*/*b* with *a* > 1 as a sum of fractions 1/*b*. **a.** Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. **b.** Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.* **c.** Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. **4.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. **a.** Understand a fraction *a*/*b* as a multiple of 1/*b*. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).* **b.** Understand a multiple of *a*/*b* as a multiple of 1/*b*, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* **4.NF.C:** Understand decimal notation for fractions, and compare decimal fractions. **4.NF.C.7** Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

Grade 5 standards that lend themselves to communicating reasoning	**The following standards can be effectively used in various combinations in Grade 5 Claim 3 items:** **Number and Operations in Base Ten (NBT)** **5.NBT.A.2** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **5.NTB.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **Number and Operations—Fractions (NF)** **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **5.NF.A.2** Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2*. **5.NF.B:** Apply and extend previous understandings of multiplication and division to multiply and divide fractions. **5.NF.B.3** Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?* **5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. **5.NF.B.7** **a.** Interpret division of a unit fraction by a non-zero whole number and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.*

Grade 5 standards that lend themselves to communicating reasoning	**b.** Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* **Measurement and Data (MD)** **5.MD.C:** Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. **5.MD.C.5** **a.** Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. **b.** Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems. **Standards to integrate with the focus on fractions and whole number operations:** **Geometry (G)** **5.G.B:** Classify two-dimensional figures into categories based on their properties. **5.G.B.4** Classify two-dimensional figures in a hierarchy based on properties.

Range ALDs – Claim 3 Grades 3-5	**Level 1** Students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.
	Level 2 Students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.
	Level 3 Students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.
	Level 4 Students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.

Target 3A: Test propositions or conjectures with specific examples.

General Task Model Expectations for Target 3A

- Items for this target should focus on the core mathematical work that students are doing around numbers and operations, with mathematical content from other domains playing a supporting role in setting up the reasoning contexts.
- Items in this task model should probe the key mathematical structures that students at that grade-level are studying, such as the structure of base-ten numbers, fractions, or the four operations and their properties.
- In response to a claim or conjecture, the student should:
    - Find a counterexample if the claim is false,
    - Find examples and non-examples if the claim is sometimes true, or
    - Provide supporting examples for a claim that is always true without concluding that the examples establish that truth, unless there are only a finite number of cases and all of them are established one-by-one. The main role for using specific examples in this case is for students to develop a hypothesis that the conjecture or claim is true, setting students up for work described in Claim 3B.
- False or partially true claims that students are asked to find counterexamples for should frequently draw upon commonly held mathematical misconceptions.
- Note: Use appropriate mathematical language in asking students for a single example. While a single example can be used to refute a conjecture, it cannot be used to prove one is always true unless that is the one and only case.

Task Model 3A.1

- The student is presented with a proposition or conjecture and asked to give
    - A counterexample if the claim is false,
    - Examples and non-examples if the claim is sometimes true, or
    - One or more supporting examples for a claim that is always true without concluding that the examples establish that truth.

Example Item 3A.1a (Grade 3)
Primary Target 3A (Content Domain OA), Secondary Target 1D (CCSS 3.OA.B), Tertiary Target 3F

Marquis said, "The more numbers you multiply, the greater the product." Then he wrote:

$2 \times 8 = 16$
$2 \times 5 \times 5 = 50$
$2 \times 3 \times 5 \times 2 = 60$

$60 > 50 > 16$

Give an example of a product of two numbers that is greater than $2 \times 5 \times 5$.

[ ] x [ ] > $(2 \times 5 \times 5)$

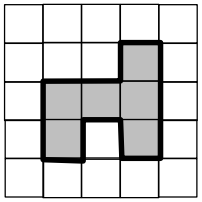
Enter the numbers in the two response boxes.

Rubric: (1 point) The student enters two numbers in the response boxes whose product is greater than 50. (e.g., 7 and 8).

Response Type: Equation/numeric

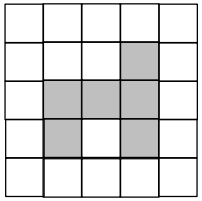
Example Item 3A.1b (Grade 4)
Primary Target 3A (Content Domain MD), Secondary Target 1I (CCSS 3.MD.D), Tertiary Target 3F

William shaded 6 squares in a grid to make the figure shown.

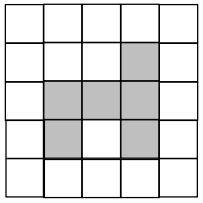


He claims that if he **adds 1 more** square to this figure in different places, the perimeter can be greater than, less than, or equal to the perimeter of the original figure.

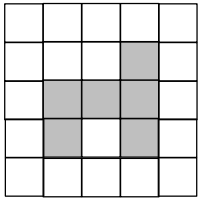
Part A. Click to shade one more square so the perimeter is greater than the original figure.



Part B. Click to shade one more square so the perimeter is less than the original figure.



Part C. Click to shade one more square so the perimeter is equal to the original figure.



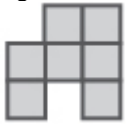
Rubric: (2 points) The student is able to provide an example that supports each conjecture.
(1 point) The student is able to provide two out of three correct examples.
(0 points) The student is unable to provide at least two correct examples.

Exemplar[6]:

For Part A, the perimeter has to be greater than 14 units.

For Part B, the perimeter of the figure has to be less than 14 units.

For Part C, the perimeter of the figure has to be equal to 14 units.



Response Type: Hot Spot

[6] An exemplar is just one example of a correct response. Other correct responses are possible.

Example Item 3A.1c (Grade 5)
Primary Target 3A (Content Domain NBT), Secondary Target 1D (CCSS 4.NBT.B), Tertiary Target 3F

Nina says, "If you multiply a 2-digit number and a 1-digit number, you get a 3-digit number."

Enter numbers in the table to give one example of when Nina's claim is true, and another example that shows her claim is **not** always true.

Example of when –	**2-digit number**	**1-digit number**	**3-digit product**
Nina's claim is true			
Nina's claim is **not** true			

Rubric: (2 points) The student gives an example where the product is a three-digit number (e.g., $90 \times 2=180$) and an example where it is not (e.g., $10 \times 2=20$).
(1 point) The student gives an example where the product is a three-digit number or an example where it is not.

Response Type: Fill-in Table

Task Model 3A.2

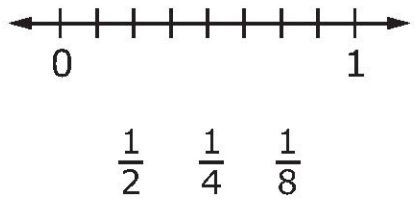
- The student is presented with one or more propositions or conjectures and several examples and asked implicitly or explicitly which examples support or refute each proposition.
- Items in this task model should cover all cases and not be unintentionally misleading about the truth status of a particular proposition or conjecture.

Example Item 3A.2a (Grade 3)
Primary Target 3A (Content Domain NF), Secondary Target 1F (CCSS 3.NF.3d), Tertiary Target 3F

Robert said, "When comparing two fractions with a numerator of 1, the fraction with the bigger denominator is always greater."

Part A
Drag each fraction to the correct location on the number line.

Part B
Is Robert's statement true? Click Yes or No.



Is Robert's statement true?
Click Yes or No.

Yes No

Interaction: The student drags fractions from the single-use palette to the number line and clicks on "Yes" or "No."

Rubric: (2 points) The student places all three fractions in the correct locations and answers "No."
(1 point) The student either places all the fractions in the correct locations and answers "Yes"; or places all fractions in the correct order but misses the correct location for one or more fractions and answers "No."

Response Type: Drag and Drop and Hot Spot

Example Item 3A.2b (Grade 4)
Primary Target 3A (Content Domain NBT), Secondary Target 1E (CCSS 4.NBT.B)

Click in the box that matches each division problem to the correct claim.

Claim	200 ÷ 5	777 ÷ 7	108 ÷ 9
When you divide a 3-digit number by a 1-digit number, the quotient can have **1 digit**.			
When you divide a 3-digit number by a 1-digit number, the quotient can have **2 digits**.			
When you divide a 3-digit number by a 1-digit number, the quotient can have **3 digits**.			

Rubric: (1 point) The student matches each quotient to the appropriate claim (e.g., Claim 2: 200 ÷ 5 and 108 ÷ 9. Claim 3: 777 ÷ 7.).

Response Type: Matching Table

Target 3B: Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.

General Task Model Expectations for Target 3B

- Items for this target should focus on the core mathematical work that students are doing around numbers and operations, with mathematical content from other domains playing a supporting role in setting up the reasoning contexts.
- Items for this target can probe a key mathematical structure such as the structure of base-ten numbers, fractions, or the four operations and their properties.
- Items for this target can require students to solve a multi-step, well-posed problem involving the application of mathematics to a real-world context. The difference between items for Claim 2A and Claim 3B is that the focus in 3B is on communicating the reasoning process in addition to getting the correct answer.
- Note that in grades 3–5, items can provide more structure than items for later grades to help them understand the expectations for justifying or refuting a proposition or conjecture.

Task Model 3B.1

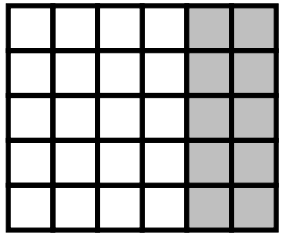
- The student is presented with a proposition or conjecture. The student is asked to identify or construct reasoning that justifies or refutes the proposition or conjecture.
- Items in this task model often address more generalized reasoning about a class of problems or reasoning that generalizes beyond the given problem context even when it is presented in a particular case.

Example Item 3B.1a (Grade 3)
Primary Target 3B (Content Domain OA), Secondary Target 1B (CCSS 3.OA.B), Tertiary Target 3F

Bev said, "I can find 5×6 by adding 5×4 and 5×2."

