

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 D: Solve problems involving the four operations, and identify and explain patterns in arithmetic. (DOK 2)	
<p>These tasks will primarily consist of contextual word problems requiring more than a single operation or step. Most of these will be straightforward two-step contextual word problems coding straightforwardly to 3.OA.D.8. These problems serve an important purpose in showing that students have solidified addition and subtraction problem solving from previous grades and integrated it correctly alongside their new understandings of multiplication and division.</p> <p>Multiplication and division steps should be within 100. Addition and subtraction steps should often involve numbers larger than 100 with solution within 1000 (cf. 3.NBT.A.2). In some tasks associated with this target, the representation of the problem with equations and/or the judgment of the reasonableness of an answer should be the explicit target for the task (cf. 3.OA.D.8).</p>	
Standards: 3.OA.D, 3.OA.D.8, 3.OA.D.9	<p>3.OA.D Solve problems involving the four operations, and identify and explain patterns in arithmetic.</p> <p>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.</p> <p>3.OA.D.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. <i>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.</i></p>
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 2.OA.A, 2.OA.A.1 4.OA.A, 4.OA.A.3, 4.OA.C 4.OA.C.5	<p>Related Grade 2 Standards</p> <p>2.OA.A Represent and solve problems involving addition and subtraction.</p> <p>2.OA.A.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, and putting together, taking apart, and comparing with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.</p> <p>Related Grade 4 Standards</p> <p>4.OA.A Use the four operations with whole numbers to solve problems.</p> <p>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</p>

	<p>reasonableness of answers using mental computation and estimation strategies including rounding.</p> <p>4.OA.C Generate and analyze patterns.</p> <p>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. <i>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.</i></p>
DOK Levels:	2
Achievement Level Descriptors:	
<p>RANGE Achievement Level Descriptor (Range ALD)</p> <p>Target D: Solve problems involving the four operations and identify and explain patterns in arithmetic.</p>	Level 1 Students should be able to represent and solve one-step problems using addition and subtraction within 100 and multiplication and division within 100.
	Level 2 Students should be able to solve two-step problems using addition and subtraction with numbers larger than 100 and solutions within 1000, assess the reasonableness of an answer, and identify patterns in the addition table.
	Level 3 Students should be able to solve two-step problems using multiplication and division within 100. They should be able to represent the problem using equations with a letter or symbol to represent an unknown quantity. They should also be able to explain patterns in the multiplication table.
	Level 4 Students should be able to use the properties of operations to explain arithmetic patterns (including patterns in the addition and multiplication tables).
Evidence Required:	<ol style="list-style-type: none"> 1. The student identifies arithmetic patterns including input/output models, number lines, addition tables, and multiplication tables. 2. The student solves one-step, real-world contextual problems using addition and subtraction within 1000.
Allowable Response Types:	Equation/Numeric; Multiple Choice, single-correct response; Fill-in Table
Allowable Stimulus Materials:	addition tables, multiplication tables, number lines
Construct-Relevant Vocabulary:	equation, multiply, divide, factor, product, quotient, subtract, add, addend, sum, difference, estimation, estimate, rounding, patterns
Allowable Tools:	None
Target-Specific Attributes:	Numbers used in addition and subtraction can include numbers greater than 100 and solutions less than 1000. Multiplication and division facts used are single digits within 100.
Non-Targeted Constructs:	

