

<p>Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.</p>	
<p>Content Domain: Numbers and Operations in Base Ten</p>	
<p>Target E [m]: Use place value understanding and properties of operations to perform multi-digit arithmetic. (DOK 1, 2)</p> <p>Tasks for this target will ask students to add and subtract multi-digit whole numbers; multiply whole numbers (up to and including four digits by one digit or two digits by two digits); and find whole number quotients and remainders (up to four-digit dividends and one-digit divisors). When possible, the focus should be on the strategies students use when solving multiplication and division problems.</p> <p>*Note: Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.</p>	
<p>Standards: 4.NBT.B, 4.NBT.B.4, 4.NBT.B.5, 4.NBT.B.6</p>	<p>4.NBT.B Use place value understanding and properties of operations to perform multi-digit arithmetic.</p> <p>4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.</p> <p>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.</p> <p>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.</p>
<p>Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling:</p> <p>3.OA.A, 3.OA.A.3, 3.OA.A.4, 3.OA.B, 3.OA.B.5, 3.OA.C, 3.OA.C.7, 3.OA.D, 3.OA.D.8, 3.NBT.A, 3.NBT.A.2, 3.NBT.A.3</p> <p>5.NBT.B, 5.NBT.B.5, 5.NBT.B.6</p>	<p>Related Grade 3 Standards</p> <p>3.OA.A Represent and solve problems involving multiplication and division.</p> <p>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.</p> <p>3.OA.A.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = \square \div 3$, $6 \times 6 = ?$.</i></p> <p>3.OA.B Understand properties of multiplication and the relationship between multiplication and division.</p>

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

3.OA.C Multiply and divide within 100.

3.OA.C.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

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

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.

Related Grade 5 Standards

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.
DOK Levels:	1, 2
Achievement Level Descriptors:	
RANGE Achievement Level Descriptor (Range ALD) Target E: Use place value understanding and properties of operations to perform multi-digit arithmetic.	Level 1 Students should be able to add and subtract one- and two-digit whole numbers using strategies based on place value; multiply two one-digit whole numbers based on place value and properties of operations; and find whole-number quotients with no remainders with up to two-digit dividends and one-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.
	Level 2 Students should be able to use place value understanding to add and subtract two- and three-digit whole numbers using a standard algorithm; multiply whole numbers up to and including four digits by one digit based on place value and properties of operations; find whole-number quotients and remainders with up to two-digit dividends and one-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division; and illustrate multiplication and division by using equations, arrays, and/or area models.
	Level 3 Students should be able to fluently add and subtract multi-digit whole numbers using the standard algorithm; multiply whole numbers including two digits by two digits based on place value and properties of operations; find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors using strategies based on place value understanding, the properties of operations, and/or the relationship between multiplication and division; and explain multiplication and division using equations, arrays, and/or area models.
	Level 4 No Descriptor
Evidence Required:	<ol style="list-style-type: none"> 1. The student adds or subtracts multi-digit whole numbers in non-contextual mathematics problems. 2. The student multiplies whole numbers (up to four digits by one digit or two digits by two digits) using strategies based on place value and the properties of operations. 3. The student finds whole numbers quotients and remainders (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.
Allowable Response Types:	Multiple Choice, single correct response; Equation/Numeric
Allowable Stimulus Materials:	Non-contextual problems in the four operations, equations, expressions, problems solved or partially solved reflecting different solution strategies
Construct-Relevant Vocabulary:	sum, difference, product, expression, equation, equal, partial product, quotient, partial quotient, remainder, multiple

Allowable Tools:	None
Target-Specific Attributes:	None
Non-Targeted Constructs:	None
Accessibility Guidance:	<p>Item writers should consider the following Language and Visual Element/Design guidelines¹ when developing items.</p> <p>Language Key Considerations:</p> <ul style="list-style-type: none"> • 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 <p>Visual Elements/Design Key Considerations:</p> <ul style="list-style-type: none"> • 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 <p>Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models.</p> <p>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</p>
Development Notes:	Illustrating and explaining multiplication calculations (CCSS 4.NBT.B.5) and division calculations (CCSS 4.NBT.B.6) by using equations, rectangular arrays, and/or area models 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