She wrote this equation and drew this picture to show her thinking.

$5 \times 6 = 5 \times 4 + 5 \times 2$

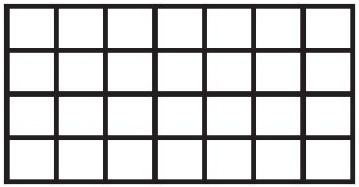


Mel wrote this equation: $4 \times 7 = 4 \times 3 + 4 \times 4$

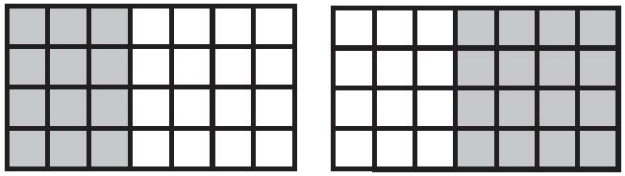
Is this equation true? Click on Yes or No.

Yes | No

Click on the squares to draw a picture that supports your answer.



Rubric: (1 point) The student identifies the equation as true and clicks to shade either a 4 x 3 rectangle or a 4 x 4 rectangle; see examples below.



Response Type: Hotspot

Example Item 3B.1b (Grade 4)
Primary Target 3B (Content Domain OA), Secondary Target 1B (CCSS 4.NBT.B), Tertiary Target 3F

Carter says, "8000 is 100 times as large as 80."

Choose three statements that support this claim.

Drag them into a logical order.

1.

2.

3.

So 8000 is 100 times as large as 80.

80 is 10 times as large as 8.
800 is 10 times as large as 80.
8000 is 10 times as large as 800.
$10 \times 10 = 100$
$10 \times 100 = 1000$
$80 \times 10 = 800$
$800 \times 10 = 8000$

Rubric: (1 point) The student selects three statements that complete an explanation for the claim and puts them in a logical order. In this particular example, the order doesn't matter.

Exemplars:

1. 800 is 10 times as big as 80.	1. $80 \times 10 = 800$
2. 8000 is 10 times as big as 800.	2. $800 \times 10 = 8000$
3. $10 \times 10 = 100$	3. $10 \times 10 = 100$

Response Type: Drag and Drop

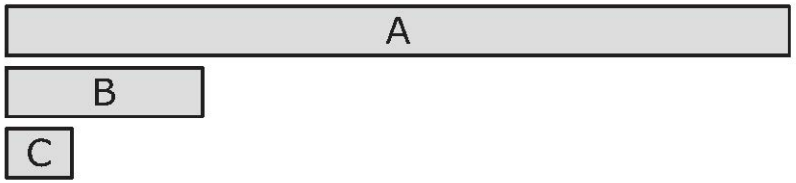
Task Model 3B.2

- The student is asked a mathematical question and is asked to identify or construct reasoning that justifies his or her answer.
- Items in this task model often address more generalized reasoning about a class of problems or reasoning that generalizes beyond the given problem context even when it is presented in a particular case.

Example Item 3B.2a (Grade 4)

Primary Target 3B (Content Domain OA), Secondary Target 1B (CCSS), Tertiary Target 3F

Rectangle A is 4 times as long as rectangle B.
Rectangle B is 3 times as long as rectangle C.



How many times greater is rectangle A than rectangle C?

☐ **times**

Choose three equations that, when taken together, support your claim. Drag them into a logical order.

1.	
2.	
3.	
$4 \times A = B$	$3 \times C = B$
$4 \times B = A$	$4 \times (3 \times C) = A$
$3 \times B = C$	$3 \times (4 \times C) = A$

Rubric: (2 point) The student enters the correct multiplicative factor in the response box (e.g., 12) and selects three statements that support the claim and puts them in a logical order.
(1 point) The student does one or the other.

Exemplars:

1. 4 x B = A
2. 3 x C = B
3. 4 x (3 x C) = C

1. 3 x C = B
2. 4 x B = A
3. 4 x (3 x B) = A

Response Type: Equation/Numeric and Drag and Drop

Note: Functionality to combine these items types doesn't currently exist. The item could be implemented as a 1 point item if the scale factor is given.

Example Item 3B.2b (Grade 5)
Primary Target 3B (Content Domain MD), Secondary Target 1I (CCSS 5.MD.5), Tertiary Target 3F

The dimensions of a right rectangular prism are:

- length = 9 centimeters
- width = 3 centimeters
- height = 5 centimeters

What will happen to the volume of the right rectangular prism if the length, the width, and the height are each doubled?

The new volume will be [drop-down choices: 2, 4, 6, 8] times the original volume because $(2 \times 9)(2 \times 3)(2 \times 5) =$ [drop-down choices: 2, 4, 6, 8] $\times (9 \times 3 \times 5)$.

Rubric: (1 point) The student selects the correct multiplier (e.g., 8) in both drop-down menus.

Response Type: Drop-down menu

Note: Functionality for this item doesn't currently exist, though we anticipate to be able to offer drop-down items by 2018. The item could be implemented as a multiple choice in the meantime.

Task Model 3B.3

- Items for this target require the student to solve a multi-step, well-posed problem involving the application of mathematics to a real-world context.
- The difference between Claim 2 task models and this task model is that the student needs to provide some evidence of his/her reasoning. The difference between Claim 4 task models and this task model is that the problem is completely well posed and no extraneous information is given.

Example Item 3B.3a (Grade 3)
Primary Target 3B (Content Domain OA), Secondary Target 1D (CCSS 3.OA.D)

A bird ate 400 grams of food in 3 days. The bird ate 120 grams of food on Day 1, 150 grams of food on Day 2, and g grams of food on Day 3.

Day	Grams of Food
1	120
2	150
3	g

How many grams of food did the bird eat on Day 3? Enter your answer in the first response box.

In the second response box, enter an equation that you could solve to find the amount of food the bird ate on Day 3.

Rubric: (2 points) The student enters the correct number of grams of food on Day 3 and enters a correct (e.g., 130; $400 - 120 - 150 = x$, $120 + 150 + x = 400$, or equivalent equation).
(1 point) The student enters the correct number of grams of food on Day 3 or enters a correct equation.

Response Type: Equation/Numeric (2 response boxes)

Example Item 3B.3b (Grade 4)
Primary Target 3B (Content Domain MD), Secondary Target 1G (CCSS 4.MD.A)

- 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)

Target 3C: State logical assumptions being used.

General Task Model Expectations for Target 3C

- Items for this target should focus on the core mathematical work that students are doing around numbers and operations, with mathematical content from other domains playing a supporting role in setting up the reasoning contexts.
- For some items, the student must explicitly identify assumptions that
    - Make a problem well-posed, or
    - Make a particular solution method viable.
- When possible, items in this target should focus on assumptions that are commonly made implicitly and can cause confusion when left implicit.
- For some items, the student will be given a definition and be asked to reason from that definition.

Task Model 3C.1

- The student is asked to identify an unstated assumption that would make the problem well-posed or allow them to solve a problem using a given method.

Example Item 3C.1a (Grade 3)
Primary Target 3C (Content Domain OA), Secondary Target 1B (CCSS 3.OA.B)

A 20 meter rope is cut into 4 pieces. Jenny says you can find the length of each piece by finding 20 ÷ 4.

What statement best describes Jenny's claim?

A. Jenny's claim is false. She should add 4 and 20 instead.
B. Jenny's claim is false. She should multiply 4 and 20 instead.
C. Jenny's claim is true if you assume that each piece is 4 meters long.
D. Jenny's claim is true if you assume that the pieces are all equal in length.

Rubric: (1 point) The student selects the correct statement (e.g., D).

Response Type: Multiple Choice, single correct response

Example Item 3C.1b (Grade 5)
Primary Target 3C (Content Domain OA), Secondary Target 1A (CCSS 4.OA.A)

Gil and Nina are comparing the numbers 3 and 12.

Gil says, “12 is 9 more than 3.”

Nina says, “12 is 4 times more than 3.”

What is true about Gil and Nina’s statements?

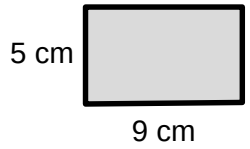
A. Nina is correct and Gil is not. You should multiply to compare the numbers.
B. Gil is correct and Nina is not. You should add to compare the numbers.
C. They are both correct. They just compared using different operations.
D. Neither one is correct. You have to compare like this: 12 > 3.

Rubric: (1 point) The student selects the correct statement (e.g., C).

Response Type: Multiple Choice, single correct response

Example Item 3C.1c (Grade 5)
Primary Target 3C (Content Domain G, MD), Secondary Target 1K (CCSS 5.G.B, 4.MD.A.3), Tertiary Target 3D

Carrie saw the figure below and said that its area is $5 \times 9 = 45$ square centimeters.



Which statement best supports Carrie’s claim?

A. It is true if the opposite sides have the same length.
B. It is true if the figure is a rectangle.
C. It is false if the opposite sides have the same length.
D. It is false if the figure is a rectangle.

Rubric: (1 point) The student selects the correct statement (e.g., B).

Response Type: Multiple Choice, single correct response

Example Item 3C.1d (Grade 5)
Primary Target 3C (Content Domain NF), Secondary Target 1F (CCSS 4.NF.A.2), Tertiary Target 3D

Flo ate $\frac{3}{4}$ of a sandwich and Arnie ate $\frac{2}{3}$ of a sandwich. If Arnie ate more, what must be true?

A. Flo's sandwich is bigger.
B. Arnie's sandwich is bigger.
C. The sandwiches are the same size.
D. It doesn't matter which sandwich is bigger.

Rubric: (1 point) The student selects the correct assumption (e.g., B).