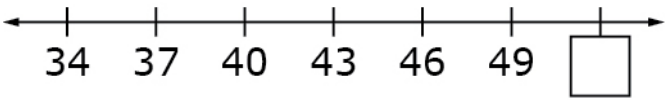
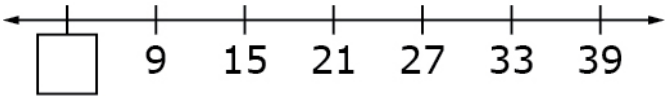
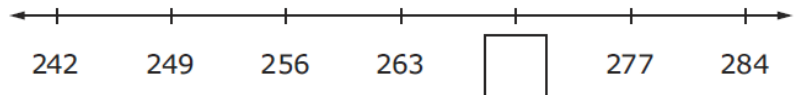
Accessibility Guidance:	<p>Item writers should consider the following Language and Visual Element/Design guidelines¹ when developing items.</p> <p>Language Key Considerations:</p> <ul style="list-style-type: none"> • Use simple, clear, and easy-to-understand language needed to assess the construct or 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:	<p>Anything measuring two-step multiplication or division for 3.OA.D.8 will either be assessed in Claim 2 or Claim 4.</p> <p>Addition and subtraction items for 3.OA.8 will reflect the guidelines of 3.NBT.A.2.</p> <p>Solving and assessing the reasonableness of an answer to a two-step, real-world contextual problem will be assessed in Claim 2.</p> <p>Representing two-step, real-world problems with an equation will be assessed in Claim 4. This is the early grades version of developing a mathematical model of a real phenomenon (Claim 4, Target E).</p> <p>Explaining patterns using properties of operations will be assessed in Claim 3.</p>

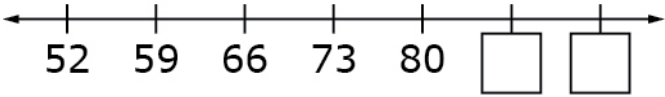
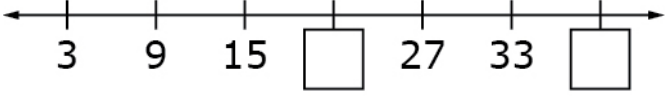
¹ For more information, refer to the General Accessibility Guidelines at:

<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 Models 1a-b</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>3.OA.D.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. <i>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.</i></p> <p>Evidence Required: 1. The student identifies arithmetic patterns including input/output models, number lines, addition tables, and multiplication tables.</p> <p>Tools: None</p> <p>Version 3 update: Added new example stem 2 to TM1b.</p>	<p>Prompt Features: The student is prompted to enter a number that completes a pattern.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> Items should use numbers less than 100 for multiplication or division patterns. Items can use numbers up to 1000 for addition or subtraction patterns. Item difficulty can be adjusted via this example method: <ul style="list-style-type: none"> The pattern chosen and represented, including these possible choices: add 3 or 4; add 6, 7, 8, 9; add two-digit numbers; multiply by 1, 2, or 5; multiply by 3 or 4; and multiply by 6, 7, 8 or 9. <p>TM1a Stimulus: The student is presented with an ascending number line within 100 with the last number unknown.</p> <p>Example Stem: Enter the number that belongs in the box on the number line.</p>  <p>TM1b Stimulus: The student is presented with an ascending number line within 100 with a number in the first position or other position in the middle of the pattern.</p> <p>Example Stem 1: Enter the number that belongs in the box on the number line.</p>  <p>Example Stem 2: Enter the number that belongs in the box on the number line.</p>  <p>Rubric: (1 point) The student enters the correct number for the pattern (e.g., 52; 3; 270).</p> <p>Response Type: Equation/Numeric</p>
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<p>Task Models 1c-d</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>3.OA.D.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. <i>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.</i></p> <p>Evidence Required: 1. The student identifies arithmetic patterns including input/output models, number lines, addition tables, and multiplication tables.</p> <p>Tools: None</p>	<p>TM1c Stimulus: The student is presented with an ascending number line within 100 with the last two numbers unknown.</p> <p>Example Stem: Enter the two numbers that belong in the boxes on the number line.</p>  <p>TM1d Stimulus: The student is presented with an ascending number line within 100 with the last number unknown and one number in the middle unknown.</p> <p>Example Stem: Enter the two numbers that belong in the boxes on the number line.</p>  <p>Rubric: (1 point) The student enters the correct numbers for the pattern (e.g., 87 and 94; 21 and 39).</p> <p>Response Type: Equation/Numeric (2 response boxes)</p>
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Task Models 1e

Response Type:
Equation/Numeric

DOK Level 2

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.*

Evidence Required:

1. The student identifies arithmetic patterns including input/output models, number lines, addition tables, and multiplication tables.