<p>Task Model 1</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 1</p> <p>4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.</p> <p>Evidence Required: 1. The student adds or subtracts whole numbers in non-contextual mathematics problems.</p> <p>Tools: None</p> <p>Version 3 Update: Added example stem 2 to TM1a.</p>	<p>Prompt Features: The student is prompted to add two or more multi-digit whole numbers, or to subtract two multi-digit whole numbers.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> • Follow any stated guidelines on allowable number ranges. • At least one number in each item should be at least four digits. • Present numbers horizontally ($4325+654=?$), vertically, or with words (what is the difference between 4003 and 1486?). • Item difficulty can be adjusted via these example methods: <ul style="list-style-type: none"> ○ The number of times composing or decomposing is required while solving the problem ○ The absence/presence of zeros ○ More than 2 addends ○ Selecting numbers that are easier or harder to add/subtract (e.g., doubles + 1 are typically easier), numbers closer to 10 or 100 <p>TM1a</p> <p>Stimulus: The student is presented with a non-contextual addition problem with two or more whole numbers.</p> <p>Example Stem 1: Enter the sum.</p> $\begin{array}{r} 4325 \\ + 654 \\ \hline \end{array}$ <p>Example Stem 2: Add together 33, 149, and 67. Enter the sum in the response box.</p> <p>Rubric: (1 point) The student enters the correct number (e.g., 4,979; 249).</p> <p>Response Type: Equation/Numeric</p>
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<p>Task Model 1</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 1</p> <p>4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.</p> <p>Evidence Required: 1. The student adds or subtracts whole numbers in non-contextual mathematics problems.</p> <p>Tools: None</p>	<p>TM1b Stimulus: The student is presented with a non-contextual subtraction problem.</p> <p>Example Stem 1: Enter the difference.</p> $\begin{array}{r} 7529 \\ - 382 \\ \hline \end{array}$ <p>Example Stem 2: Enter the difference.</p> $\begin{array}{r} 4003 \\ - 1486 \\ \hline \end{array}$ <p>Rubric: (1 point) The student enters the correct number (e.g., 7,147; 2,517).</p> <p>Response Type: Equation/Numeric</p>
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<p>Task Model 2a</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 1</p> <p>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.</p> <p>Evidence Required: 2. The student multiplies whole numbers (up to four digits by one digit or two digits by two digits) using strategies based on place value and the properties of operations.</p> <p>Tools: None</p> <p>Version 3 Update: Added example stem 2 to TM2a.</p>	<p>Prompt Features: The student is prompted to multiply two whole numbers.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> • Follow any stated guidelines on allowable number ranges. • Item difficulty can be adjusted via these example methods: <ul style="list-style-type: none"> ○ One factor is a multiple of 10, 100, or 1000 ○ One or more partial products result from multiplying 5 by an even digit (e.g., multiplying 5 by 4 gives 20, but 5 by 40 gives 200 – the extra 0 seems to violate the pattern of “when you multiply ones by tens, just add a zero on the end”) ○ Factors contain digits that are easier to multiply (e.g., multiplying by 2 or 5 is typically easier than multiplying by 6, 7, or 8). ○ Solving the problem requires composing/ decomposing ○ Presenting numbers horizontally vs. vertically; larger number first vs. smaller number first <p>TM2a Stimulus: The student is presented with a non-contextual multiplication problem.</p> <p>Example Stem 1: Enter the product.</p> $\begin{array}{r} 5327 \\ \times \quad 4 \\ \hline \end{array}$ <p>Example Stem 2: Multiply 48 and 20. Enter the product in the response box.</p> <p>Rubric: (1 point) The student multiplies two whole numbers and enters the correct product (e.g., 21,308; 960).</p> <p>Response Type: Equation/Numeric</p>
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<p>Task Model 2b</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>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.</p> <p>Evidence Required: 2. The student multiplies whole numbers (up to four digits by one digit or two digits by two digits) using strategies based on place value and the properties of operations.</p> <p>Tools: None</p> <p>Version 3 Update: Revised Example Stem 2 in TM2b to include an area model.</p>	<p>Prompt Features: The student is prompted to complete a multiplication strategy.</p> <p>Stimulus Guidelines: Same as for TM2a.</p> <p>TM2b Stimulus: The student is presented with a multiplication expression in which properties of operations have been used as strategies for multiplication, with one unknown number.</p> <p>Example Stem 1: Enter the unknown number that makes the equation true.</p> $26 \times 74 = (20 + 6) \times (\square + 4)$ <p>Rubric: (1 point) The student enters the unknown number that makes the equation true (e.g., 70).</p> <p>Response Type: Equation/Numeric</p> <p>Example Stem 2: In the area model shown, $A = 2700$ and $D = 7$. What are the values of B and C?</p> <table border="1" data-bbox="565 1066 1312 1360" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">90</td> <td style="text-align: center;">+7</td> </tr> <tr> <td style="text-align: center;">30</td> <td style="text-align: center;">A</td> <td style="text-align: center;">B</td> </tr> <tr> <td style="text-align: center;">+5</td> <td style="text-align: center;">C</td> <td style="text-align: center;">D</td> </tr> </table> <p>Rubric: (1 point) The student enters correct numbers for B and C (e.g., $B = 210$, $C = 450$).</p> <p>Response Type: Equation/Numeric (2 response boxes, labeled $B =$ and $C =$, respectively).</p>		90	+7	30	A	B	+5	C	D
	90	+7								
30	A	B								
+5	C	D								