Response Type: Multiple Choice, single correct response

Task Model 3C.2

- The student will be given one or more definitions or assumptions and be asked to reason from that set of definitions and assumptions.

Example Item 3C.2a (Grade 5)
Primary Target 3C (Content Domain G), Secondary Target 1K (CCSS 5.G.B)

Patrick is learning about quadrilaterals. He was given the following true statements.

- Opposite sides of all parallelograms have the same length.
- Opposite sides of all rectangles have the same length.
- All sides of a square have the same length.
- All rectangles are parallelograms.
- All rectangles have right angles.
- All squares have right angles.

Based on this information, Patrick assumes the following statements are always true. Which statement is **not** supported by the given information?

A. All squares are rectangles.
B. All squares are parallelograms.
C. All parallelograms are rectangles.
D. All parallelograms are quadrilaterals.

Rubric: (1 point) The student selects the correct response (e.g., C).

Response Type: Multiple choice, single correct response

Target 3D: Use the technique of breaking an argument into cases.

General Task Model Expectations for Target 3D

- Items for this target should focus on the core mathematical work that students are doing around numbers and operations, with mathematical content from other domains playing a supporting role in setting up the reasoning contexts.
- The student is given
  - A problem that has a finite number of possible solutions, some of which work and some of which don't, or
  - A proposition that is true in some cases but not others.
- Items for Claim 3 Target D should either present an exhaustive set of cases to consider or expect students to consider all possible cases in turn in order to distinguish it from items in other targets.
- In grades 3-5, the student will be given the cases to consider.

Task Model 3D.1

- The student is given a problem that has a finite number of possible solutions, some of which work and some of which don't.

Example Item 3D.1a (Grade 3)

Primary Target 3D (Content Domain OA), Secondary Target 1A (CCSS 3.OA.A)

Select **all** the ways can you divide 15 children into equal groups with none left over.

A. 2 groups
B. 3 groups
C. 4 groups
D. 5 groups

Rubric: (1 point) The student selects the possible number of groups (B and D).

Response Type: Multiple Choice, multiple select response

Example Item 3D.1b (Grade 4)
Primary Target 3D (Content Domain MD), Secondary Target 1K (CCSS 4.MD.C)

When you cut an obtuse angle into two smaller angles, what can be true? (Select **all** that apply.)

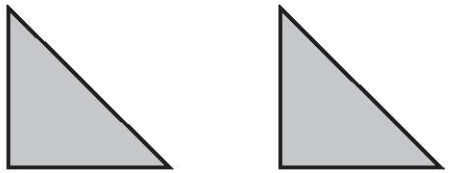
A. The two smaller angles can be less than 90 degrees.
B. At least one of the two smaller angles can be greater than 90 degrees.
C. Both of the two smaller angles can be greater than 90 degrees.

Rubric: (1 point) The student selects the possible cases (A and B).

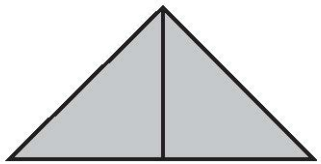
Response Type: Multiple Choice, multiple correct response

Example Item 3D.1c (Grade 5)
Primary Target 3D (Content Domain G), Secondary Target 1K (CCSS 5.G.B)

Nora has drawn two identical isosceles right triangles.



Here is a way to put them together so that they share a side and make another triangle.



Select **all** the quadrilaterals Nora can make with these triangles if she puts them together so that they share a side.

A. A square
B. A rectangle that is not a square
C. A rhombus that is not a square
D. A parallelogram that is not a rectangle

Rubric: (1 point) The student selects the possible cases (A and D).

Response Type: Multiple Choice, multiple select response

Task Model 3D.2

- The student is given a proposition and an exhaustive list of cases and asked to determine in which of those cases the proposition is true.

Example Item 3D.2a (Grade 3)
Primary Target 3D (Content Domain OA), Secondary Target 1B (CCSS 3.OA.B), Tertiary Target 3C

n is a whole number and $n \times 5 = 5$.

Identify which values of *n* make this equation true.

	True	False
When $n = 0$		
When $n = 1$		
When $n > 1$		
This is never true		

Rubric: (1 point) The student identifies the correct values of *n* (F, T, F, F)

Response Type: Matching Table

Example Item 3D.2b (Grade 4)
Primary Target 3D (Content Domain NF), Secondary Target 1G (CCSS 4.NF.A), Tertiary Target 3C

What must be true about *d* to make this inequality true?

$\frac{3}{d} \geq \frac{3}{10}$

Identify which values of *d* make this equation true.

	True	False
$d < 10$		
$d = 10$		
$d > 10$		

Rubric: (1 point) The student identifies the correct values of *d* (T, T, F)

Response Type: Matching Table

Example Item 3D.2c (Grade 5)
Primary Target 3D (Content Domain NF), Secondary Target 1? (CCSS 5.NF.B), Tertiary Target 3C

32×45 is greater than both 32 and 45. When is $a \times b$ between a and b?

Select **all** that apply.

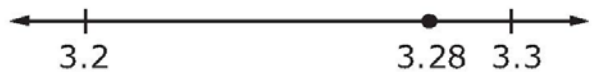
A. When $a > 1$ and $b > 1$
B. When $a < 1$ and $b > 1$
C. When $b < 1$ and $a > 1$
D. When $a < 1$ and $b < 1$

Rubric: (1 point) The student selects B and C.

Response Type: Multiple Choice, multiple correct response

Example Item 3D.2d (Grade 5)
Primary Target 3C (Content Domain NBT), Secondary Target 1C (CCSS 5.NBT.A), Tertiary Target 3F

Jenny says, "To round a decimal d between 3.2 and 3.3 to the nearest tenth, you just see which tenth it is closest to on the number line. For example, 3.28 is closer to 3.3 than 3.2, so it rounds to 3.3."



In which cases will Jenny's method work? (Select **all** that apply.)

A. Case 1: $3.25 < d \leq 3.3$
B. Case 2: $d = 3.25$
C. Case 3: $3.2 \leq d < 3.25$
D. Jenny's method doesn't usually doesn't work—it just worked for this example.

Rubric: (1 point) The student selects the correct cases (A and C).

Response Type: Multiple Choice, multiple correct response

Target 3E: Distinguish correct logic or reasoning from that which is flawed and—if there is a flaw in the argument—explain what it is.

General Task Model Expectations for Target 3E

- Items for this target should focus on the core mathematical work that students are doing around numbers and operations, with mathematical content from other domains playing a supporting role in setting up the reasoning contexts.
- The student is presented with valid or invalid reasoning and told it is flawed or asked to determine its validity. If the reasoning is flawed, the student identifies, explains, and/or corrects the error or flaw.
- The error should be more than just a computational error or an error in counting, and should reflect an actual error in reasoning.
- Analyzing faulty algorithms is acceptable so long as the algorithm is internally consistent and it isn't just a mechanical mistake executing a standard algorithm.

Task Model 3E.1

- Some flawed reasoning or student work is presented and the student identifies and/or corrects the error or flaw.
- The student is presented with valid or invalid reasoning and asked to determine its validity. If the reasoning is flawed, the student will explain or correct the flaw.

Example Item 3E.1a (Grade 3)
Primary Target 3E (Content Domain OA), Secondary Target 1A (CCSS 3.OA.A), Tertiary Target 3C

Tasha is solving this problem:

There 4 tanks with 10 fish in each tank. How many fish are there all together?

Tasha claims, "There are 4 + 10 = 14 fish all together."

Which statement best describes Tasha's claim?

A. Tasha correctly added to find the total.
B. Tasha should subtract instead.
C. Tasha should multiply instead.
D. Tasha should divide instead.

Rubric: (1 point) The student selects the correct statement (C).

Response Type: Multiple Choice, single correct response

Example Item 3E.1b (Grade 4)
Primary Target 3E (Content Domain NBT), Secondary Target 1E (CCSS 3.NBT.B)

Harvey was solving this problem:

There are 12 packets of gum each with a mass of 65 grams. What is the mass of all of the packets combined?

Harvey said, "I can multiply the tens places and the ones places and add them."

Then he wrote:
12 = 10 + 2
65 = 60 + 5
600 + 10 = 610
The total mass is 610 grams.

Which statement best describes Harvey's claim?

A. Harvey solved the problem correctly and got the right answer.
B. Harvey made a mistake in solving the problem but got the right answer anyway.
C. Harvey had a correct way of solving the problem but got the wrong answer.
D. Harvey's solution is not correct because he did not multiply the tens with the ones.

Rubric: (1 point) The student selects the correct statement (e.g., D).

Response Type: Multiple Choice, single correct response

Example Item 3E.1c (Grade 5)
Primary Target 3E (Content Domain NF), Secondary Target 1E (CCSS 5.NF.A)

Brian is adding $\frac{2}{3} + \frac{7}{5}$. He wrote: $\frac{2}{3} + \frac{7}{5} = \frac{2+7}{3+5} = \frac{9}{8}$

Brian's approach is **not** correct. Select **all** of the statements that could indicate mistakes with Brian's approach.

A. He added the denominators.
B. He didn't write $\frac{7}{5}$ as a mixed number.
C. He didn't write his answer as a mixed number.
D. He added the numerators when the denominators were different.

Rubric: (1 point) The student clicks on the mistakes in the algorithm (A and S).

Response Type: Multiple Choice, multiple correct response

Task Model 3E.2

- Two or more approaches or chains of reasoning are given and the student is asked to identify the correct method and justification OR identify the incorrect method/reasoning and the justification.

Example Item 3E.2a (Grade 4)
Primary Target 3E (Content Domain NBT), Secondary Target 1E (CCSS 4.NBT.A), Tertiary Target 3C, Quaternary Target 3F

Zach and Nate both rounded 6481, but used different methods.