Tools: None

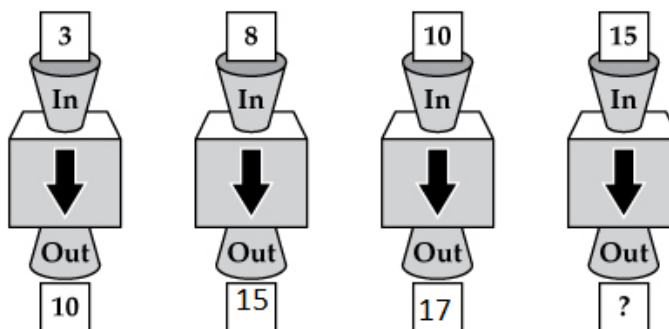
TM1e

Stimulus: The student is presented with a function (input/output) machine with four numbers being inputted.

- The function rule may include addition or multiplication.
- Last number on the function machine is needed.

Example Stem: An input/output machine is shown.

- The same rule is used for each number that is put in the machine.
- Three numbers that came out of the machine are shown.



What number comes out of the machine when 15 is put in?

Rubric: (1 point) The student enters the correct number for the pattern (e.g., 22).

Response Type: Equation/Numeric

Task Models 1i-j
Response Type:
Fill-in Table
DOK Level 2**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.*

Evidence Required:

1. The student identifies arithmetic patterns including input/output models, number lines, addition tables, and multiplication tables.

Tools: None

Version 3 Update:

Retired TMf, TMg, TMh, and TMk. Revised TMi and TMj, as well as the stimulus guidelines, to reflect a 4 by 4 section of a standard multiplication table.

Prompt Features: The student is prompted to enter a number that completes a pattern.

Stimulus Guidelines:

- Items should use numbers less than 100.
- A 4 by 4 section of a standard multiplication table must be used in the stem.
- Item difficulty can be adjusted by choosing different 4 by 4 sections of the table and by asking for one or two missing terms.

TM1i

Stimulus: The student is presented with part of a multiplication table. One cell is blank.

Example Stem 1: Part of a multiplication table is shown.

10		20	25
12	18	24	30
14	21	28	35
16	24	32	40

What number correctly completes the pattern in the table?
Enter your answer in the table.

TM1j

Stimulus: The student is presented with part of a multiplication table. Two cells are blank.

Example Stem 1: Part of a multiplication table is shown.

42		54	60
49	56	63	70
56		72	80
63	72	81	90

What two numbers correctly complete the pattern in the table?
Enter your answers in the table.

Rubric: The student correctly enters the numbers in the table (e.g., 15; 48 and 64).

Response Type: Fill-in Table

<p>Task Models 2a-b</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 1</p> <p>3.OA.D Solve problems involving the four operations, and identify and explain patterns in arithmetic.</p> <p>Evidence Required: 2. The student solves one-step, real-world contextual problems using addition and subtraction within 1000.</p> <p>Tools: None</p> <p>Version 3 Update: Added new "evidence required" statement 2 and TM1a and TM1b</p>	<p>Prompt Features: The student is prompted to solve a one-step, real-world contextual problem using addition and subtraction.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> • All contextual problems can be solved in one step. • Addition problems are restricted to items where the sum is less than or equal to 1000. • Subtraction problems are restricted to items where the minuend and subtrahend are both less than or equal to 1000. • Items may integrate 3.NBT.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). • Item difficulty can be adjusted via these example methods: <ul style="list-style-type: none"> ◦ Using regrouping or not regrouping ◦ Order of presentation of minuend and subtrahend <p>TM1a Stimulus: The student is presented with a one-step, contextual addition problem.</p> <p>Example Stem: There are 392 students in Hall Elementary School and 503 students in Jackson Elementary School.</p> <p>Enter the total number of students in both schools.</p> <p>TM1b Stimulus: The student is presented with a one-step, contextual subtraction problem.</p> <p>Example Stem: There are 425 boys and 510 girls in Franklin Elementary School.</p> <p>How many more girls than boys are in Franklin Elementary School?</p> <p>Enter your answer in the response box.</p> <p>Rubric: (1 point) The student enters the correct number (e.g., 935, 85), or equivalent answer.</p> <p>Response Type: Equation/Numeric</p>
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