<p>Task Model 2c-d</p> <p>Response Type: Multiple Choice, single correct response</p> <p>DOK Level 2</p> <p>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.</p> <p>Evidence Required: 2. The student multiplies whole numbers (up to four digits by one digit or two digits by two digits) using strategies based on place value and the properties of operations.</p> <p>Tools: None</p>	<p>Prompt Features: The student is prompted to select a multiplication strategy.</p> <p>Stimulus Guidelines: Same as for TM2a.</p> <p>TM2c Stimulus: The student is presented with a multiplication expression in the stem and expressions reflecting use of the distributive property or decomposition of factors in the answer choices.</p> <p>Example Stem: Which expression is equal to 36×94?</p> <p>A. $(30 \times 90) + (6 \times 4)$ B. $(30 + 6) \times (90 + 4)$ C. $(30 + 6) \times 94 + (30 + 6) \times 4$ D. $(30 \times 90) + (30 \times 6) + (90 \times 6) + (90 \times 4)$</p> <p>Rubric: (1 point) The student selects a correct expression (e.g., B).</p> <p>Response Type: Multiple Choice, single correct response</p> <p>TM2d Stimulus: The student is presented with a multiplication problem and four vertically recorded partial solutions.</p> <p>Example Stem: Which strategy for multiplying 94 and 36 should result in the correct product?</p> <p>A. $\begin{array}{r} 94 \\ \times 36 \\ \hline 24 \\ 540 \\ 120 \\ + 270 \\ \hline \end{array}$ B. $\begin{array}{r} 94 \\ \times 36 \\ \hline 24 \\ 54 \\ 120 \\ + 2700 \\ \hline \end{array}$ C. $\begin{array}{r} 94 \\ \times 36 \\ \hline 2700 \\ 540 \\ 120 \\ + 240 \\ \hline \end{array}$ D. $\begin{array}{r} 94 \\ \times 36 \\ \hline 2700 \\ 540 \\ 120 \\ + 24 \\ \hline \end{array}$</p> <p>Rubric: (1 point) The student selects a correct strategy (e.g., D).</p> <p>Response Type: Multiple Choice, single correct response</p>
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<p>Task Model 3a</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 1</p> <p>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.</p> <p>Evidence Required: 3. The student finds whole number quotients and remainders (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.</p> <p>Tools: None</p> <p>Version 3 Update: Revised TM3a to focus on the relationship between multiplication and division with, or without, a remainder.</p>	<p>Prompt Features: The student is prompted to divide two whole numbers or determine the remainder when given two factors of a quotient plus an unknown number.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> • Follow any stated guidelines on allowable number ranges. • Item difficulty can be adjusted via these example methods: <ul style="list-style-type: none"> ○ Using an easier divisor (e.g., dividing by 2 or 5 is typically easier than dividing by 6, 7, or 8) ○ Dividends that do or do not contain 0s (e.g., dividing 527 by 4 will be easier than dividing 507 by 4) ○ Divisors that are greater than, less than, or equal to the first digit of the dividend (e.g., dividing 839 by 7 will be easier than dividing 639 by 7) ○ Partial remainders of 0 (e.g., dividing 83 by 3 will be easier than dividing 83 by 4) ○ Partial dividends that are greater than the divisor (e.g., dividing 632 by 5 will be easier than dividing 632 by 6) ○ Problems that are “math facts” (e.g., dividing 64 by 8 will be easier than dividing 68 by 8) <p>TM3a Stimulus: The student is presented with an equation that illustrates the relationship between multiplication and division with, or without, a remainder. (Note: In the case of a remainder as the unknown, be sure the number is less than the single digit factor.)</p> <p>Example Stem 1: Enter the unknown number that makes the equation true.</p> $2571 \div 3 = \square$ <p>Example Stem 2: Enter the unknown number that makes the equation true.</p> $120 \times 5 + \square = 603$ <p>Rubric: (1 point) The student enters the correct unknown number (857; 3).</p> <p>Response Type: Equation/Numeric</p>