Zach thought about it this way:	Nate thought about it this way:
6481 rounds to 6480 6480 rounds to 6500 6500 rounds to 7000 So 6481 rounds to 7000.	6481 is closer to 6000 than to 7000, so it rounds to 6000.

Which statement best describes these methods?

A. Zach's method is correct.
B. Nate's method is correct.
C. Both methods are correct.
D. Neither method is correct.

Rubric: (1 point) The student selects the correct method (B).

Response Type: Multiple Choice, single correct response

Example Item 3E.2a (Grade 5)
Primary Target 3E (Content Domain NBT), Secondary Target 1E (CCSS 4.NBT.A), Tertiary Target 3C

Mr. Spivak's class was finding the volume of a right rectangular prism with dimensions 20 cm, 45 cm, and 80 cm.

Brigit said, "I tried two ways of multiplying the dimensions and got different answers. I can't figure out what went wrong."

She explained her two ways to Mr. Spivak.

First method:	**Second method:**
Step 1: I distributed. $20 \times (45 \times 80) = (20 \times 45) + (20 \times 80)$	Step 1: I broke apart the numbers. $20 \times 45 \times 80 = (2 \times 10) \times (5 \times 9) \times (8 \times 10)$
Step 2: I multiplied 20 by 45 and 20 by 80. $= 900 + 1600$	Step 2: I rearranged the numbers.
Step 3: Then I added. $= 2500$	Step 3: Then I multiplied everything. $= 72 \times (10 \times 100) = 72{,}000$

Which method has an error? Which step has the first error in that method?

Brigit's [drop-down options: first, second] method has an error. She made the error in step [drop-down options: 1, 2, 3].

Rubric: (1 point) The student selects the incorrect method (first) and identifies the step in which the error occurred (1).

Response Type: Drop-down Menu[7]

[7] This response is not yet supported by the Smarter Balanced item authoring tool, but is expected as an enhancement by 2017.

Target 3F: Base arguments on concrete referents such as objects, drawings, diagrams, and actions

Task Model 3F.1

- The student uses concrete referents to help justify or refute an argument.
- Items in this task model should address content in standards that specifically call for number lines, diagrams, and contexts to be used as a basis for reasoning.

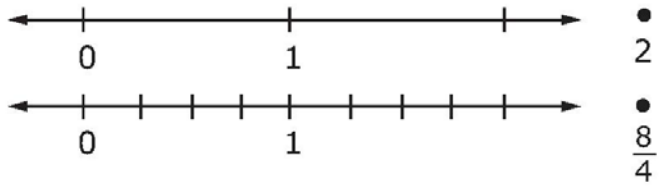
Example Item 3F.1a (Grade 3)

Primary Target 3F (Content Domain NBT), Secondary Target 1F (CCSS 3.NF.A), Tertiary Target 3B

Compare $\frac{8}{4}$ and 2.

Part A

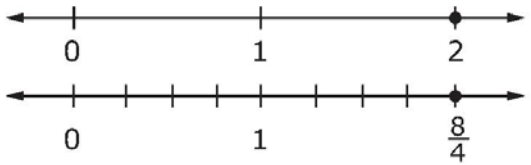
Plot each number on a number line.



Part B

$\frac{8}{4}$ [drop-down choices: <, =, >] 2

Rubric: (1 point) The student plots the points correctly (see below) and selects the correct comparison (=).



Response Type: Drop-down Menu, Graphing

Note: Functionality for this item type does not currently exist.

Example Item 3B.1b (Grade 3)
Primary Target 3F (Content Domain NF), Secondary Target 1F (CCSS 3.NF.A), Tertiary Target 3B

Part A

Which comparison between $\frac{1}{5}$ and $\frac{1}{8}$ is correct?

A. $\frac{1}{5} < \frac{1}{8}$

B. $\frac{1}{5} > \frac{1}{8}$

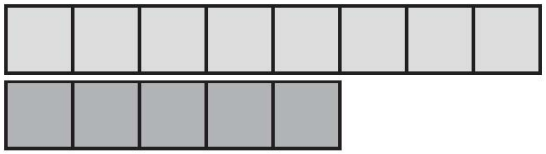
C. $\frac{1}{5} = \frac{1}{8}$

Part B

Choose a picture that supports your answer in *Part A*.

D.

E.



F.

Rubric: (1 point) The student selects the correct comparison and the correct picture (B, F).

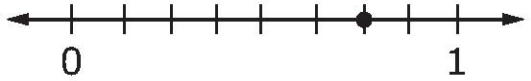
Response Type: Drop-down Menu and Multiple Choice, single correct response

Example Item 3F.1c (Grade 4)

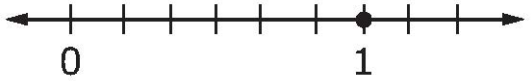
Primary Target 3F (Content Domain NBT), Secondary Target 1F (CCSS 4.NF.A), Tertiary Target 3B

Which number line shows that $\frac{3}{4} = \frac{6}{8}$?

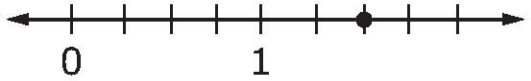
A.



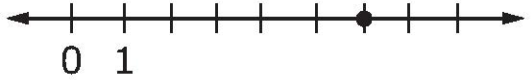
B.



C.



D.



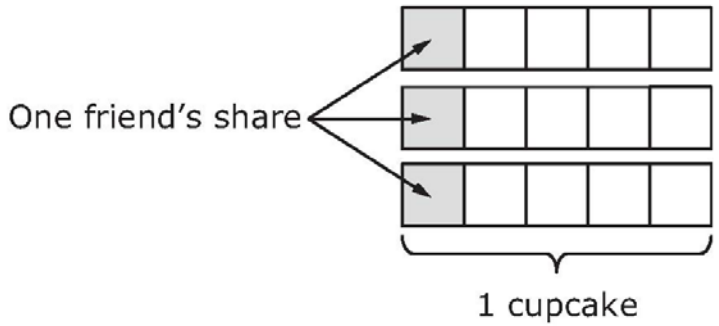
Rubric: (1 point) The student selects the correct number line (A).

Response Type: Multiple Choice, single correct response

Example Item 3F.1d (Grade 5)
Primary Target 3F (Content Domain NBT), Secondary Target 1F (CCSS 5.NF.B), Tertiary Target 3B

Complete the story about friends sharing cupcakes to show that $3 \div 5 = \frac{3}{5}$.

- 5 friends were sharing 3 cupcakes. They divided each cupcake into 5 equal pieces.
- Each piece is [drop-down menu choices: $\frac{1}{3}$, $\frac{1}{5}$, $\frac{3}{5}$] of a cupcake.
- Each friend got 1 piece of each cupcake.
- Each friend got [drop-down menu choices: $\frac{1}{3}$, $\frac{1}{5}$, $\frac{3}{5}$] of a cupcake in total.



Rubric: (1 point) The student selects the correct unit fraction ($\frac{1}{5}$) and the correct total amount each friend receives ($\frac{3}{5}$).

Response Type: Drop-down Menu

Grades 3–5 Mathematics Item Specification Claim 4	
"Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decision-making." (p.72, CCSSM)	
Primary Claim 4: Modeling and Data Analysis Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.	
Secondary Claim(s): Items/tasks written primarily to assess Claim 4 will necessarily involve some Claim 1 content targets. Related Claim 1 targets should be listed below the Claim 4 targets in the item form. If Claim 2 or Claim 3 targets are also directly related to the item/task, list those following the Claim 1 targets in order of prominence.	
Primary Content Domain: Each item/task should be classified as having a primary, or dominant, content focus. The content should draw upon the knowledge and skills articulated in the progression of standards leading up to and including the targeted grade with strong emphasis on the major work of previous grades.	
Secondary Content Domain(s): While tasks developed to assess Claim 4 will have a primary content focus, components of these tasks will likely produce enough evidence for other content domains that a separate listing of these content domains needs to be included where appropriate. The standards in the NBT domain in grades 3–5 can be used to construct higher difficulty items for the adaptive pool. The integration of the OA, G, and MD domains with NBT allows for higher content limits within the grade level than might be allowed when staying within the primary content domain.	
DOK Levels	1, 2, 3, 4
Allowable Response Types	**Response Types:** Multiple Choice, single correct response (MC); Multiple Choice, multiple correct response (MS); Equation/Numeric (EQ); Drag and Drop, Hot Spot, and Graphing (GI); Matching Table (MA); Fill-in Table (TI) No more than five choices in MS and MA items. Short Text – Performance tasks only **Scoring:** Scoring rules and answer choices will focus on a student's ability to use the appropriate reasoning. For some problems, multiple correct responses and/or strategies are possible. • MC and MS will be scored as correct/incorrect (1 point) • If MA items require two skills, they will be scored as: o All correct choices (2 points); at least ½ but less than all correct choices. (1 point) o Justification[1] for more than 1 point **must be** clear in the scoring rules.

[1] For a CAT item to score multiple points; either distinct skills must be demonstrated that earn separate points or distinct levels of understanding of a complex skill must be tied directly to earning one or more points.

	○ Where possible, include a "disqualifier" option that if selected would result in a score of 0 points, whether or not the student answered ½ correctly. • EQ, GI, and TI items will be scored as: ○ Single requirement items will be scored as correct/incorrect. (1 point) ○ Multiple requirement items: All components correct (2 points); at least ½ but less than all correct. (1 point) ○ Justification for more than 1 point **must be** clear in the scoring rules.
Allowable Stimulus Materials	Effort must be made to minimize the reading load in problem situations. Use tables, diagrams with labels, and other strategies to lessen the reading load. Use simple subject-verb-object (SVO) sentences; use contexts that are familiar and relevant to students at the targeted grade level. Target-specific stimuli will be derived from the Claim 1 targets used in the problem situation. All real-world problem contexts will be relevant to the age of the students. Stimulus guidelines specific to task models are given below.
Construct-Relevant Vocabulary	Refer to the Claim 1 specifications to determine Construct-Relevant Vocabulary associated with specific content standards.
Allowable Tools	Any mathematical tools appropriate to the problem situation and the Claim 1 target(s). Some tools are identified in Standard for Mathematical Practice 5 and others can be found in the language of specific standards.
Target-Specific Attributes	CAT Items should take from 3 to 6 minutes to solve. Claim 4 items that are part of a performance task may take 5 to 15 minutes to solve.
Accessibility Guidance	Item writers should consider the following Language and Visual Element/Design guidelines[2] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary

[2] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

	• Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[3]
Development Notes	CAT items/tasks generating evidence for Claim 4 in a given grade will draw upon knowledge and skills articulated in the progression of standards up through that grade, though more complex problem-solving tasks may draw upon knowledge and skills from lower grade levels. Claim 1 *Specifications* that cover the following standards should be used to help inform an item writer's understanding of the difference between how these standards are measured in Claim 1 versus Claim 4. Development notes have been added to many of the Claim 1 specifications that call out specific topics that should be assessed under Claim 4. Distinguishing between Claim 4 and Claims 1 and 2: • In early grades when equations are still new to students, an important distinction between Claim 2 and Claim 4 is requiring a model that would lead to a problem's solution. • In Claim 2 problems are well posed, while in Claim 4 they may have extraneous or missing information. • In Claims 1 and 2, measurements of objects or figures can be accurately determined. In Claim 4, modeling is used to make approximations. • In Claim 1, data analysis is straightforward procedural. In Claim 4, the analysis should be tied to some useful purpose in the real-world. At least 80% of the items written to Claim 4 should primarily assess the standards and clusters listed in the table that follows.

[3] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Grades 3–5, Claim 4

Grade 3	Grade 4	Grade 5
3.OA.A	4.OA.A	5.NBT.B
3.OA.D	4.NF.B	5.NF.A
3.MD.A	4.MD.A*	5.NF.B
3.MD.C	4.MD.B*	5.MD.A*
3.MD.D*	4.MD.C*	5.MD.B*
		5.MD.C
		5.G.A*

* Denotes additional and supporting clusters

REMINDER: Claim 4 tasks may also ask students to apply content from prior grades in sophisticated applications.

Assessment Targets: Any given item/task should provide evidence for two or more Claim 4 assessment targets. Each of the following targets should not lead to a separate task. It is in *using* content from different areas, including work studied in earlier grades, that students demonstrate their problem-solving proficiency. Multiple targets should be listed in order of prominence as related to the item/task.

Target A: Apply mathematics to solve problems arising in everyday life, society, and the workplace. (DOK 2, 3)
Problems used to assess this target for Claim 4 should not be completely formulated (as they are for the same target in Claim 2), and require students to extract relevant information from within the problem and find missing information through research or the use of reasoned estimates.

Target B: Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. (DOK 2, 3, 4)
Items that require the student to make decisions about the solution path needed to solve a problem are aligned with this target. Target B is not intended to be the primary target for an item, but should be a secondary, tertiary, or quaternary target for an item with primary alignment to other targets.

Target C: State logical assumptions being used. (DOK 1, 2)
Tasks used to assess this target ask students to use stated assumptions, definitions, and previously established results in developing their reasoning. In some cases, the task may require students to provide missing information by researching or providing a reasoned estimate.

Target D: Interpret results in the context of a situation. (DOK 2, 3)
Tasks used to assess this target should ask students to link their answer(s) back to the problem's context. (See Claim 2, Target C for further explication.)

Target E: Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. (DOK 3, 4)
Tasks used to assess this target ask students to investigate the efficacy of existing models (e.g., develop a way to analyze the claim that a child's height at age 2 doubled equals his/her adult height) and suggest improvements using their own or provided data.

Other tasks for this target will ask students to develop a model for a particular phenomenon (e.g., analyze the rate of global ice melt over the past several decades and predict what this rate might be in the future).
Longer constructed-response items and extended performance tasks should be used to assess this target.

Target F: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). (DOK 1, 2, 3)
Unlike Claim 2 where this target might appear as a separate target of assessment (see Claim 2, Target D), it will be

embedded in a larger context for items/tasks in Claim 4. The mapping of relationships should be part of the problem posing and solving related to Claim 4 Targets A, B, E, and G.

Target G*: Identify, analyze, and synthesize relevant external resources to pose or solve problems. (DOK 3, 4)
Especially in extended performance tasks, students should have access to external resources to support their work in posing and solving problems (e.g., finding or constructing a set of data or information to answer a particular question or looking up measurements of a structure to increase precision in an estimate for a scale drawing). Constructed-response items should incorporate "hyperlinked" information to provide additional detail (both relevant and extraneous) for solving problems in Claim 4.

*Measured in Performance Tasks only; functionality of linking to external resources is planned for future enhancements.

What sufficient evidence looks like for Claim 4[4]:

"A key feature of items and tasks in Claim 4 is that the student is confronted with a contextualized, or 'real world' situation and must decide which information is relevant and how to represent it. As some of the examples provided below illustrate, 'real world' situations do not necessarily mean questions that a student might really face; it means that mathematical problems are embedded in a practical application context. In this way, items and tasks in Claim 4 differ from those in Claim 2, because while the goal is clear, the problems themselves are not yet fully formulated (well-posed) in mathematical terms.

"Items/tasks in Claim 4 assess student expertise in choosing appropriate content and using it effectively in formulating models of the situations presented and making appropriate inferences from them. Claim 4 items and tasks should sample across the content domains, with many of these involving more than one domain. Items and tasks of this sort require students to apply mathematical concepts at a significantly deeper level of understanding of mathematical content than is expected by Claim 1. Because of the high strategic demand that substantial non-routine tasks present, the technical demand will be lower—normally met by content first taught in earlier grades, consistent with the emphases described under Claim 1. Although most situations faced by students will be embedded in longer performance tasks, within those tasks, some selected-response and short constructed-response items will be appropriate to use.

"Modeling and data analysis in the Common Core State Standards trace a visible arc of growing prominence across the grades, showing low prominence in grades K–5, higher prominence in grades 6–8 (which is when the Statistics and Probability domain first appears), and highest prominence in high school (which is when Modeling appears as a content category with the full modeling cycle). Therefore to align to the Standards, Claim 4 will be more important on the assessment in high school, less important in grades 6–8, and the least important in grades 3–5. Again, to align to the Standards, Claim 4 tasks will be most sophisticated and complete in high school (cf. the modeling cycle in CCSSM pp. 72, 73), less sophisticated/more tied to specific content in middle school, and least sophisticated/most tied to specific content in grades 3–5."

[4] Text excerpted from the Smarter Balanced Mathematics Content Specifications (p. 74-75).

Grade 3 Content Combinations:	**The following standards can be effectively used in various combinations in Grade 3 Claim 4 items:** **Primary emphases for Claim 4 Items at Grade 3: Operations and Algebraic Thinking and Measurement and Data** **Operations and Algebraic Thinking (OA)** **3.OA.A: Represent and solve problems involving multiplication and division.** **3.OA.A.1** Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* **3.OA.A.2** Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* **3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.[1] **3.OA.A.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = ☐ ÷ 3, 6 × 6 = ?.* **3.OA.D: Solve problems involving the four operations, and identify and explain patterns in arithmetic.** **3.OA.D.8** Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.[3] **3.OA.D.9** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.* **Measurement and Data (MD)** **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).[6] 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.[7] **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.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.

Grade 4 Content Combinations:	**The following standards can be effectively used in various combinations in Grade 4 Claim 4 items:** **Primary emphases for Claim 4 Items at Grade 4: Operations and Algebraic Thinking, Number and Operations—Fractions, and Measurement and Data** **Operations and Algebraic Thinking (OA)** **4.OA.A: Use the four operations with whole numbers to solve problems.** **4.OA.A.1** Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. **4.OA.A.2** Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.[1] **4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **Number and Operations—Fractions (NF)** **4.NF.B: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.** **4.NF.B.3** Understand a fraction *a*/*b* with *a* > 1 as a sum of fractions 1/*b*. **a.** Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. **b.** Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.* **c.** Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. **d.** Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. **4.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

	a. Understand a fraction *a*/*b* as a multiple of 1/*b*. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).* **b.** Understand a multiple of *a*/*b* as a multiple of 1/*b*, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* **c.** Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* **Measurement and Data (MD)** **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.* **4.MD.B: Represent and interpret data.** **4.MD.B.4** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

	4.MD.C: Geometric measurement: understand concepts of angle and measure angles. **4.MD.C.5** Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: **a.** An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. **b.** An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. **4.MD.C.6** Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. **4.MD.C.7** Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

Grade 5 Content Combinations:	**The following standards can be effectively used in various combinations in Grade 5 Claim 4 items:** **Primary emphases for Grade 5 Claim 4 Items: Number and Operations—Base Ten, Number and Operations—Fractions, Measurement and Data, and Geometry** **Number and Operations—Base Ten (NBT)** **5.NBT.B: Perform operations with multi-digit whole numbers and with decimals to hundredths.** **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm. **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

	Number and Operations—Fractions (NF) **5.NF.A: Use equivalent fractions as a strategy to add and subtract fractions.** **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **5.NF.A.2** Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.* **5.NF.B: Apply and extend previous understandings of multiplication and division to multiply and divide fractions.** **5.NF.B.3** Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?* **5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. **a.** Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)* **b.** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. **5.NF.B.5** Interpret multiplication as scaling (resizing), by: **a.** Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. **b.** Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a

	fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1. **5.NF.B.6** Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. **5.NF.B.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1] **a.** Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.* **b.** Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* **c.** Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?* **Measurement and Data (MD)** **5.MD.A: Convert like measurement units within a given measurement system.** **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. **5.MD.B: Represent and interpret data.** **5.MD.B.2** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.* **5.MD.C: Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.** **5.MD.C.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

	a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. **b.** A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units. **5.MD.C.4** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. **5.MD.C.5** Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. **a.** Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. **b.** Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems. **c.** Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems. **Geometry (G)** **5.G.A: Graph points on the coordinate plane to solve real-world and mathematical problems.** **5.G.A.1** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). **5.G.A.2** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Range ALDs – Claim 4 Grades 3-5	**Level 1** Students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.
	Level 2 Students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.
	Level 3 Students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.
	Level 4 Students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.