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<p>Task Model 3b</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>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.</p> <p>Evidence Required: 3. The student finds whole number quotients and remainders (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.</p> <p>Tools: None</p>	<p>Prompt Features: The student is prompted to complete the decomposition of a dividend as a strategy to divide.</p> <p>Stimulus Guidelines: Same as for TM3a.</p> <p>TM3b Stimulus: The student is presented with a non-contextual division problem with a box to represent an unknown number.</p> <p>Example Stem: Enter the unknown number to make the equation true.</p> $98 \div 5 = (\square \div 5) + (8 \div 5)$ <p>Rubric: (1 point) The student enters the correct number (e.g., 90).</p> <p>Response Type: Equation/Numeric</p>
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<p>Task Model 3c</p> <p>Response Type: Multiple Choice, single correct response</p> <p>DOK Level 1</p> <p>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.</p> <p>Evidence Required: 3. The student finds whole number quotients and remainders (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.</p> <p>Tools: None</p>	<p>Prompt Features: The student is prompted to select a multiplication equation that is the inverse of a given division equation.</p> <p>Stimulus Guidelines: Same as for TM3a.</p> <p>TM3c Stimulus: The student is presented with a division equation with a box representing an unknown number.</p> <p>Example Stem: Select the equation that has the same unknown number as $90 \div 5 = \square$.</p> <p>A. $5 \times 90 = \square$ B. $90 \times \square = 5$ C. $5 \times \square = 90$ D. $\square \times 90 = 5$</p> <p>Rubric: (1 point) The student selects the related multiplication equation (e.g., C).</p> <p>Response Type: Multiple Choice, single correct response</p>
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<p>Task Model 3d</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 1</p> <p>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.</p> <p>Evidence Required: 3. The student finds whole number quotients and remainders (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.</p> <p>Tools: None</p> <p>Version 3 Update: Added new TM3d.</p>	<p>Prompt Features: The student is prompted to determine the whole number quotient and remainder when given a contextual problem to solve.</p> <p>Stimulus Guidelines: Same as for TM3a.</p> <p>TM3d Stimulus: The student is presented with a contextual division problem where the student must identify the whole number quotient and remainder.</p> <p>Example Stem: A teacher has 1247 craft sticks. She divides them equally among 9 students.</p> <p>How many craft sticks does each student get? Enter your answer in the first response box.</p> <p>How many craft sticks are left over? Enter your answer in the second response box.</p> <p>Rubric: (1 point) The student enters the correct numbers in each response box (e.g., 138, 5).</p> <p>Response Type: Equation/Numeric, two response boxes</p>
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