Target 4A: Apply mathematics to solve problems arising in everyday life, society, and the workplace.

General Task Model Expectations for Target 4A

- The student is asked to solve a problem arising in everyday life, society, or the workplace.
- Information needed to solve the problem has a level of complexity that is not present in items within Claim 2 Target A. For example, the student must
    - distinguish between relevant and irrelevant information, or
    - identify information that is not given in the problem and request it, or
    - make a reasonable estimate for one or more quantities and use that estimate to solve the problem.
- The student must select a mathematical model independently and is not directly told what arithmetic operation or geometric structure to use to solve the problem.
- Tasks in this model often have secondary alignments to other Claim 4 targets, in particular Target 4B, constructing autonomous chains of reasoning, Target 4D, requiring the student to interpret results in the context of the problem, and Target 4F, requiring students to identify quantities and map relationships between them.
- The student is often required to draw upon knowledge from different domains, including knowledge from earlier grade-levels.
- Tasks have Depth of Knowledge Level 2 or 3.

Task Model 4A.1

Task Expectations

- The student solves a multi-step problem involving one or more of the four operations.
- The student identifies needed information and chooses which operations to perform. The student may
    - ignore irrelevant information,
    - request missing information, and/or
    - make an estimate for one or more quantities and use that estimate to solve the problem.
- Problems in this model may have a tertiary or quaternary alignment to 4B or 4D.
- Problems in this model may have more than one possible solution.

Example Item 4A.1a (Grade 3)
Primary Target 4A (Content Domain OA), Secondary Target 1D (CCSS 3.OA.D), Tertiary Target 4D, Quaternary Target 4F

Eva has 2 quarters, 4 dimes, and 6 nickels. She wants to buy a different gift for each of her 3 friends.

Click on the gifts in the table to show 3 gifts that Eva could buy.

Gift	Cost
Balloon	60 ¢
Eraser	35 ¢
Gumball	25 ¢
Kazoo	75 ¢
Mood ring	50 ¢
Pencil	35 ¢
Sticker	20 ¢

Rubric: (1 point) The student is able to identify three items whose total cost is less than $1 and 20¢. (e.g., Mood ring, pencil, and sticker).

Response Type: Hot Spot

Commentary: The item aligns to 4F because it requires that students identify the total amount of money that Eva has as a key quantity in solving the problem, and relate it to the prices of different items. Complexity of this item can be decreased by directly giving the total amount of money. If this is done, the alignment to 4F should be removed. The item can be varied by specifying that she wants to give the same gift to each of her friends, turning it into a multiplication problem. Complexity and grade level can be increased by increasing the amount of money she has, the prices of the objects, or the number of friends, so that 3-digit addition or multiplication is required. For larger numbers, other contexts might make more sense.

Example Item 4A.1b (Grade 4)
Primary Target 4A (Content Domain NBT), Secondary Target 1A (CCSS 4.OA.B), Tertiary Target 4B, Quaternary Target 4D

A bag of 5 apples at the grocery store has a mass of 825 grams. The largest apple has a mass of 185 grams.

What is a reasonable estimate for the mass, in grams, of the smallest apple in the bag? Select Yes for each reasonable mass and No for each mass that is **not** reasonable.

	Yes	No
50 grams		
100 grams		
150 grams		
200 grams		

Rubric: (1 point) The student selects numbers that are reasonable estimates for the mass of the smallest apple. The student could select just 150 since an argument can be made that if the apples are fairly similar in size, then 150 is the only reasonable estimate, but if they vary a lot, then 100 would be reasonable as well. 200 would not be possible as that is larger than the largest apple, and 50 is not possible because that would require at least one other apple to be 197 grams. (There are three correct response patterns: {100}, {150}, or {100, 150}).

Response Type: Matching Table

Example Item 4A.1c (Grade 5)
Primary Target 4A (Content Domain MD, NBT), Secondary Target 1E (CCSS 4.MD.A, 4.NBT.B), Tertiary Target 4B, Quaternary Target 4F

How many minutes are in 1 day? [Click here for more information if you need it]

Interaction: If the student clicks for more information, they get the following conversion data[5]:

- There are 60 seconds in 1 minute
- There are 60 minutes in 1 hour
- There are 24 hours in 1 day
- There are 7 days in 1 week
- There are 52 weeks in 1 year

Rubric: (1 point) The student enters the correct number of minutes (1440).

Response Type: Equation/Numeric (label the response box with minutes)

Commentary: This item requires students to recognize which quantities are of interest (minutes, hours, and days) and then identify the relationship between them. Identifying these different quantities and mapping their relationships draws on the skill set identified in Target 4F.

Example Item 4A.1d (Grade 5)
Primary Target 4A (Content Domain NBT), Secondary Target 1E (CCSS 5.NBT.B), Tertiary Target 4B, Quaternary Target 4D

A parking meter accepts nickels, dimes, and quarters. It holds up to 1500 coins. Estimate the value of the coins, in dollars, in the meter when it is full.

Rubric: (1 point) The student enters a reasonable estimate (a multiple of 5 between 75 and 375).

Response Type: Equation/Numeric

[5] The ability to pull up information interactively is not currently available, but part of the plan for enhancements to the item-authoring system in 2017.

Example Item 4A.1e (Grade 5)
Primary Target 4A (Content Domain NF), Secondary Target 1I (CCSS 5.MD.C), Tertiary Target 4F

Gina is making cookies. The last three steps used to make the cookies are shown.

> Step 5: Roll the dough into balls that are $\frac{1}{2}$-inch wide.
>
> Step 6: Place the balls on a baking tray 2 inches apart.
>
> Step 7: Bake for 12 minutes.
>
> **This recipe makes 18-24 cookies**

Gina plans to

- give cookies to 9 people;
- give each person 3 cookies; and
- have no extra cookies remaining.

Which action will help Gina get closest to the exact number of cookies she needs?

A. Place the cookies 3 inches apart.
B. Bake the cookies for only 10 minutes.
C. Roll the cookies slightly larger than $\frac{1}{2}$-inch wide.
D. Roll the cookies slightly smaller than $\frac{1}{2}$-inch wide.

Rubric: (1 point) The student correctly determines which action will help Gina get closest to the exact number of cookies (D).

Response Type: Multiple Choice, single correct response

Example Item 4A.1f (Grade 3)
Primary Target 4A (Content Domain OA), Secondary Target 1D (CCSS 3.OA.D), Tertiary Target 4F, Quaternary Target 1D (CCSS 3.MD.A)

Jenny went to the store to buy 15 bottles of water.

- The bags at the store can each hold 6 kilograms.
- The bottles of water each weigh 2 kilograms.
- Jenny bought 15 bottles of water.

What is the fewest number of bags that Jenny needs to hold all 15 water bottles?

Rubric: (1 point) The student enters the smallest number of bags needed (5).

Response Type: Equation/Numeric

Example Item 4F.1a (Grade 3)
Primary Target 4A (Content Domain MD), Secondary Target 1G (CCSS 3.MD.1), Tertiary Target 4F

The table shows the start and end times for runners in a race.

Racing Times		
Runner	**Start Time**	**End Time**
Mike	12:03 p.m.	12:26 p.m.
Ann	12:10 p.m.	12:17 p.m.
John	12:13 p.m.	12:19 p.m.
Patty	12:16 p.m.	12:25 p.m.

What is the difference, in minutes, between Patty's start time and Mike's start time?

Rubric: (1 point) The student enters the correct difference (13).

Response Type: Equation/Numeric

Target 4B: Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem.

Items that require the student to make decisions about the solution path needed to solve a problem are aligned with Target 4B. Note that Target 4B is never the primary target for an item, but is frequently a Tertiary or Quaternary Target for an item with primary alignment to other targets; see, for example, items in Task Models for 4A, 4C, and 4E.

General Task Model Expectations for Target 4B

- The student is presented with a multi-step problem with little or no scaffolding, or
- The student must make estimates or choose between different reasonable assumptions in order to solve the problem.

Target 4B is assessed in conjunction with Target 4A, 4C, and 4E.

Target 4C: State logical assumptions being used.

Task Model 4C.1

Task Expectations:

- The student is presented with a problem arising in everyday life, society, or the workplace. The student either
  - identifies information or assumptions needed to solve the problem or
  - provides a reasoned estimate of a quantity needed to solve the problem.

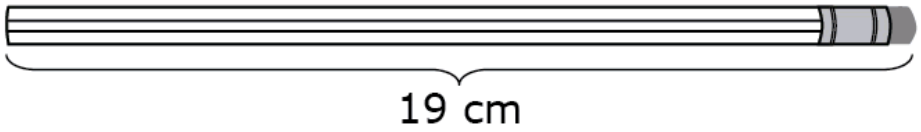
  It is not necessary that a student constructs a complete solution to the problem for this target.
- Tasks in this model generally have either more information than is needed solve the problem (and students must choose) or not enough information (and students must make a reasoned estimate).
- The student is often required to draw upon knowledge from different domains, including knowledge from earlier grade-levels.
- Tasks for this target may also assess Target 4B or 4D.
- Tasks have DOK Level 1 or 2

Example Item 4C.1a (Grade 3)
Primary Target 4C (Content Domain OA), Secondary Target 1D (CCSS 3.OA.D, 2.MD.A), Tertiary Target 4D, Quaternary Target 4E

Part A
Estimate the length of this unsharpened pencil, in centimeters. [ ]

Enter your estimate in the response box.

Part B
The length of the pencil is about 19 cm.



How much longer or shorter is your estimate than the real length? [ ]

Enter your answer in the response box.

Interaction: The student must enter an estimate for the length of the pencil before seeing the actual length and cannot change it once the actual length is shown. The student's estimate does not factor into the score he or she receives.

Rubric: (1 point) The student finds the difference between their estimate, *a*, and the actual length of the pencil (|19-*a*|).

Response Type: Equation/Numeric

Note: Functionality for this item type does not currently exist, but is planned for future enhancements.

Commentary: This item type is new and may be unfamiliar to item writers and is designed to activate a particular practice which is important in mathematical modeling. Students are often required to make an estimate as one of the logical assumptions on which they will base a mathematical model. In grades 3-5, students are learning how to make reasoned estimates by first developing the habit of making their best estimate (without penalty) and then reflecting on the accuracy of their estimate. The difference between items in this task model and Task Model 4E.3 is that the emphasis here is on making and reflecting on the accuracy of the estimate and the emphasis in Task Model 4E.3 is on making and revising the estimate.

Example Item 4C.1b (Grade 5)
Primary Target 4C (Content Domain NF), Secondary Target 1H (CCSS 4.NBT.A), Tertiary Target 4D, Quaternary Target 4E

Part A
A liter is more than a cup. Estimate the number of liters in a cup. You can use the picture to help you make an estimate.

Enter your estimate, in liters, in the response box. [ ]

Part B
There are about 0.24 liters in one cup. How much greater or less than your estimate is the real amount?

Enter the difference in the response box. [ ]

Interaction: The student must select an estimate for the number of liters in a cup before seeing the actual value and cannot change it once the actual value is shown. The students' estimate does not factor into the score he or she receives.

Rubric: (1 point) The student finds the difference between their estimate, *a*, and the actual number of liters ($|19-a|$).

Response Type: Equation/Numeric

Example Item 4C.1c (Grade 4)
Primary Target 4C (Content Domain OA), Secondary Target 1A (CCSS 3.OA.A), Tertiary Target 4B, Quaternary Target 4F

Sarah is helping her dad make cookies for her class using a recipe they found online. Her dad asks, "Do you think one batch of cookies will be enough?" Select **all** of the information they need to answer the question.

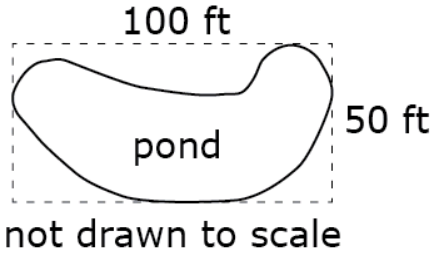
A. The amount of flour in the recipe.
B. The number of cookies in one batch.
C. The number of students in the class.
D. The temperature of the oven for baking the cookies.
E. The number of cookies you can fit onto a cookie sheet.

Rubric: (1 point) The student selects the correct pieces of information (B and C).

Response Type: Multiple Choice, multiple correct response

Example Item 4C.1d (Grade 4)
Primary Target 4C (Content Domain MD), Secondary Target 1I (CCSS 4.MD.3), Tertiary Target 4B, Quaternary Target 4D

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[6]

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

[6] This combination of item types is currently not supported, but is planned for future enhancements to the item-authoring tool.

Target 4D: Interpret results in the context of a situation.

Target 4D identifies a key step in the modeling cycle, and is thus present in the majority of modeling problems that require students to find a numerical answer. Note that in Grades 3-5, Target 4D is never the primary target for an item, but is frequently a Tertiary or Quaternary Target for an item with primary alignment to other targets; see, for example, items in Task Models for 4A, 4C, and 4E. In later grades, students interpret more complex mathematical objects (like equations and graphs) in more sophisticated contexts.

General Task Model Expectations for Target 4D

- The student must solve a problem that results in a numerical answer and interpret the number in the context of the problem.

In Grades 3-5, Target 4D is assessed in conjunction with Target 4A, 4C, and 4E.

Target 4E: Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon.

General Task Model Expectations for Target 4E

- The student is presented with a problem arising in everyday life, society, or the workplace. The student either
    - chooses between competing mathematical models to solve the problem (which may depend on different interpretations of the problem), or
    - evaluates a partial or complete (possibly incorrect) solution to the problem, or
    - constructs a mathematical model to solve the problem

  It is not necessary that a student constructs a complete solution to the problem for this target.
- Tasks in this model can also assess Target 4B (Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem). Thus some tasks should plausibly entail a chain of reasoning to complete the task (not just a single step). For example, it might be necessary for the student to construct a two-step arithmetic expression to evaluate a model or solution, or to try out a geometric shape and then perform a calculation to see if it satisfies the requirements.
- The student is often required to draw upon knowledge from different domains, including knowledge from earlier grade-levels.
- Tasks have DOK Level 2, 3, or 4

Task Model 4E.1

Task Expectations:

- Students construct a geometric figure, a numerical expression, or a numerical equation that models a given problem.
- Students may or may not perform a multi-step numerical calculation to verify that the model solves the problem.
- The operations to be performed should not be explicitly given, but should be inferred from the situation.
- Students are expected to reason autonomously from a context to the figure, expression, or equation.
- Difficulty and grade level maybe be varied by varying the types of numbers used (whole numbers, fractions, decimals), the complexity of the geometric figure (square, rectangle, triangle, polygon), the complexity of the numerical expression or equation (number of steps to build it up), whether or not it is required to perform a numerical calculation to complete the task.

Example Item 4E.1a (Grade 3)
Primary Target 4E (Content Domain OA), Secondary Target 1A (CCSS 3.OA.A), Tertiary Target 4F

Tina has 4 packs of gum. Each pack has the same number of pieces of gum. Altogether there are 60 pieces of gum.

Part A
Make an equation to find the number of pieces of gum in each pack. Use *n* for the number of pieces in each pack.

Part B
How many pieces of gum are in each pack?

Rubric: (2 points) One point for a correct answer to each part. For Part A, the student enters a correct equation (e.g., $n=60\div4$, $4 \times n = 60$, $4 = 60 \div n$). For Part B, the student enters the correct number (15).

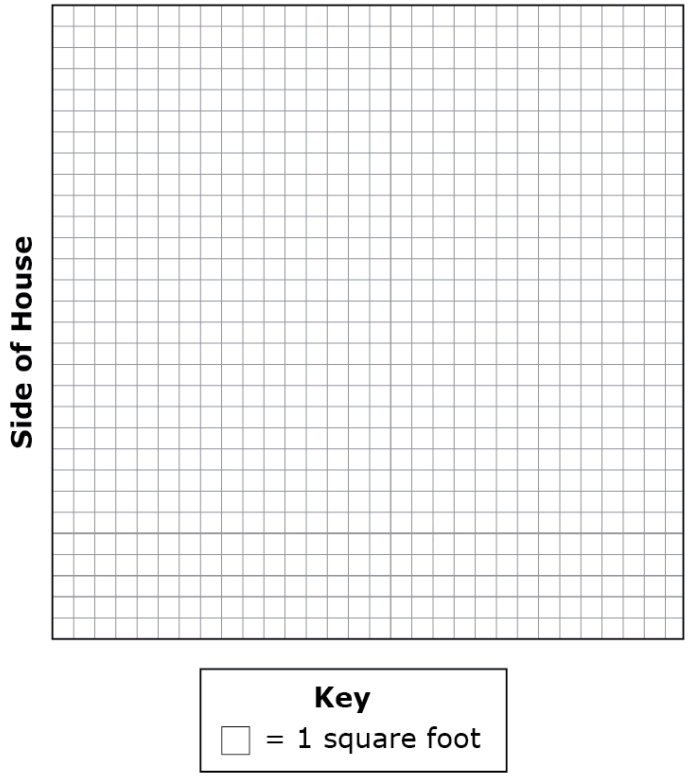
Response Type: Equation/Numeric (2 response boxes; label them *Part A* and *Part B*)

Example Item 4E.1b (Grade 4)
Primary Target 4E (Content Domain MD), Secondary Target 1I (CCSS 4.MD.3), Tertiary Target 4F

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.

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

Example Item 4E.1c (Grade 5)

Primary Target 4E (Content Domain OA), Secondary Target 1A (CCSS 5.NBT.B), Tertiary Target 4F

A school spends $2.40 on every lunch it serves in the cafeteria and $0.30 for each carton of milk.

- 250 people at the school get a lunch each day
- 120 people take a carton of milk

Create an expression using this information that shows how much the school spends altogether on lunches and milk each day.

Rubric: (1 point). Student constructs a correct numerical expression (250 x 2.40 + 120 x 0.30 or its equivalent).

Response Type: Equation/Numeric

An alternate (easier) version of the problem above:

A school spends $2.40 on every lunch it serves in the cafeteria and $0.30 for each carton of milk.

- 250 people at the school get a lunch each day
- 120 people take a carton of milk

Which expression represents the amount of money the school spends altogether on lunches and milk each day?

A. 250 x 2.40 + 120 x 0.30
B. 250 x 0.30 + 120 x 2.40
C. 250 x (2.40 + 0.30)
D. 120 x (2.40 + 0.30)

Rubric: (1 point). Student selects the correct numerical expression (A).

Response Type: Multiple Choice, multiple correct response

Task Model 4E.2

Task Expectations:

- Students choose between two or more different models to solve a given problem, between two or more problems that fit a given model, or between two or more different solutions to a given problem.
- Different models or solutions can depend on different (possibly incorrect) interpretations of the problem, but do not have to.

Example Item 4E.2a (Grade 3)
Primary Target 4E (Content Domain OA), Secondary Target 1D (CCSS 3.OA.D), Tertiary Target 4B

A large water jug holds 24 liters of water. Nan uses it for her animals.

- Nan fills her animals' water dish 2 times each day.
- She puts the same amount of water in the dish every time.
- She uses all of the water in 3 days.

Which equation can be solved to find the number of liters of water (n) she puts in the dish each time?

A. $3 \times 2 + n = 24$
B. $3 + 2 + n = 24$
C. $3 + 2 \times n = 24$
D. $3 \times 2 \times n = 24$

Rubric: (1 point) The student selects the correct equation (D).

Response Type: Multiple Choice, single correct response

Example Item 4E.2b (Grade 3)
Primary Target 4E (Content Domain OA), Secondary Target 1D (CCSS 3.OA.8), Tertiary Target 4B, Quaternary Target 4F

There are 123 girls and 135 boys in the third grade at a school. Today there are 9 third grade students absent.

Which equation can be used to find the total number of third grade students (s) in school today?

A. $123 + 135 = s$
B. $135 - 9 = s$
C. $123 + 135 + 9 = s$
D. $123 + 135 - 9 = s$

Rubric: (1 point) The student selects the correct equation (D).

Response Type: Multiple Choice, single correct response

Example Item 4E.2c (Grade 4)
Primary Target 4E (Content Domain OA), Secondary Target 1A (CCSS 4.OA.1), Tertiary Target 4B, Quaternary Target 4D

Which situation is represented by the equation $4 \times 3 = \square$?

A. A kitten weighs 4 pounds. A puppy weighs 3 times as much as the kitten.
How much does the puppy weigh?

B. A kitten weighs 4 pounds. A puppy weighs 3 pounds more than the kitten.
How much do they weigh altogether?

C. A kitten weighs 4 pounds. A puppy weighs 3 pounds more than the kitten.
How much does the puppy weigh?

D. A kitten weighs 4 pounds. A puppy weighs 3 times as much as the kitten.
How much do they weigh altogether?

Rubric: (1 point) The student correctly identifies the context that represents the multiplication equation as a multiplicative comparison (A).

Response Type: Multiple Choice, single correct response

Example Item 4E.2d (Grade 5)
Primary Target 4E (Content Domain NBT), Secondary Target 1 (CCSS 5.NBT.B), Tertiary Target 4D, Quaternary Target 4F

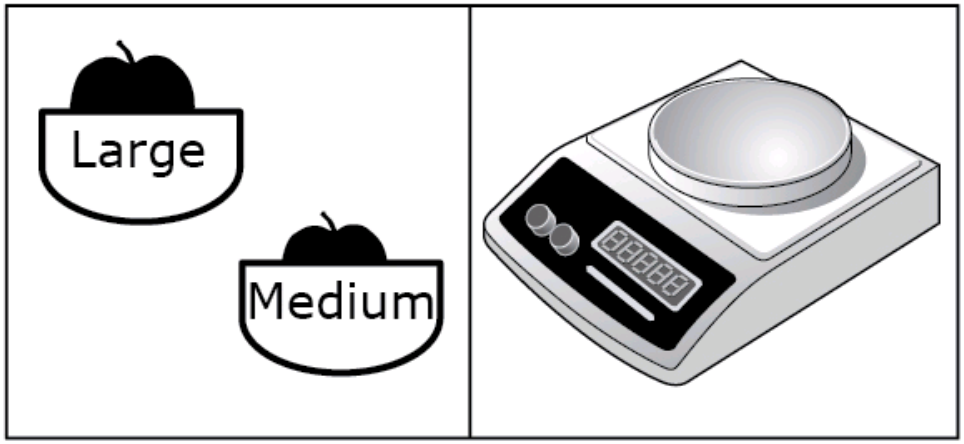
Molly and Sam need about 2 pounds of apples for a pie. Medium apples cost $0.45 each. Large apples cost $0.65 each.

Molly says: "Let's buy the medium apples, they are less expensive."

Sam says: "I think it's less expensive to buy large apples. They are more expensive but we won't have to buy as many of them."

Analyze both approaches. You can use the scale to weigh the apples.

Use the drop down menus to complete each statement.



Statement A:
Molly and Sam would need [1, 2, 3, 4, 5, 6, 7, 8] medium apples or [1, 2, 3, 4, 5, 6, 7, 8] large apples for the pie.

Statement B:
The number of medium apples that would be needed cost [more, less] than the number of large apples that would be needed. So [Molly, Sam] is correct.

Interaction: The student can drag apples one at a time onto the scale from bins labeled "Large" or "Medium" to get the weight in pounds, to the nearest $\frac{1}{8}$ pound. The scale should give weights as mixed numbers, in eighths of a pound. 6 medium apples should weight $2\frac{1}{8}$ pounds, 4 large apples should weigh $2\frac{1}{4}$ pounds. Reducing the number of apples by one should give a weight which is less than 2 pounds and not as not close to 2 pounds (e.g. $1\frac{3}{4}$ for 5 medium apples and $1\frac{5}{8}$ for 3 large apples).

Rubric: (2 points) The student selects the correct numbers and words in all of the drop-down menus (6, 4, more, Sam)

(1 point) Student identifies the correct number of each size of apple needed but does not compare their costs correctly or identify the right reasoning, or the numbers of apples are different but their cost is correctly compared and the correct conclusion is made about who is correct in their reasoning based on the numbers the student chose.

Response Type: Drop-Down Menu[7]

[7] Drop-Down Menu response type is not currently available, but is a planned enhancement to the test-authoring tool by 2017.

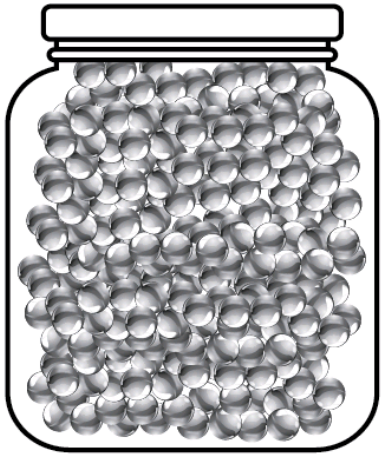
Task Model 4E.3

Task Expectations:

- The student makes estimates to solve a problem and then has a chance to improve the estimates.

Example Item 4E.3a (Grade 5)
Primary Target 4E (Content Domain OA), Secondary Target 1A (CCSS 4.OA.A), Tertiary Target 4B, Quaternary Target 4D

Lilian wants to estimate the number of marbles in a glass jar that has a mass of 2.3 kilograms when it is full.



Part A:
Make an estimate for the mass of a single marble, in grams.
Enter your estimate in the response box. [ ]

Make an estimate for the mass of the jar, in grams.
Enter your estimate in the response box. [ ]

Estimate the number of marbles in the jar based on the assumptions you made.
Enter your estimate in the response box. [ ]

Part B:
The jar has a mass of about 500 grams and there are about 600 marbles in the jar. Which of the following estimates is closest to the actual mass of a single marble?

A. 2 grams
B. 20 grams
C. 200 grams
D. 1200 grams

Interaction: The student enters values for the mass of a single marble and the mass of the jar. The student's choices do not factor into the score he or she receives as long as the estimate for the number of marbles is consistent with those estimates. The student has to make those estimates before moving on to Part B.

Rubric: (2 points) The student estimates the mass of a single marble *m* and the mass of the jar *b*, and makes an estimate of the number of marbles in the jar that is consistent with the initial estimates [e.g., (2300-*b*)/*m* +/-50, rounded to a whole number] and then selects the best estimate from the choices given (A).

(1 point) The student makes an estimate for the number of marbles that is consistent with his/her estimated masses in Part A or selects the best estimate from the choices given in Part B.

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

Note: Functionality for this item type does not currently exist.

Commentary: This item type is new and may be unfamiliar to item writers and is designed to activate a particular practice which is important in mathematical modeling. In grades 3-5, students are learning how to make reasoned estimates by first developing the habit of making their best estimate (without penalty) and then revising their estimate when more information is known. The difference between items in this task model and Task Model 4C.1 is that the emphasis here is on making and revising the estimate and the emphasis in Task Model 4C.1 is on making and reflecting on the accuracy of the estimate.

Target 4F: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).

Target 4F identifies a key step in the modeling cycle, and is thus present in the majority of modeling problems.

Task Model 4F.1

Task Model Expectations

- Students are presented with a mathematical problem in a real-world context where the quantities of interest are not named explicitly, are named but represented in different ways, or the relationship between the quantities is not immediately clear.
- The student is asked to solve a problem that may require the integration of concepts and skills from multiple domains.

Example Item 4F.1a (Grade 3)
Primary Target 4F (Content Domain MD), Secondary Target 1G (CCSS 3.MD.1), Tertiary Target 4A

The table shows the start and end times for runners in a race.

Racing Times		
Runner	**Start Time**	**End Time**
Mike	12:03 p.m.	12:26 p.m.
Ann	12:10 p.m.	12:17 p.m.
John	12:13 p.m.	12:19 p.m.
Patty	12:16 p.m.	12:25 p.m.

What is the difference, in minutes, between Patty's start time and Mike's start time?

Rubric: (1 point) The student enters the correct difference (13).

Response Type: Equation/Numeric (label the response box with minutes)